AGENDA
CITY OF GLENWOOD SPRINGS
Planning and Zoning Commission
Regular Meeting
JULY 28, 2026
Council Chambers, First Floor
101 W. 8TH STREET
6:00 PM

1 Meeting Instructions

A. This meeting is held in person as well as via Zoom.
Join at: https://us02web.zoom.us/i/86380550264
Or Dial:719-359-4580, 253-215-8782 US (Tacoma) 346-248-7799 US (Houston)
Webinar ID: 863 8055 0264
International numbers available: https://us02web.zoom.us/u/kbEVpOzwHL

2 Roll Call

3 Receipt of the Minutes

A. May 28, 2026 Meeting Minutes

4 Comments from citizens appearing for items not on the agenda

5 Building Board of Appeals

A. APPEAL-000067-2026 506 Maple

6 Old Items

A. CDA-000049-2026 Code Amendment Short Term Rental and Accessory Tourist Rental ***REQUEST FOR CONTINUANCE TO AUGUST 25, 2026***

7 New Items

A. VAR-000056-2026 Variance 1108 Colorado Avenue

B. L&E-000076-2026 Location and Extent Review 3500 Airport Road

8 Commissioner Comments

9 Director Comments

10 Adjournment

MINUTES
City of Glenwood Springs Planning and Zoning Commission
Regular Meeting
June 23, 2026
Council Chambers, First Floor
101 W. 8TH STREET 6:00 PM

1. Roll Call
Present: Chairman Peter Waller, Kyle Jones, Patrick Corcoran, Amy Connerton, John Houghton, Connie Geiman.

Also Present: Economic and Community Development Director Trent Hyatt, Senior Planner Emery Ellingson, Permit Technician Joel Asplund, and City Attorney Karl Hanlon.

Conflicts of Interest
No conflicts of interest were declared.

2. Receipt of the Minutes
a. May 26, 2026 Meeting Minutes

Motion: Councilor Amy Connerton made the motion to approve the meeting minutes for May 26, 2026, and Commissioner Kyle Jones seconded the motion.

Commissioner Comments: None

Outcome: Motion was approved unanimously by digital voting system.

3. Comments from citizens for items not appearing on the agenda
No public comments offered in person or online.

4. New Items
a. APPEAL-000029-2026 319 Park Drive Short Term Rental
Presenter: Applicant **Cindy Svatos** accompanied by her attorney **Sherry Caloia**

Cindy Svatos explained that she applied for and maintained a short-term rental (STR) permit for her property on Park Drive but was denied renewal because she had not rented the unit or paid lodging taxes. She argued that the municipal code did not require an STR to be rented in order to maintain a permit, only that any required taxes be paid which she had filed monthly as zero. Cindy also described significant medical challenges that prevented her from hosting guests during the period in question.

Sherry Caloia clarified the applicant's position that the ordinance does not state any requirement to rent the property, only to pay applicable taxes. She argued that the city's interpretation was incorrect, that Cindy complied with the written ordinance, and that if the

city wishes to require rentals, the ordinance must be amended. She also requested an exception based on Cindy's medical circumstances if the commission found otherwise.

Key points of the presentation:

- Has lived in Glenwood Springs since 1978 at 319 Park Drive for 41 years.
- Described the neighborhood as an older, family-oriented, affordable area with many young families and children playing outside.
- Stated that the seller of the house across the street told her it was being sold as a full-time short-term rental.
- Applied for a short-term rental license immediately after hearing this; did not plan on using it for short-term rental use.
- Completed application requirements, including installing new egress windows, clearing egress window wells, and installing multiple CO and smoke alarms.
- Application was finalized on October 22, 2025.
- Reapplied for renewal by December 21 2025.
- Filed monthly tax forms with a zero amount, as instructed; no one questioned the filings.
- Was notified on February 5 that her renewal was denied because she had not rented the property or paid lodging taxes.
- Learned that other applicants had been told they could rent their property before year-end to avoid denial, but she was not given that information.
- Explained that she has a serious foot injury, has had 15 surgeries since the previous July, and has limited mobility.
- Stated that her condition made it difficult to have guests in the house.
- Read aloud the ordinance language requiring all taxes to be paid to renew and stated it does not say she must rent the property.
- Expressed concerns about the impacts of short-term rentals in her neighborhood, including unknown renters, turnover, traffic, large occupancy, and safety for children.
- Stated that many towns lack affordable housing because of short-term rentals.
- Noted that the commission would be discussing an ordinance change to require rentals in order to renew and stated that the current ordinance does not say that.
- Stated she would be willing to rent the property if required in the future.

Commission Questions & Discussion Included:

- **Commissioner Connie Geiman:** Given the December 9 email in which staff told you that renewal requires having rented the property and remitted some sales tax, do you believe that message served as notice that you were required to rent it out?
    - **Cindy Svatos**: No, I interpreted that differently. I interpreted it as if I have not rented it out there is nothing to pay.
- **Commissioner Connie Geiman**: Now that you know you have to rent out your property in a 2-year period would you rent out your house?
    - **Cindy Svatos**: Yes.

- **Commissioner Amy Connerton**: What is the timeline of your medical issue in relation to this permit?
    - **Cindy Svatos**: Starting last July, I underwent multiple surgeries at CU Health, including removing hardware and rebuilding my heel. I then experienced a serious setback when the wound reopened, which led to many more surgeries and weekly wound-clinic visits. In December, amputation was even discussed. I continued with additional procedures, including a complex one in March that lets me stand without putting weight on my heel. Since last July, I've had 15 surgeries, and I still cannot bear weight.
- **Commissioner Amy Connerton:** You previously said you filed for the permit immediately after speaking with the buyers across the street, but also said you never intended to rent your house. Can you clarify on this?
    - **Cindy Svatos**: When the buyers across the street told me their plans, my husband and I checked the rules, and everything we found said I didn't have to actually rent the house to apply. So, I started to get the application in the system. There was a software glitch, so I went to City Hall, and staff helped me complete it in person. The buyers couldn't apply yet because they hadn't closed, and one of them later confronted me about filing first. I told her this is also my retirement home. I want to be clear that I followed all requirements, paid the fees, and made the upgrades. If anyone had told me I had to rent it out, I would have but no one ever told me that.
- **Chairman Peter Waller**: Aside from the email exchanges referenced earlier, did you have any other conversations with Emery or City Staff where they told you that you needed to rent the property, or was all communication limited to email?
    - **Cindy Svatos:** Almost all of my communication with staff was through email. I received monthly reminders to file my taxes, and I always filed zero, but no one ever asked why or told me I needed to have guests. If someone had asked, I would have addressed it. Between October and December, I was going through a very difficult medical period, and I'm not sure I could have had guests then anyway. I also know of others who filed zero taxes for two years and didn't realize they needed renters, yet they were told later to just rent the property once before the end of the year.
- **Commissioner Connie Geiman**: How did you hear about these individuals? Were these other individuals who filled zero part of a Colorado Open Records Act or CORA request?
    - **Staff Response**: There was a CORA request that was not included in the staff report. The contents of this report are similar emails as the December 9th Email stating the applicant to renew and what they would need to do to renew.
    - **Attorney Sherry Caloia:** In the last couple of years there were only two and they did not contest the renewal.
- **Chairman Peter Waller:** How far back did this CORA request go?

- **Attorney Sherry Caloia:** The CORA was left general only asking for permit renewal denials.
- **Tony Svatos**: I've been helping Cindy throughout this process. When she had trouble with the permit application, I went to City Hall to get a hard copy, but Emery told me they didn't have any. I asked him directly whether there was any rental-frequency requirement, and he told me no. Cindy, Sherry, and I had all reviewed the ordinance and found nothing about needing to rent the property, and even an online search showed the same. Everything we saw indicated we didn't need to rent it, which is why I wanted to speak.

Staff presentation
Presenter: Senior Planner **Emery Ellingson**

Senior Planner Emery Ellingson gave a brief overview of the appeal process. He explained that the only action before the commission is to consider the appeal of the administrative decision related to section 070.030.030(E)(9)(f)(6) and staff's interpretation of that section. He noted that staff is not providing a recommendation and that all relevant information is included in the staff report.

He reviewed the appeal procedure, stating that administrative decisions can be appealed to the Planning and Zoning Commission, and their decisions can be further appealed to City Council. He outlined the commission's options: affirm, reverse, modify, or attach conditions to the decision.

Emery also described the criteria the commission must consider, including the facts presented by the applicant, the requirements and intent of the code standards, evidence of past interpretation and administration, and consistency with the comprehensive plan. He concluded his presentation with no further comments.

Commission Questions & Discussion Included:

- **Commissioner Amy Connerton**: How many short-term rentals are there currently?
  - **Staff response**: There are currently 119 Active rentals
- **Commissioner Amy Connerton**: How many have been denied?
  - **Staff response**: This past year there were three that were denied for renewal.
- **Commissioner Patrick Corcoran:** What is the maximum number of short-term rentals that can be issued?
  - **Staff Response:** The city has two types of rental permits. A short-term rental permit, which allows renting an entire home, is capped at about 213 permits citywide and includes a 250-foot spacing requirement between permits. However, the city may not physically be able to reach that full number due to the buffer between permits. The second type, the accessory tourist rental permit, allows renting one bedroom in an owner-occupied home for up to two guests. This permit has no cap and no distance requirements.
- **Commissioner Patrick Corcoran:** What percentage is that of total housing units?

    - **Staff response:** There are approximately 4,300 housing units and 119 permits. The original cap was set at about 5%. Based on the actual numbers we are closer to 2.5%-3%.
- **Commissioner Connie Geiman:** Regarding the other individuals mentioned in the CORA request has there been any other appeals from them or do they no longer hold permits?
    - **Staff response**: Of the three individuals referenced, none chose to pursue another full short-term rental permit. Two decided not to continue with vacation rentals at all, and the third allowed their permit to lapse and later applied for an accessory tourist rental for a single bedroom.
- **Commissioner Connie Geiman**: Based on the code language if a permit is issued very late in the year, such as December 28, on a renewal year they are still required to rent it. How can the ordinance require renewal when there's almost no time to rent the property before the shared end-of-year deadline?
    - **Staff response**: That is correct if someone applies for a permit late in the year, they still must meet all renewal requirements within the few days remaining because all permits share the same two-year expiration date. Applicants could wait to apply until January 1 to gain more time, but doing so risks someone else applying first within the 250-foot radius and blocking their eligibility. Having a uniform expiration date is intended to keep the system consistent and fair for everyone.
    - **Staff response**: A link to the CORA requests has been forwarded to you. These are available to the public through the city website.
- **Commissioner John Houghton**: What is the renewal process like? Is there a hard deadline?
    - **Staff response**: The renewal period begins on September 1. Current permit holders then have until the end of the year to complete their renewal, which includes submitting the application, paying the fee, passing a building inspection, and providing proof of remitted accommodation taxes. Priority in the renewal process is given to active permit holders.
- **Commissioner Geiman:** Can the permit be transferred with sale?
    - **Staff response:** No, the permit expires with the sale of a building.
- **Commissioner Amy Connerton:** How many times do situations like this occur where applicants are competing for permits in the same area?
    - **Staff response:** That would not be something that we could measure. If a property is within 250 feet of an existing short-term rental permit, the system will not accept an application. There is no waiting list, and applicants in that situation are simply ineligible. If someone attempted to apply while a neighbor already holds a permit, the application would be denied and not processed.
- **Commissioner Patrick Corcoran:** Is that 250' buffer measured from property line or building location?
    - **Staff response:** That is measured 250' from the property line.

- **Commissioner Geiman:** In emails to another applicant, staff explicitly recommended having a guest stay before year-end to remit taxes. Did you give similar guidance to this applicant?
    - **Staff response:** The December 9 email to Cindy conveyed the same intent as the emails sent to other applicants, that she needed to have rented and remitted some amount of sales tax in order to qualify for renewal**.**
- **Chair Peter Waller:** Are these emails the only communication between staff and the applicant?
    - **Staff response:** The renewal process involves extensive communication with permit holders, including many emails and notices that go out during each biannual cycle. While not every message pertains specifically to the rental-frequency standard, the department maintains regular contact with applicants. Staff was also instructed to be especially careful in communicating clearly with Ms. Svatos because an adjacent property owner was also pursuing a permit. Staff was deliberate in informing all parties about the process, requirements, and review standards.
- **Commissioner Amy Connerton:** The code language is mandatory correct?
    - **Staff response:** That is correct the language is mandatory and applicable to all applicants without exception.

Public Comment:

- **James Maguire Co-Owner 322 Park Dr**: Asked the commission to uphold staff's decision to revoke the short-term rental permit at 319 Park Drive and to allow his application for 322 Park Drive to proceed. He stated that the owners of 319 Park Drive never intended to operate a short-term rental, never listed or rented the property, never collected lodging taxes, and obtained the permit solely to block his group's application. He argued that the STR ordinance requires proof of lodging tax collection for renewal and that permits must be used for active, compliant rentals. Maguire said he and his partners purchased 322 Park Drive in good faith after checking eligibility with the city and already operate several compliant STRs in Glenwood Springs. He emphasized that allowing inactive permits undermines the ordinance and can be used against legitimate applicants. He urged the commission to maintain the revocation of the 319 Park Drive permit and allow the 322 Park Drive application to move forward.
- **Jon Lipp Co-Owner 322 park Dr**: Urged the Commission to uphold the City's decision to revoke the short-term rental permit at 319 Park Drive. He stated that the City has an established precedent of cancelling STR permits when no lodging tax is generated and noted three recent examples (400 Pinion St., 1071 Park West, and 1640 Lincolnwood Dr.) where permits were not renewed due to zero rentals and no accommodation tax remitted. He asserted that the permit at 319 Park Drive was never used for rentals, produced no revenue, and functioned only as a placeholder to prevent another application. Mr. Lipp argued that overturning staff's decision

would create an unfair exception and asked the Commission to affirm the revocation so that his application may move forward.

- **Morgan Walker Owner 323 Park Dr:** Spoke in favor to the appeal and noted concerns about ambiguity in Glenwood Springs' short-term rental regulations. She contrasted them with the City of Aspen's clearer requirement that STR properties be rented at least once per year to qualify for renewal. She expressed that Glenwood's less specific language can disadvantage ordinary homeowners and favor applicants with legal resources. Ms. Walker also shared context regarding the timing of the neighboring application, stating that the previous owner informed her and another neighbor shortly before closing that the buyers intended to operate an STR, which prompted the neighbor's application. She noted that she and her husband would have applied as well if their neighbor Cindy had not.
- **Oliver Obermeyer Owner 323 Park Dr:** stated that he does not interpret the current STR ordinance language as requiring a rental to occur in order for a permit to be renewed, noting that the phrasing is ambiguous and could be clarified with more precise sentence structure. He agreed with prior comments that clearer language, similar to Aspen's approach, would prevent confusion. He asked the Commission to consider whether this ambiguity is material to the appeal. Mr. Obermeer also urged the City to apply a consistent remediation period that allows applicants to clarify intent or correct issues before losing a permit, stating he does not believe such an opportunity was provided in this case. Finally, he requested that the City consider flexibility or deadline extensions for applicants facing medical or mobility-related challenges.
- **Carly Stillman Long time resident:** Stated that she operates multiple short-term rentals, in her experience, the City's communication with Short-Term Rental or STR permit holders is clear and that it is the responsibility of permit holders to understand and follow the rules. She questioned why the regulations would be considered unclear to one applicant when they appear to be understood by the broader group of STR operators. Ms. Stillman added that, based on her conversations with the neighboring permit holder, she believes there was no intent to rent the property and that the permit was used only as a placeholder. She noted that no taxes were remitted and that more than a year had passed without compliance.

Appellant Rebuttal:

- **Sherry Caloia Applicants Attorney:** Ms. Caloia acknowledged that a December 9th staff email referenced a requirement to have rented the property, but stated that staff statements are not legally controlling and that the Commission must rely on the ordinance text itself. She argued that the code requires only tax remittance, not proof of rental activity, and that the language does not support denying renewal based on a lack of rentals. She noted that past non-renewals were not appealed and do not establish binding precedent. Regarding concerns about "blocking," she stated that any applicant effectively blocks others by applying and that her client's actions were permitted under the ordinance. She emphasized that the applicant

intends to comply with whatever future requirements exist and requested that the Commission overturn the denial and reinstate the short-term rental permit.

Motion: **Councilor Amy Connerton** made the motion to affirm staff decision to deny renewal for 319 Park Drive Short Term Rental and **Commissioner John Houghton** seconded the motion.

Commissioner Comments:

- **Commissioner John Houghton**: The key issue is whether lodging tax was collected, as required by the code. To me the ordinance reads that a permit holder cannot collect zero lodging tax and still be eligible for renewal.
- **Commissioner Amy Connerton**: I agree with Commissioner Houghton's interpretation of the code, and I believe the intent of the STR regulations aligns with how staff applied them. I also think it's important for us to apply these rules consistently and fairly, especially considering others who have been denied under similar circumstances. In my view, the code was applied correctly in this case. I know this is a difficult situation, and I do hope the neighbors can move forward, given that we are a small community.
- **Commissioner Connie Geiman**: I think the code is vague and doesn't clearly require collecting more than zero dollars in tax. If a property isn't rented, it makes sense that no tax would be collected, and the applicant only had the permit for a short time. The email she received wasn't as direct as others, and I believe she should have had a fair chance to rent within the full permit period.
- **Commissioner Amy Connerton**: I understand the concerns, but to me, you can't collect lodging tax unless you've actually generated it, and zero means no activity. While the code doesn't explicitly say you must rent the property, several emails indicated that renting was necessary to comply. Given that, and the applicant's earlier statement that she didn't intend to rent the home, I question whether it would ever have been rented.
- **Commissioner Connie Geiman:** The applicant said she would rent the home if the permit were renewed. I also feel this situation stems from the City's own unclear process, which created confusion and competition over limited permits. I think the ordinance is vague, and we are now having to fix that. I sympathize with both sides, but objectively, the code language is not clear.
- **Chair Peter Waller:** My statement is actually a question for City staff. When did this code go into effect?
    - **City Staff:** The city buffer was established in 2019.
- **Chair Peter Waller**: is the code that we are reviewing today last reviewed in 2009?
    - Staff response: No, there have been many minor alterations to short term rentals. The last major overhaul was in 2019, to include safety inspections and the 250' buffer.
- **Chair Peter Waller**: Has there been any other confusion on collecting lodging since this iteration of the code?

    - **Staff response**: No this is our first appeal since 2019 on collecting lodging.
- **Commissioner Kyle Jones:** I agree that the language of the code is less than ideal. But would also argue that communication from staff was clear on expectations for renewal with no follow up from the applicant.

Outcome: Motion was approved by a vote of 4-2 with Commissioner Connie Geiman and Chair Peter Waller opposed.

b. CDA-000049-2026 Code Amendment Short Term Rental and Accessory Tourist Rental
Presenter: Senior Planner Emery Ellingson**.**

Senior Planner Emery Ellingson presented a proposed code amendment intended to clarify renewal requirements for short-term rental and accessory tourist rental permits, specifically regarding lodging-tax collection. The amendment was introduced in response to ambiguity highlighted during the recent appeal.

Key points of the presentation included:
- The amendment seeks to clearly state that permit holders must "utilize and collect more than $0 in lodging taxes" to qualify for renewal.
- The proposed language applies to both STR and accessory tourist rental permits and would take effect for the 2026–2027 permit cycle.
- The intent is to eliminate ambiguity in the existing code, which has been in place since 2019.
- Staff recommended approval and noted no public comment had been submitted for this item.

Commission Questions & Discussion Included:
- **Commissioner Patrick Corcoran**: I'm wondering if this leaves the threshold too low. Could someone just rent their place for a single weekend and still meet the requirement?
    - **Staff response**: The code was intentionally written without a minimum rental threshold because STR permit holders use their properties in many different ways some rent full-time, some only a few months, and others just occasionally while on vacation. Setting a high minimum such as 30 nights would make the permit impractical for owners who primarily live in their homes. Other communities take different approaches, with some requiring many rental nights and others imposing limits. These are things that as commissioners you should consider and what best fits Glenwood Springs' goals.
- **Commissioner Amy Connerton**: In the proposed amendment why is the word rent not used and did the buffer come into effect before COVID-19?
    - **Chair response:** In the amended language it states requirements to be greater than $0

    - **Staff response:** That is correct there was no buffer before 2019.
- **Commissioner Patrick Corcoran:** How much tax do we collect on a yearly basis from short-term rentals?
    - **Staff response:** Last year it was about $450,000 in accommodation taxes which is 13% of what the city collects citywide. Hotels and Motels make up around $2.5 Million.
- **Commissioner Patrick Corcoran:** Do Hotels complain about Short Term Rentals?
    - **Staff response:** Generally no, hotels and short-term rentals serve different markets, and while there is some competition, we generally don't receive pushback from hotels. The main concern hotels raise is that short term rentals are taxed as residential properties rather than commercial ones, which is an issue the legislature revisits each year.
- **Commissioner Connie Geiman**: During the appeal we seemed to think the code was clear as written, so why are we clarifying it now? At the same time if we're changing it because we believe it isn't clear, won't that complicate things for the applicant as she moves on to City Council?
    - **Staff response**: After any appeal, we routinely review the code to see if it can be improved. Refining language is a normal part of code maintenance. City Council will not see this amendment until after they hear the appeal, and to the language of the current code so it won't affect their decision on the current case. It should also be noted that code drafting is an ongoing process that is brought to the commission around 10 times a year.
- **Chair Peter Waller**: I'm generally comfortable with the new language, though adding a clearer word like "rent" might help. I also think "more than zero dollars" is straightforward. One idea I'd like us to consider is giving late applicants a short rolling window to rent before they fall under the fixed two-year cycle.
    - **Staff response**: the permit cycle is intentionally tied to a fixed, predictable calendar. Applicants know when renewals open and close, and they can choose when to apply. From an administrative standpoint, keeping a clear annual schedule is simpler and more consistent, especially given the 250-foot buffer and how it affects applicant decisions.
- **Commissioner Amy Connerton**: Do we need to stick with the word utilize?
    - **Staff response**: Staff is happy to change the word of the code amendment to whatever the commission decides.
- **Commissioner Connie Geiman:** Do applicants have to be business owners?
    - **Staff response:** They have to be the property owner of the space being rented.
- **Commissioner Connie Geiman:** I believe there should be a grace period since these are just regular citizens.
    - **Staff response:** This single appeal should not drive policy changes because it involved many months of communication, inspection work, and long gaps in applicant follow-through. The overall process has generally worked well. The Commission should not rewrite code based on an isolated case alone,

consistent issues or repeated variance requests should trigger code revisions. It should also be noted that fixed expiration dates keep the system clear and predictable, whereas rolling deadlines for each permit would create confusion for both staff and the public.

- **Commissioner Kyle Jones:** The code language isn't designed to differentiate between business owner and owner or life circumstances. Applicants have to make those decisions based on their individual circumstances. Having the ability to have variations in the type of rentals we see is a good thing for our community.
- **Commissioner Amy Connerton:** Is there anything in the code that says somebody cannot intentionally block another permit?
    - **Staff response:** All permits block all others from putting in a permit. Under the proposed language, a permit holder would need to rent the property and remit lodging tax at least once during the permit cycle not once every two years. Even a single $1 rental would meet that requirement.

Public Comment:

- **James Maguire Co-Owner 322 Park Dr**: Short-term rental permits are already difficult to obtain in Glenwood Springs due to the 250-foot buffer and HOA restrictions. If you look at the City map with the 250' buffer on you can see that there is nearly no space already. The commission should adopt stricter code amendment does not allow permits to be "weaponized" to block applicants with genuine intentions. Please consider structuring the language in a way that supports the purpose of short-term rentals, legal business operation, promotes tourism, supplies tax to the city and prevents misuse of the permitting system.

Motion: **Commissioner Amy Connerton** made the motion to approve Item b. CDA-000049-2026 Code Amendment Short Term Rental and Accessory Tourist Rental with the stipulation that "Utilize" is changed to "Rent" and **Commissioner Kyle Jones** seconded the motion.

Commissioner Comments:

- **Commissioner John Houghton**: I would propose changing the penalty period for a ban from reapplying from a two-year period to a one-year period.
- **Commissioner Amy Connerton**: I agree with Commissioner Houghton, what are staffs thoughts?
    - **Staff response:** Reducing the penalty period for failing to collect lodging tax would likely have limited practical effect. In most recent cases where applicants did not renew, no other neighbors were seeking permits, meaning those applicants could immediately reapply as a new STR under existing rules. Because of this, shortening the non-renewal period generally does not change outcomes most applicants either reapply right away with a new STR permit or, if another neighbor obtains a permit, become ineligible regardless

of timing due to spacing requirements. While there may be rare situations where a shorter penalty period could benefit someone, these would be uncommon. The current system is already "use it or lose it," the threshold for use is low, and an owner could potentially retain a permit with only a single day of rental activity.

- **Commissioner Connie Geiman**: I think that the way that the code read our appellant was well within her rights. I think the proposed amendment is still too vague. The code should read rent at least one night and collect more than $0 in lodging tax. If the code was worded this way we likely would not have seen an appeal today.
    - **Staff response**: That request is reasonable. Various communities word how that looks differently whether the commission wants it to be one day or some other amount of days is worth looking at.
- **Chair Peter Waller**: The one night in two years and fixed two-year period are worth re-evaluating to me. I think that it is worth a conversation to take some time and define what STR and accessory tourist rental or ATR really are.
    - **Staff response**: It is worth noting that the way the code is written now is not creating a lot of issues. That being said it would be worth it to take some time and define what a STR and ATR are before bringing a recommendation to council.
- **Chair Peter Waller**: Does the 250' buffer apply to the General Improvement District or GID?
    - **Staff response**: The GID is set to 15% of free market units. It used to previously be 18% before that. That percentage puts us at 28 available permits with 28 already existing.
- **Commissioner John Houghton**: Do STR permit applications expire within their two-year cycle?
    - **Staff response:** Applications have a six-month expiration that is not limited to a permit cycle. For example, if a person puts a permit in for a STR in October they block all others from applying and if they complete their permit in November they will have to rent and collect lodging tax. If the same applicant waits and finishes their application in January, they have two years to rent and collect lodging tax.
    - **Staff response:** I think the real question is whether we want to adopt this code language as proposed or re-evaluate the language and requirements first.
- **Chair Peter Waller**: I do not believe that the requirements match the intent of the code. Having a single rental in two years does not match up to me with what can be defined as a rental.
- **Commissioner Amy Connerton**: I agree with our chair that one night doesn't match the intention of what a short-term rental should be. Because of this, I would like to suggest we revisit this subject before making any recommendations for council.
- **Commissioner John Houghton:** I agree that it warrants further discussion.

Motion:
Motion was withdrawn by **Commissioner Amy Connerton**, and second was withdrawn by **Commissioner Kyle Jones**.

Motion to continue planning item b. CDA-000049-2026 Code Amendment Short Term Rental and Accessory Tourist Rental to Jul 28th, 2026, Planning and Zonning Commission Meeting was made by **Commissioner Connie Geiman** and Seconded by **Commissioner Patrick Corcoran**.

Outcome: Continuation was approved unanimously by hand vote.

c. CDA-000050-2026 Code Amendments Electric Vehicle Charging Stations
Presenter: **Senior Planner Emery Ellingson**
Senior Planner Emery Ellingson presented proposed amendments to Article 070 of the Municipal Code to establish clear definitions, land-use standards, and review procedures for electric vehicle (EV) charging stations. The purpose of the amendments is to fill current regulatory gaps, provide clarity for applicants and staff, and support growing EV demand within Glenwood Springs. While based loosely on the State of Colorado's Model Land Use Code for EV infrastructure, the proposed changes adapt those standards to local conditions and existing code structure.

Key points of the presentation included:

- The city currently lacks clear regulations for EV charging stations, and recent applications highlight the need for defined use categories and review procedures
- The State's Model Land Use Code was used as a template, but staff tailored the proposed standards to local needs; adoption of the state model is not required.
- New definitions clarify primary versus accessory charging uses and distinguish Levels 1, 2, and 3 chargers.
- EV charging facilities will use existing land-use review processes
    - Primary charging uses allowed by right in most commercial and industrial zones, with a special use permit required in low-density residential areas, and prohibited in the M2 downtown district.
    - Accessory chargers allowed in all zoning districts when paired with a primary use.
    - • Existing parking, ADA, lighting, and signage requirements will apply; staff does not recommend adopting the model code's double-counting parking provision.
    - • Screening requirements for mechanical/electrical equipment would extend to EV charging infrastructure, consistent with current practices.

Commission Questions & Discussion Included:

- **Commissioner John Houghton**: If you have a parking lot as principal use in the M2 zoning district can you have Electric Vehicle or EV charging as accessory use, and what is the threshold where parking is no longer the primary use?
    - **Staff response**: You make a good point, it can be difficult to determine when a large number of accessory chargers effectively turns a site into a primary charging use, and no clear threshold has been established. Allowing EV chargers as a primary use with a Special Use Permit could add more flexibility in these scenarios and allow the commission an opportunity to evaluate these on a case-by-case basis.
- **Commissioner Amy Connerton:** Can you elaborate more on screening?
    - **Staff response:** Screening requirements apply only to the supporting electrical equipment such as transformers or generators not the charging units themselves. Charging stations must remain visible for users, while associated equipment can be screened with fencing or landscaping where appropriate
    - **Staff response:** It is also worth noting that we work closely with our utility department on these types of permits. With some of these charging stations, estimated to draw as much as 50% of what is generally used by the entire city when used at a full capacity.
- **Commissioner Connie Geiman**: Are these uses only limited to private property, and how would parking in these spaces be enforced?
    - **Staff response**: No, if the city wanted to put in charging stations these uses in zoning district would still apply. As for enforcement these spots are treated in a similar way as handicap parking in limitations and fees; if a vehicle is not actively charging, it can be ticketed.
- **Chair Peter Waller**: How do drivers find and distinguish between primary and accessory chargers on charging maps?
    - Staff response: modern EVs and charging apps categorize chargers by level, distance, availability, and whether they are in use, allowing drivers to select the type they need.
- **Chair Peter Waller**: Would lighting or digital displays on chargers be regulated, especially if they include bright screens or advertisements?
    - **Staff response**: Sign and lighting codes would apply. While the state's model code discourages regulating "out-of-the-box" equipment, the city will still regulate anything that functions as signage or excessive lighting. Large video boards or promotional screens would be subject to these rules as well.

Public Comment: None

Motion: Commissioner John Houghton made the motion to approve CDA-000050-2026 Code Amendment Electric Vehicle Charging Stations with the amendment to allow EV charging as a primary use with a Special Use Permit in the M2 Zoning district and Commissioner Patrick Corcoran seconded the motion.

Commissioner Comments: None

Outcome: Motion was approved unanimously.

5. Commissioner Comments:

- **Commissioner Kyle Jones:** Is there any interest in discussing the use of E-Bikes?
    - **Staff response:** It would likely be reviewed by council and not this commission since it doesn't touch the scope of the development code.
- **Commissioner John Houghton:** I would like to hear from the director during his comments how the discussion of parking minimums went during the last work session, and if any projects will be starting soon?
- **Commissioner Connie Geiman:** Can we require or improve education for short-term rental guests about properly using bear-proof trash cans and local trash rules? I keep seeing STR visitors putting trash out early or not locking bear cans correctly because they don't know our local requirements.
    - **Staff Response:** This is a recurring issue, especially during peak wildlife season. The most effective approach is letting us know the specific address when it happens. We then contact the property owner who is responsible for their guests and warn them that continued violations will result in fines issued to them, not the renters. Owners typically correct the problem quickly once fines are involved.

6. Director Comments

Community Development Director Trent Hyatt:

- The Mountain Goat has been issued a certificate of occupancy or CO and is not waiting on any actions from the building department for business to start.
- Mi Mexico was issued a temporary certificate of occupancy or TCO and has opened to the public.
- Coloradough gets a weekly list from the building department on what is needed to keep their permit moving forward. We want them to open and are doing what we can inside our control.
- The parking discussion mostly revolved around the GID. Would any commissioners be interested in joining a sub-committee of the transportation commission and the downtown development authority or DDA?
    - Commissioner John Houghton agreed to join
- Canyon Vista no new news which can be discouraging
- Next meeting we will revisit STRs and a variance application

7. Adjournment Meeting adjourned at 8:41PM.

DRAFT

Building Board of Appeals Staff Report

Date	July 28, 2026
Planning File Number	APPEAL-000067-2026
Request	Consideration of an appeal of the Building Official's interpretation of Chapter 903.2.8 of the International Building Code (2021) that a Group R-1 occupancy requires an automatic fire sprinkler system.
Appellant	Susan Wilmot
Owner	Susan Wilmot
Location	506 Maple Street
Zone	Mixed Use Corridor (M1)
Staff	Emery Ellingson, Senior Planner, Community and Economic Development

ACTION ITEM

As per Section 020.020.020(2) of the *Glenwood Springs Municipal Code* (Code) and Section 113.3 of the *International Building Code, 2021 edition* (the "IBC," as adopted by the City per Section 060.020.020 of the Municipal Code), the Planning and Zoning Commission (Commission) shall serve as the Building Board of Appeals (Board). Per Section 020.020.020(c) of the Municipal Code and Section 113.1 of the IBC, the Board shall hear and decide appeals of orders, decisions, or determinations of the Building Official. The following staff report outlines an Appeal of the Building Official's interpretation of Section 903.2.8 of the IBC which requires an automatic fire sprinkler system for Group R-1 occupancies (i.e. hotels, apartment buildings, etc.).

Action 1 – Appeal - Consideration of an appeal of the Building Official's interpretation of Chapter 903.2.8 of the International Building Code (2021) that a Group R-1 occupancy requires an automatic fire sprinkler system.

Staff Recommendation: Not applicable.

BACKGROUND AND TIMELINE

The Building Board of Appeals exists to review any appeal of a determination of the Code

by the City Building Official, including interpretations of the IBC, which has been adopted by the City for the regulation of the construction of buildings.

A key component of the IBC is its occupancy classification system. Occupancy classification is the formal designation of the primary purpose of the building and is based on the nature of the hazards and risks to building occupant associated with intended purpose and structure. The occupancy classification of a building can be changed, and as described below this can happen multiple times during a building's lifespan and it may also trigger additional building improvements.

On the subject property exists a 567 square foot accessory structure, which is the subject of this Appeal, that was originally constructed in 1980 as a private garage. Garages are considered a Group U Utility and Miscellaneous occupancy which includes barns, carports, sheds, and stables, among others. Then, in 1993 a building permit was issued to remove the garage doors and enclose the garage as part of a change of use to convert the structure into a t-shirt print shop. Following completion of that project, the structure's occupancy was changed from Group U to a Group B Business. The Group B Business occupancy includes a wide variety of uses for office, professional, or service type transactions such as a print shop. Please see Attachment A for Building Permit 93-0102.

Several years later, in 1998, a building permit was issued to remodel and add a bathroom to the subject structure as part of a change of use to convert the structure into a spa and massage studio. These uses also fall under the broad Group B Business occupancy category, although the use had changed, the building's occupancy type remained Group B. At some point since 1998, many of the spa improvements were removed and the appellant started to advertise and utilize the structure for nightly rentals. However, despite the change in how the building was being utilized, its occupancy type remained Group B as no official change of occupancy has been approved by the City. Please see Attachment B for Building Permit 98-0136.

The use of the structure for nightly rentals came to the attention of the city following a citizen compliant regarding an unpermitted vacation rental. Upon receipt of the complaint and confirmation that a rental was being operated on property, the City sent a code violation letter dated January 15, 2026, for the operation of a short-term rental STR without the necessary permit. The entire property, including a separate residential structure, is ineligible for a STR permit because it is located within 250 feet of existing permits at 404 and 509 Maple Street.

Furthermore, the structure's Group B occupancy type does not allow for habitation or overnight lodging which are associated with Group R Occupancies. Group R occupancies are further divided into additional subcategories as described in the table below. In order

for there to be any use of the structure for dwelling and/or sleeping, the appellant would have to change the occupancy of the structure.

Occupancy Type	Description	Uses
Residential Group R-1	Buildings which contain sleeping units where the occupants are primarily transient in nature.	• Transient* boarding houses with more than 10 occupants • Transient congregate living facilities with more than 10 occupants • Hotels • Motels
Residential Group R-2	Buildings which contain sleeping units or more than two dwelling units where the occupants are primarily permanent in nature.	• Apartment houses • Non-transient congregate living facilities with more than 16 occupants • Hotels (non-transient) • Live/work units • Motels (non-transient) • Vacation timeshare properties.
Residential Group R-3	Buildings where occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4, or I	• Buildings with less than two dwelling units • Non-transient congregate living facilities with 16 or fewer occupants • Transient Congregate facilities with 10 or few occupants • Transient lodging houses with five or fewer guest rooms and 10 or fewer occupants • Care facilities providing accommodations for five of fewer persons

**The IBC definition of transient is occupancy of a dwelling unit or sleeping unit for not more than 30 days*.

While the approval of an STR Permit is not allowed due to the proximity of two other existing STRs, the M1 zoning of the property would allow for a lodging use. Following receipt of the code violation letter, the appellant submitted a Change of Use/Occupancy Permit application to officially change the use and occupancy of the structure with the intention to conduct nightly rentals. Following review of the application and understanding of the appellant's intentions, staff indicated to the appellant that converting the structure to an R-1 Occupancy would allow for nightly rentals (see Attachment C). The R-1 Occupancy group includes hotels, motels, and other uses where the occupancy contains

sleeping units where the occupants are primarily transient in nature. This occupancy type would allow for nightly stays as a hotel type use.

Per Section 903.2.8 of the IBC, all Group R occupancies are required to install an automatic sprinkler system. It is worth mentioning that the City amended this requirement of the IBC in the Code with Ordinance 07-2025 which removed the fire sprinkler requirement for one and two-family dwelling units (R-3 occupancy types) of less than 2,000 square feet. However, the requirement for fire sprinklers remained for R-1 occupancy types (hotels/motels) as well as R-2 occupancies (apartment buildings).

At an on-site inspection with representatives from the Community Development, Building, and Fire Departments on April 9, 2026, staff reconfirmed that an R-1 occupancy would require an automatic sprinkler system. Staff also identified other required items for a change of occupancy to R-1 which included the installation of a carbon monoxide (CO) detector, installation of an egress window in the bedroom, and the addition of fire caulking in walls and ceiling.

Following the inspection, the appellant researched options for installation of automatic fire sprinklers. On June 4, 2026, the applicant submitted an Appeal application to related to the Building Official's interpretation of Chapter 903.2.8 of International Building Code (2021) that a Group R-1 occupancy requires an automatic fire sprinkler system.

Timeline

The following table outlines various events related to the appeal.

Date	Action
1980	Structure built as a garage (Group U Utility and Miscellaneous Occupancy)
1993	Approval of Building Permit #93-0102 for conversion of the structure into a t-shirt print shop. Structure is converted from a Group U (Utility) to a Group B (Business) occupancy.
1998	Approval of Building Permit #98-0136 for remodel, addition of a bathroom, and conversion of the structure into a spa and massage studio. Structure remains a Group B (Business) occupancy.
1998-2025	Structure is used as a spa and massage studio. At some point, the spa improvements are removed, and appellant starts to use the structure for nightly rentals.
November 2025	City receives complaints about an unpermitted vacation rental in North Glenwood. Staff confirms exact location.
January 22, 2026	Appellant submits a Change of Use application to convert the

	accessory structure previously used as a spa (Group B Occupancy) into a residence (Group R Occupancy)
March 10, 2026	Staff provides appellant with information on the requirements of converting the structure to an R-1 occupancy to allow nightly rentals. Please see Attachment C.
April 9, 2026	Fire Department, Building Department, and Planning Department conduct an on-site inspection which identified items which would need addressing prior to approval of a change of occupancy to an R-1 occupancy.
June 4, 2026	Appellant submits an appeal. Please see Attachment D for narrative.

APPEAL CRITERIA

Section 113 of the IBC outlines the process for appeals of the implementation of the Building Code. Per Section 113.2, an application for Appeal shall be based on a claim that the true intent of the Building Code, or the rules legally adopted thereunder have been incorrectly interpreted, or the provisions of the Building Code do not fully apply or an equivlaent or better form of construction is provposed. Section 113.2 also states that *"The board shall not have the authority to waive requirements of this code or intepret the administration of this Code."* Therefore, the focus of the Board's review should be focused on the Building Official's intepretation of Code that an R-1 Occupancy requires an automatic fire sprinkler system.

PUBLIC NOTICE

The Appeal completed the public notice process per the requirements of Section 070.060.030 which includes:

- Notice published in the *Glenwood Springs Post Independent* on July 14 and July 21.
- Notices were also mailed to all property owners within 300 feet; and
- Sign posted on the subject property at least ten days prior to the hearing

At time of compiling the packet, no public comments had been received.

ACTION ALTERNATIVES

Action 1 – Appeal – Consideration of an appeal of the Building Official's interpretation of Chapter 903.2.8 of International Building Code (2021) that a Group R-1 occupancy requires an automatic fire sprinkler system.

Staff Recommendation
Not applicable as outlined above.

Motion to Affirm Building Official's Decision

I move to affirm the Building Official's interpretation of Chapter 903.2.8 of International Building Code (2021) that a Group R-1 occupancy requires an automatic fire sprinkler system.

Suggested Findings

Findings for any motion should be based on the criteria outlined below

1. The true intent of this code or rules legally adopted thereunder have been correctly interpreted.
2. The provisions of code do apply and an equivalent or better form of construction has not been proposed.

Conditions

Not applicable as Section 113 of IBC does not empower the Board to place additional conditions on the decision.

Motion to Reverse Building Official's Decision

I move to reverse the Building Official's interpretation of Chapter 903.2.8 of International Building Code (2021) that a Group R-1 occupancy requires an automatic fire sprinkler system.

Suggested Findings

Findings for any motion should be based on the criteria outlined below

1. The true intent of this code or rules legally adopted thereunder have been incorrectly interpreted.
2. The provisions of code do not apply or a better form of construction has been proposed.

Motion to Continue

I move to continue consideration of Planning File APPEAL-000067-2026, *to [ENTER SPECIFIC MEETING DATE HERE] to gather additional information necessary for a decision*.

PERMIT NO. 930102
DATE RECEIVED 3/11/93
PLAN REVIEW NO. 930041

City of Glenwood Springs Building Dept.

806 Cooper Avenue
Phone 303/945-2575

BUILDING PERMIT APPLICATION & BUILDING PERMIT

Print legibly in ink or type

Job Address 506 Maple
Subdivision _____ Block _____ Lot _____
Parcel No. 2185-091-16-006
Describe Work and Type of Structure Enclose Garage Door. w/h Wall

Nature of Work [X] Commercial [ ] Residential
[ ] New [ ] Addition [X] Alteration [ ] Repair [ ] Tenant Finish

Owner Ewell Morrison Add. 506 Maple Ph. 945-5702
Contractor Owner Add. _____ Ph. _____
Registered Architect _____ Add. _____ Ph. _____
Professional Engineer _____ Add. _____ Ph. _____

Total Lot Area (Sq. Ft.) _____ UBC Type Structure _____ UBC Group/Division _____ Functional Use _____
Setbacks: Front _____ Rear _____ Right Side _____ Left Side _____
Sq. Footage: 1st Floor _____ 2nd Floor _____ ___ Floor _____ Bsmnt: Finished _____ Unfinished _____
Garage Sq. Footage _____ Building Height _____
Valuation (Labor & Materials) Building $258.00 Electric _____ Mechanical _____
Plumbing _____ Other _____ Total 258.00

This permit is made with the specific understanding that it is subject to suspension or revocation for failure to comply with the terms of the application, or for violation of City Ordinances, or laws of Colorado.

Applicant hereby warrants that he/she is authorized to make this application and agrees that the same shall be binding upon the owner, the applicant, their agents, heirs and assigns. All documents attached hereto are incorporated by reference and made a part hereof. Applicant agrees to notify the Building Department at least 24 hours in advance for inspection of footings, foundation, frame, water service, building sewer, plumbing, gas, masonry, insulation, drywall, fire protection, wood burning appliances, mechanical, etc. and final inspection; such inspection to be approved in writing before proceeding further. All contractors are required to have a current license in Glenwood Springs, prior to beginning their phase of construction.

CRS 12-4-101 et. seq requires most buildings to be designed by an architect licensed by the State of Colorado. The applicant acknowledges that criminal sanctions may be imposed by theState of Colorado for violations of this statute.

The Building Inspector, or his/her agent or representatives, is authorized to inspect the premises.

EXPIRATION: This permit shall expire by limitation and become null and void if the building or work authorized by this permit is not commenced within 180 days from the date of this permit, or if the building or work authorized by this permit is suspended or abandoned at any time after the work is commenced for a permit of 180 days. See Chapter 3 of the Uniform Building Code for extensions.

Ewell Morrison 3/11/93
Signature of owner (if owner builder) Date

Signature of contractor or authorized agent Date

I certify that in the performance of the work for which this permit is issued, I will not be employing any person(s) so as to become subject to this Workmen's Compensation laws of the State of Colorado.

If, after making such certificate, the applicant for the permit shall become subject to the Workmen's Compensation provisions of this code, he/she shall forthwith comply with the provisions of subsection 050.040.010.D or his/her permit shall be deemed revoked.

Ewell Morrison 3/11/93
Signature of owner (if owner builder) Date

Signature of contractor or authorized agent Date

NOTICE: ALL THE ABOVE IS TO BE COMPLETED, AS APPLICABLE, BEFORE APPLICATION IS ACCEPTED BY THE CITY FOR PROCESSING. THIS PERMIT DOES NOT INCLUDE ELECTRIC. ELECTRICAL PERMITS MUST BE OBTAINED SEPARATELY FROM THE STATE ELECTRICAL INSPECTOR.

– THE SPACES BELOW ARE TO BE FILLED OUT BY THE CITY OF GLENWOOD SPRINGS –

Bldg. Sq. Ft.: Finished 500 Unfinished ___ Total 500 Type of Construction V-N
Zone District R1 No. of Floor/Stories 1 Calculated Height N/C ft. No. of Dwelling Units ___ Occupancy R-3
Off Street Parking Spaces: Covered ___ Uncovered 3 Calculated Valuation $1500.00 w/o elect $1300.00

SPECIAL APPROVALS	DATE	APPVD. BY	SPECIAL CONDITIONS & NOTES
Landscaping			
Zoning/Setback			(SEE CONDITIONS ATTACHED.)
Address			
Parking			
Height Calculation			
Soil Report			
Eng. Fdn. Plans			
Street Cut			
Drainage Report			
Energy Calculation			

PERMIT FEES

	VALUATION	FEE		FEE
Building	1300.00	~~15.00~~ 31.00	Water Improvement	
Plumbing			Sewer Improvement	
Mechanical			Water Tap	
Wood Stove			Sewer Tap	N/C
Other			Water Meter	
Plan Review		20.15	Parkland	
			Supplemental	

Estimated Use Tax Bought @ Biggin's
If applicant chooses to pay actual use tax, receipts for ALL materials purchased must be provided.
TOTAL FEES AND USE TAX $ 15.00
PREPAID $ 5.15 RECEIPT NO. Ck # 3199
TOTAL DUE $ ~~15.00~~ 5.15 RECEIPT NO. Rec'd 5-6-93 SKK

When signed below and fee is paid, this application is your building permit subject to attached conditions.

Approval for issuance by:
Shelley K. Kaup 5-6-93
Building Department Date

WHITE COPY: Applicant YELLOW COPY: City Address File PINK COPY: City Recap File

CGS–Form 4-90
Previous editions are obsolete

CONDITION OF PLAN REVIEW NO.: 930041
PERMIT NO.: 930102
Brett Morrison - Giraffiks
506 Maple Avenue
May 4, 1993

1. This permit is for conversion of an existing private garage to a T-shirt print shop. The structure and setbacks are pre-existing and are to remain unchanged. The garage door has been replaced with windows and a pair of doors. The following conditions apply: (Please note that at time of issuance of this permit most of the work has been completed and the building has been occupied, the City assumes no responsibility for work performed prior to issuance of this permit.)

2. The issuance of this permit does not in any way imply that this building is in compliance with the Americans with Disabilities Act (ADA). It is the owners responsibility to assure compliance, if applicable. The City of Glenwood Springs is not authorized, nor required, to enforce the ADA.

FIRE

3. The Department of Emergency Services (DES) inspected the site on 4/30/93. The following requirements must be completed as soon as possible:

   1) A ventilation system must be installed in accordance with Sec. 705 of the UBC and the UMC for buildings where Class II and III-A liquids are used. The systems must be capable of supplying 4 air changes per hour and exhaust ventilation must be taken at or near the floor level.

   2) A listed flammable liquid cabinet is required for storage of the Class II and III-A liquids in accordance with UFC Sec. 79.201.

   3) One 4A40BC fire extinguisher is required. It must be mounted in a location which is easily accessible.

   If you have any questions on these items please contact Jack Jones, DES @ 945-4942.

SITE

4. Please submit a parking plan to the Building Department for approval. Three parking spaces must be provided in accordance with Art. 070.050 of the Glenwood Springs Municipal Code. Design of the areas shall be in accordance with Art. 070.050.100. Construction of the parking areas shall be completed prior to issuance of a Certificate of Occupancy. Please note that parking is not permitted in the alley.

5. It shall be the developer's responsibility to provide for dust control on the site during construction.

6. Notify all utilities for line locations and approval prior to beginning any excavation on site. (Electric, Water/Wastewater, Rocky Mountain Natural Gas, Telephone, etc.)

7. This permit does not include the installation of any sign. Please submit a separate sign permit application for review and approval prior to the installation of any sign.

BUILDING CODE ITEMS

8. Attic access must be provided for all roof areas where there is more than 30" vertical dimension above the ceiling to the rafters. Openings shall be not less than 22" x 30". (Sec. 3205 (a), UBC).

9. Enclosed attics and enclosed rafter spaces formed where ceilings are applied direct to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. The net free ventilating area shall be not less than 1/150 of the area of the space ventilated, except that the area may be 1/300, provided at least 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least three feet above eave or cornice vents, with the balance of the required ventilation provided by eave or cornice vents. The openings shall be covered with corrosion-resistant metal mesh openings of 1/4 in dimension (sec. 3205 (c), UBC)

Usually open to soffit may not require vents

10. Exit doors shall be openable from the inside without the use of a key or any special knowledge or effort. (See Section 3304(c), UBC for exception.)

11. Provide safety glazing in all hazardous locations as defined in Chapter 54 of the UBC. Glass and glazing must also comply with all State and Federal requirements. (i.e., doors, windows, shower and bathtub enclosures, etc.)

PLUMBING ITEM

12. Plumbing and mechanical must comply with the Uniform Plumbing Code (UPC) and the Uniform Mechanical Code (UMC). (Please note: This building is not served by water/wastewater, toilet facilities are provided in the adjacent house.)

13. Coordinate gas meter location with Rocky Mountain Natural Gas Company. Gas meter are not permitted to be installed within 3' of electrical services.

MECHANICAL ITEM

14. Gas furnace or boiler and water heater shall comply with the UPC and the UMC. (i.e., combustion air, installation, clearances, access, venting, gas line sizing, etc.) Plans were not submitted for review.

15. Provide disconnects and receptacles for all mechanical units as required in Sec. 509 of the UMC.

Shelley K. Kaup

Shelley K Kaup
Building Dept.
City of Glenwood Springs

Owner

DATE ISSUED 6/3/98
PERMIT NO. 980136
DATE RECEIVED 5/13/98
PLAN REVIEW NO. 985064

Print legibly in ink or type

City of Glenwood Springs Building Dept.

806 Cooper Avenue
Phone 970/945-2575 • Fax 970/945-2597

BUILDING PERMIT APPLICATION & BUILDING PERMIT

Job Address 506 MAPLE ST Subdivision ORIGINAL TOWNSITE Block 72 Lot 23

Parcel No. 2185-091-16-006 Describe Work and Type of Structure REMODEL INTERIOR AND ADD A BATHROOM TO EXISTING STUDIO/CONVERTED GARAGE

Nature of Work ___ Commercial X Residential ___ New ___ Addition X Alteration ___ Repair ___ Tenant Finish

Owner LARRY HON + SUSAN WILMOT Address 509 HYLAND PARK DR Ph. 945-2340

Contractor SELF Contractor License No: ___ Ph. 945-7920

Registered Architect ___ Address ___ Ph. ___

Professional Engineer ___ Address ___ Ph. ___

Total Lot Area (Sq. Ft.) 5250 UBC Type Structure ___ UBC Group/Division ___ Functional Use RESIDENTIAL/BUSINESS

Setbacks: Front ___ Rear ___ Right Side ___ Left Side ___

Sq. Footage: 1st Floor ___ 2nd Floor ___ 3rd Floor ___ Bsmnt: Finished ___ Unfinished ___

Garage Sq. Footage 488 Building Height 12.5

Valuation (Labor & Materials) Building $13,000 Electric $1,000 Total $14,000

This permit is made with the specific understanding that it is subject to suspension or revocation for failure to comply with the terms of the application, or for violation of City Ordinances, or laws of Colorado.

Applicant hereby warrants that he/she is authorized to make this application and agrees that the same shall be binding upon the owner, the applicant, their agents, heirs and assigns. All documents attached hereto are incorporated by reference and made a part hereof. Applicant agrees to notify the Building Department at least 24 hours in advance for inspection of footing, foundation, frame, water service, building sewer, plumbing, gas, masonry, insulation, drywall, fire protection, wood burning appliances, mechanical, etc. and final inspection; such inspection to be approved in writing before proceeding further. All contractors and subcontractors are required to have a current license in Glenwood Springs, prior to beginning their phase of construction.

CRS 12-4-101 et. seq requires most buildings to be designed by an architect licensed by the State of Colorado. The applicant acknowledges that criminal sanctions may be imposed by the State of Colorado for violations of this statute.

The Building Inspector, or his/her agent or representatives, is authorized to inspect the premises.

Every permit issued by the building official under the provisions of this code shall expire by limitation and become null and void if an inspection has not been performed verifying substantial progress for the building or work authorized by such permit, within 180 days from the date of such permit.

Signature of Owner (if owner builder) 5-12-98 Date ___ Signature of Contractor or Authorized Agent Date

I certify that in the performance of the work for which this permit is issued, I will not be employing any person(s) so as to become subject to the Workmen's Compensation laws of the State of Colorado.

If, after making such certificate, the applicant for the permit shall become subject to the Workmen's Compensation provisions of the Glenwood Springs Municipal Code, he/she shall forthwith comply with the provisions of subsection 050.040.010.D or his/her permit shall be deemed revoked.

Signature of Owner (if owner builder) 5-12-98 Date ___ Signature of Contractor or Authorized Agent Date

NOTICE: ALL THE ABOVE IS TO BE COMPLETED, AS APPLICABLE, BEFORE APPLICATION IS ACCEPTED BY THE CITY FOR PROCESSING. THIS PERMIT DOES NOT INCLUDE ELECTRIC. ELECTRICAL PERMITS MUST BE OBTAINED SEPARATELY FROM THE STATE ELECTRICAL INSPECTOR

— THE SPACES BELOW ARE TO BE FILLED OUT BY THE CITY OF GLENWOOD SPRINGS —

Bldg. Sq. Ft.: Finished 553 Ø Unfinished NA Garage A Total 553 Ø ConstructionType: VN

Zone District C/1 No. of Floor/Stories 1 Calculated Height NC ft. No. of Dwelling Units 0 Occupancy R

Off Street Parking Spaces: Covered 0 Uncovered 3 Req. Calculated Valuation $14,000.00

SPECIAL APPROVALS	DATE	APPVD. BY	SPECIAL CONDITIONS & NOTES
Planning			
Engineering			See PERMIT CONDITIONS
Emergency Services			
Water			
Electric			
Police			

PERMIT FEES

VALUATION	FEE		FEE
Building	199.75	* Water Improvement	$182.33
Plumbing	Included Above	* Sewer Improvement	$109.40
Mechanical		Water Tap	
Electrical	State	Sewer Tap	
Other		Water Meter	
Plan Review	129.84	Parkland	
* Off-Site Transportation Impact Fee Zone:		School	

* 1/2 DUE AT PERMIT
* 1/2 DUE AT C.O.

Estimated Use Tax 182.00

If applicant chooses to pay actual use tax, receipts for ALL materials purchased must be provided within 30 days after payment of the estimated use tax.

TOTAL FEES AND USE TAX $ 511.59

PREPAID $ 129.84 DATE 5/13/98 $ 491.48 DATE 6/4/98

BALANCE DUE $ 182.00 DATE ___

OK TO CLOSE RETURN T.C.O. CHECK 10/7/98 PS

When signed below and fee is paid, this application is your building permit subject to attached conditions.

Approval for issuance by:

Building Department ___ Date 6/3/98

CGS Form 3-97 S Previous editions are obsolete

WHITE COPY: Applicant YELLOW COPY: City Address File PINK COPY: City Recap File

Emery Ellingson

From: Emery Ellingson
Sent: Tuesday, March 10, 2026 2:58 PM
To: 'Splendor Mountain Spa'
Subject: RE: City of Glenwood Springs - Change of Use Permit Application

Hello,

After reviewing all aspects of Code and what how you would like to operate the property, there are basically two options going forward that I have outlined below.

Option #1 Convert the garage to an R-1 (Hotel) occupancy.

The garage was never approved as a residential unit or as a lodging unit. It was only approved to be a studio for the spa use. If you wanted to rent the garage out for nightly stays, you would need to do the following:

- Submit a Change-of-Use application on the City application website. Cost is $94.00
    - Include a site plan showing off-street parking, 1 for the live-work structure (main house) and one parking space for the accommodation.
    - Provide a floor plan which shows the accommodation space
- Pay an applicable system improvement fees for converting the garage into an accommodation. This would result in $1,159.05
- Upgrade the structure to have fire sprinklers in accordance with Section 903.3.1.3 of the International Building Code 2021.
- Obtain a business license for the accommodation use and remit all applicable sales taxes and accommodation taxes through the MUNIREVs website for the accommodation use.

Option #2 Revert garage to spa use and conduct a rental within the primary house

This option would be to revert using the garage as a originally approved and apply for an Accessory Tourist Rental to rent a room in the house as a short term stay. This would require the following:

- Revert garage to the studio space
- Submit an application for an Accessory Tourist Rental Permit on the City application website. This would be limited to one bedroom inside the home with a maximum occupancy of two people. The bedroom would have to pass a building inspection as well. Cost for this application is $368.17 and would be good until 12/31/2027 at which time you would have to renew the Permit.
- Obtain a business license for the accommodation use and remit all applicable sales taxes and accommodation taxes through the MUNIREVs website for the accommodation use.

Option #3 Stop accommodation use

This option does not sound like your preference; however, it would clear the code violation if you completed the following:

- Revert garage to the studio space
- Remove all online listings advertising the cottage space for rental

And to be clear, there is currently a code violation for rental of the cottage. No stays should be occurring until this item is resolved. You will have 30 days from today to start compliance with the options above. If no action is taken by Thursday, April 9, 2026, a second code violation letter will be issued.

Further questions on any of these options, let us know. Can certainly discuss more in person too, just let me know a time. City Hall hours are Monday-Thursday from 7:30 AM to 5:30 PM.

Thanks,

Emery Ellingson
Senior Planner
City of Glenwood Springs
101 W. Eighth Street
Glenwood Springs, CO 81601
970.384.6472 (p) 970.945.8582 (f)
emery.ellingson@cogs.us

CITY OF GLENWOOD SPRINGS COMMUNITY DEVELOPMENT

Accessibility Policy / Política de accesibilidad

City Hall hours are Monday-Thursday from 7:30 AM to 5:30 PM and closed on Fridays. Phone calls and e-mails will be returned during the new business hours.

From: Splendor Mountain Spa <splendor@rof.net>
Sent: Tuesday, January 27, 2026 2:42 PM
To: Emery Ellingson <emery.ellingson@cogs.us>
Subject: Re: City of Glenwood Springs - Change of Use Permit Application

Good afternoon Emery!

Thank you very much for working with me on this. And I apologize again, for the misunderstanding on our part. I have used the main house as my residence and spa business as well as the back building for the spa business since we opened in 1998. My understanding was the property was zoned residential/commercial when I bought it.

We would like to use the back smaller building to offer our clients overnight accommodations. Just the one room.

Please let me know what else we need to do to get into compliance and thank you again very much for working with me.

Susan

Splendor Mountain Spa
506 Maple Street
Glenwood Springs, CO 81601
(970) 945-7454
www.splendormtndayspa.com

On Jan 27, 2026, at 12:40 PM, Emery Ellingson <emery.ellingson@cogs.us> wrote:

Hello,

This e-mail concerns the Change of Use Application for 506 Maple Street. I have a couple follow up questions on the application as follows:

1. Is the main larger building your primary residence? The building is listed as residential with Garfield County Assessor. My current understanding is that the main building is residence with massage business and the back building used to be a massage studio but that is where you want to rent the room.

2. The smaller building in the rear of the property has only 1 guest room correct?

I would need to understand this as part of the review in determining how to move forward with bringing all the uses into compliance with Code.

Question, let us know.

Emery Ellingson
Senior Planner
City of Glenwood Springs
101 W. Eighth Street
Glenwood Springs, CO 81601
970.384.6472 (p) 970.945.8582 (f)
emery.ellingson@cogs.us



Accessibility Policy / Política de accesibilidad

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Splendor Mountain Spa has been a family-owned and operated small business since opening in 1998. For nearly three decades, we have worked hard to create a welcoming and restorative space for both locals and visitors in our community. Our back building previously housed our therapy pool and one of our treatment rooms. When the therapy pool recently failed, we were faced with the difficult decision of how best to repurpose the space in a way that would help keep our business sustainable for the future.

After much consideration, we felt that offering overnight accommodations for spa guests would be a natural and meaningful fit. The building is small, quiet, private, detached from the main business/residence, and ideally suited for short stays. We were excited by the opportunity to create a peaceful retreat experience for our guests while also helping support our small business.

As we began the conversion process, we carefully reviewed and worked toward meeting all city requirements. Unfortunately, the only requirement we are unable to fulfill is the installation of a fire sprinkler system. We genuinely explored every possible option. We hired a plumber to evaluate our water pressure, which was found to be more than sufficient, but the existing pipes are too narrow to support a sprinkler system. Because the building has neither an attic nor a crawl space, a tank system is also not feasible.

The only remaining option would require excavating and installing an entirely new water line from the street at an estimated cost of nearly $60,000. As a very small family business, this expense is simply beyond what we can afford.

When discussing the project with sprinkler contractors, several expressed surprise that sprinklers were required for such a small structure. At only 400 square feet, the building would require just four sprinkler heads. We also reviewed the building code sections cited by the city and noted that the building falls well below the square footage thresholds listed for the occupancy groups referenced. When we asked for clarification, we were informed that because the space would be used for overnight accommodations, it must instead comply with hotel requirements.

We fully understand and respect the importance of fire safety, and we would never want to create a situation that places guests at risk. At the same time, we humbly ask for consideration of the unique circumstances surrounding this building. The space includes two exits located on opposite sides of the building, only about 20 feet apart, allowing for quick and easy evacuation. Multiple fire extinguishers are also installed throughout the building and are accessible from nearly every area within the space.

We were also presented with the option of converting the building into an ADU, which would not require fire sprinklers. However, this would require us to install a permanent

cooking appliance, which arguably increases fire risk, despite our willingness to comply. After completing that process, we could then apply for a variance to use the ADU for short-term accommodations.

Our back building is truly ideal for short overnight stays, but far less practical for long-term housing due to its very small size and lack of storage space. As longtime locals, we deeply understand the housing challenges facing the valley and do not feel this space would serve well as permanent housing. However, we believe it could offer a wonderful, safe, and unique experience for guests staying one or two nights while helping preserve our small local business that has been part of this community for many years.

We sincerely appreciate your time, consideration, and willingness to review our appeal.

Column

OFFICIAL AD PROOF

This is the proof of your ad scheduled to run in **Glenwood Springs Post Independent** on the dates indicated below. If changes are needed, please contact us prior to deadline at **(970) 945-8515**.

Notice ID: 6ljjtl7HJoaKuxwWWvDC | **Proof Updated: Jun. 29, 2026 at 09:51am MDT**
Notice Name: APPEAL-000067-2026 Public Notice | Publisher ID: 408045

This is not an invoice. Below is an estimated price, and it is subject to change. You will receive an invoice with the final price upon invoice creation by the publisher.

FILER	FILING FOR
Emery Ellingson	Glenwood Springs Post
emery.ellingson@cogs.us	Independent
(970) 384-6472	

Columns Wide: 1 **Ad Class:** Legals

Total Column Inches: 2.91

Number of Lines: 35

07/14/2026: Other Notice	17.71
07/21/2026: Other Notice	12.88
Affidavit Fee	10.00
Subtotal	$40.59
Tax	$0.00
Processing Fee	$4.06
Total	**$44.65**

TAKE NOTICE that Susan Wilmot has applied to the City of Glenwood Springs to allow:

Consideration by the Planning and Zoning Commission, acting as the Building Board of Appeals, to consider an appeal of application of Chapter 903.2.8 of the International Building Code 2021 to require an automatic fire sprinkler system for a Group R-1 occupancy on a property in the M1 Mixed Use Zoning District, addressed as 506 Maple Street, legally described as Section 9 Township 6 Range 89 Original Townsite Glenwood, Block 72 Lot 23 and 24 and owned by Susan Wilmot.

A public hearing on this application will be held in the Council Chambers at City Hall, 101 West 8th Street, Glenwood Springs, Colorado on Tuesday, July 28, 2026 at 6:00pm MST.

For more information on this application, please contact Community Development Department at 970-384-6450 or building@cogs.us.

The City of Glenwood Springs ensures meaningful access to City programs, services, and activities to comply with the American Disabilities Act and reasonably provides: translation, interpretation, modifications, accommodations, alternative formats, auxiliary aids and services. To request these services, contact Bryana Starbuck, public information officer bryana.starbuck@cogs.us or 970-309-7521.

PUBLISHED IN THE GLENWOOD SPRINGS POST INDEPENDENT ON TUESDAY, JULY 14, 2026 AND TUESDAY, JULY 21, 2026.

Planning and Zoning Commission Staff Report

Date	July 28, 2026
Planning File Number	VAR-000056-2026
Request	Consideration of a Variance application for relief from Section 070.020.060 and Table 020.8 for an encroachment into a side yard setback.
Applicant	Jordan Architecture, Inc.
Owner	Joshua and Kellie McCarrel
Location	1108 Colorado Avenue (Parcel #218509438002)
Zone	Residential Multifamily Limited (RM2) Zoning District
Staff	Emery Ellingson, Senior Planner, Community and Economic Development

ACTION ITEM

According to Section 070.060.070(a) of the *Glenwood Springs Municipal Code* (Code), "[T]he Variance process is intended to provide limited relief from the requirements of this Code where the strict application of Code would result in exceptional difficulty or undue hardship preventing the use of the land as otherwise allowed by Code. The variance procedure is not intended to allow a use in a zoning district where it is not currently permitted or to alleviate inconveniences or financial burdens imposed on landowners."

Per Section 070.060.040(a)(3)(e)(1), the Planning and Zoning Commission (Commission) "*...shall review the variance application and shall approve, approve with conditions, or deny the variance in accordance with Subsection 070.060.030(g) and the criteria...*" which are described below in this report.

Action 1 - Variance – Consideration of a Variance application for relief from Section 070.020.060 and Table 020.8 for encroachment of a front porch into the side setback.

Staff Recommendation: Staff recommends **approval** with the findings and conditions outlined on pages 8-9 of the staff report.

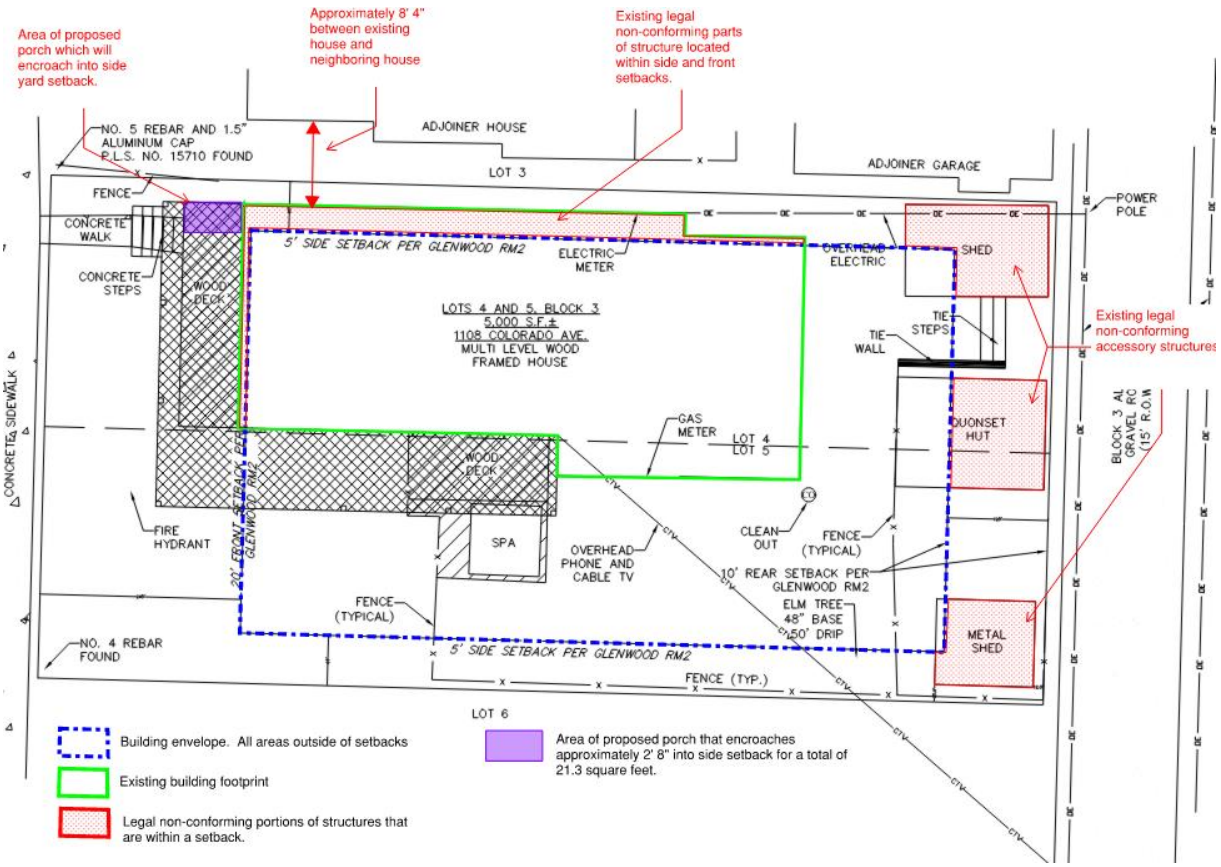
BACKGROUND

The applicant purchased the home in May 2024 and immediately started making needed repairs to the structure. One of these repairs was a partial foundation replacement on the west (front) and south elevations of the structure. A building permit for foundation repair was issued on August 7, 2024 and work was finished on March 4, 2025. In order access the foundation on the front part of the house, the existing front porch was removed. This porch had spanned the width of the home's front facade and, like the foundation, was in disrepair. Staff reviewed and approved the demolition permit for the deck as well as the building permit for foundation repair.

When the homeowner contacted City staff in 2026 about a proposed reconstruction of a front porch in its previous location, they were informed that a variance would be required because the north part of the porch would encroach approximately 2 feet, 8 inches into the side yard setback on the north side of the property.



Image of home in August 2023, showing original front porch extending the full width of the home prior to demolition.



Proposed site plan showing area of encroachment.

Code defines a setback as *"the minimum required distance between a lot line and a building or structure"*. Each zoning district establishes the required setbacks for the front, side, and rear sides of a property. The RM2 zoning district has a required side yard setback of 5 feet and the applicant has proposed construction of a covered front porch that will encroach approximately 2 feet, 8 inches into this setback. Said encroachment has prompted this variance application.

The existing house is currently **located within this side yard setback which means that this structure is a *legal, nonconforming structure*. The structure is *legal* because it was built according to** applicable **regulations exist**ing **at time of construction. This structure was built in 1900, far prior to the City's adoption of a zoning code in 1950**, at which time, **there were no** applicable **setback requirements**. The structure is also *nonconforming* because it no longer conforms to current Code, requiring a 5-foot side setback. A legal, non-conforming structure may continue to exist, but it cannot be altered in a way that increases the nonconformity, such as further expansion into a setback. For this reason, the extension of the porch into the side setback requires a variance, even though parts of the house are already encroaching into the side setback.

The proposed front porch also encroaches approximately 8 feet, 9 inches into the 20-foot required front yard setback. However, this is allowed by *Section 070.020.200 Measurements and Exceptions, Table 020.020 Authorized Exceptions to Setback Standards* which authorizes front porches to encroach up to 10 feet into a required front yard provided that such porch or stoop is a minimum of 65% open and is no closer than 10' from the property line. The proposed porch complies with those stipulations, and for that reason, no variance is required for the encroachment into the front setback. As seen in the table below, this exception does not allow for a front porch to extend into a side setback.



Table 020.20: Authorized Exceptions to Setback Standards	
Accessibility ramps	May be located within required yards. Ramps shall be removed within three (3) months after the need for such ramp is removed. Ramps shall not be located in the public right-of-way without approval by the City.
Front porches and stoops	May encroach ten (10) feet into required front yard provided such porch or stoop is a minimum of sixty-five (65) percent open (including screens and/or windows) on the front and each side and is no closer than ten (10) feet from the front property line.
Ground-mounted solar panels	May encroach five (5) feet into required side and rear yards provided no element is located closer than two (2) feet from any property line.
Ground-mounted mechanical equipment	May encroach five (5) feet into required side and rear yards provided no element is located closer than two (2) feet from any property line and the equipment complies with screening standards in Subsection 070.040.050(f), Screening, Fences, and Walls.
Roof eaves and other incidental architectural features	May encroach eighteen (18) inches into a required yard.

Storage sheds	In residential districts, storage sheds less than one hundred twenty (120) square feet in size may be placed up to, but not closer than three (3) feet from a rear or side property line provided they are not placed on a permanent foundation or over an easement.
Uncovered balconies and fire escapes	May encroach eighteen (18) inches into required side yard; four (4) feet into required front or rear yard.
Uncovered porches, slabs, patios, walks, and steps	May encroach into required yards by any amount provided all components of the encroachment are no greater than thirty (30) inches above ground level.
Retaining walls	May encroach by any amount into required front, rear, or side yards with the approval of the Public Works Director and City Engineer, provided that all other standards of this Code and the Engineering Standards related to retaining walls are met.

APPROVAL CRITERIA AND ANALYSIS

Section 070.060.070(a)(3)e.2 of the Code, outlines the approval criteria (listed in *italics* below) the Commission shall consider in the review of a Variance application. Staff analysis of these criteria follows. Please note that all seven criteria must be met for variance approval.

Approval Criteria 070.060.070(a)(3)e.2.i	**Compliance YES**
i. The subject property has an exceptional shape, topography, building configuration, or other exceptional site condition that is not a general condition throughout the zone district; **Analysis**: The existing house's legal nonconforming status due to its encroachment into a setback area is not an exceptional condition throughout the zone district. The majority of the RM2 Zoning District is within the oldest parts of Glenwood where the construction of many homes predates any City zoning regulations. However, the building configuration is unique because instead of being centered/located in the middle of the property, this building was built almost entirely on only one lot. Had the original building been constructed centered on the property, the house would likely be outside the setbacks that today's Code requires and not require a variance to reconstruct a porch in its original location. **Finding**: Staff finds that the application complies with 070.060.070(a)(3)e.2.i as the property has an exceptional building configuration not found as a general condition throughout the zone district.	

Approval Criteria 070.060.070(a)(3)e.2.ii	**Compliance YES**

ii. The strict application of the Code standards for which a variance is sought would produce undue hardships;

Analysis: Code defines a hardship as *"a condition by which the property in question cannot be put to reasonable use under existing regulation"*. A denial of this variance places a hardship on the use of the existing single-family residence as it would create an impractical termination of the porch at the setback line. Doing so would result in a partially uncovered front door which would result in an architectural imbalance along the front elevation and would unnecessarily subject the structure to weather impacts from rain and snow.

Finding: Staff finds that the application complies with Section 070.060.070(a)(3)e.2.ii of the Code as it is reasonable to have a porch which adequately covers the primary entrance of a home and that would be constructed of fire resistant materials that meet all Building and Fire Code requirements for the proposed proximity to the neighboring home. The denial of this variance would produce an undue hardship in that not allow the property owner the reasonable use of the property in having a front porch that covers the primary entrance to the home.

Approval Criteria **070.060.070(a)(3)e.2.iii**	**Compliance** **YES**

iii. The applicant did not create the hardship by his/her own actions;

Analysis: The applicant did choose to remove the original deck in order to repair the failing foundation. However, the applicant did not build the house in its original location, so close to the property line. In addition, the applicant is not responsible for the years of deferred maintenance which resulted in the deteriorated condition of the original porch and foundation. Had the original porch been maintained and in better condition, it could have been a more feasible option to keep or temporarily remove the original porch during the foundation repair.



The placement of the door on the far side of the front facade is also a condition which the applicant did not create. If the door was not located within the side setback, it would be more reasonable to terminate the deck at the setback line and avoid the variance. However, this would result in the door only being partially covered by the porch roof, which is an impractical solution. The image above illustrates what the home would look like if the porch adhered to the setback standard. Please note the lack of protection from the elements that would result.

Finding: Staff finds that the applicantion meets complies with Section 070.060.070(a)(3)e.2.iii as the applicant did not create the hardship entirely by their own actions as they are not responsible for the original placement of the house nor the deferred maintenance of the porch.

Approval Criteria **070.060.070(a)(3)e.2.iv**	**Compliance** **YES**

iv. The variance requested does not harm the public and does not impair the intent or purposes of this Code, goals, and polices, including the specific regulation for which the variance is sought;

Analysis: The intent of a setback is to provide for reasonable distancing between structures and to provide fire separation distance to reduce risk of fire jumping between buildings. The proposed porch will be constructed with materials which meet International Residential Code standards for fire resistance. There are sections of the existing house which were not constructed with modern fire-resistant materials that are closer to the neighboring house and represent a greater fire risk than the proposed porch would.

Finding: Staff finds that the application complies with Section 070.060.070(a)(3)e.2.iv as the porch will be constructed with materials meeting International Residential Code (IRC) standards for fire resistance for building in proximity to another structure. This will result in not increasing risk of fire than already exists on the property.

Approval Criteria **070.060.070(a)(3)e.2.v**	**Compliance** **YES**

v. The variance request demonstrates exceptional hardship not related to purpose of

convenience or financial burden;

Analysis: The applicant has proposed building a porch larger than what the setback would actually allow. The applicant will also be required to construct the entire deck with higher rated fire-resistant materials. This demonstrates that this request is not related to the purpose of avoiding a financial burden as the proposed deck would be more expensive than simply keeping the porch outside the setback area.

Finding: Staff finds that the application complies with Section 070.060.070(a)(3)e.2.v as the variance is not being requested as a way to avoid a financial burden or for the purpose of convenience.

Approval Criteria 070.060.070(a)(3)e.2.vi	Compliance YES

vi. The variance request will not violate building or fire code requirements; and

Analysis: The proposed porch will not violate building or fire code requirements. Applicable building and fire regulations do not necessarily prohibit buildings from being built closer together than the 10 feet that the combined side yard setbacks would require. However, if buildings are built closer, the materials selected have to meet more stringent standards for fire resistance and combustibility. Recommended Condition of Approval #4 further clarifies the requirement for this project to comply with all Code requirements.

Finding: Staff finds that the application comlies with Section 070.060.070(a)(3)e.2.vi as the applicant will have to submit a building permit for the porch and meet all Building Code and Fire Code requirements prior to issuance of permit and construction.

Approval Criteria 070.060.070(a)(3)e.2.vii	Compliance YES

vii. The variance is the minimum variance that will afford relief of the subject standards of the Code.

Analysis: The proposal for the porch is to reconstruct the porch to its original dimensions to align with the edge of the house. The applicant does not propose to extend the porch any further into the side setback than the rest of the house already does.

Finding: Staff finds that the application complies with Section 070.060.070(a)(3)e.2.vii as the proposal requests the minimum variance to afford relief and is not requesting to encroach further into the side setback than the existing structure.

PUBLIC COMMENT

The applicant completed the public notice process per the requirements of Section 070.060.030 which includes:

- Notice published in the *Glenwood Springs Post Independent* on two separate dates with first notice published 10-15 days prior to meeting and second notice published one week thereafter;
- Notices were also mailed to all property owners within 300 feet; and
- Sign posted on the subject property by applicant prior to Saturday, July 18th, 2026.

Public comments received prior to packet deadline have been included in the packet. Any public comment received following the packet deadline will be read into the record during the public hearing.

REVIEWING DEPARTMENT COMMENTS

The following City Departments have provided the comments below:

Building Department: Comments outline there is no issue with approving the variance, as long as the porch is built with fire resistant materials which meet the necessary requirement for building materials as described in the 2021 International Residential Code as adopted by the City of Glenwood Springs. Such building materials could include fire-resistance treated wood or heavy timber for construction of the deck portion of the porch or Grade A roofing materials.

Fire Department: Comments outlined there is no issue with approving the variance, as long as the porch is built with fire resistant materials which meet the necessary requirement for building materials as described in the 2021 International Fire Code as adopted by the City of Glenwood Springs.

ACTION ALTERNATIVES AND STAFF RECOMMENDATION

The Planning and Zoning Commission may approve, approve with conditions, or deny the Variance. The Commission may also continue the hearing with a request for specific information necessary to determine compliance with the Code and city goals and policies.

Action 1 - Variance – Consideration of a Variance application for relief from Section 070.020.060 and Table 020.8 for an encroachment of a front porch into the side setback.

Staff Recommendation: Staff finds that the application meets the applicable criteria for

the approval of a variance. Therefore, we recommend approval with findings and conditions provided below.

Suggested Motion to Approve

I move to approve Planning File VAR-000056-2026, incorporating *staff's findings and conditions, because the application meets the approval criteria for a Variance*.

Suggested Findings:

1. The subject property has an exceptional shape, topography, building configuration, or other exceptional site condition that is not a general condition throughout the zone district;
2. The strict application of the Code standards for which a variance is sought would produce undue hardship;
3. The applicant did not create the hardship by his/her own actions;
4. The variance requested does not harm the public and does not impair the intent or purposes of this Code, goals, and policies, including the specific regulation for which the variance is sought;
5. The variance request demonstrates exceptional hardship not related to purposes of convenience or financial burden.
6. The variance request will not violate building or fire code requirements; and
7. The variance is the minimum variance that will afford relief of the subject

Suggested Conditions:

1. Applicant shall comply with all verbal representations made in the public hearing, as outlined in all application materials, and/or revised conditions herein and approved by the Community Development Director.
2. The applicant shall comply with all City staff comments related to specific Code requirements prior to the approval of a building permit.
3. Any future changes or improvements to the building are subject to review and approval of the Community Development Director for compliance with applicable requirements of the Glenwood Springs Municipal Code.
4. Except where specific variances have been granted, the construction shall comply with all requirements of the Glenwood Springs Municipal Code.
5. The Notice of Decision from any approved variance shall be recorded at cost to applicant with the Garfield County Clerk and Recorder.

Alternative Motion to Deny

Any motion to deny the application shall include findings explaining which approval criteria have not been met. An example motion for denial is provided below.

*I move to **deny** Planning File VAR-000056-2026 because the application does not meet the approval criteria for a Variance specifically [ENTER APPLICABLE CRITERIA HERE].*

1. The subject property does not have an exceptional shape, topography, building configuration, or other exceptional site condition that is not a general condition throughout the zone district;
2. The strict application of the Code standards for which a variance is sought would not produce undue hardship;
3. The applicant did create the hardship by his/her own actions;
4. The variance requested does harm the public and does not impair the intent or purposes of this Code, goals, and policies, including the specific regulation for which the variance is sought;
5. The variance request does not demonstrate exceptional hardship not related to purposes of convenience or financial burden.
6. The variance request will violate building or fire code requirements; and
7. The variance is not the minimum variance that will afford relief of the subject

Motion to Continue

I move to continue consideration of Planning File VAR-000056-2026, to [ENTER SPECIFIC MEETING DATE HERE] to gather additional information necessary for a decision.

Jordan Architecture Inc.

PO Box 1031 Glenwood Springs, CO 81602 970-618-6690
email: bradjordanarchitect@gmail.com website: jordanarchitecture.com

15 May 2025

City of Glenwood Springs
Attn: Emery Ellingson

1108 Colorado Avenue

Emery,

The following serves as a narrative for the variance request at 1108 Colorado Avenue, Glenwood Springs, Colorado.

Project Description: There is an existing Victorian style home built around 1920 currently located on the property, which had a covered front porch. The current owners, Joshua & Kellie McCarrel purchased the home on May 24, 2024. The home was in need of some major repairs, which included removal of the covered front porch, including foundation supports. A portion of the front porch was left 'as is' for access to the front entrance to the home, yet the entire roof structure was removed with the majority of the porch, due to dilapidation/rot and safety concerns.

The existing structure is a non-conforming, pre-existing structure. The existing home is 2.25' – 2.4' from the property line and the side yard setback that was established well after the home was constructed is 5'. The adjacent structure to the North is 3' – 3.25' from the property line. The previously existing roof over the front porch was approximately 2' from the property line.

The distance between the 2 structures is 8.33' at the front side (Colorado Avenue) and 5.25' near the rear of the structures. The two structures appear to sit parallel to each other, yet the property line is not parallel with the structures.

The owner would like to completely rebuild the covered front porch, similar to what previously existed. The previous porch was approximately 6' out from the front of the house, and the proposed porch would be 8' out from the front of the house.

Variance Request: To rebuild/allow for a roof projection into a side yard setback. The porch is allowed to project into the setback when it is 30" or less above the adjacent grade.

Variance Criteria –

1. The subject property has an exceptional shape, topography, building configuration or other exceptional site condition that is not a general condition throughout the zone district.
   RESPONSE: The subject property has a structure that was sited well before setbacks were established. The North property line does not run parallel with the structures on either side of the property line.
2. The strict application of the Code standards for which a variance is sought would produce and undue hardship.
   RESPONSE: By adhering to the existing setback, it would provide for a strange transition between the roof, porch and existing house. We have reviewed multiple options with staff and the best solution, that would provide the best aesthetic appearance of this home in the Downtown Core, would be to reconstruct the roof similar to what previously existed and achieve the previous character and charm indicative to the area.
3. The applicant did not create the hardship by his/her own actions.
   RESPONSE: The previous roof and the majority of the front porch were removed for safety reasons. The roof structure was dilapidated and showing severe signs of wood rot. The porch was in similar condition, whereas one would not feel comfortable walking across it without the fear of falling through it. The owner decided to remove the covered porch & foundation supports at the time instead of repairing and renovating it due to various reasons.
4. The variance requested does not harm the public and does not impair the intent or purposes of this Code, goals, and policies, including the special regulation for which the variance is sought.
   RESPONSE: The variance would provide relief from the strict application of the setback requirement and allow for restoration of what previously existed, which provides for a neighborly friendly covered front porch that previously existed. If granted, the proposed covered front porch will positively impact the neighborhood and keep within the Downtown Core charm and character.
5. The variance request demonstrates exceptional hardship not related to purposes of conveniene or financial burden.
   RESPONSE: By not allowing a variance, the owner would have to relocate his existing front door and leaded glass transom window, or leave it as it currently exists without any type of covered protection. Considering the age of the home, weatherstripping was non-existent and one can only do so much to adequately weatherstrip a door that was made in the era, so leaks around an unprotected door are inevitable. Moving the entry door and leaded glass transom window in a structure that is over 100 years old can be quite difficult, with some of the structure being impacted,

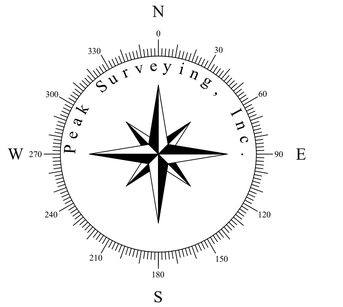
which could become impractical. This would also affect the floor plan layout and encroach into the living room area of a narrow Victorian style home. This would also provide a strange appearance from Colorado Avenue, and not in line with the neighboring homes.

6. The variance request will not violate building or fire code requirements.
   RESPONSE: If the requested variance is granted, we would build the roof structure and support posts/beams out of materials that are considered fire resistant in order to meet any fire safety concerns.
7. The variance is the minimum variance that will afford relief of the subject standards of the code.
   RESPONSE: Our request is to reconstruct what was previously in constructed. Therefore, the variance would allow us to re-establish what existed prior to removal, which was strictly due to safety concerns.

Respectfully submitted,
Brad Jordan
Brad Jordan
Principal Architect

IMPROVEMENT LOCATION CERTIFICATE

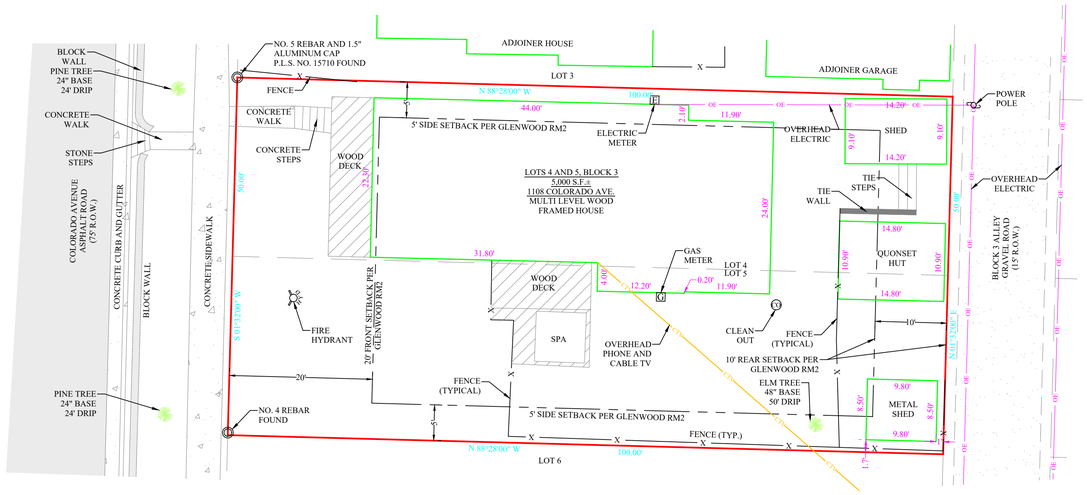
LOTS 4 AND 5, BLOCK 3, CITY AND TOWNSITE OF GLENWOOD SPRINGS
CITY OF GLENWOOD SPRINGS, COUNTY OF GARFIELD, STATE OF COLORADO



GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.



NOTES:

1) THIS PROPERTY IS SUBJECT TO RESERVATIONS, RESTRICTIONS, COVENANTS, BUILDING SETBACKS AND EASEMENTS OF RECORD, OR IN PLACE. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE COMMITMENT THEREFORE, EXCEPTIONS TO TITLE THAT MAY AFFECT THE SUBJECT PROPERTY HAVE NOT BEEN RESEARCHED BY PEAK SURVEYING, INC.

2) THE DATE OF THIS SURVEY WAS JANUARY 15, 2024.

3) BASIS OF BEARINGS FOR THIS SURVEY IS A BEARING OF S 01°32'00" W BETWEEN THE NORTHWEST CORNER OF LOT 4, A NO. 5 REBAR AND 1.5" ALUMINUM CAP P.L.S. NO. 15710 FOUND IN PLACE AND THE SOUTH WEST CORNER OF LOT 5, A NO. 4 REBAR FOUND IN PLACE.

4) UNITS OF MEASURE FOR ALL DIMENSIONS SHOWN HEREON IS U.S. SURVEY FEET.

5) THIS SURVEY IS BASED ON THE QUIT CLAIM DEED RECORDED OCTOBER 15, 2001 AS RECEPTION NUMBER 590209, AND THE ORIGINAL TOWNSITE OF GLENWOOD SPRINGS IN THE GARFIELD COUNTY CLERK AND RECORDER'S OFFICE AND CORNERS FOUND IN PLACE.

6) THERE WAS APPROXIMATELY 6-8" OF SNOW AND ICE ON THE GROUND AT THE TIME OF SURVEY.

7) BUILDING SETBACKS AS SHOWN ARE BASED ON CITY OF GLENWOOD SPRINGS ZONING WEBSITE FOR RM2 LAND USE CODE. BUILDING SETBACKS SHOULD BE VERIFIED WITH COMMUNITY DEVELOPMENT PRIOR TO ANY PLANNING, DESIGN OR CONSTRUCTION.

PROPERTY DESCRIPTION

LOTS 4 AND 5, BLOCK 3, CITY AND TOWNSITE OF GLENWOOD SPRINGS, CITY OF GLENWOOD SPRINGS, COUNTY OF GARFIELD, STATE OF COLORADO.

IMPROVEMENT LOCATION CERTIFICATE

I HEREBY CERTIFY THAT THIS IMPROVEMENT LOCATION CERTIFICATE WAS PREPARED FOR ETHAN MERRITT, DAVID ALAN DUNPHY AND LAND TITLE GUARANTEE COMPANY, THAT IT IS NOT A LAND SURVEY PLAT OR AN IMPROVEMENT SURVEY PLAT, AND THAT IT IS NOT TO BE RELIED UPON FOR THE ESTABLISHMENT OF FENCE, BUILDING, OR OTHER FUTURE IMPROVEMENT LINES. THIS CERTIFICATE IS VALID ONLY FOR USE BY PARTIES LISTED ABOVE AND DESCRIBES THE PARCEL'S APPEARANCE ON JANUARY 15, 2024.

I FURTHER CERTIFY THAT THE IMPROVEMENTS ON THE ABOVE DESCRIBED PARCEL ON THIS DATE, JANUARY 15, 2024, EXCEPT UTILITY CONNECTIONS, ARE ENTIRELY WITHIN THE BOUNDARIES OF THE PARCEL, EXCEPT AS SHOWN, THAT THERE ARE NO ENCROACHMENTS UPON THE DESCRIBED PREMISES BY IMPROVEMENTS ON ANY ADJOINING PREMISES, EXCEPT AS INDICATED, AND THAT THERE IS NO APPARENT EVIDENCE OR SIGN OF ANY EASEMENT CROSSING OR BURDENING ANY PART OF SAID PARCEL, EXCEPT AS NOTED. I FURTHER STATE THAT THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE COMMITMENT, THEREFORE EXCEPTIONS TO TITLE HAVE NOT BEEN RESEARCHED BY PEAK SURVEYING, INC.

DATE: JANUARY 16, 2024

BY: _____
JASON R. NEIL, P.L.S. NO. 37935
FOR AND ON BEHALF OF
PEAK SURVEYING, INC.

JASON R. NEIL 37935 COLORADO PROFESSIONAL LAND SURVEYOR

NOTICE: ACCORDING TO COLORADO LAW, YOU **MUST** COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

Peak Surveying, Inc.
P.O. Box 1746
Rifle, CO 81650
Phone (970) 625-1954
Fax (970) 579-7150
www.peaksurveyinginc.com
Est. 2007

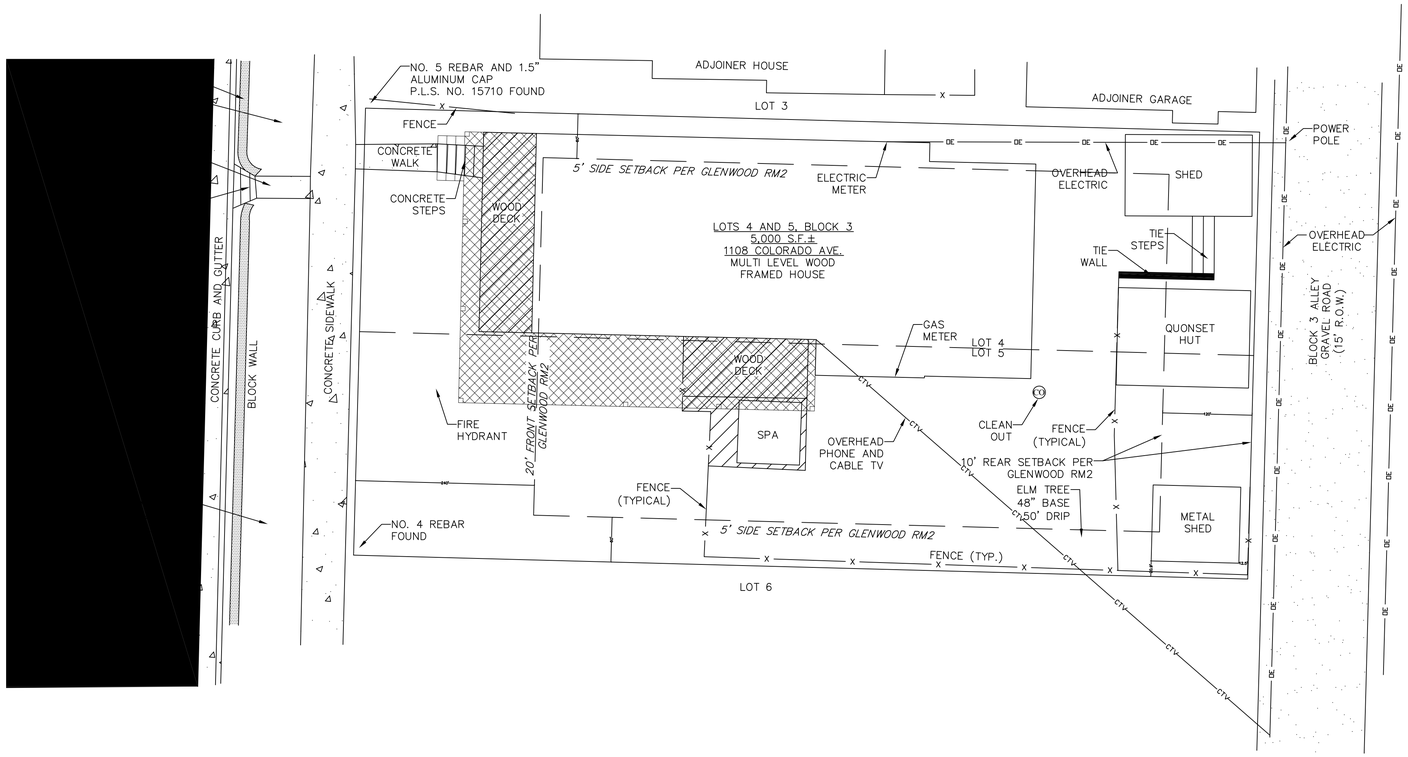
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SHF				
Checked By:				
JRN				
Date:				
JANUARY 16, 2024				
Computer File:				
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DAVID A. DUNPHY
CITY OF GLENWOOD SPRINGS, COLORADO

IMPROVEMENT LOC. CERT.
BLOCK 3: LOTS 4 AND 5
1108 COLORADO AVE.

Project NO.
24003

1 OF 1



TRUE NORTH

Architectural Site Plan

1/8"=1'-0"

JORDAN ARCHITECTURE
P.O. Box 1031
Glenwood Springs, Colorado 81602
Phone: 970.618.6600
bradjordan@gmail.com
jordanarchitecture.com

A Covered Deck Addition for:

Joshua McCarrel

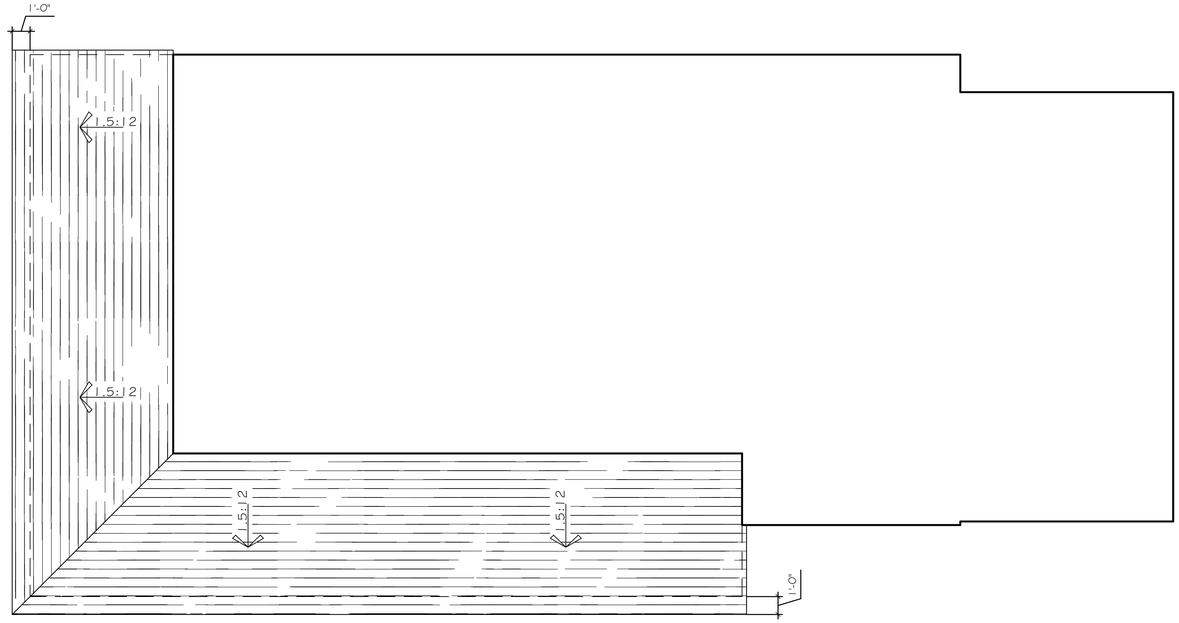
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Glenwood Springs, Colorado
Parcel #218509438002

Date	
05-18-26	Variance
Revisions	

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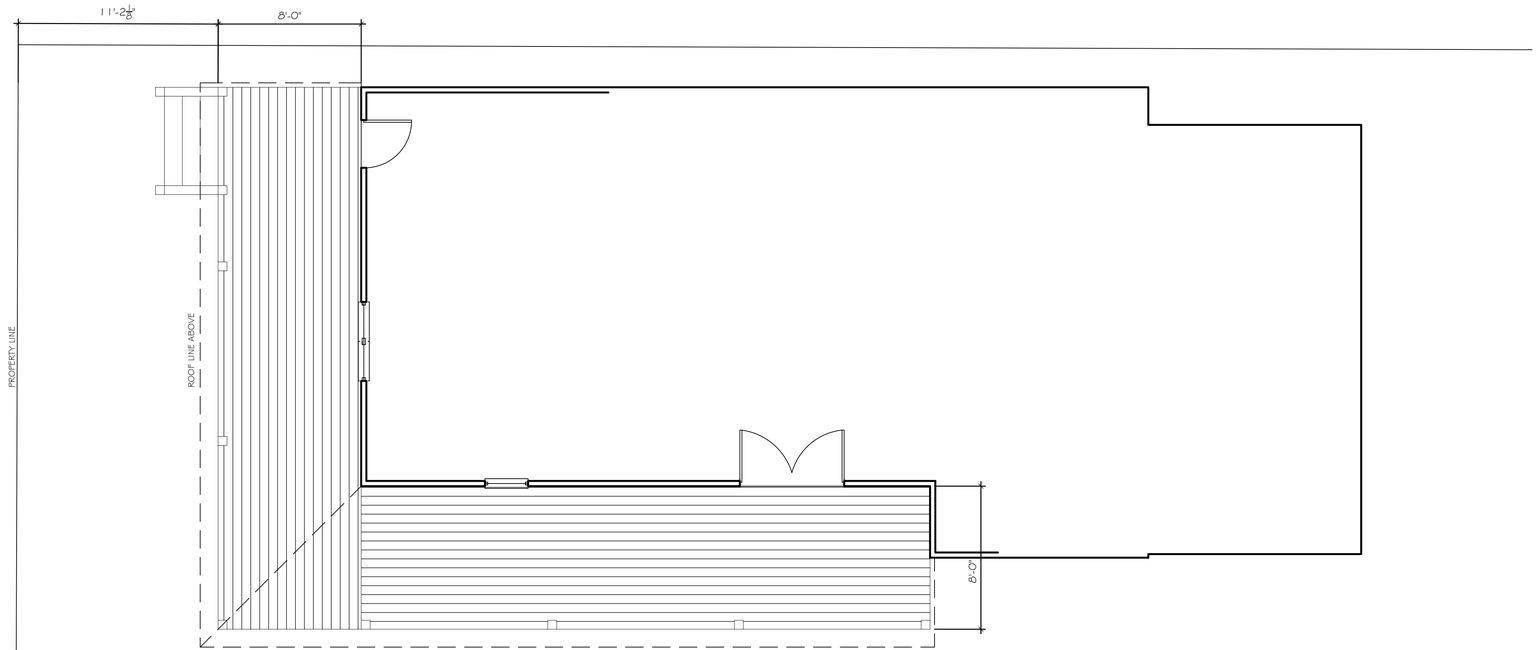
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Deck Roof Plan

1/4"= 1'-0"



Main Level Deck Plan

1/4"= 1'-0"

PLAN NORTH

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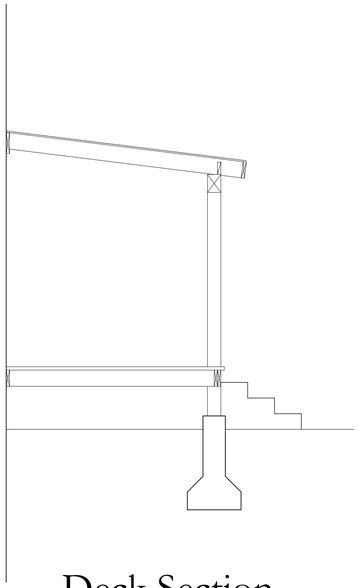
STATE OF COLORADO
BRADLEY SCOTT JORDAN
202508
LICENSED ARCHITECT

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Joshua McCarrel
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Parcel #218509438002

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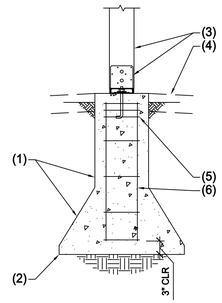


Deck Section

3/8" = 1'-0"

NOTES:

1. 24" DIA. 'BIG FOOT' & 10" DIA. 'SONOTUBE'.
2. BEAR ON FIRM, UNDISTURBED NATIVE SOIL OR STRUCTURAL FILL. BEAR AT FROST DEPTH.
3. COLUMN AND SIMPSON ABU 44 BASE.
4. FINISHED GRADE OR CONCRETE SLAB.
5. 3 TIES IN TOP 6" OF PIER.
6. 4-#4 VERTICAL DOWELS PER PLAN.



Concrete Pier & Footing

3/4" = 1'-0"



Proposed Front/West Side

1/4" = 1'-0"



Proposed Right/South Side

1/4" = 1'-0"

Partial Elevations/Section

As Noted

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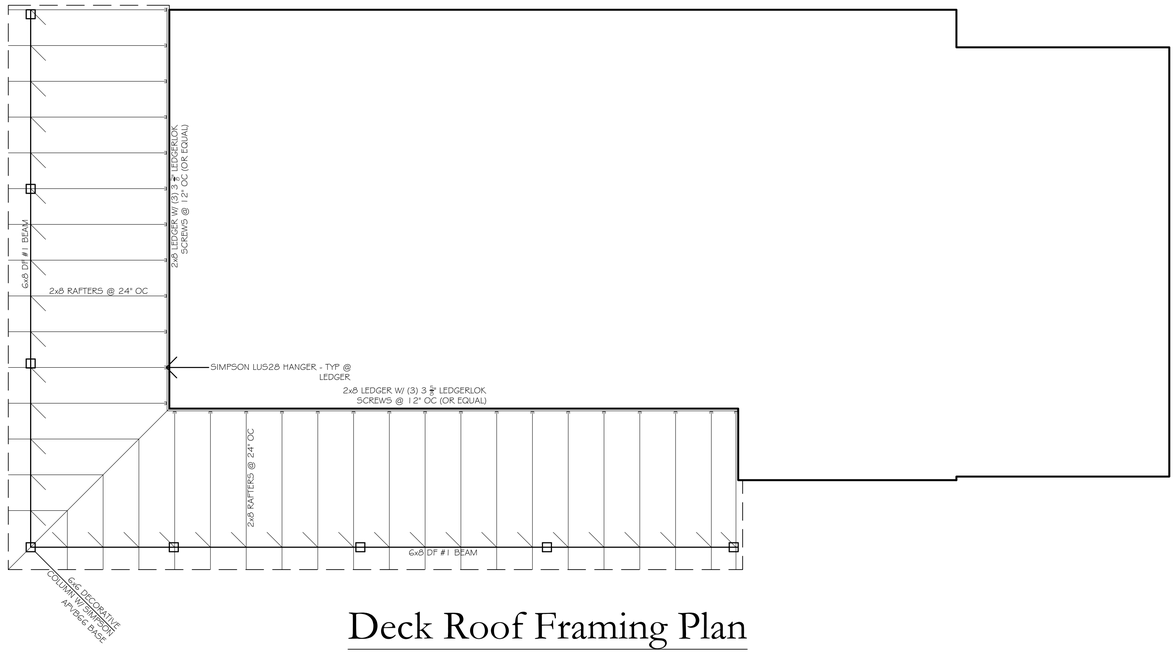
STATE OF COLORADO
BRADLEY SCOTT JORDAN
#29388
LICENSED ARCHITECT

A Covered Deck Addition for:
Joshua McCarrel
1108 Colorado Avenue
Glenwood Springs, Colorado
Parcel #218509438002

Date	
05-18-26	Variance
Revisions	

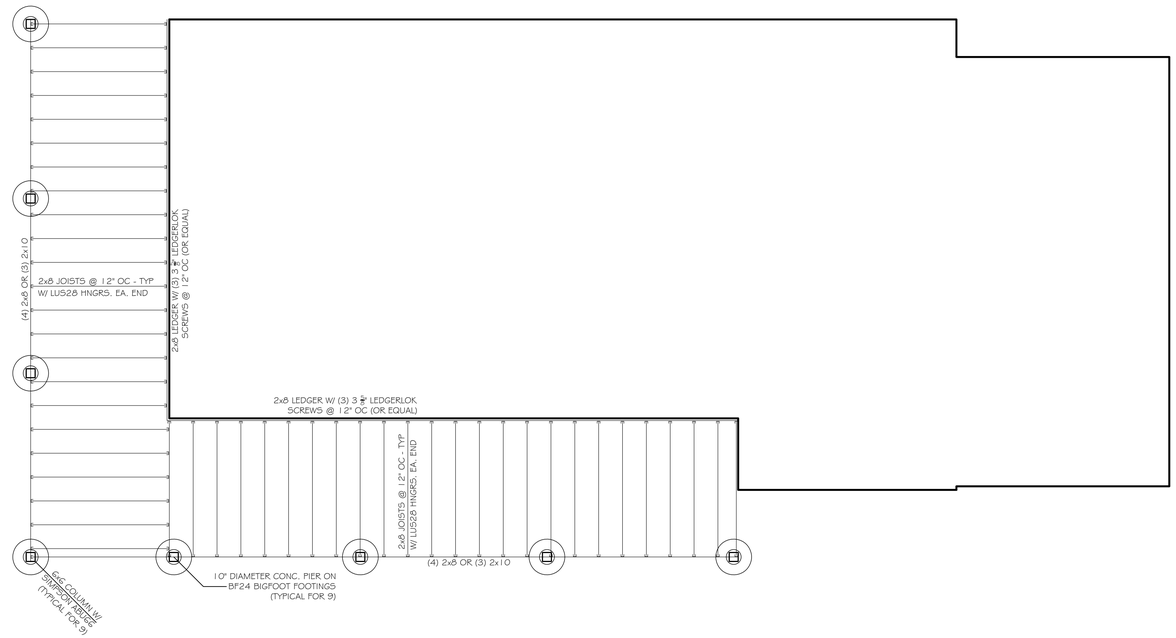
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Deck Roof Framing Plan

1/4"= 1'-0"



Foundation & Deck Framing Plan

1/4"= 1'-0"

PLAN NORTH

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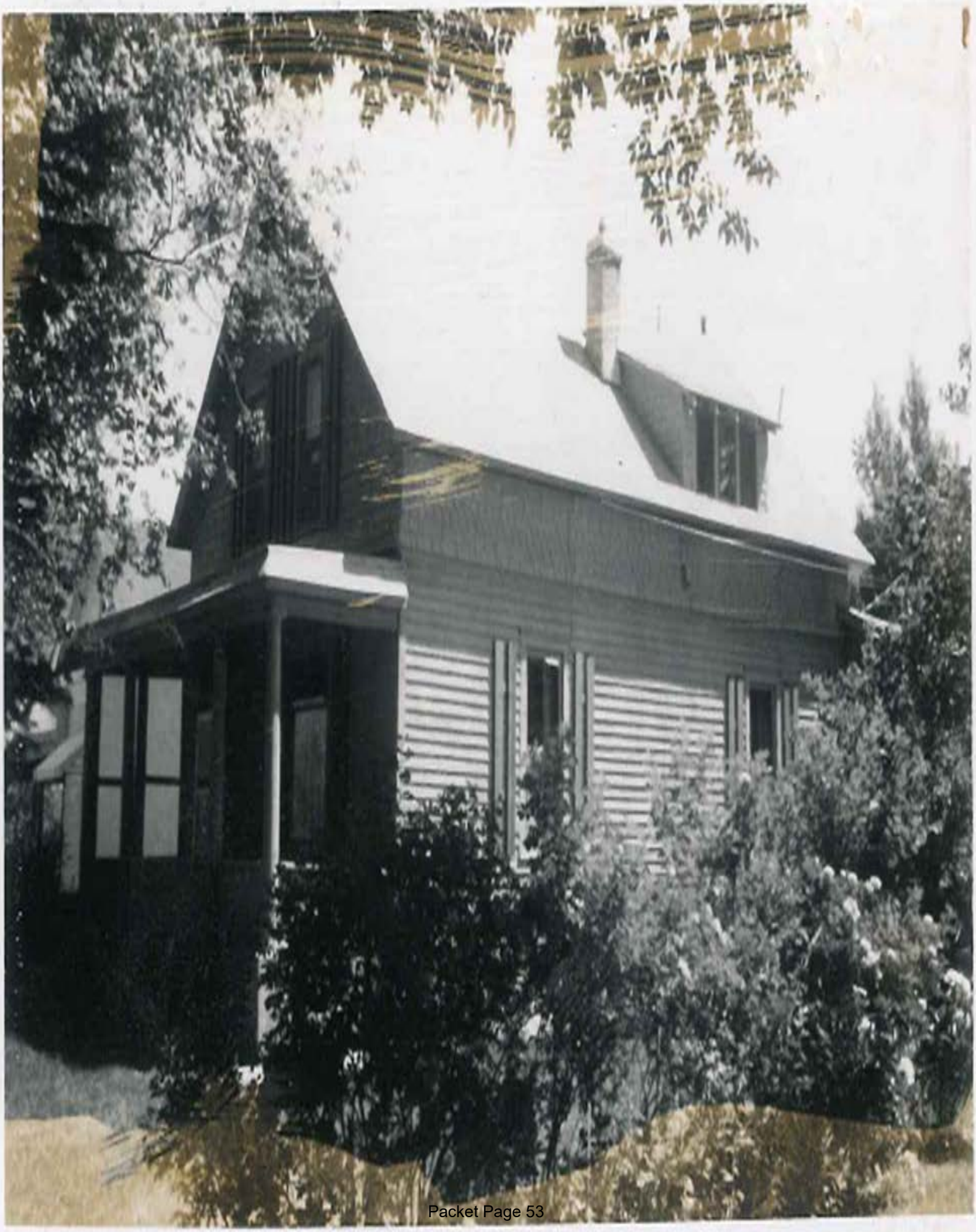
STATE OF COLORADO
BRADLEY SCOTT JORDAN
22388
LICENSED ARCHITECT

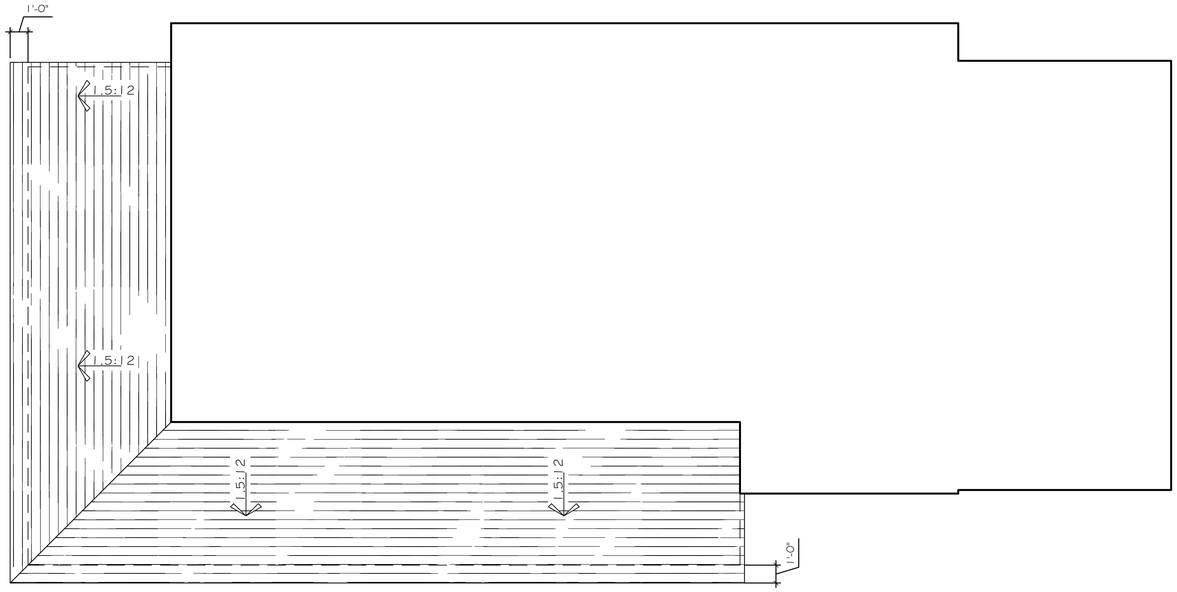
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Parcel #218509438002

Date	
05-18-26	Variance
Revisions	

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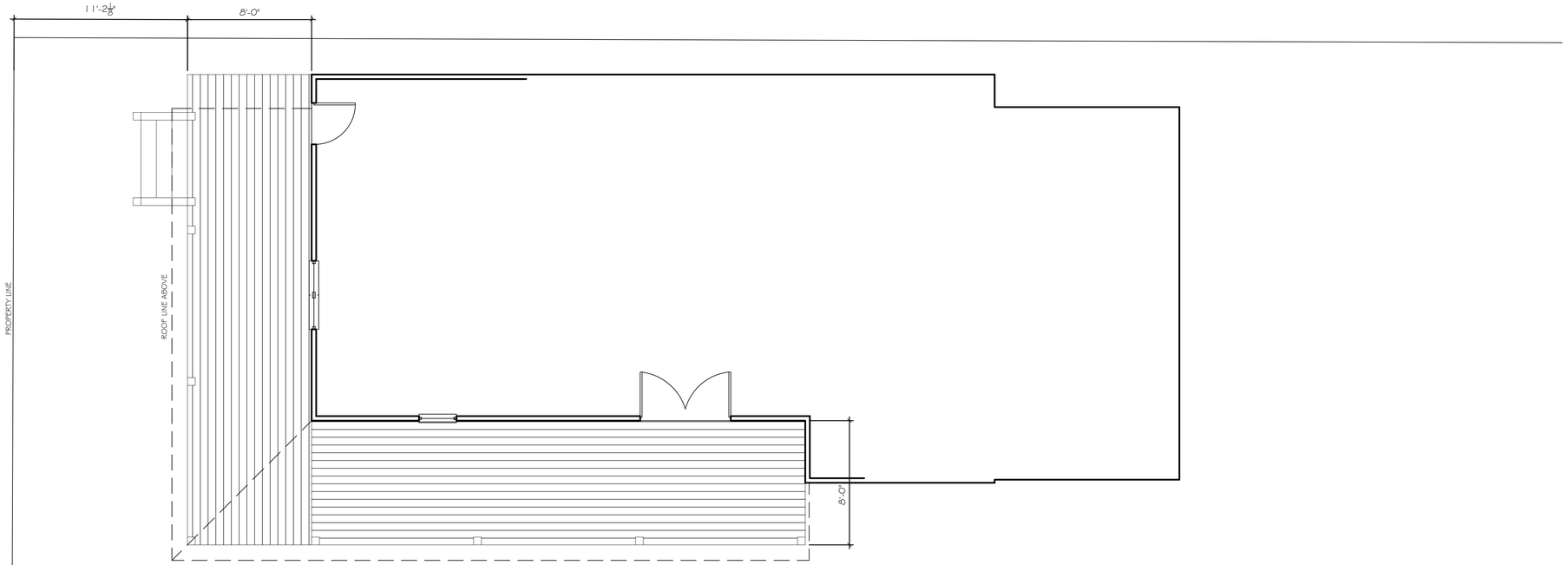
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ALTERNATE Deck Roof Plan

1/4"= 1'-0"



ALTERNATE Main Level Deck Plan

1/4"= 1'-0"

PLAN NORTH

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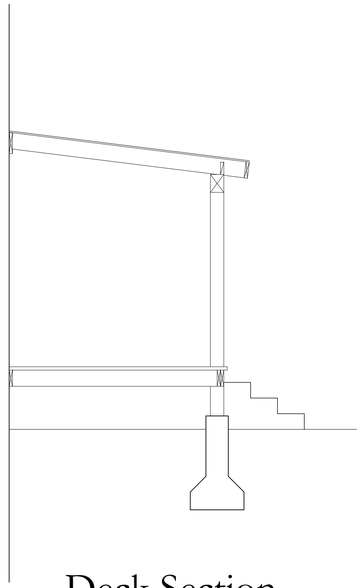
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20388
LICENSED ARCHITECT

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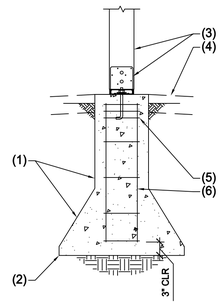


Deck Section

3/8" = 1'-0"

NOTES:

1. 24" DIA. 'BIG FOOT' & 10" DIA. 'SONOTUBE'.
2. BEAR ON FIRM, UNDISTURBED NATIVE SOIL OR STRUCTURAL FILL. BEAR AT FROST DEPTH.
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Concrete Pier & Footing

3/4" = 1'-0"



Alternate Front/West Side

1/4" = 1'-0"

ALTERNATE Partial Elevations/Section

As Noted

STATE OF COLORADO
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Parcel #218509438002

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Planning and Zoning Commission Staff Report

Date	July 28, 2026
Planning File Number	L&E-000076-2026, Airport Hangar Relocation
Request	Consideration of a Location and Extent Review application regarding the relocation of a hangar and maintenance shed.
Applicant	City of Glenwood Springs
Owner	Hector Brown and Rudd Aviation, Inc. (buildings) City of Glenwood Springs (land beneath buildings)
Location	3500 Airport Rd.
Zone	Light Industrial (I1) District
Staff	Watkins Fulk-Gray, AICP, Senior Planner

ACTION ITEM

Section 070.060.050(d)(1) *Purpose* of the *Glenwood Springs Municipal Code* (Code) states, "*The location and extent review procedure provides the City an opportunity to review projects proposed by a public or quasi-public entity in relation to the applicable policies and goals of the Comprehensive Plan, and to inform any public or quasi-public entity of the City's reasonable expectations for land use and development.*" The process is provided for by Section 30-28-110 of the Colorado Revised Statutes. According to Section 070.060.050(d)(3)e.1, the Planning and Zoning Commission (Commission) "…shall review and approve, approve with conditions, or deny the location and extent application in accordance with Subsection 070.060.030(g)…"

Action 1 – Location and Extent Review - Consideration of a Location and Extent Review application for the relocation of a hangar and maintenance shed totaling 19,050 square feet.

Staff Recommendation: Staff recommends **approval** with the findings and conditions of approval on page 13 of this report.

BACKGROUND

The Glenwood Springs airport, officially titled KGWS Sumers Airpark, is located on a 62-acre parcel near the southern limit of the city, between the Roaring Fork River and Airport Road. Currently, there are 21 separate buildings or facilities at the airport, including hangars for airplanes, a general aviation terminal and pilot's lounge, an airplane maintenance building, storage yards, a fueling station, storage areas both (enclosed and unenclosed), a taxiway, and one runway. The airport serves only light aircraft, typically powered by piston-engine or turboprops. Due to the surrounding geography, the airport observes visual flight rules and does not allow instrument-only flying, meaning takeoffs and landings are only permitted between one hour before sunrise and one hour after sunset. To avoid noise impacts to Glenwood residents, pilots take off toward and land from the south, with exceptions for weather conditions that dictate taking off and landing toward/from the north.



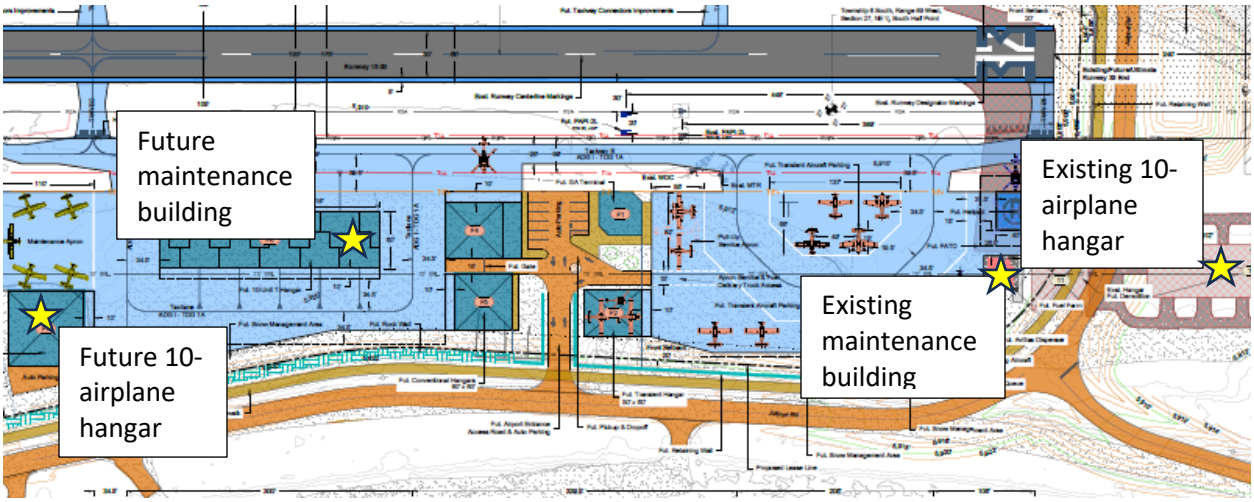
Above: An operational airplane from the 1940s that is "tied down."

The airport is operated as a public-private partnership via a lease and concession agreement between the City and a nonprofit corporation known as KGWS Sumers Airpark,

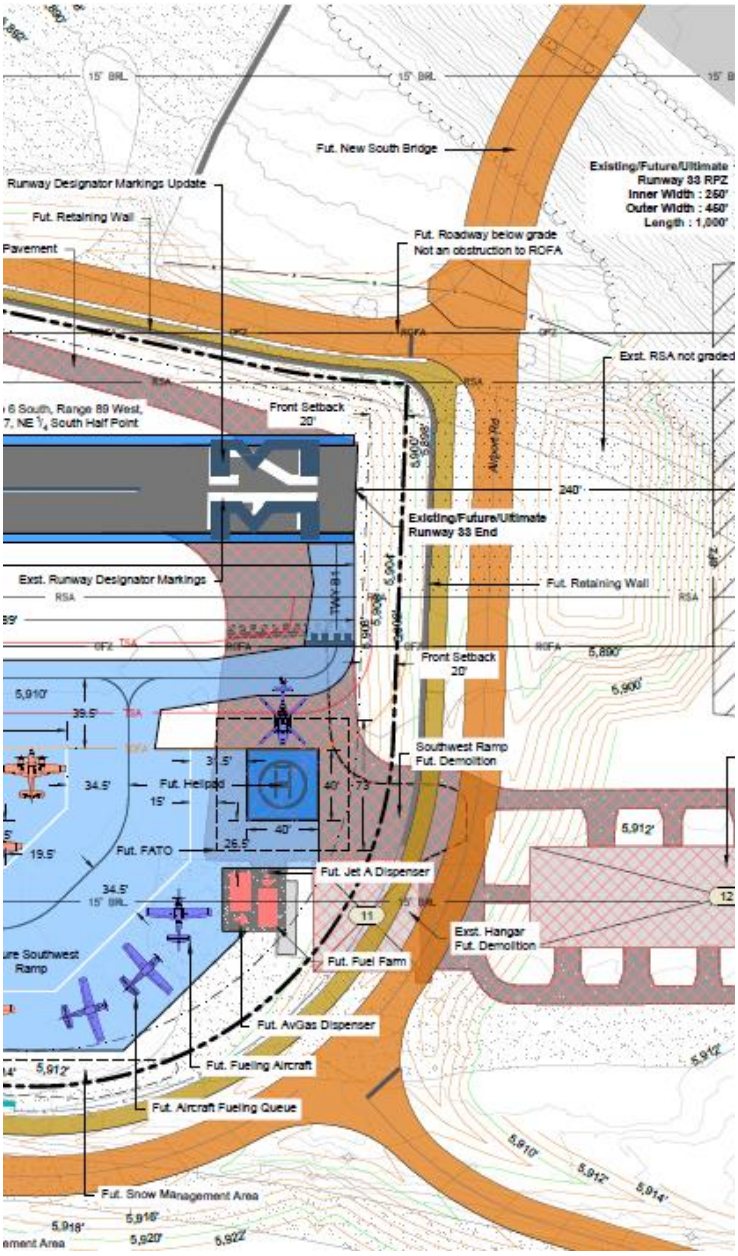
Inc. As with most structures located at the airport, the two buildings that are the subject of this Location and Extent Review are privately-owned buildings erected on public land leased by the City. Hector Brown owns and operates the existing facility that provides aviation maintenance for the airport's members and regionally to other pilots in the area. The current maintenance building is served by water, electricity, gas utilities, but has no fire suppression system. Wastewater is handled by an onsite wastewater system (OWTS). Similar utilities are proposed for the new proposed maintenance building with the addition of broadband service and a fire suppression system (to comply with applicable building code requirements). The existing hangar is served only by electricity as will be the case with the relocated hangar. The 10-plane hangar is currently and will continue to be owned by Rudd Aviation, Inc. Both buildings are important to the airport's current and future day-to-day operations.

Project Description

The South Bridge project, in which Midland Avenue/Airport Road vehicle and pedestrian facilities will be extended with a new bridge to Highway 82 and the Rio Grande Trail, impacts the existing southern end of the airport. The project's design aligns the new roadway through the existing maintenance building and bisecting the existing airplane hangar from the rest of the airport property. Recognizing that the City's project will negatively impact the airport and the owners of these two buildings, the City has prepared this Location and Extent development application to replace these two buildings.

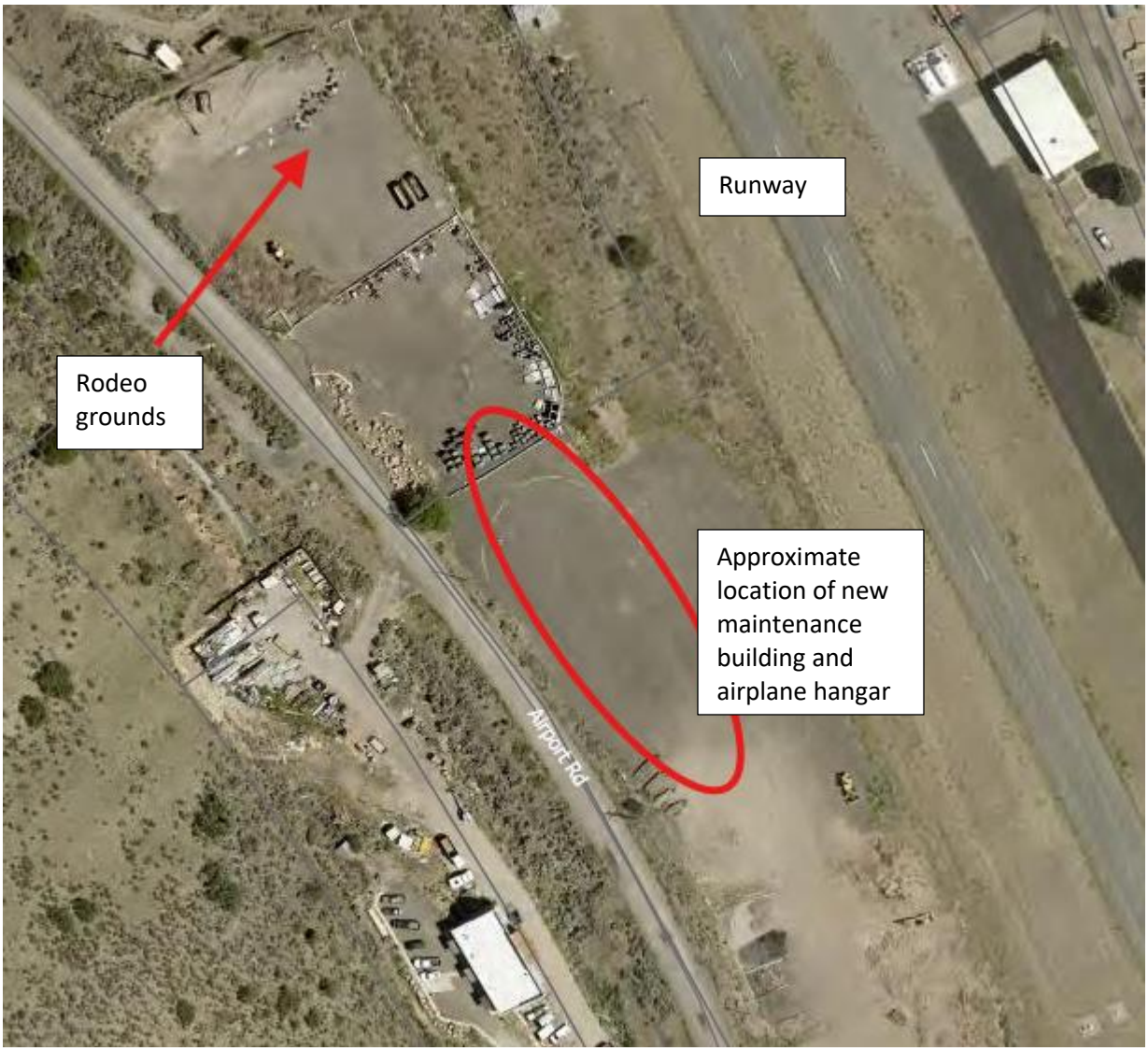


Above: Current locations of maintenance building and 10-airplane hangar and proposed future locations.

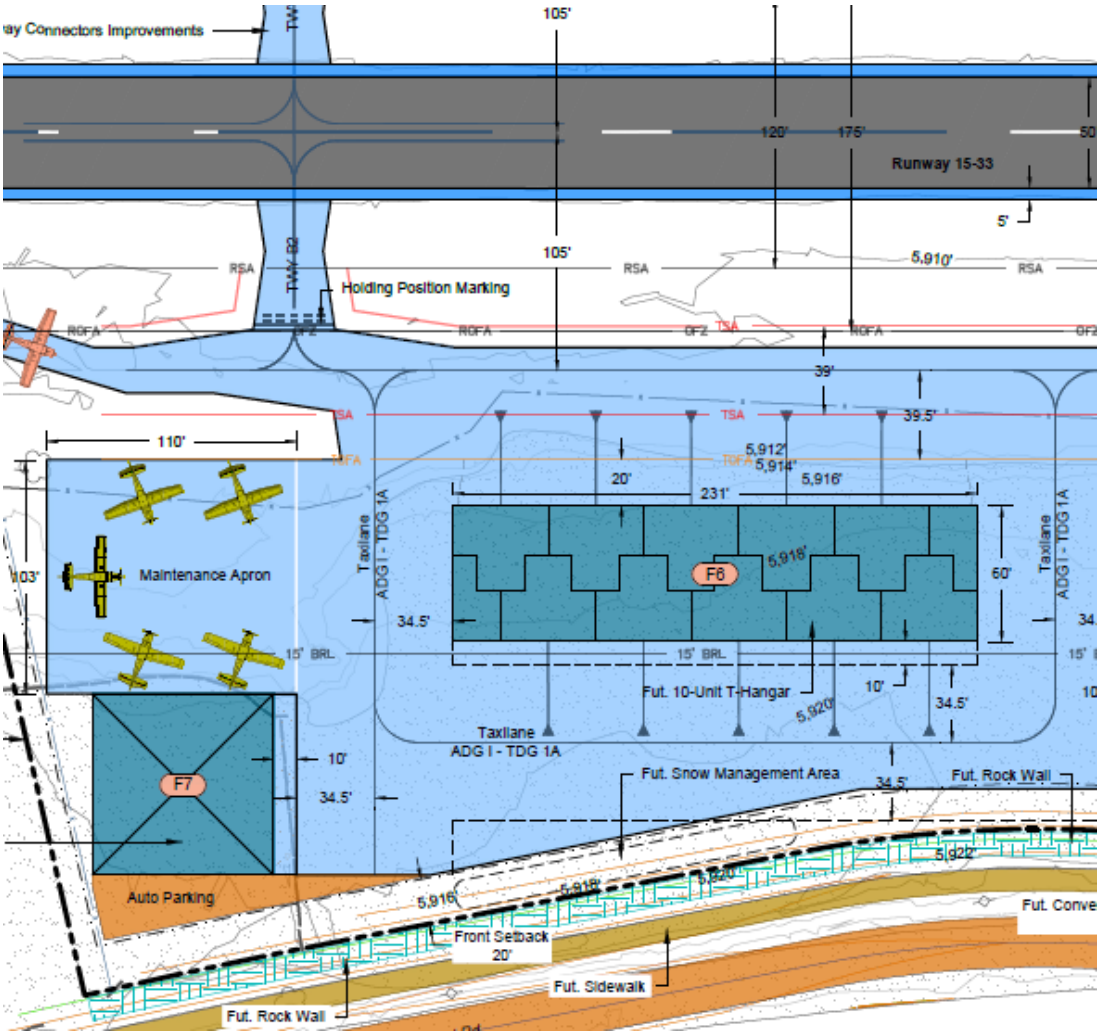


Above: In orange, the planned future alignment of the South Bridge roadway.

The 10-plane hangar will be deconstructed, moved, and reassembled in a new location. Due to the condition of the maintenance building, it will be demolished and replaced by a new metal building in a new location. The new location for both buildings will be approximately 700 feet north, maintaining their proximity to each other and staying on the west side of the runway. A structural evaluation has been completed for the hangar that supports the potential to deconstruct and rebuild the building.



Above: Aerial image of proposed maintenance building and hangar locations.



Above: Detailed view of page 4 of draft Airport Layout Plan, Terminal Area Drawing – South. Building F7 is the proposed new maintenance building, and F6 is the proposed relocated 10-airplane hangar.

CRITERIA AND ANALYSIS

Section 070.060.050(d)(3)e.3 of the Code outlines the criteria (listed in *italics* below) the Commission shall consider in the review of the application. Staff analysis of these criteria follows.

Criteria **070.060.050(d)(3)e.3.i**	**Compliance** **Yes**
Project is consistent with the Comprehensive Plan and other City plans and policies. **Analysis**: The replacement and relocation of the maintenance building and 10-airplane hangar helps the City work towards one goal and three policies contained in the	

Comprehensive Plan. Each of these goals/policies is listed (in *underlined italics*) and further discussed below.

Goal: Maintain the municipal airport. The proposal allows the airport to continue operating while also allowing the South Bridge project to move forward.

Policy: Promote safe operations at the municipal airport. The replacement/relocation of the two buildings will have no anticipated impact to the safety of airport operations. Please note, this analysis does not consider the safety impacts to the airport from the South Bridge project as a whole, which is a question that has been evaluated in other settings. The scope of this development application only includes the replacement/relocation of the maintenance building and southern 10-airplane hangar.

Policy: Serve as a leader in regional transportation and strengthen partnerships to pursue federal funding and to "regionalize" nonfederal funding commitments. Begin to budget transportation and capital improvement work programs and work with RFTA and others to leverage multi-modal opportunities (such as road/Bus Rapid Transit or road/rail) to fund and implement corridor routes for SH82, Railroad Corridor and ***South Bridge***. The project is essential for the completion of the South Bridge project.

Policy: Complete critical street network connections to include the I-70 A-line breaks and ***South Bridge*** *transportation projects.* The project is essential for the completion of the South Bridge project.

The project also conforms to the Comprehensive Plan's future land use map which designates the property as Industrial. The Industrial designation intends to accommodate heavy commercial, light industrial, and industrial uses such as manufacturing, warehousing, distributing, and indoor/outdoor storage.

Finding: Staff finds that the application complies with Section 070.060.050(d)(3)e.3.i of the Code as it consistent with multiple goal/policies outline in Comprehensive Plan.

Criteria **070.060.050(d)(3)e.3.ii**	**Compliance** **Yes**

Project is consistent with the general purpose and intent of this Code.

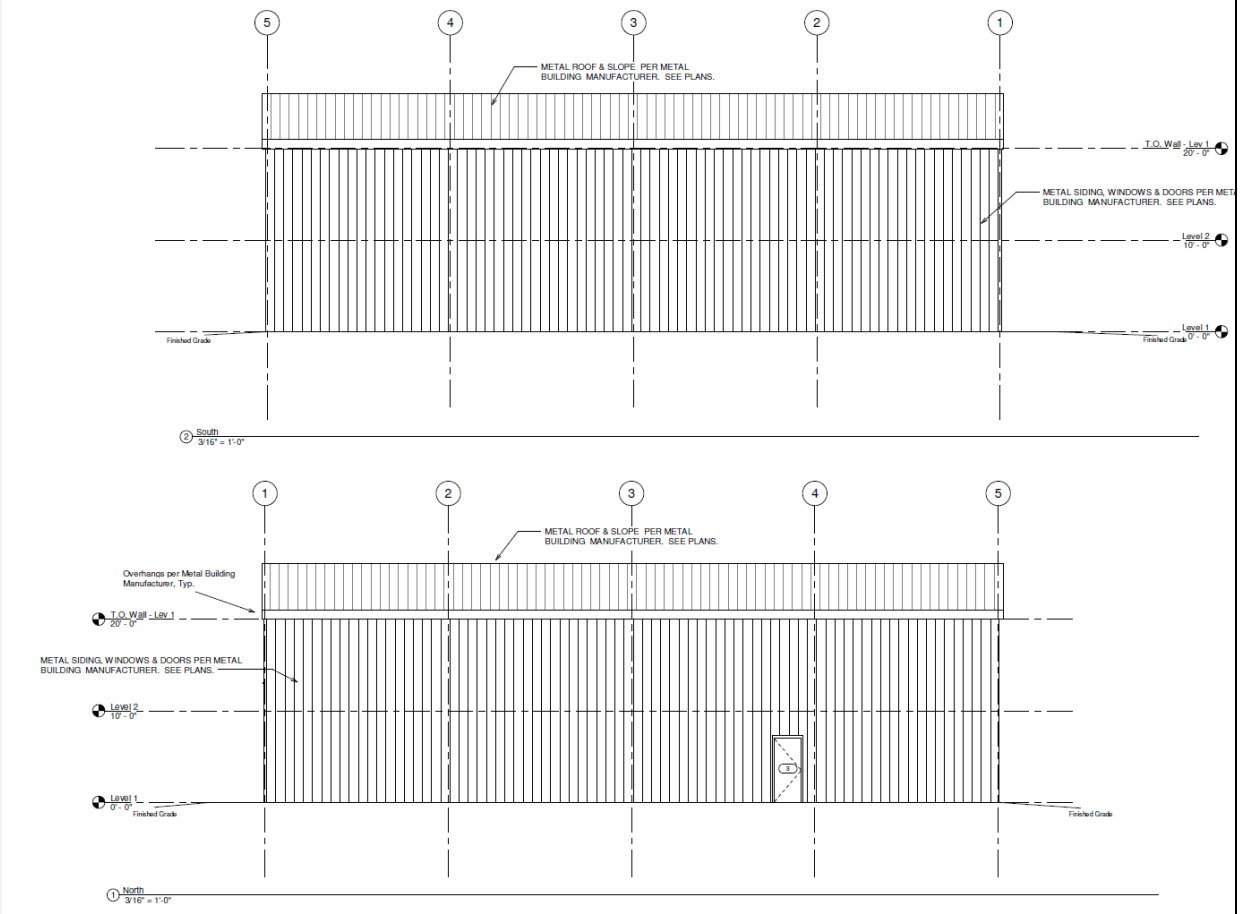
Analysis: Section 070.0120.030(a) outlines that the general purpose of the Code "*…is to protect the public health, safety, and welfare of the City and to implement the policies, goals, and strategies adopted by the City of Glenwood Springs, including those set forth in the Glenwood Springs Comprehensive Plan."* Section 070.0120.030(b) explains the intent of Code is "*…to create the best built environment for the City by…"* promoting efficient development, providing for a variety of housing and neighborhood types and densities, regulating the development and use of land based upon the impact, providing

minimum standards for the design and improvement of land, guarding against loss from natural hazards, the equitable processing of development proposals, and providing for legally accepted record of lots.

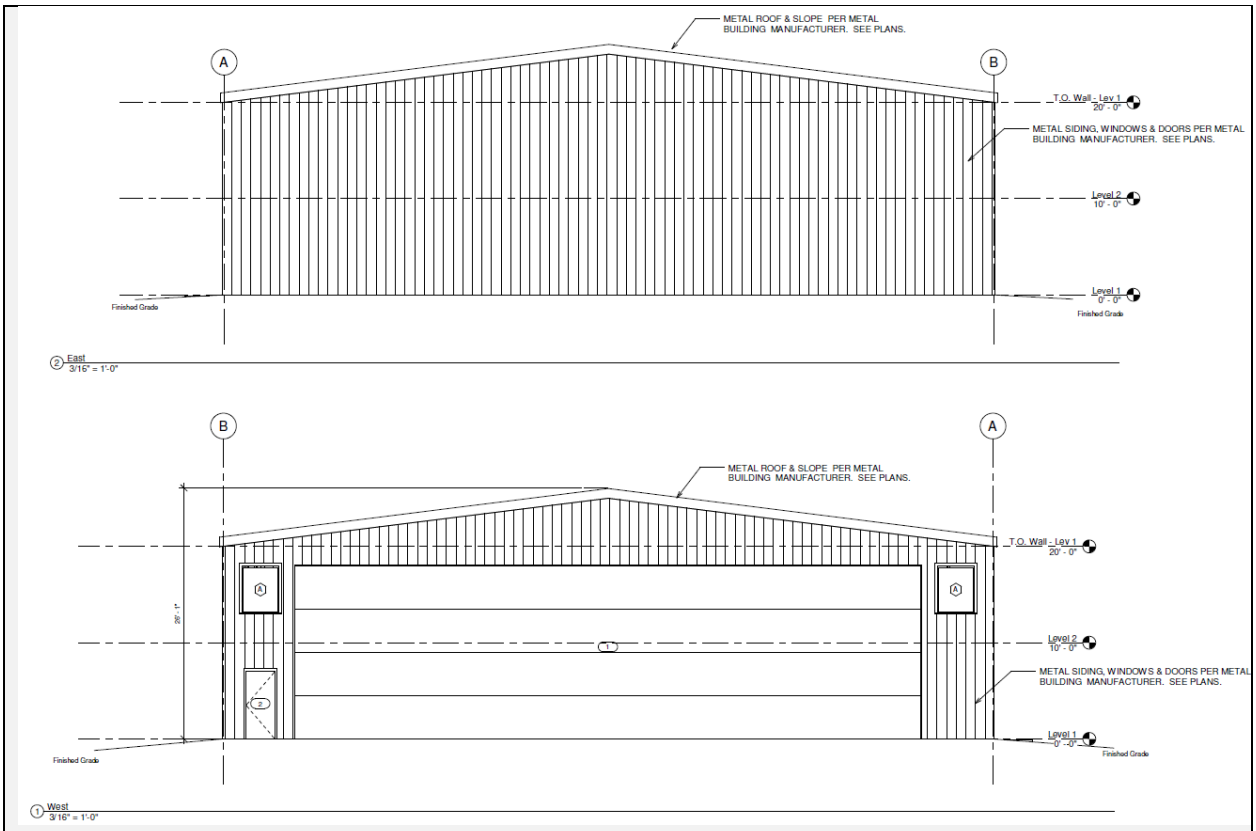
The proposed relocation of the airport hangar and maintenance building is consistent with the said purpose and intent as it allows for the construction of South Bridge while also improving the functional layout of airport facilities and aviation activities. The relocation promotes orderly and efficient development by organizing airport structures in a manner that better aligns with existing circulation, access, and operational needs. The proposal is compatible with existing and surrounding land uses and continues to support the broader community by ensuring that airport facilities operate safely and reliably. The project meets the Code's intent to regulate land development based on potential impacts, as the relocation reduces potential hazards and maintains appropriate separation between airport functions and adjacent areas. The improved site arrangement ensures that each relocated structure is appropriately sited on land capable of supporting its intended use, consistent with required design and development standards. The project does not increase exposure to natural hazards and maintains compliance with applicable floodplain, geologic, and safety considerations. The application has been processed in accordance with the applicable Location and Extent Review procedures as permitted by C.R.S. No changes to lot lines or easements are required beyond what is shown in the submitted plans.

Overall, the proposal conforms to the Purpose and Intent of the Code by supporting safe, orderly, and well-planned development at the Glenwood Springs Airport.

The proposed improvements comply with Section 070.020 of the Municipal Code regarding standards for building height and minimum setbacks and with Section 070.030 for land uses allowed in the I/1-Light Industrial zone. Minimum common open space and landscaping requirements do not apply to the project. Sidewalks along Airport Road will be provided with the South Bridge project, and the City has no concerns about meeting the exterior lighting requirements which will be evaluated thoroughly with a future building permit application. However, these two buildings do not meet the Code's nonresidential design standards found in Section 070.040.090. These standards require that building elevations that exceed 30 feet in length are required to provide three design treatments from Section 070.40.090(e)(2), such as projections, recessions, or reveals; glazed windows and doors; changes in texture and/or masonry pattern; Changes in building, parapet, or roofline height; and/or awnings, canopies, or marquees extending at least four (4) feet beyond the building face.



Above: The north and south elevations of the proposed new maintenance building.



Above: The east and west elevations of the proposed new maintenance building.

As the elevations above show, three sides of the proposed maintenance building have no design interest at all, and the elevation seen from the west meets perhaps two of the required three design treatments. However, the industrial use of this building will be airplane maintenance; it will not be a building visited by the general public, though the side of the building with the most design features is the one that faces the public right-of-way. Staff proposes no changes to the building elevations on account of the nature of airport uses that are distinct from other areas and zone districts that are subject to nonresidential design standards.








Clockwise, from top left: South face of 10-airplane hangar, north face, west face, and east face.

As the photos above show, the 10-airplane hangar building does not meet three of the five standards in 070.40.090(e)(2). As stated above for the maintenance building, an airplane hangar will not be visited by the general public, and the public good of having a hangar that meets the design standards of 070.40.090(e)(2) is not the same as it would be for a building in a neighborhood commercial center.

Finding: Although not in strict compliance with the design standards, Staff finds the project is consistent with the Code's general purpose and intent per Section 070.060.050(d)(3)e.3.ii. The proposal protects the public health, safety, and welfare of the city and implements the policies, goals, and strategies adopted by the City, including those set forth in the Comprehensive Plan.

Criteria **070.060.050(d)(3)e.3.iii**	**Compliance** **Yes**

Project minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city.

Analysis: As outlined above, staff does not believe the project constitutes a negative impact to surrounding properties or the health, safety, and welfare of the city's inhabitants. The project allows the airport to continue operation and for the South Bridge project to move forward.

Finding: Staff finds that the application complies with Section 070.060.050(d)(3)e.3.iii of the Code as it minimizes impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the City.

PUBLIC COMMENT

Notice of the application was published in the *Glenwood Springs Post Independent* on July 17 and 24, 2026, mailed to adjacent property owners on July 15, and posted on July 17, per

the requirements of Section 070.060.030 of the Code. As of the drafting of this staff report, the City has not received any comments related to the proposal.

REVIEWING AGENCY COMMENTS

The Building Department and Fire Department have reviewed the application and are comfortable not requiring fire sprinklers in the relocated airplane hangar.

The Engineering Department is managing this project and will be available to answer questions.

ACTION ALTERNATIVES AND RECOMMENDATION

Per Section 070.060.050(d)(3)e.1 of the Code, the Commission may approve, approve with conditions, or deny the application. Additionally, the Commission may remand the application to the Director for further consideration.

Action 1 – Location and Extent Review - Consideration of a Location and Extent Review application for the relocation of a hangar and maintenance shed totaling 19,050 square feet.

Staff Recommendation: Staff recommends **approval with the conditions** as outlined in the motion below because the application complies for the approval criteria for a Location and Extent Review.

Recommended Motion:
I move to **approve with conditions** this Location and Extent Review with the findings and conditions outlined in the staff report.

Suggested Findings:
1. The proposal is consistent with the Comprehensive Plan and other City plans and policies;
2. The proposal is consistent with the general purpose and intent of this Code; and
3. The proposal minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city.

Suggested Conditions:
1. The applicant shall comply with all verbal representations made in the public hearings, as outlined in all application materials, and/or as revised per conditions herein and approved by the Community Development Director.
2. Prior to construction, applicant shall submit building and/or grading permit, as required.

3. The applicant shall provide exterior building color samples for Community Development Director review and approval at the time of building permit submission. The proposed colors shall be earth-tone.
4. The applicant shall provide lighting manufacturer information for all exterior lighting. Lighting shall be reviewed and approved by the Community Development Director prior to installation.
5. Any future physical changes to or improvements on the property are subject to the review and approval of the Community Development Director for compliance with applicable requirements of the Glenwood Springs Municipal Code.

City of Glenwood Springs
101 West 8th Street, Glenwood Springs, CO 81601

Ryan Gordon, PE, City Engineer
970-384-6413 (o)
ryan.gordon@cogs.us

June 2, 2026

RE: Location & Extent Review Application for Airport Buildings associated with the South Bridge Project

Dear Planning and Zoning Commission,

The City of Glenwood Springs (City) submits this Location and Extent Review application for the construction of a new airport maintenance building the relocation of the existing airplane hanger. These activities are required as part of the South Bridge Project.

INTRODUCTION

The City, in coordination with Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT), are planning to construct the South Bridge Project (Project) in the City of Glenwood Springs and unincorporated Garfield County. The Project will create secondary access connecting residents, public users, and businesses south of Glenwood Springs and west of the Roaring Fork River to State Highway 82 (SH 82).

The Project will address limited connectivity across the Roaring Fork River and current reliance on existing routes for access to SH 82. The Project will construct a new bridge across the Roaring Fork River and associated roadway improvements to provide access between SH 82 and neighborhoods east of Airport Road in Glenwood Springs. The Project will also provide a second paved evacuation route to connect the residents of the South Corridor with SH 82. The new route will improve emergency evacuation, emergency service access, and will support connectivity for residents, businesses, and the traveling public.

The new route directly impacts the existing maintenance building and hanger. The route goes through the maintenance building and will cutoff the hanger from the airport, and as a result, the buildings will need to be relocated.

EXISTING BUILDINGS

The existing hanger is 55ft x 230 ft x 20ft and can house up to 10 planes in a nested-T configuration. The hanger does not have water, sewer or other utilities except for electricity. The hanger has a door on tracks on the west side and is open on the east side, see Photos 1 and 2. The hanger was constructed in the 1970's (exact date is not known) and is in good condition

and relocation instead of replacement is appropriate. A structural analysis is underway but the hanger to identify modifications to bring the hanger up to code.



Figure 1 - Hanger East Facing



Figure 2 - Hanger West Facing

The maintenance building is 60ft x 60ft x 20 ft and is used to for general maintenance of airplanes and other aviation equipment; a 20ft x 40ft trailer is attached to the building used for office space. The building has water, electricity (provided by the City) and gas (provided by Black Hills Energy); wastewater is handled by an on-site wastewater treatment system (OWTS). The building has some insultation but does not have a fire suppression system. A 48ftx18ft door is located on the south wall to allow for planes to enter and exit the building as well as a single personnel door; see Photo 3.



Figure 3 - Existing Maintenance Building

PROPOSED BUILDINGS

The hanger is proposed to be deconstructed and relocated to the north; see Figure 1 – Site Plan. The area will be graded and a new foundation will be constructed. The recommendations from the structural analysis will be implemented to bring the hanger up to current building codes.

The existing maintenance building will be demolished and properly disposed. A new 80ftx80ftx20ft building will be constructed to the north; see Figure 1 – Site Plan. City water, electric and broadband will be provided to the building and Black Hills gas will be provided. An OWTS will be provided to handle wastewater from the building. The building will be constructed to current building codes and will be insulated and a fire suppression system will be included. A 65ftx18ft door and two personnel doors will be provided for egress. The building color will match the existing building exterior.

New pavement will be placed around the maintenance building and hanger that will generally match the limits of the existing pavement in order to connect the runway to the hanger and the maintenance building.

FOUNDATION DESIGN AND GEOTECHNICAL CONSIDERATIONS

The foundations for both buildings has not been completed.

Once the structural analysis has been complete for the hanger, the foundation design will be completed so the design can account for any additional loads that may be required to bring the building up to code.

The maintenance building foundation design is underway and

A geotechnical report is being prepared for the site. We do not anticipate issues and the foundation design should be straightforward given recent construction in the area. The City recently constructed a building similar to the proposed maintenance building at the streets lot immediately to the south of proposed location. A geotechnical report was prepared for the streets building and no issues were observed; we anticipate similar results for the geotechnical analysis for the proposed airport buildings.

PROJECT NEED AND FIT

The construction and relocation of the buildings fits into the airports' long-term vision and goals. In 2025, the airport started a master plan effort to layout out the airport for current and future uses. The City has worked extensively with the airport to determine the new location of the buildings as shown on Figure 1 – Site Plan. The location of the buildings has been incorporated in the airports planning documents.

DRAINAGE

The airport has an established stormwater management plan which consists of dry wells in the northern reach and vegetated swales on either side of the runway sloping from the north to the south to an outfall that discharges to the Roaring Fork River. Stormwater has historically infiltrated and it's rare that water makes it to the outfall.

The construction and relocation of the buildings – including new pavement, will result in a net increase in impervious area of 600 sf. Table 1 shows the change in impervious areas due to the work.

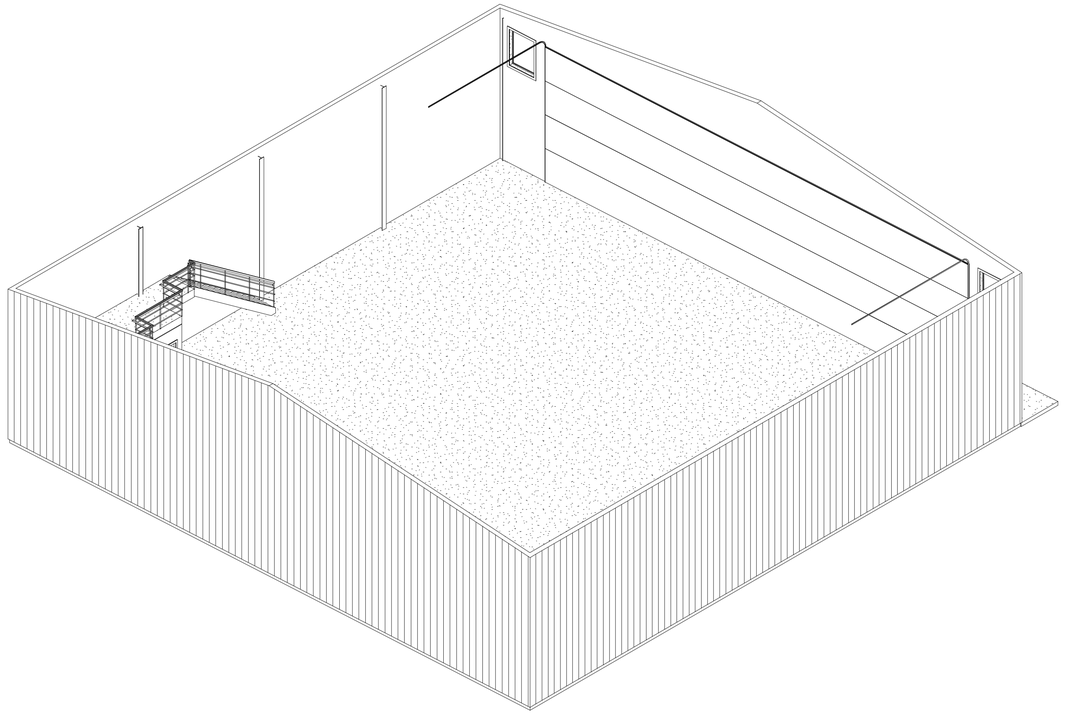
Table 1 - Stormwater Areas

	Existing Area (SF)	Proposed Area (SF)
Hanger	12,650	12,650
Maintenance Building	4,400	6,400
Paved Area/Impervious Area	39,200	37,800
TOTAL	56,250	56,850

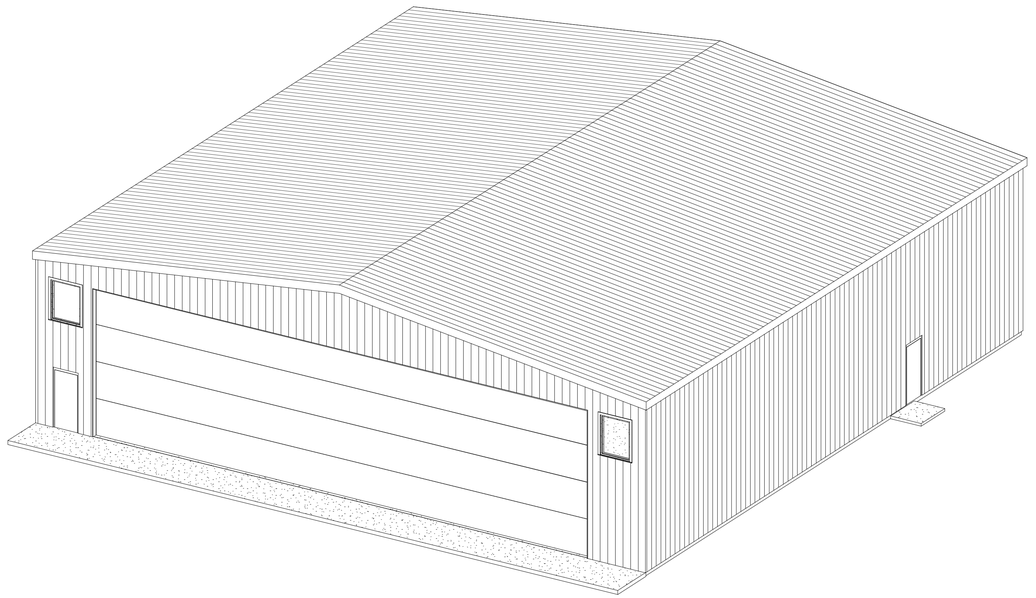
The site is graded to direct stormwater to north of the maintenance shop to a new vegetated swale and also to the east to the existing vegetated located adjacent to the runway. The amount of additional impervious area that is added due to the new elements is insubstantial and the existing facilities will adequately accommodate the additional stormwater.

Sincerely,

Ryan Gordon, PE, City Engineer
City of Glenwood Springs
970-384-6413 (o)
ryan.gordon@cogs.us



2 3D 2



1 3D 1

CADFISH LLC
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Phone (970) 618-0230

ISSUE DATES
4.15.26 Preliminary

City of Glenwood Springs
Aircraft Maintenance Building
Glenwood Springs CO

Designed By: MH, RG
Checked By: MH, RG

TITLE
3D

SHEET
A0

GENERAL NOTES:
- BUILDING SIZE: 6400 SQ. FT..

- BUILDING USE & OCCUPANCY: AIRCRAFT MAINTENANCE BUILDING
- OCCUPANCY: S-1 AIRCRAFT RELATED OCCUPANCY PER SEC.311.2 & 412 IBC 2021

- DISTANCE TO PROPERTY LINES: 30 FT., MIN.
- DISTANCE TO ASSUMED PROPERTY LINE BETWEEN BUILDINGS ON THE SAME LOT (SEE SITE PLAN) : 30 FT., MIN.
FIRE RESISTANCE EXTERIOR WALLS - NON RATED
OPENINGS IN EXTERIOR WALLS: NON-RATED

- OCCUPANT LOAD: LEVEL 1: 6400/500 = 13
MEZZANINE: 180/500 = 1
BLDG. TOTAL: = 14

- TYPE OF CONSTRUCTION : IIB

- FIRE SUPPRESSION SPRINKLER SYSTEM: GROUP III PER TABLE 412.3.6 IBC, NFPA 409
VERIFY REQUIREMENTS FOR FIRE SUPPRESSION & ALARM SYSTEMS WITH THE GLENWOOD SPRINGS FIRE DEPARTMENT & PROVIDE PLANS AS REQUIRED BY THE FIRE DEPARTMENT AS A DEFERRED SUBMITTAL
- PROVIDE FIRE EXTINGUISHERS AS REQUIRED BY FIRE DEPARTMENT

- ALL CONSTRUCTION SHALL COMPLY WTH THE IBC, IPC, IMC, IFGC, IFC 2021 & THE IECC 2021 AS ADOPTED & AMENDED BY THE CITY OF GLENWOOD SPRINGS, AND, THE NEC AS ADOPTED & AMENDED BY THE CITY OF GLENWOOD SPRINGS

2021 INTERNATIONAL ENERGY CODE NOTES:
- ALL CONSTRUCTION TO COMPLY WITH 2021 IECC AS ADOPTED BY THE CITY OF GLENWOOD SPRINGS, PRESCRIPTIVE COMPLIANCE (C401.2.1 IECC 2021) INCLUDING BUT NOT LIMITED TO BUILDING ENVELOPE REQUIREMENTS (INSULATION R OR U VALUES, FENESTRATION U-VALUE, AIR LEAKAGE, AIR BARRIERS, FENESTRATION AIR LEAKAGE, FUEL BURNING APPLIANCES, BUILDING MECHANICAL SYSTEMS, BUIIDING, SERVICE WATER HEATING, ELECTRIC POWER AND LIGHTING SYSTEMS

- FLOOR DESIGN LOAD - 125 PSF LIVE LOAD
- WIND DESIGN LOAD - 110 MPH EXPOSURE B
- TRUSS/ROOF DESIGN LOAD - 50 PSF GROUND SNOW LOAD, MIN.

- BUILDING TO BE HEATED WITH DIRECT VENT OVERHEAD GAS OR ELECTRIC UNIT HEATERS. SEE IECC NOTES, PLANS, AND DETAILS.

-SEE IECC NOTES, PLANS, AND DETAILS FOR INSULATION, WINDOW AND DOOR SPECIFICATIONS, AND OTHER ENERGY RELATED ITEMS
-PLUMBING, ELECTRICAL, MECHANICAL, AND HVAC BY OWNER AND PROJECT MEP ENGINEER AS REQUIRED BY OWNER AND BUILDING DEPARTMENT.

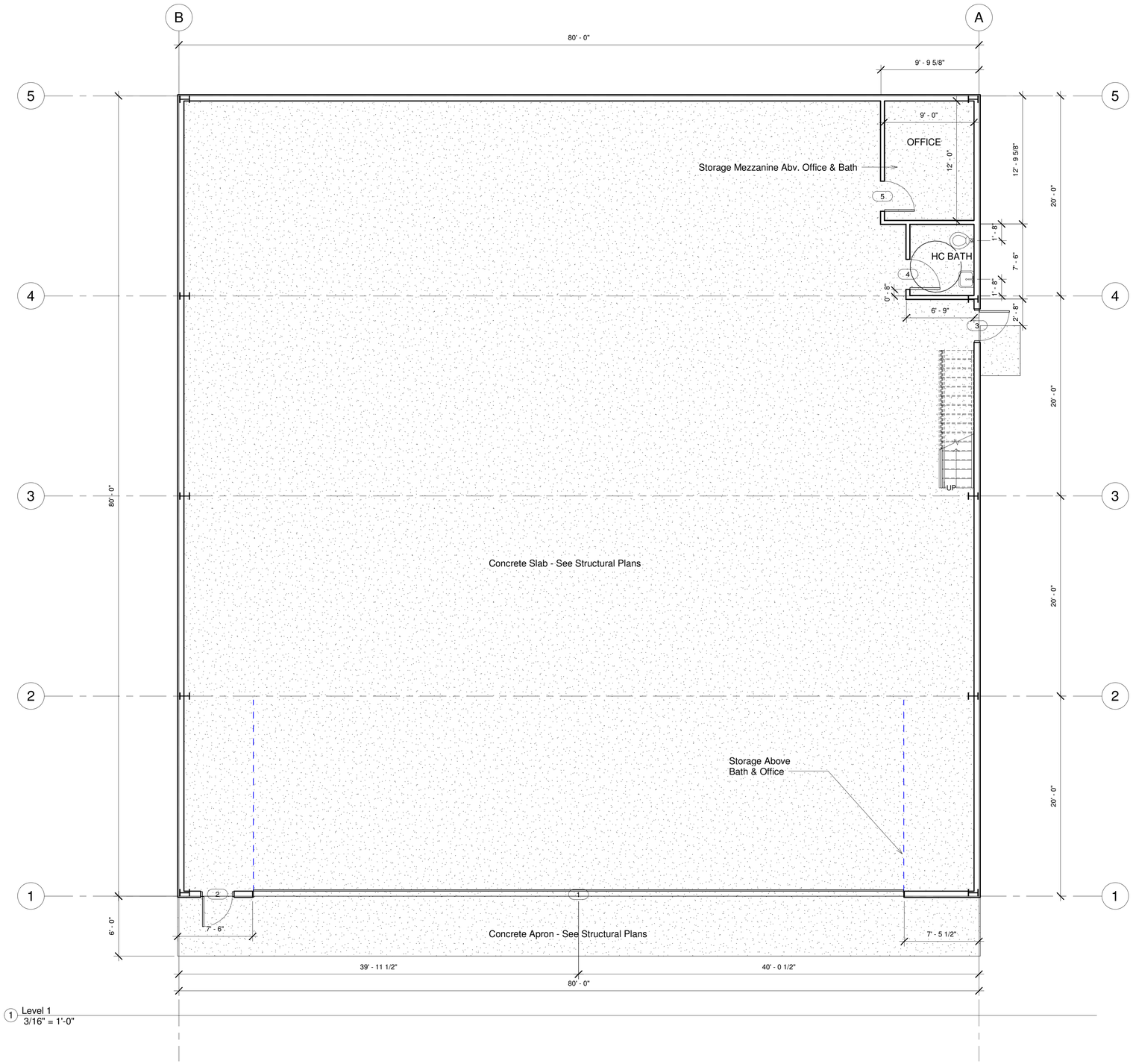
- PROVIDE ILLUMINATED EXIT SIGNS AND EXIT ILLUMINATION AT ALL EXITS AS REQUIRED BY OWNER, IBC 2021, AND FIRE DEPARTMENT

- GLAZING IN HAZARDOUS LOCATIONS SHALL BE SAFETY GLAZING PER SEC. 2406 IBC 2021

- INTERIOR FINISHES SHALL BE CLASS C OR BETTER AND COMPLY WITH SEC. 803., TABLE 803.11. IBC 2021.
REFER TO METAL BUILDING MANUFACTRURER PLANS.
- INSULATION SHALL COMPLY WITH SEC. 720, 807 IBC 2015, IECC 2021
- MECHANICAL VENTILATION OF VEHICLE EXHAUST SHALL BE PROVIDED PER IMC SEC. 403. DESIGN TO BE PROVIDED BY PROJECT MECHANICAL ENGINEER AS REQUIRED BY OWNER AND BUILDING DEPARTMENT.
- GUTTERS, DOWN SPOUTS, AND SNOW SLIDES TO BE INSTALLED ON AS REQUIRED BY OWNER AND / OR ENGINEER. SEE DESIGN BY GUTTER SUPPLIER &/OR GUTTER INSTALLER.
- PROVIDE SITE DRAINAGE AWAY FROM BUILDING PER SOILS REPORT AND CIVIL ENGINEERING PLANS
- SLOPE SLAB TO DRAIN TO GARAGE DOORS PER ENGINEER PLANS. VERIFY SLOPE PITCH WITH OWNER.

INSTALL ALL STAIRS PER 1011, 1014, 1015 IBC 2021
- 7 " RISE, MAX.
- 10 " RUN, MIN.
- HANDRAILS 34" - 42" ABV. TREADS, INSTALL PER 1011, 1014.
- INSTALL GUARDRAILS @ DECKS 30" OR MORE ABV. FINISH GRADE GUARDRAILS 42" ABV. LANDINGS & DECKS, MIN., 4" SPACING MAX, EXC. 21" SPACING, MAX. FOR STORAGE MEZZANINE. GUARDS TO BE INSTALLED PER 1015, TYP.
- VERIFY HANDRAIL & GUARDRAIL DETAILS WITH OWNER PRIOR TO INSTALLATION
- PROVIDE 6 '8" HEADROOM MIN. AT STAIRS
- INSTALL 5/8 TYPE X DRYWALL ON WALLS, CEILINGS, AND UNDERSIDE OF STAIR STRINGERS OF ENCLOSED USEABLE SPACE UNDER STAIRS

(2) Notes 1
1/2" = 1'-0"



(1) Level 1
3/16" = 1'-0"

Door Schedule						
Mark	Count	Family	Width	Height	Description	Comments
1	1	Door-Garage-Flush_Panel	65' - 0"	18' - 0"		Exterior
2	1	Door-Passage-Single-Flush	3' - 0"	7' - 0"		Exterior
3	1	Door-Passage-Single-Flush	3' - 0"	7' - 0"		Exterior
4	1	Single-Flush	3' - 0"	7' - 0"		Interior
5	1	Single-Flush	3' - 0"	7' - 0"		Interior

Window Schedule						
Mark	Count	Family	Width	Height	Description	Comments
A	1	Fixed with Trim	4' - 0"	5' - 0"		
A	1	Fixed with Trim	4' - 0"	5' - 0"		

- GLAZING IN HAZARDOUS LOCATIONS SHALL BE SAFETY GLAZING PER SEC. 2406 IBC 2021

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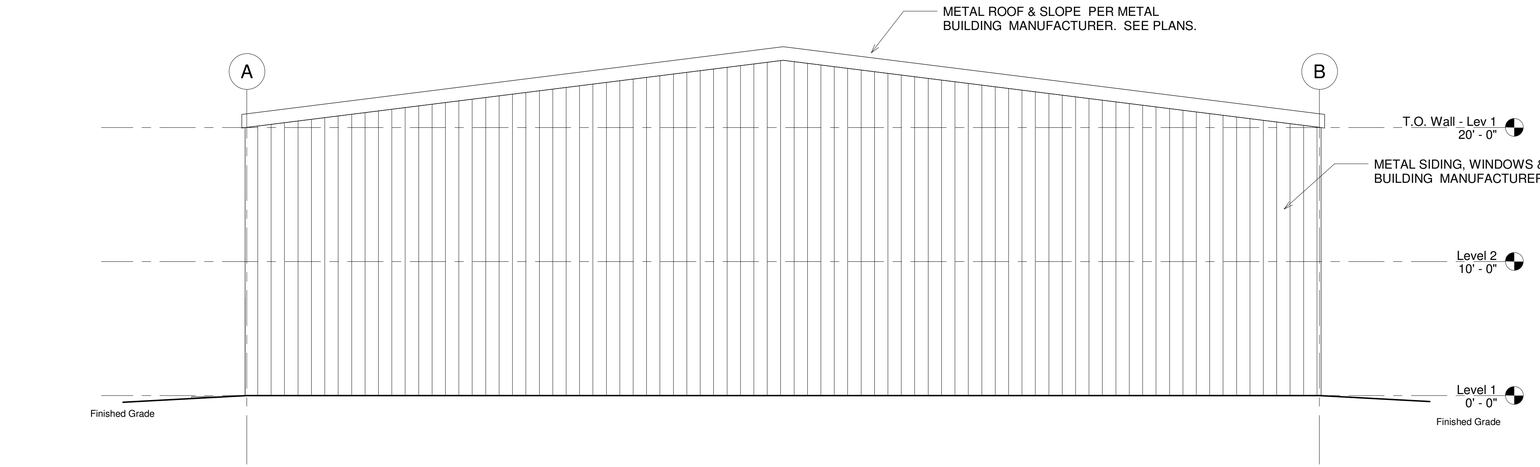
ISSUE DATES
4.15.26 Preliminary

City of Glenwood Springs
Aircraft Maintenance Building
Glenwood Springs CO

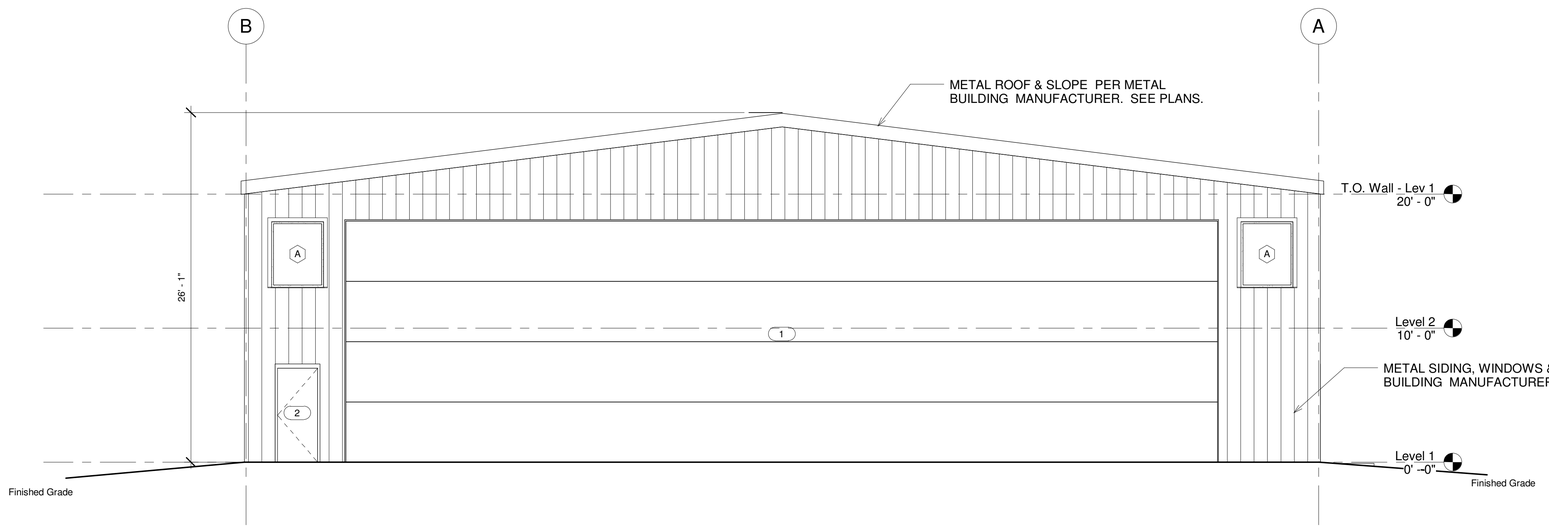
Designed By: MH, RG
Checked By: MH, RG

TITLE
Floor Plan - Schedule - Notes

SHEET
A1



2 East
3/16" = 1'-0"



1 West
3/16" = 1'-0"

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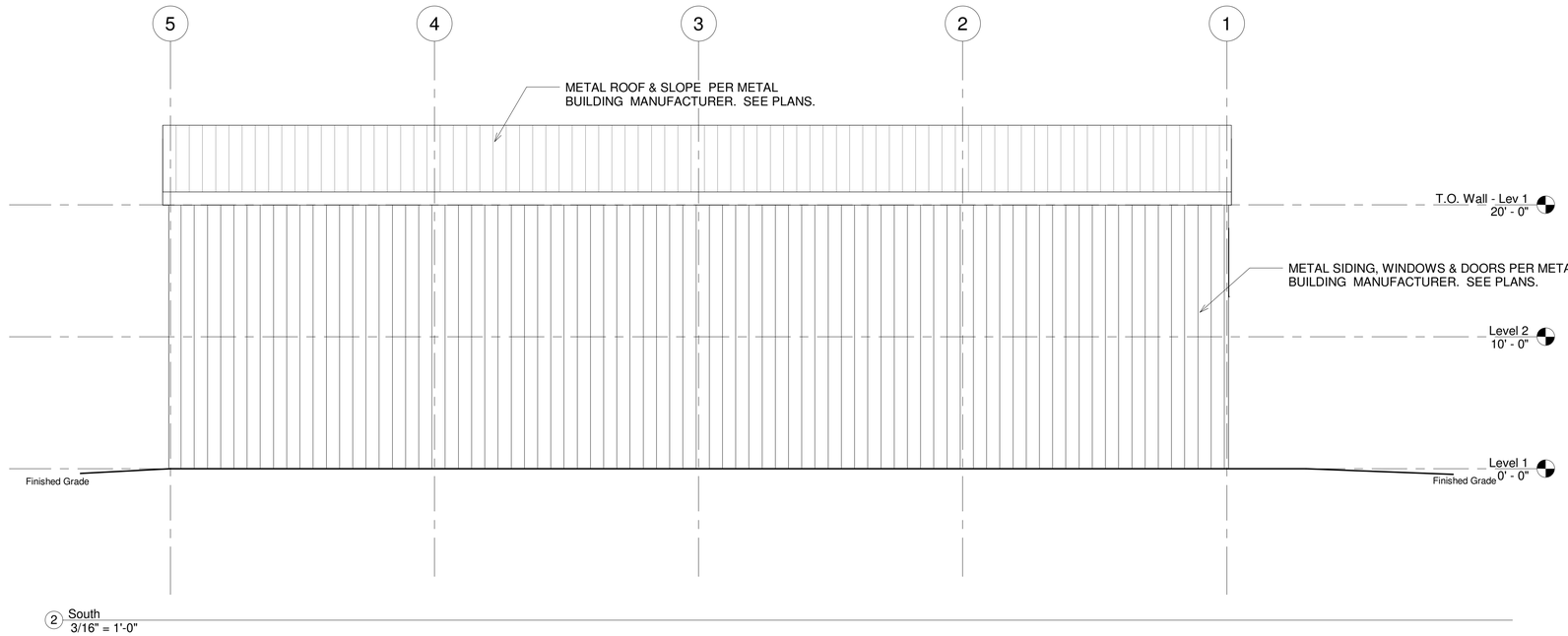
ISSUE DATES
4.15.26 Preliminary

City of Glenwood Springs
Aircraft Maintenance Building
Glenwood Springs CO

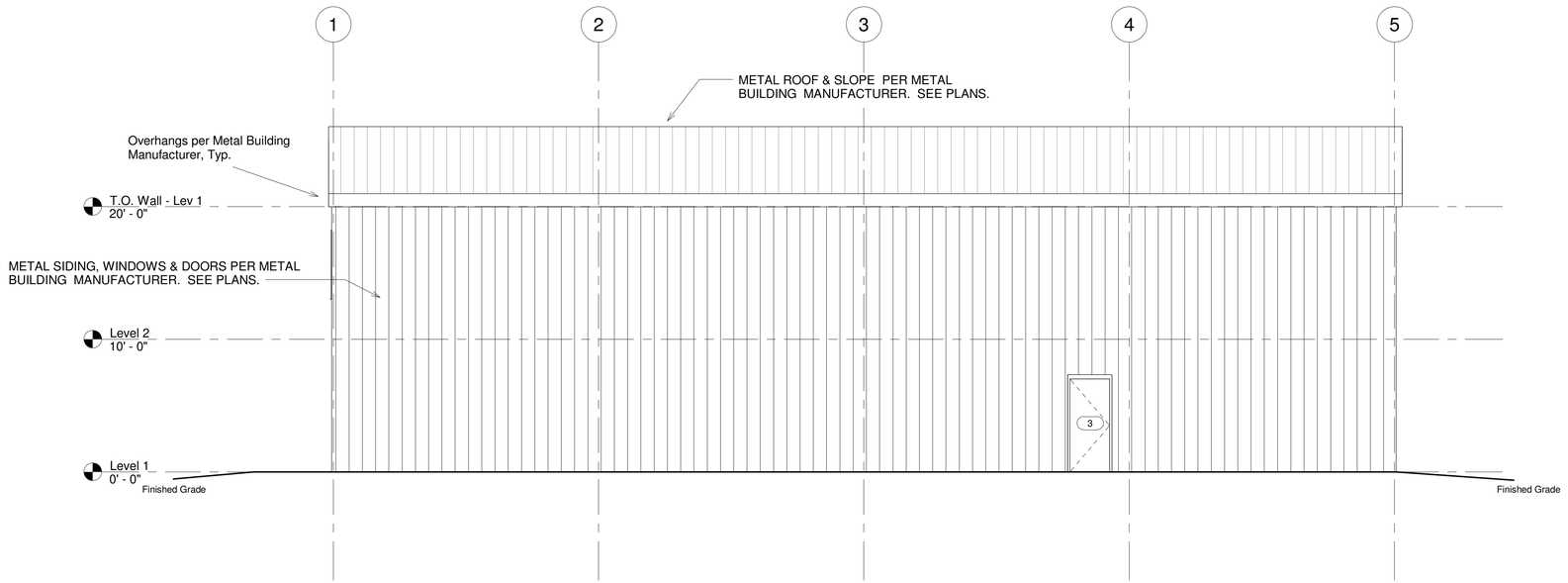
Designed By: MH, RG
Checked By: MH, RG

TITLE
Elevations

SHEET
A2



2 South
3/16" = 1'-0"



1 North
3/16" = 1'-0"

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CAD Drafting, Design, Planning, Construction Management
80 Sagewood Court, Basalt, Colorado 81621
Phone (970) 618-6280

ISSUE DATES
4.15.26 Preliminary

City of Glenwood Springs
Aircraft Maintenance Building
Glenwood Springs CO

Designed By: MH, RG
Checked By: MH, RG

TITLE
Elevations

SHEET
A3







0' 20' 40' 120'

AIRPORT RUNWAY

5910

40'

RSA

ROF/ACFZ

15' BRL

1.3%

281'

1.0%

35'

231'

90'

1.2%

60'

HANGERS
FFE: 5913.00

DW

5912

5914

5916

5918

5920

5922

5924

3.0:1

4.5:1

SHOP
FFE:5813.50'

270'

30'

1.8%

0.9%

PROPOSED SPECIAL USE PATH

AIRPORT ROAD

REV	DESCRIPTION	DATE

CITY OF GLENWOOD SPRINGS
101 WEST 8TH STREET
GLENWOOD SPRINGS, CO 81601

L&E SITE PLAN APPLICATION

CITY OF GLENWOOD SPRINGS
ENGINEERING

SITE PLAN
JUNE 8TH, 2026

SCALE: 1" = 20'
SHEET 1 OF 1

Airport Data Table			
Airport Data	**Existing**	**Future**	**Ultimate**
Airport Elevation (Feet MSL, NAVD 88)	5,921.5'	Same	Same
Airport Reference Point (ARP) (NAD83(2011))			
Latitude	N 39° 30' 21.47"	Same	Same
Longitude	W 107° 18' 32.81"	Same	Same
Mean Daily Max. Temp. of Hottest Month	88.6 °F	Same	Same
Airport Reference Code (ARC)	A/B-I(S)	Same	Same
Critical Aircraft (Typ.)	Cessna 172 Skyhawk AAC - A ADG - I (Small) TDG - 1A	Same	Same
Airport NAVAIDs - Owner	PAPI-2L (1) - Airport	Same	Same
Miscellaneous Facilities	MicroTower WDC (2)	Same	Same
Magnetic Declination & Accur. - Change Rate	8° 43' E ± 22' - 5' W / Year	Same	Same
Magnetic Declination Date & Source	NOAA NCEI (June 2025)	Same	Same
2025-2029 NPIAS Service Level	N/A	Same	Same
2025-2029 NPIAS Asset Role	N/A	Same	Same
2020 CASP Service Role	GA-Local	Same	Same
Combined Wind Coverage			
All Weather	No Data @ 10.5 kts	Same	Same

Airport Data Table Notes:
- No hourly/sub hourly surface weather observation data is currently available at GWS.
- 10.5 Knots is the Maximum Allowable Crosswind Component for Runways having a RDC of A/B-I (SA).

All Weather Wind Coverage Table				
Runway	**10.5 Knots**	**13 Knots**	**16 Knots**	**20 Knots**
Runway 15-33	No Data	No Data	No Data	No Data
Runway 15	No Data	No Data	No Data	No Data
Runway 33	No Data	No Data	No Data	No Data

Wind Data Source:
- No hourly/sub hourly surface weather observation data is currently available at GWS.
- Station: N/A
- Years of Data: N/A

Wind Rose Tables Notes:
NOAA wind directions are based on True North. Percent wind coverage is evaluated on the the basis of crosswinds not exceeding 10.5 knots for runways having a RDC of A/B-I-VIS.
Meteorological conditions:
- Visual flight rules are in effect when ceiling is at or above 1,000' and visibility is greater than 3 miles.
- Instrument flight rules are in effect when either ceiling is below 1,000', or visibility is lower than 3 miles.

Taxiway Data Table			
Description	**Taxiways & Taxilanes (Modified Standard)**		
	Existing	**Future**	**Ultimate**
Taxiway Design (ADG - TDG)	I - 1A	Same	Same
Taxiway Pavement Width (Straight)	20'	Same	Same
Taxiway Edge Safety Margin	3.5'	Same	Same
Taxiway Shoulder Width	None	Same	Same
Taxiway Safety Area Width	39'	Same	Same
Taxiway Object Free Area Width	79'	Same	Same
Taxilane Object Free Area Width	69'	Same	Same
Taxiway Lighting	None	Same	Same

Taxiway Data Table Notes:
- Penetrations to TOFA: None
- The modified standards applied for taxiway protection and separation are less stringent than the FAA design standards for A/B-I (Small) aircraft, and have been calculated based on the standard FAA wingtip clearance for TOFAs and T_6 OFAs applied to a maximum aircraft wingspan of 39 feet (Cessna T210 Turbo Centurion) instead of the standard 49 feet of the critical aircraft for the ADG I grouping

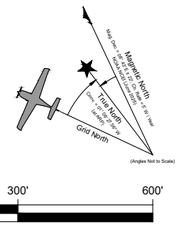
Declared Distances						
	Runway 15			**Runway 33**		
	Existing	**Future**	**Ultimate**	**Existing**	**Future**	**Ultimate**
TORA	3,310	Same	Same	3,310	Same	Same
TODA	3,310	Same	Same	3,310	Same	Same
ASDA	3,310	Same	Same	3,310	Same	Same
LDA	3,310	Same	Same	3,310	Same	Same

Declared Distances Table Notes:
- At the time of writing, there are no published declared distances at GWS.

Runway Data Table						
Description	**Runway 15-33 (Formerly Runway 14-32)**					
	Runway 15			**Runway 33**		
	Existing	**Future**	**Ultimate**	**Existing**	**Future**	**Ultimate**
Runway Design Code (RDC)	A/B-I(S)-VIS	Same	Same	A/B-I(S)-VIS	Same	Same
Approach Reference Code (APRC)	N/A	Same	Same	N/A	Same	Same
Departure Reference Code (DPRC)	N/A	Same	Same	N/A	Same	Same
Percent (%) Wind Coverage (All Weather)	No Data @ 10.5 kts	Same	Same	No Data @ 10.5 kts	Same	Same
Runway Dimensions (Length x Width)	3,310' x 50'	3,310' x 60'	Same	3,310' x 50'	3,310' x 60'	Same
Runway End Coordinates (NAD83(2011))	N 39° 30' 36.14" W 107° 18' 42.14"	Same	Same	N 39° 30' 06.80" W 107° 18' 23.49"	Same	Same
Runway End Elevation (Feet MSL, NAVD 88)	5,921.5'	Same	Same	5,909.7'	Same	Same
Disp. Thresh. Coordinates (NAD83(2011))	N/A	Same	Same	N/A	Same	Same
Disp. Thresh. Elevation (Feet MSL, NAVD 88)	N/A	Same	Same	N/A	Same	Same
Disp. Thresh. Distance (Feet)	N/A	Same	Same	N/A	Same	Same
Touchdown Zone Elev. (Feet MSL, NAVD 88)	-	Same	Same	-	Same	Same
High Point / Low Point (Feet MSL, NAVD 88)	5,921.5' / 5,909.7'	Same	Same	5,921.5' / 5,909.7'	Same	Same
Effective Gradient Maximum Gradient	- 0.35 % - 0.70 %	Same	Same	0.35 % 0.70 %	Same	Same
Pavement Type	Asphalt	Same	Same	Asphalt	Same	Same
Pavement Strength	15,000 lbs (S)	Same	Same	15,000 lbs (S)	Same	Same
Surface Treatment	None	Same	Same	None	Same	Same
Runway Lighting Type	None	Same	Same	None	Same	Same
Runway Marking Type	Visual	Same	Same	Visual	Same	Same
Runway Blast Pad Dimensions (Length x Width)	None	Same	Same	None	Same	Same
Runway Shoulder	None	Same	Same	None	Same	Same
14 CFR Part 77 Approach Category	A(V)	Same	Same	A(V)	Same	Same
14 CFR Part 77 Approach Surface Slope	20:1	Same	Same	20:1	Same	Same
Approach Visibility Minimums	Visual	Same	Same	Visual	Same	Same
Type of Aeronautical Survey Required for Approach	Non-Vertically Guided	Same	Same	Non-Vertically Guided	Same	Same
Threshold Siting Surface (TSS)	Type 2, 20:1 Penetrations (46 Exst./26 Fut.)	Same	Same	Type 2, 20:1 Clear	Same	Same
Vertical Guidance Surface (VGS)	N/A	Same	Same	N/A	Same	Same
Departure Surface	N/A	Same	Same	N/A	Same	Same
Instrument & Visual NAVAIDs	None	Same	Same	PAPI-4L	Same	Same
Runway Safety Area (RSA) Width: Length Beyond Departure End: Length Prior to Threshold:	120' 240' (Less in the Field) 240' (Less in the Field)	Same	Same	120' 240' (Less in the Field) 240' (Less in the Field)	Same	Same
Runway Object Free Area (ROFA) Width Length Beyond Departure End Length Prior to Threshold	175' (Modified Standard) 240' (Less in the Field) 240' (Less in the Field)	Same	Same	175' (Modified Standard) 240' (Less in the Field) 240' (Less in the Field)	Same	Same
Obstacle Free Zone (OFZ) (POFZ: Y/N; IAOFZ & ITOFZ: Y/N) Width Length Beyond Runway End	N; N 175' (Modified Standard) 200' (Less in the Field)	Same	Same	N; N 175' (Modified Standard) 200' (Less in the Field)	Same	Same
Runway Protection Zone (RPZ) Inner Width Outer Width Length	APP DEP 250' 250' 450' 450' 1,000' 1,000'	Same	Same	APP DEP 250' 250' 450' 450' 1,000' 1,000'	Same	Same

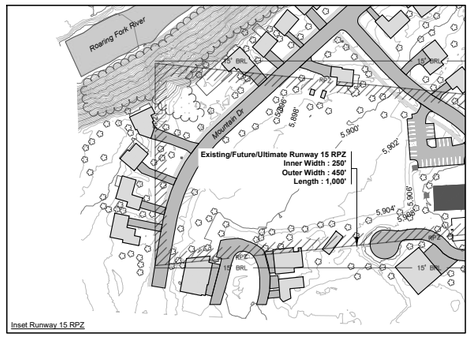
Runway Data Table Notes:
- Runway 14-33 was renumbered Runway 15-33 in XXX 2026 due to change in magnetic declination.
- Runway 15-33 meets line of sight requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1.
- There currently are no displaced threshold at GWS. No displaced threshold are planned in the future.
- The current published pavement strength of Runway 15-33 is 15,000 pounds (S). However, Runway 15-33 is designated as a Utility Runway because it is intended to be used by propeller driven aircraft weighing 12,500 pounds or less. According to RunwayStatd data, over 99.9 percent of aircraft using the runway annually have a maximum gross weight under 12,500 pounds.
- The modified standards applied for runway protection and separation are less stringent than the FAA design standards for A/B-I (Small) aircraft, and have been calculated based on an aircraft wingspan of 39 feet (Cessna T210 Turbo Centurion) instead of the standard 49 feet of the critical aircraft for the ADG I grouping.
- The lengths observed in the field for the RSA, ROFA, and ROFZ beyond the departure end and prior to the threshold are approximately 120 feet for Runway 15 (full width) and 80 feet for Runway 33 (partial width).

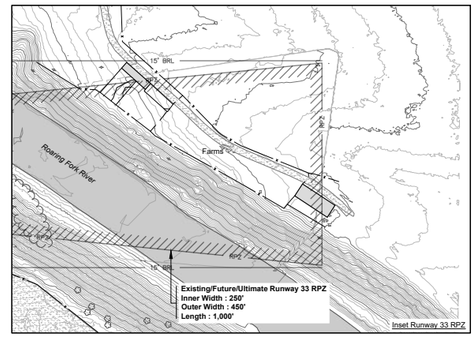
City of Glenwood Springs, Colorado Approval:	KGWS Sumers Airpark Approval:
_____	_____
Title: _____	Title: _____
Date: _____	Date: _____

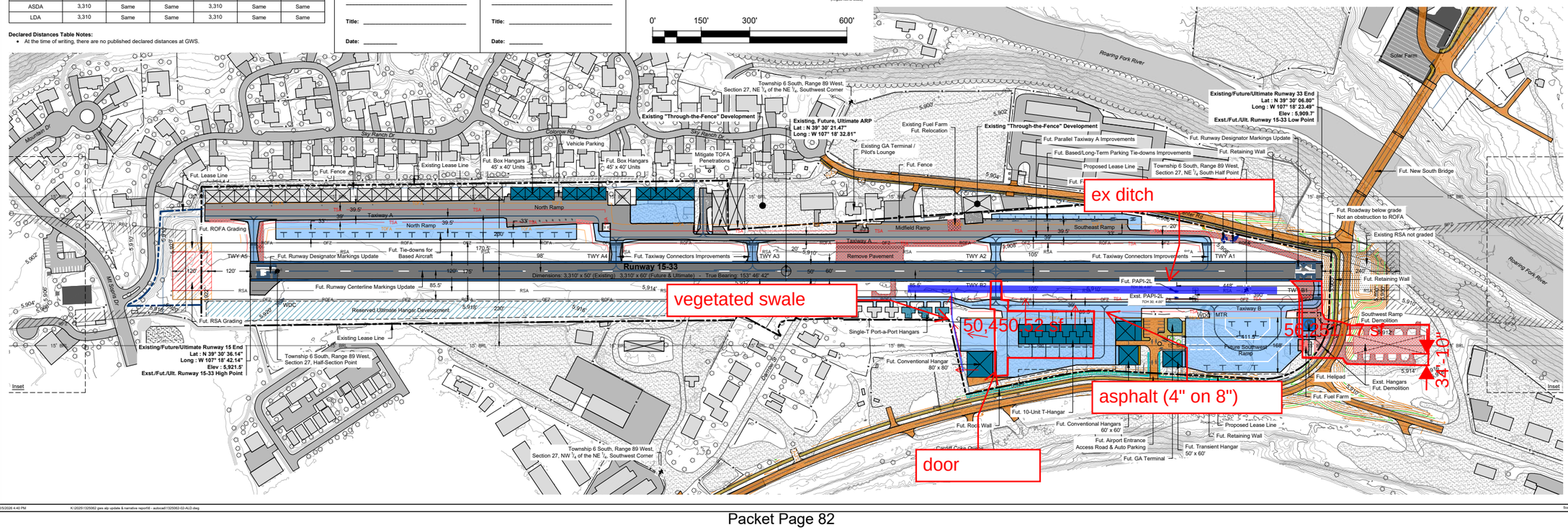


Legend							
Description	**Existing**	**Future**	**Ultimate**	**Description**	**Existing**	**Future**	**Ultimate**
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
Airport Reference Point (ARP)		-	-	Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
PLSS Section Corner (Accepted/Not Determined)		-	-	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
On-Airport Building/Hangar				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Airport Leasing Line				2-Light Precision App. Path Indicator (PAPI-2L)			-
Off-Airport Building		-	-	Wind Cone (WDC)			
Roadway / Driveway / Parking (Paved /Unpaved)				MicroTower Weather System			-
Pavement Demolition	-			Storm Pipes / Culverts & Ditches		-	-
Trees		-	-	-	-	-	-
Water Body & Streams		-	-	-	-	-	-
Fence	x	x	x	-	-	-	-
Topographic Contours	1,000'	-	-	-	-	-	-

Notes:
1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. The nearest quadrangle corner is the southeast corner of USGS US Topo Map, Glenwood Springs, CO Quadrangle, 7.5-minute Series. The quadrangle corner is located approximately 3.2 miles east of the existing airport reference point.
5. Section corners shown are GIS data retrieved from the U.S. Bureau of Land Management Geospatial Data platform, Public Land Survey System (PLSS) Section Corners database. Township & Range per the 6th Principal Meridian.
6. Runway 15-33 meets Line-of-Sight (LOS) requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1. Refer to Sheet 8 of 14, "Runway 15-33 Centerline Profile" for further information.







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KGWS Sumers Airpark

No.	Date	Revisions
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Airport Layout Drawing

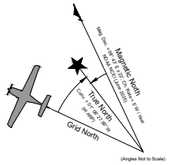
KGWS Sumers Airpark (GWS)

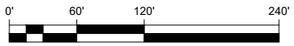
Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	2 of 14
Scale:	1" = 150'



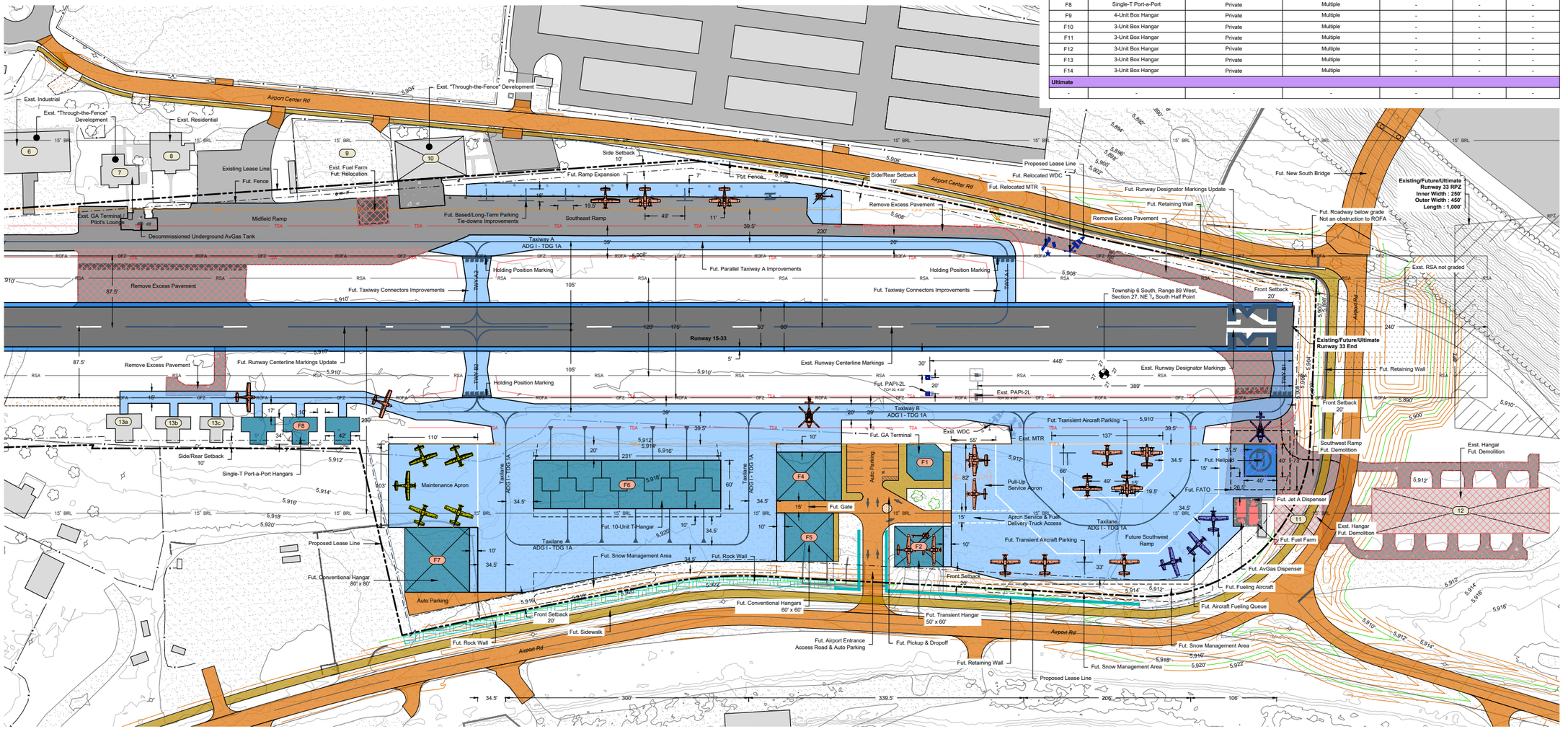


Legend							
Description	Existing	Future	Ultimate	Description	Existing	Future	Ultimate
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
Airport Reference Point (ARP)		-	-	Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
PLSS Section Corner (Accepted/Not Determined)		-	-	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
On-Airport Building/Hangar				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Airport Leasing Line				2-Light Precision App. Path Indicator (PAPI-2L)			-
Off-Airport Building		-	-	Wind Cone (WDC)			
Roadway / Driveway / Parking (Paved /Unpaved)				MicroTower Weather System			-
Pavement Demolition	-			Storm Pipes / Culverts & Ditches		-	-
Trees		-	-	-	-	-	-
Water Body & Streams		-	-	-	-	-	-
Fence	x	x	x	-	-	-	-
Topographic Contours	1,000'	-	-	-	-	-	-

Notes:

1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. The nearest quadrangle corner is the southeast corner of USGS US Topo Map, Glenwood Springs, CO Quadrangle, 7.5-minute Series. The quadrangle corner is located approximately 3.2 miles east of the existing airport reference point.
5. Section corners shown are GIS data retrieved from the U.S. Bureau of Land Management Geospatial Data platform, Public Land Survey System (PLSS) Section Corners database. Township & Range per the 6th Principal Meridian.
6. Runway 15-33 meets Line-of-Sight (LOS) requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1. Refer to Sheet 8 of 14, "Runway 15-33 Centerline Profile" for further information.
7. Setbacks shown per the City of Glenwood Springs Code, zone Light Industrial (I1) - front setback: 20 feet, side & rear setbacks: 10 feet.

Buildings / Facilities Table						
ID	Description	Owner	Operator / Tenant	Disposition	Top Elevation (Feet MSL)	Obstruction Marking / Lighting
Existing						
1	Conventional Hangar	Private (Heuer)	Classic Air Medical	-	5,937.2'	No
2	Single-T Port-a-Port	Private (Sinclair)	Sinclair	-	5,924.4'	No
3	Former CAP Building	KGWS Sumers Airpark	KGWS Sumers Airpark	-	5,923.0'	No
4	2-Unit Box Hangar	Private (Rudd)	Rudd	-	5,935.4'	No
5	2-Unit Shade Structure	Private TTF (Rudd)	Multiple TTF	-	5,930.4'	No
6	Warehouse & Storage Yard	Private	Industrial Storage	-	5,927.2'	No
7	GA Terminal / Pilot's Lounge	Private TTF (Rudd)	KGWS Sumers Airpark	Release from Use (Fut.)	2,924.2'	No
8	Residential	Private	Residential	-	5,934.0'	No
9	Storage Yard	Private	Industrial Storage	-	-	No
10	Conventional Hangar	Private TTF (Reeves)	Reeves	-	5,930.2'	No
11	Conventional Hangar	Aircraft Repair LLC	Aircraft Repair LLC	Remove (Fut.)	5,932.9	No
12	10-Unit T-Hangar	Private (Rudd)	Multiple	Remove (Fut.)	5,930.8'	No
13a	Single-T Port-a-Port	Private (Brown)	Brown	-	5,924.0'	No
13b	Single-T Port-a-Port	Private (Gwost)	Gwost	-	5,923.0'	No
13c	Single-T Port-a-Port	Private (Brown)	Brown	-	5,923.5'	No
14	Single-T Port-a-Port	Private TTF (Terry)	Terry	-	Unknown	No
15	1-Unit Shade Structure	Private TTF (Force)	Force	-	Unknown	No
16 (A)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,933.4'	No
17 (B)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,934.5'	No
18 (C)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,935.3'	No
19 (D)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,935.9'	No
20 (E)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,936.7'	No
21 (F)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,937.7'	No
Future						
F1	GA Terminal / FBO	KGWS Sumers Airpark	KGWS Sumers Airpark	-	-	-
F2	Transient Hangar	KGWS Sumers Airpark	KGWS Sumers Airpark	-	-	-
F3	Reserved	-	-	-	-	-
F4	Conventional Hangar	Private	Classic Air Medical	-	-	-
F5	Conventional Hangar	Private	EPIC	-	-	-
F6	10-Unit T-Hangar	Private	Multiple	-	-	-
F7	Maintenance Hangar	Aircraft Repair LLC	Aircraft Repair LLC	-	-	-
F8	Single-T Port-a-Port	Private	Multiple	-	-	-
F9	4-Unit Box Hangar	Private	Multiple	-	-	-
F10	3-Unit Box Hangar	Private	Multiple	-	-	-
F11	3-Unit Box Hangar	Private	Multiple	-	-	-
F12	3-Unit Box Hangar	Private	Multiple	-	-	-
F13	3-Unit Box Hangar	Private	Multiple	-	-	-
F14	3-Unit Box Hangar	Private	Multiple	-	-	-
Ultimate						
-	-	-	-	-	-	-



KGWS Sumers Airpark

No.	Revisions	Date
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Terminal Area Drawing - South

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	4 of 14
Scale:	1" = 60'

KGWS Sumers Airpark
Airport Layout Plan (ALP)

Glenwood Springs, Colorado

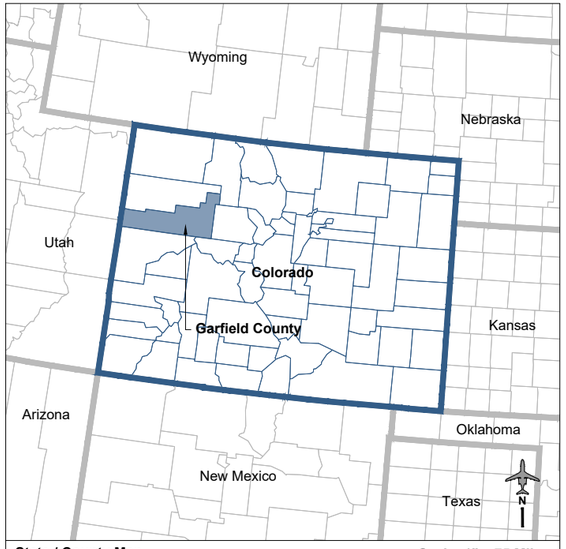
June 2026

Colorado DOT State Grant No.: 25-GWS-01

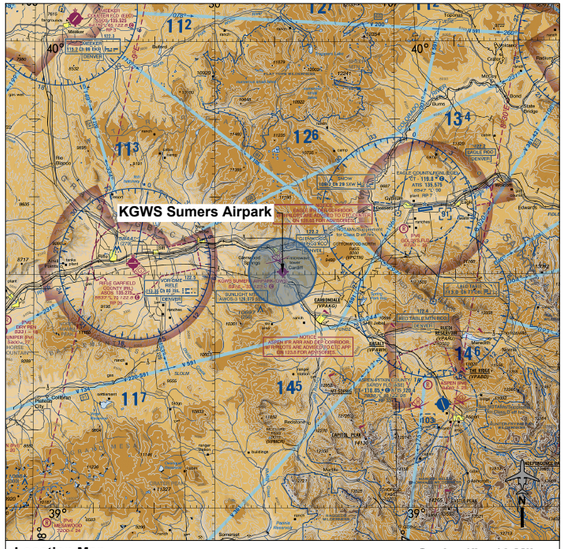
Drawing Index:

No.	Title	Rev. Date
1	Cover Sheet	06/01/2026
2	Airport Layout Drawing	06/01/2026
3	Terminal Area Drawing - North	06/01/2026
4	Terminal Area Drawing - South	06/01/2026
5	Airport Airspace Drawing	06/01/2026
6	Airport Airspace Drawing - Extended Centerline Profile	06/01/2026
7	Airport Airspace Drawing - Data Tables	06/01/2026

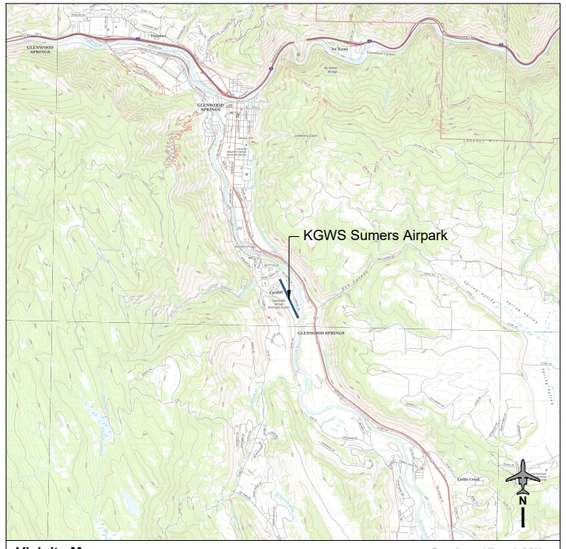
No.	Title	Rev. Date
8	Runway 15-33 Centerline Profile	06/01/2026
9	Inner Portion of the Approach Surface Drawing - Runway 15	06/01/2026
10	Inner Portion of the Approach Surface Drawing - Runway 33	06/01/2026
11	Inner Portion of the Approach Surface Drawing - Data Tables	06/01/2026
12	Airport - Community Land Use Compatibility Drawing	06/01/2026
13	Airport Area Terrain Map	06/01/2026
14	Airport Property Map	06/01/2026



State / County Map — Scale: 1" = 75 Miles



Location Map — Scale: 1" = 10 Miles



Vicinity Map — Scale: 1" = 1 Mile

Prepared for:
City of Glenwood Springs, Colorado
KGWS Sumers Airpark

Prepared by:
Dibble

KGWS Sumers Airpark

No.	Revisions	Date
1	----	----
2	----	----
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5	----	----

DRAFT

KGWS Sumers Airpark Approval:
Name: _____ Title: _____ Date: __/__/____ Signature:

City of Glenwood Springs, Colorado Approval:
Name: _____ Title: _____ Date: __/__/____ Signature:

DIBBLE

Date: 06/01/2026

2/3/2026 2:25 PM K:\2025\1325062 gws alp update & narrative report\d - autocad\1325062-01-CVR.dwg

Airport Data Table			
Airport Data	**Existing**	**Future**	**Ultimate**
Airport Elevation (Feet MSL, NAVD 88)	5,921.5'	Same	Same
Airport Reference Point (ARP) (NAD83(2011))			
Latitude	N 39° 30' 21.47"	Same	Same
Longitude	W 107° 18' 32.81"	Same	Same
Mean Daily Max. Temp. of Hottest Month	88.6 °F	Same	Same
Airport Reference Code (ARC)	A/B-I(S)	Same	Same
Critical Aircraft (Typ.)	Cessna 172 Skyhawk AAC - A ADG - I (Small) TDG - 1A	Same	Same
Airport NAVAIDs - Owner	PAPI-2L (1) - Airport	Same	Same
Miscellaneous Facilities	MicroTower WDC (2)	Same	Same
Magnetic Declination & Accur. - Change Rate	8° 43' E ± 22' - 5' W / Year	Same	Same
Magnetic Declination Date & Source	NOAA NCEI (June 2025)	Same	Same
2025-2029 NPIAS Service Level	N/A	Same	Same
2025-2029 NPIAS Asset Role	N/A	Same	Same
2020 CASP Service Role	GA-Local	Same	Same
Combined Wind Coverage			
All Weather	No Data @ 10.5 kts	Same	Same

Airport Data Table Notes:
- No hourly/sub hourly surface weather observation data is currently available at GWS.
- 10.5 Knots is the Maximum Allowable Crosswind Component for Runways having a RDC of A/B-I (SA).

All Weather Wind Coverage Table				
Runway	**10.5 Knots**	**13 Knots**	**16 Knots**	**20 Knots**
Runway 15-33	No Data	No Data	No Data	No Data
Runway 15	No Data	No Data	No Data	No Data
Runway 33	No Data	No Data	No Data	No Data

Wind Data Source:
- No hourly/sub hourly surface weather observation data is currently available at GWS.
- Station: N/A
- Years of Data: N/A

Wind Rose Tables Notes:
NOAA wind directions are based on True North. Percent wind coverage is evaluated on the the basis of crosswinds not exceeding 10.5 knots for runways having a RDC of A/B-I-VIS.
Meteorological conditions:
- Visual flight rules are in effect when ceiling is at or above 1,000' and visibility is greater than 3 miles.
- Instrument flight rules are in effect when either ceiling is below 1,000', or visibility is lower than 3 miles.

Taxiway Data Table			
Description	**Taxiways & Taxilanes (Modified Standard)**		
	Existing	**Future**	**Ultimate**
Taxiway Design (ADG - TDG)	I - 1A	Same	Same
Taxiway Pavement Width (Straight)	20'	Same	Same
Taxiway Edge Safety Margin	3.5'	Same	Same
Taxiway Shoulder Width	None	Same	Same
Taxiway Safety Area Width	39'	Same	Same
Taxiway Object Free Area Width	79'	Same	Same
Taxilane Object Free Area Width	69'	Same	Same
Taxiway Lighting	None	Same	Same

Taxiway Data Table Notes:
- Penetrations to TOFA: None
- The modified standards applied for taxiway protection and separation are less stringent than the FAA design standards for A/B-I (Small) aircraft, and have been calculated based on the standard FAA wingtip clearance for TOFAs and T_4 OFAs applied to a maximum aircraft wingspan of 39 feet (Cessna T210 Turbo Centurion) instead of the standard 49 feet of the critical aircraft for the ADG I grouping

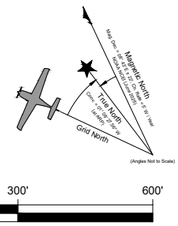
Declared Distances						
	Runway 15			**Runway 33**		
	Existing	**Future**	**Ultimate**	**Existing**	**Future**	**Ultimate**
TORA	3,310	Same	Same	3,310	Same	Same
TODA	3,310	Same	Same	3,310	Same	Same
ASDA	3,310	Same	Same	3,310	Same	Same
LDA	3,310	Same	Same	3,310	Same	Same

Declared Distances Table Notes:
- At the time of writing, there are no published declared distances at GWS.

Runway Data Table						
Description	**Runway 15-33 (Formerly Runway 14-32)**					
	Runway 15			**Runway 33**		
	Existing	**Future**	**Ultimate**	**Existing**	**Future**	**Ultimate**
Runway Design Code (RDC)	A/B-I(S)-VIS	Same	Same	A/B-I(S)-VIS	Same	Same
Approach Reference Code (APRC)	N/A	Same	Same	N/A	Same	Same
Departure Reference Code (DPRC)	N/A	Same	Same	N/A	Same	Same
Percent (%) Wind Coverage (All Weather)	No Data @ 10.5 kts	Same	Same	No Data @ 10.5 kts	Same	Same
Runway Dimensions (Length x Width)	3,310' x 50'	3,310' x 60'	Same	3,310' x 50'	3,310' x 60'	Same
Runway End Coordinates (NAD83(2011))	N 39° 30' 36.14" W 107° 18' 42.14"	Same	Same	N 39° 30' 06.80" W 107° 18' 23.49"	Same	Same
Runway End Elevation (Feet MSL, NAVD 88)	5,921.5'	Same	Same	5,909.7'	Same	Same
Disp. Thresh. Coordinates (NAD83(2011))	N/A	Same	Same	N/A	Same	Same
Disp. Thresh. Elevation (Feet MSL, NAVD 88)	N/A	Same	Same	N/A	Same	Same
Disp. Thresh. Distance (Feet)	N/A	Same	Same	N/A	Same	Same
Touchdown Zone Elev. (Feet MSL, NAVD 88)	-	Same	Same	-	Same	Same
High Point / Low Point (Feet MSL, NAVD 88)	5,921.5' / 5,909.7'	Same	Same	5,921.5' / 5,909.7'	Same	Same
Effective Gradient Maximum Gradient	- 0.35 % - 0.70 %	Same	Same	0.35 % 0.70 %	Same	Same
Pavement Type	Asphalt	Same	Same	Asphalt	Same	Same
Pavement Strength	15,000 lbs (S)	Same	Same	15,000 lbs (S)	Same	Same
Surface Treatment	None	Same	Same	None	Same	Same
Runway Lighting Type	None	Same	Same	None	Same	Same
Runway Marking Type	Visual	Same	Same	Visual	Same	Same
Runway Blast Pad Dimensions (Length x Width)	None	Same	Same	None	Same	Same
Runway Shoulder	None	Same	Same	None	Same	Same
14 CFR Part 77 Approach Category	A(V)	Same	Same	A(V)	Same	Same
14 CFR Part 77 Approach Surface Slope	20:1	Same	Same	20:1	Same	Same
Approach Visibility Minimums	Visual	Same	Same	Visual	Same	Same
Type of Aeronautical Survey Required for Approach	Non-Vertically Guided	Same	Same	Non-Vertically Guided	Same	Same
Threshold Siting Surface (TSS)	Type 2, 20:1 Penetrations (46 Exst./26 Fut.)	Same	Same	Type 2, 20:1 Clear	Same	Same
Vertical Guidance Surface (VGS)	N/A	Same	Same	N/A	Same	Same
Departure Surface	N/A	Same	Same	N/A	Same	Same
Instrument & Visual NAVAIDs	None	Same	Same	PAPI-4L	Same	Same
Runway Safety Area (RSA) Width: Length Beyond Departure End: Length Prior to Threshold:	120' 240' (Less in the Field) 240' (Less in the Field)	Same	Same	120' 240' (Less in the Field) 240' (Less in the Field)	Same	Same
Runway Object Free Area (ROFA) Width Length Beyond Departure End Length Prior to Threshold	175' (Modified Standard) 240' (Less in the Field) 240' (Less in the Field)	Same	Same	175' (Modified Standard) 240' (Less in the Field) 240' (Less in the Field)	Same	Same
Obstacle Free Zone (OFZ) (POFZ: Y/N; IAOFZ & ITOFZ: Y/N) Width Length Beyond Runway End	N; N 175' (Modified Standard) 200' (Less in the Field)	Same	Same	N; N 175' (Modified Standard) 200' (Less in the Field)	Same	Same
Runway Protection Zone (RPZ) Inner Width Outer Width Length	APP DEP 250' 250' 450' 450' 1,000' 1,000'	Same	Same	APP DEP 250' 250' 450' 450' 1,000' 1,000'	Same	Same

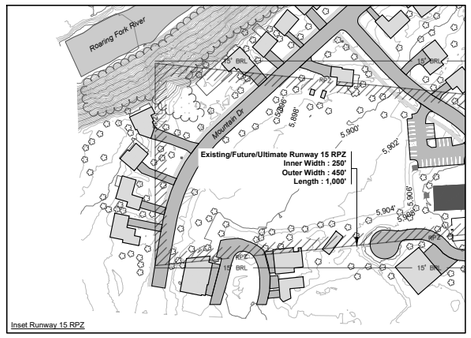
Runway Data Table Notes:
- Runway 14-33 was renumbered Runway 15-33 in XXX 2026 due to change in magnetic declination.
- Runway 15-33 meets line of sight requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1.
- There currently are no displaced threshold at GWS. No displaced threshold are planned in the future.
- The current published pavement strength of Runway 15-33 is 15,000 pounds (S). However, Runway 15-33 is designated as a Utility Runway because it is intended to be used by propeller driven aircraft weighing 12,500 pounds or less. According to RunwayStatS data, over 99.9 percent of aircraft using the runway annually have a maximum gross weight under 12,500 pounds.
- The modified standards applied for runway protection and separation are less stringent than the FAA design standards for A/B-I (Small) aircraft, and have been calculated based on an aircraft wingspan of 39 feet (Cessna T210 Turbo Centurion) instead of the standard 49 feet of the critical aircraft for the ADG I grouping.
- The lengths observed in the field for the RSA, ROFA, and ROFZ beyond the departure end and prior to the threshold are approximately 120 feet for Runway 15 (full width) and 80 feet for Runway 33 (partial width).

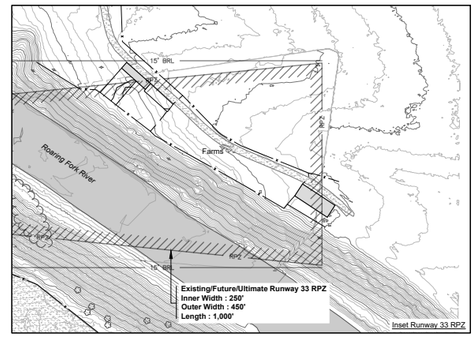
City of Glenwood Springs, Colorado Approval:	KGWS Sumers Airpark Approval:
_____	_____
Title: _____	Title: _____
Date: _____	Date: _____

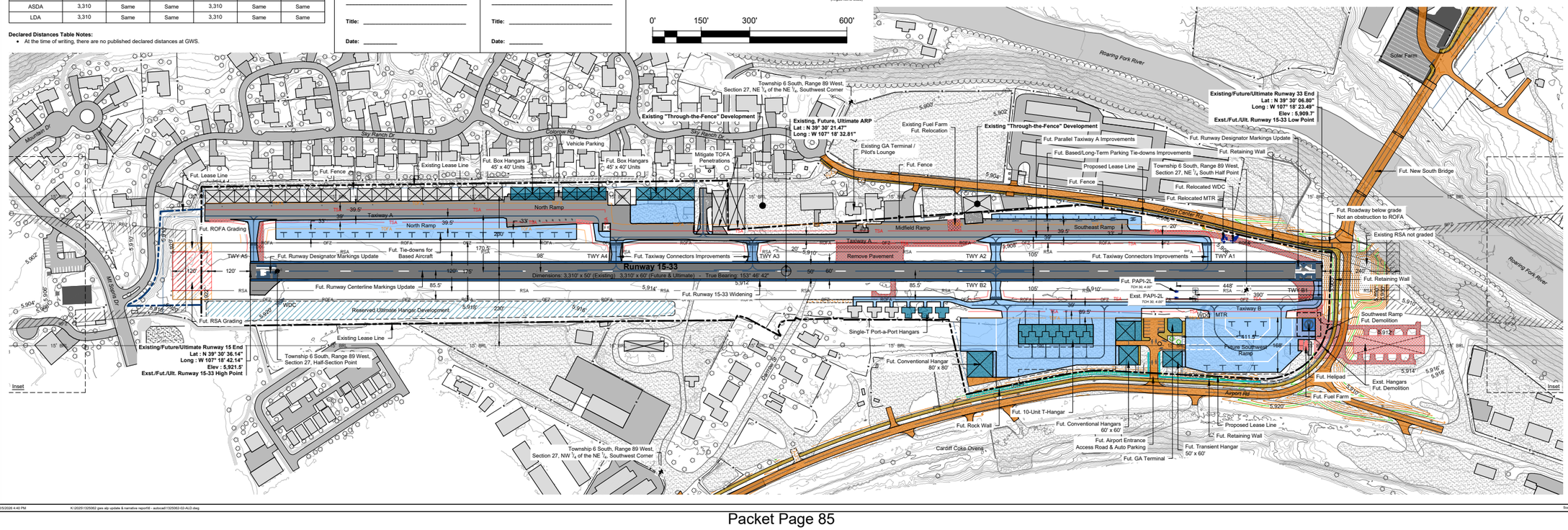


Legend							
Description	**Existing**	**Future**	**Ultimate**	**Description**	**Existing**	**Future**	**Ultimate**
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
Airport Reference Point (ARP)		-	-	Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
PLSS Section Corner (Accepted/Not Determined)		-	-	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
On-Airport Building/Hangar				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Airport Leasing Line				2-Light Precision App. Path Indicator (PAPI-2L)			-
Off-Airport Building		-	-	Wind Cone (WDC)			
Roadway / Driveway / Parking (Paved /Unpaved)				MicroTower Weather System			-
Pavement Demolition	-			Storm Pipes / Culverts & Ditches		-	-
Trees		-	-	-	-	-	-
Water Body & Streams		-	-	-	-	-	-
Fence	x	x	x	-	-	-	-
Topographic Contours	1,000'	-	-	-	-	-	-

Notes:
1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
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3. All dimensions shown are horizontal surface measurements.
4. The nearest quadrangle corner is the southeast corner of USGS US Topo Map, Glenwood Springs, CO Quadrangle, 7.5-minute Series. The quadrangle corner is located approximately 3.2 miles east of the existing airport reference point.
5. Section corners shown are GIS data retrieved from the U.S. Bureau of Land Management Geospatial Data platform, Public Land Survey System (PLSS) Section Corners database. Township & Range per the 6th Principal Meridian.
6. Runway 15-33 meets Line-of-Sight (LOS) requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1. Refer to Sheet 8 of 14, "Runway 15-33 Centerline Profile" for further information.







KGWS Sumers Airpark

No.	Revisions	Date
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RAFT

Airport Layout Drawing

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

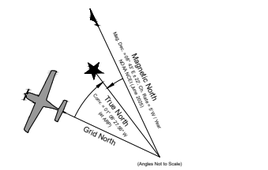
Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	2 of 14
Scale:	1" = 150'

Buildings / Facilities Table						
ID	Description	Owner	Operator / Tenant	Disposition	Top Elevation (Feet MSL)	Obstruction Marking / Lighting
Existing						
1	Conventional Hangar	Private (Heuer)	Classic Air Medical	-	5,937.2'	No
2	Single-T Port-a-Port	Private (Sinclair)	Sinclair	-	5,924.4'	No
3	Former CAP Building	KGWS Sumers Airpark	KGWS Sumers Airpark	-	5,923.0'	No
4	2-Unit Box Hangar	Private (Rudd)	Rudd	-	5,935.4'	No
5	2-Unit Shade Structure	Private TTF (Rudd)	Multiple TTF	-	5,930.4'	No
6	Warehouse & Storage Yard	Private	Industrial Storage	-	5,927.2'	No
7	GA Terminal / Pilot's Lounge	Private TTF (Rudd)	KGWS Sumers Airpark	Release from Use (Fut.)	2,924.2'	No
8	Residential	Private	Residential	-	5,934.0'	No
9	Storage Yard	Private	Industrial Storage	-	-	No
10	Conventional Hangar	Private TTF (Reeves)	Reeves	-	5,930.2'	No
11	Conventional Hangar	Aircraft Repair LLC	Aircraft Repair LLC	Remove (Fut.)	5,932.9	No
12	10-Unit T-Hangar	Private (Rudd)	Multiple	Remove (Fut.)	5,930.8'	No
13a	Single-T Port-a-Port	Private (Brown)	Brown	-	5,924.0'	No
13b	Single-T Port-a-Port	Private (Gwost)	Gwost	-	5,923.0'	No
13c	Single-T Port-a-Port	Private (Brown)	Brown	-	5,923.5'	No
14	Single-T Port-a-Port	Private TTF (Terry)	Terry	-	Unknown	No
15	1-Unit Shade Structure	Private TTF (Force)	Force	-	Unknown	No
16 (A)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,933.4'	No
17 (B)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,934.5'	No
18 (C)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,935.3'	No
19 (D)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,935.9'	No
20 (E)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,936.7'	No
21 (F)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,937.7'	No
Future						
F1	GA Terminal / FBO	KGWS Sumers Airpark	KGWS Sumers Airpark	-	-	-
F2	Transient Hangar	KGWS Sumers Airpark	KGWS Sumers Airpark	-	-	-
F3	Reserved	-	-	-	-	-
F4	Conventional Hangar	Private	Classic Air Medical	-	-	-
F5	Conventional Hangar	Private	EPIC	-	-	-
F6	10-Unit T-Hangar	Private	Multiple	-	-	-
F7	Maintenance Hangar	Aircraft Repair LLC	Aircraft Repair LLC	-	-	-
F8	Single-T Port-a-Port	Private	Multiple	-	-	-
F9	4-Unit Box Hangar	Private	Multiple	-	-	-
F10	3-Unit Box Hangar	Private	Multiple	-	-	-
F11	3-Unit Box Hangar	Private	Multiple	-	-	-
F12	3-Unit Box Hangar	Private	Multiple	-	-	-
F13	3-Unit Box Hangar	Private	Multiple	-	-	-
F14	3-Unit Box Hangar	Private	Multiple	-	-	-
Ultimate						
-	-	-	-	-	-	-

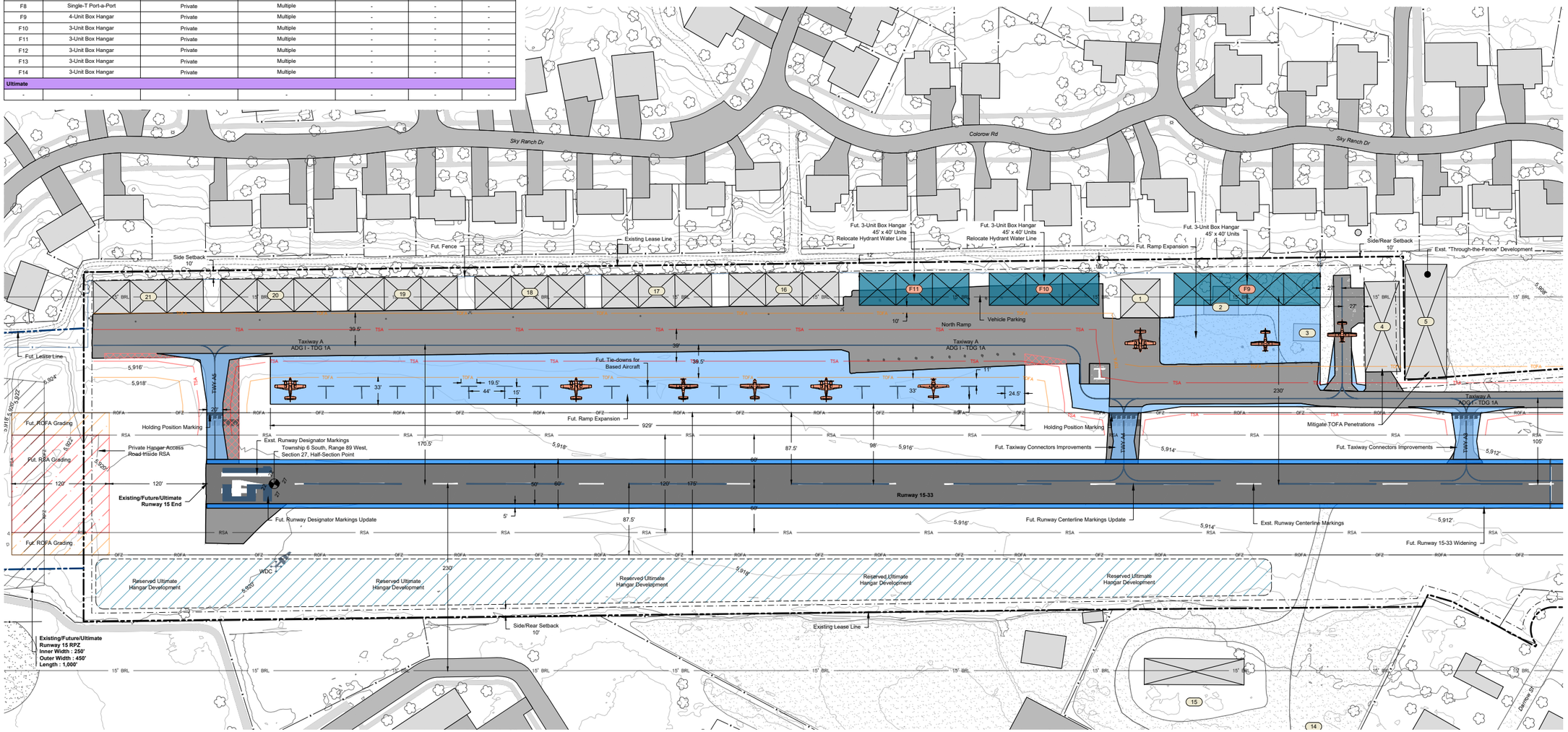
Legend							
Description	Existing	Future	Ultimate	Description	Existing	Future	Ultimate
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
Airport Reference Point (ARP)		-	-	Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
PLSS Section Corner (Accepted/Not Determined)		-	-	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
On-Airport Building/Hangar				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Airport Leasing Line				2-Light Precision App. Path Indicator (PAPI-2L)			-
Off-Airport Building		-	-	Wind Cone (WDC)			
Roadway / Driveway / Parking (Paved /Unpaved)				MicroTower Weather System		-	-
Pavement Demolition	-			Storm Pipes / Culverts & Ditches		-	-
Trees		-	-	-	-	-	-
Water Body & Streams		-	-	-	-	-	-
Fence	x	x	x	-	-	-	-
Topographic Contours	1,000'	-	-	-	-	-	-

Notes:

1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
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6. Runway 15-33 meets Line-of-Sight (LOS) requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1. Refer to Sheet 8 of 14, "Runway 15-33 Centerline Profile" for further information.
7. Setbacks shown per the City of Glenwood Springs Code, zone Light Industrial (I1) - front setback: 20 feet, side & rear setbacks: 10 feet.







DRAFT

KGWS Sumers Airpark

No.	Revisions	Date
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Terminal Area Drawing - North

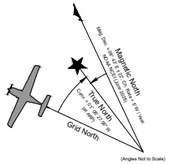
KGWS Sumers Airpark (GWS)

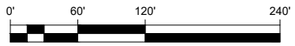
Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	3 of 14
Scale:	1" = 60'



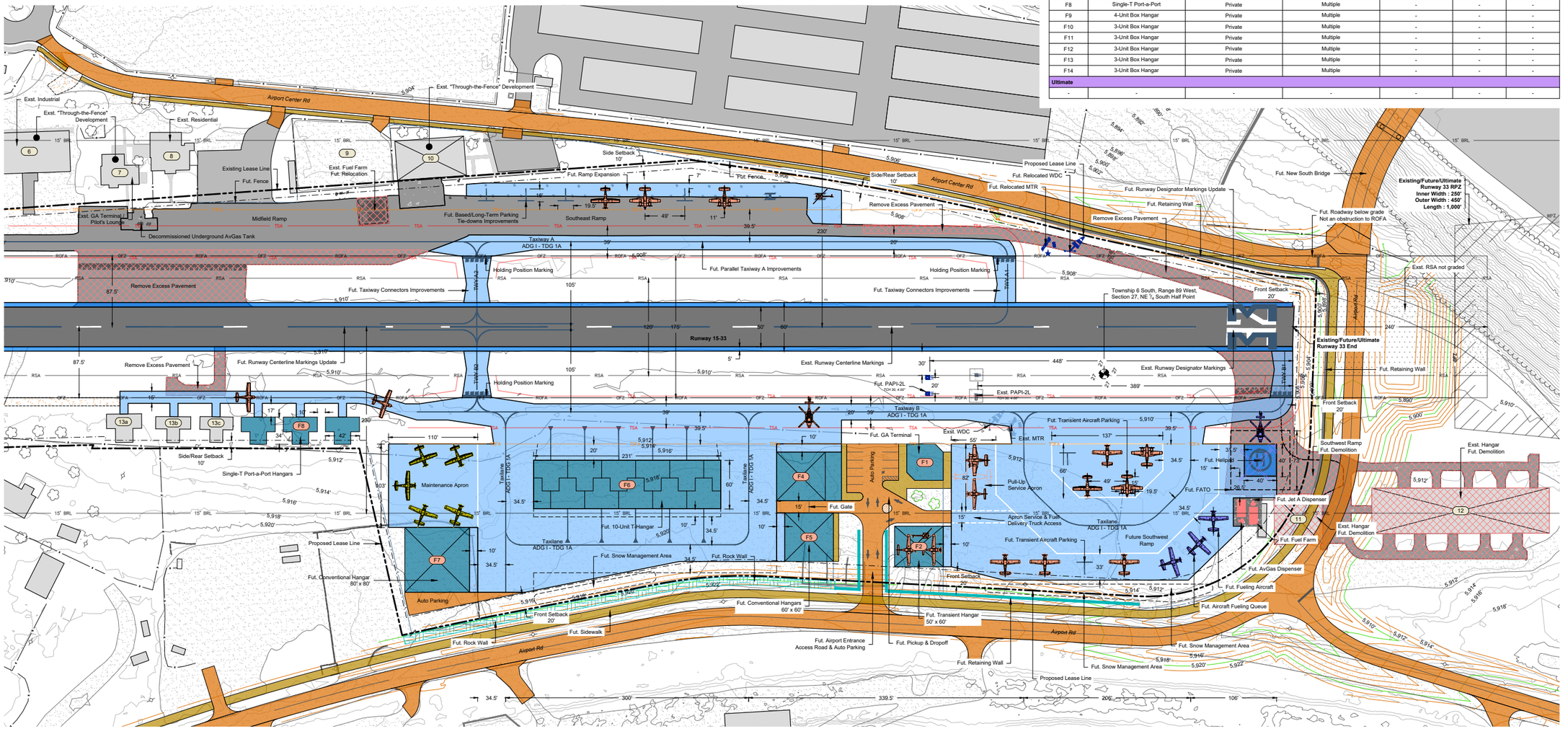


Legend							
Description	Existing	Future	Ultimate	Description	Existing	Future	Ultimate
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Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
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Airport Leasing Line				2-Light Precision App. Path Indicator (PAPI-2L)			-
Off-Airport Building		-	-	Wind Cone (WDC)			
Roadway / Driveway / Parking (Paved /Unpaved)				MicroTower Weather System			-
Pavement Demolition	-			Storm Pipes / Culverts & Ditches		-	-
Trees		-	-	-	-	-	-
Water Body & Streams		-	-	-	-	-	-
Fence	x	x	x	-	-	-	-
Topographic Contours	1,000'	-	-	-	-	-	-

Notes:

1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
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6. Runway 15-33 meets Line-of-Sight (LOS) requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1. Refer to Sheet 8 of 14, "Runway 15-33 Centerline Profile" for further information.
7. Setbacks shown per the City of Glenwood Springs Code, zone Light Industrial (I1) - front setback: 20 feet, side & rear setbacks: 10 feet.

Buildings / Facilities Table						
ID	Description	Owner	Operator / Tenant	Disposition	Top Elevation (Feet MSL)	Obstruction Marking / Lighting
Existing						
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2	Single-T Port-a-Port	Private (Sinclair)	Sinclair	-	5,924.4'	No
3	Former CAP Building	KGWS Sumers Airpark	KGWS Sumers Airpark	-	5,923.0'	No
4	2-Unit Box Hangar	Private (Rudd)	Rudd	-	5,935.4'	No
5	2-Unit Shade Structure	Private TTF (Rudd)	Multiple TTF	-	5,930.4'	No
6	Warehouse & Storage Yard	Private	Industrial Storage	-	5,927.2'	No
7	GA Terminal / Pilot's Lounge	Private TTF (Rudd)	KGWS Sumers Airpark	Release from Use (Fut.)	2,924.2'	No
8	Residential	Private	Residential	-	5,934.0'	No
9	Storage Yard	Private	Industrial Storage	-	-	No
10	Conventional Hangar	Private TTF (Reeves)	Reeves	-	5,930.2'	No
11	Conventional Hangar	Aircraft Repair LLC	Aircraft Repair LLC	Remove (Fut.)	5,932.9	No
12	10-Unit T-Hangar	Private (Rudd)	Multiple	Remove (Fut.)	5,930.8'	No
13a	Single-T Port-a-Port	Private (Brown)	Brown	-	5,924.0'	No
13b	Single-T Port-a-Port	Private (Gwost)	Gwost	-	5,923.0'	No
13c	Single-T Port-a-Port	Private (Brown)	Brown	-	5,923.5'	No
14	Single-T Port-a-Port	Private TTF (Terry)	Terry	-	Unknown	No
15	1-Unit Shade Structure	Private TTF (Force)	Force	-	Unknown	No
16 (A)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,933.4'	No
17 (B)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,934.5'	No
18 (C)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,935.3'	No
19 (D)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,935.9'	No
20 (E)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,936.7'	No
21 (F)	3-Unit Box Hangar	Private (Multiple)	Multiple	-	5,937.7'	No
Future						
F1	GA Terminal / FBO	KGWS Sumers Airpark	KGWS Sumers Airpark	-	-	-
F2	Transient Hangar	KGWS Sumers Airpark	KGWS Sumers Airpark	-	-	-
F3	Reserved	-	-	-	-	-
F4	Conventional Hangar	Private	Classic Air Medical	-	-	-
F5	Conventional Hangar	Private	EPIC	-	-	-
F6	10-Unit T-Hangar	Private	Multiple	-	-	-
F7	Maintenance Hangar	Aircraft Repair LLC	Aircraft Repair LLC	-	-	-
F8	Single-T Port-a-Port	Private	Multiple	-	-	-
F9	4-Unit Box Hangar	Private	Multiple	-	-	-
F10	3-Unit Box Hangar	Private	Multiple	-	-	-
F11	3-Unit Box Hangar	Private	Multiple	-	-	-
F12	3-Unit Box Hangar	Private	Multiple	-	-	-
F13	3-Unit Box Hangar	Private	Multiple	-	-	-
F14	3-Unit Box Hangar	Private	Multiple	-	-	-
Ultimate						
-	-	-	-	-	-	-



KGWS Sumers Airpark

No.	Revisions	Date
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DRAFT

Terminal Area Drawing - South

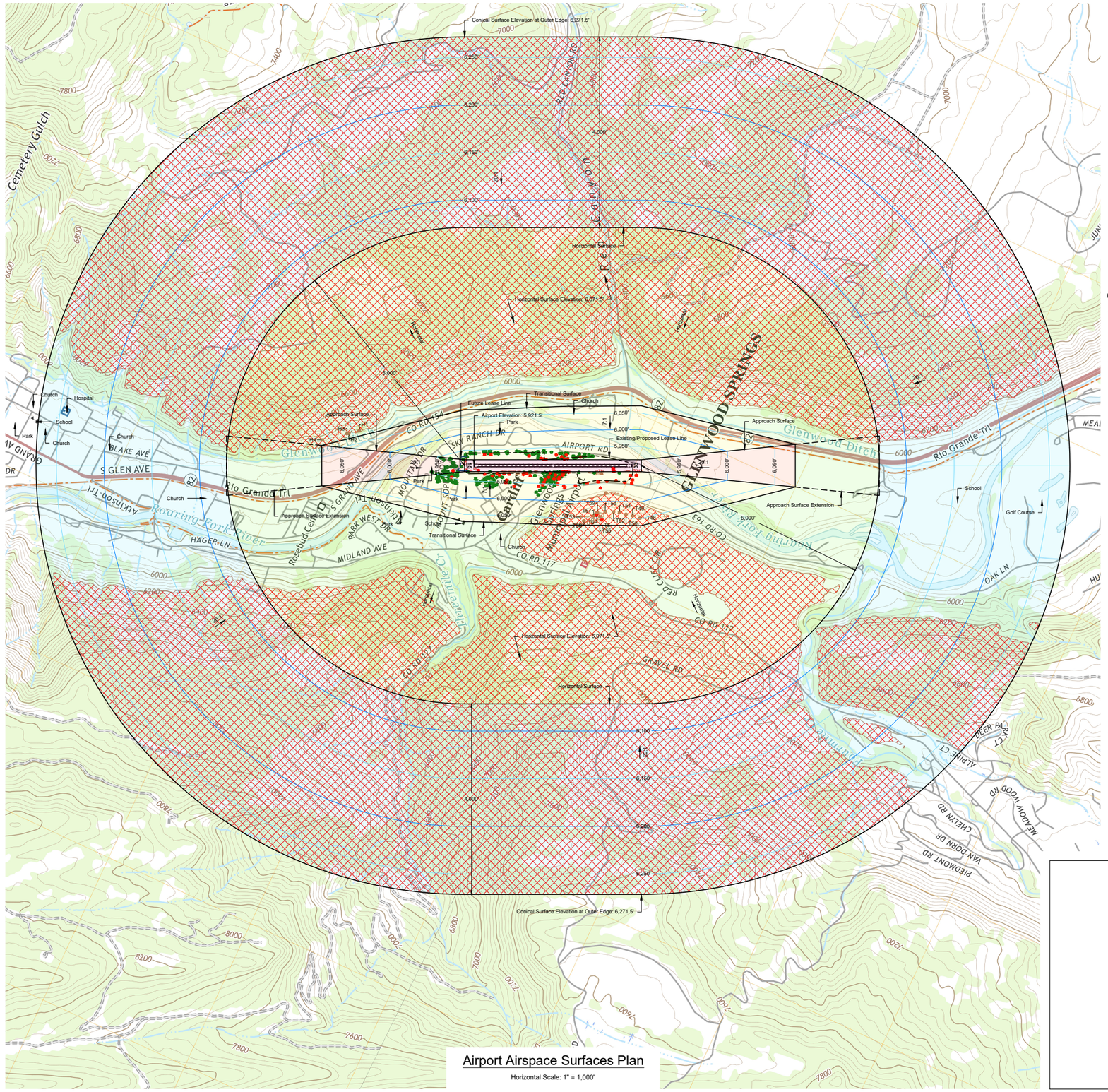
KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	4 of 14
Scale:	1" = 60'



Garfield County Planning Jurisdiction

Garfield County has county-wide zoning regulations as adopted July 15, 2013 and amended September 9, 2024.

As of May 2026, Garfield County has not adopted height restrictions and/or zoning overlay regulations that apply to KGWS Sumers Airpark. Garfield County has airport overlay zoning and land use regulations titled *Airport/Heliport Influence Area Overlay* last updated in September 2023. Those overlay regulations include height restrictions that apply to the Rifle Garfield County Airport (RIL).

For provisions concerning subdivision regulation, zoning, and development standards, reference *Articles 3, 4, 5, 6, 7, and 10* of the Land Use and Development Code of Garfield County, CO.

City of Glenwood Springs, CO Planning Jurisdiction

The City of Glenwood Springs maintains a Code of Ordinances. The Code is current and was last updated in December 2025.

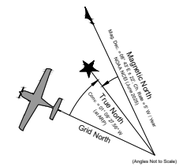
Title 70, *Development Code* of the Code of Ordinances (Municipal Code) of the City of Glenwood Springs currently contains zoning district definitions, use regulations, and development standards. As of May 2026, the City of Glenwood Springs has not adopted height restrictions and/or zoning overlay regulations that apply to KGWS Sumers Airpark. The Airport is currently is zoned Light Industrial (I1).

For provisions concerning subdivision regulation, zoning, and development standards, reference *Title 70, Development Code* of the Code of Ordinances of the City of Glenwood Springs, CO.

Obstruction Legend:

- Man-Made Objects
- Trees & Brushes
- Ground
- Terrain Penetrations to Part 77 Surfaces
- Existing/Proposed Lease Line
- Future Lease Line

0' 1,000' 2,000' 4,000'



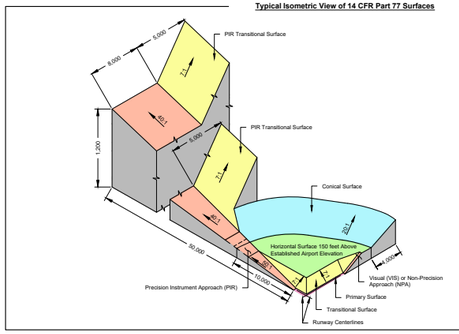
Notes:

1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. The nearest quadrangle corner is the southeast corner of USGS US Topo Map, Glenwood Springs, CO Quadrangle, 7.5-minute Series. The quadrangle corner is located approximately 3.2 miles east of the existing airport reference point.
5. Section corners shown are GIS data retrieved from the U.S. Bureau of Land Management Geospatial Data platform, Public Land Survey System (PLSS) Section Corners database. Township & Range per the 6th Principal Meridian.
6. Airspace obstructions from an airspace survey by others in 2021. Whether survey data is pursuant to FAA AC 150 5300-16B, -17C (Change 1), and -18B (Change 1) is unknown.
7. Future and Ultimate 14 CFR Part 77 Surface are unchanged from existing conditions.
8. Profile View for the centerline of Runway 15-33 is shown on Sheet 8 of 14, "Runway 15-33 Centerline Profile".
9. Elevation information for Traverse Ways may be found on Sheets 9, 10, and 11 of 14, "Inner Portion of the Approach Surface Drawings".
10. For clarity purposes, close-in penetrations to the 14 CFR Part 77 Primary, Transitional, and Approach Surfaces have not been labeled on this sheet. These penetrations may be found on Sheet 8 of 14, "Runway 15-33 Centerline Profile" as well as Sheets 9, 10, and 11 of 14, "Inner Portion of the Approach Surface Drawings".

14 CFR Part 77 Surface Dimensions

Surface		Runway 15-33 (Formerly Runway 14-32) Existing/Future/Ultimate A(V)
Airport Elevation		5,921.5'
Primary Surface	Width	250'
Approach Surface	Inner Width	250'
	Outer Width	1,250'
	Length	5,000'
	Slope	20:1
Transitional Surface	Slope	7:1
Horizontal Surface	Elevation	6,071.5'
	Radius	5,000'
Conical Surface	Slope	20:1
	Width	4,000'

Typical Isometric View of 14 CFR Part 77 Surfaces



KGWS Sumers Airpark

No.	Revisions	Date
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Airport Airspace Drawing

KGWS Sumers Airpark (GWS)

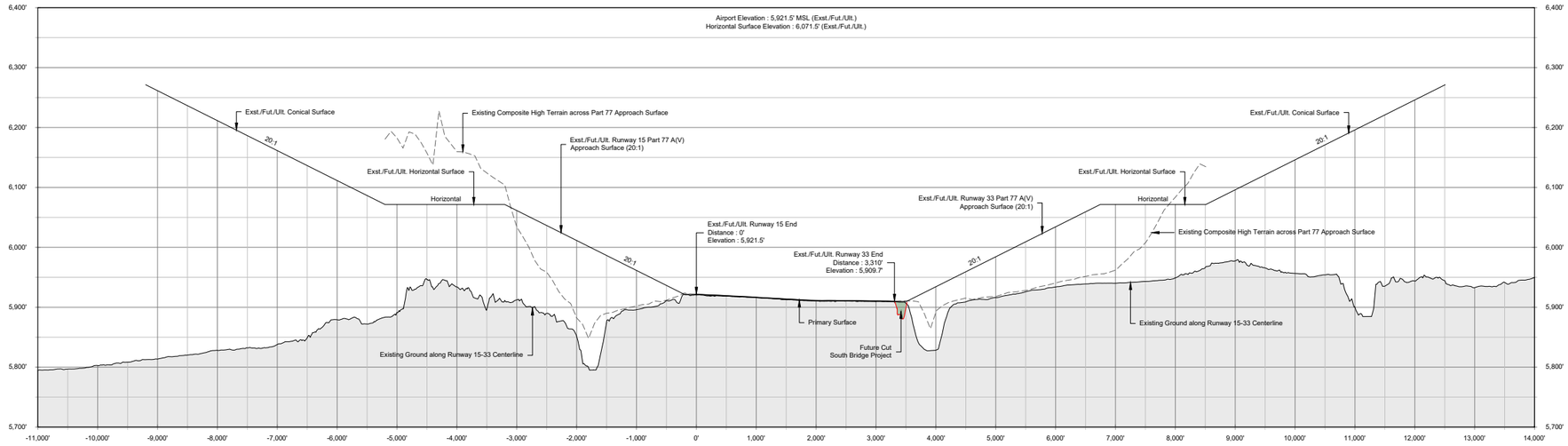
Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	5 of 14
Scale:	1" = 1,000'

DRAFT



Runway 15-33 Extended Centerline Profile

Horizontal Scale: 1" = 1,000'
Vertical Scale: 1" = 100'

14 CFR Part 77 Runway 15-33 Primary Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
1533P01	N 39° 30' 34.93"	W 107° 18' 42.80"	Airport Windsock	A1	5928.39	5919.90	8.49	5921.07	7.32	None
1533P02	N 39° 30' 09.59"	W 107° 18' 27.00"	Airport Windsock	A2	5932.58	5910.09	22.49	5910.38	22.20	None
1533P03	N 39° 30' 09.86"	W 107° 18' 26.65"	Airport PAPI-2L	A3	5912.90	5909.59	3.31	5910.38	2.52	None
1533P04	N 39° 30' 09.98"	W 107° 18' 26.37"	Airport PAPI-2L	A4	5912.83	5909.56	3.27	5910.38	2.45	None

14 CFR Part 77 Runway 15 A(V) Approach Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
15A1	N 39° 30' 39.61"	W 107° 18' 45.85"	Light	L1	5939.02	5913.77	25.25	5933.63	5.39	None
15A2	N 39° 30' 43.24"	W 107° 18' 48.67"	Tree	T126	5991.94	5902.44	89.50	5955.00	36.94	None
15A3	N 39° 30' 43.35"	W 107° 18' 48.69"	Tree	T127	5992.01	5901.59	90.42	5955.53	36.48	None
15A4	N 39° 30' 43.51"	W 107° 18' 48.74"	Tree	T128	5977.08	5900.72	76.36	5956.35	20.73	None
15A5	N 39° 30' 42.19"	W 107° 18' 48.45"	Tree	T134	5969.86	5905.50	64.36	5949.83	20.03	None
15A6	N 39° 30' 42.03"	W 107° 18' 48.24"	Tree	T135	5973.63	5906.13	67.50	5948.78	24.85	None
15A7	N 39° 30' 42.09"	W 107° 18' 48.30"	Tree	T136	5964.55	5905.95	58.60	5949.14	15.41	None
15A8	N 39° 30' 42.40"	W 107° 18' 48.55"	Tree	T137	5958.12	5905.17	52.95	5950.99	7.13	None
15A9	N 39° 30' 43.34"	W 107° 18' 44.21"	Tree	T139	5956.74	5898.51	58.23	5947.72	9.02	None
15A10	N 39° 30' 42.94"	W 107° 18' 44.21"	Tree	T141	5947.22	5899.17	48.05	5945.89	1.33	None
15A11	N 39° 30' 42.30"	W 107° 18' 44.39"	Tree	T143	5958.84	5902.57	56.27	5943.31	15.53	None
15A12	N 39° 30' 41.24"	W 107° 18' 46.75"	Tree	T195	5948.17	5907.52	40.65	5942.58	5.59	None
15A13	N 39° 30' 41.25"	W 107° 18' 47.04"	Tree	T196	5952.11	5908.33	43.78	5943.15	8.96	None
15A14	N 39° 30' 41.45"	W 107° 18' 47.07"	Tree	T197	5957.39	5906.14	51.25	5944.10	13.29	None
15A15	N 39° 30' 41.34"	W 107° 18' 45.91"	Tree	T198	5948.93	5909.13	39.80	5941.57	7.36	None
15A16	N 39° 30' 40.92"	W 107° 18' 47.56"	Tree	T199	5979.97	5908.03	71.94	5942.53	37.44	None
15A17	N 39° 30' 40.27"	W 107° 18' 46.92"	Tree	T201	5992.76	5910.44	82.32	5938.51	54.25	None
15A18	N 39° 30' 40.86"	W 107° 18' 46.76"	Tree	T203	5966.74	5909.41	57.33	5940.90	25.84	None
15A19	N 39° 30' 40.40"	W 107° 18' 46.95"	Tree	T204	5994.70	5909.69	85.01	5939.13	55.57	None
15A20	N 39° 30' 40.53"	W 107° 18' 46.65"	Tree	T205	5990.50	5910.42	80.08	5939.19	51.31	None
15A21	N 39° 30' 40.93"	W 107° 18' 45.68"	Tree	T206	5953.72	5910.63	43.09	5939.36	14.36	None
15A22	N 39° 30' 41.06"	W 107° 18' 45.65"	Tree	T207	5953.75	5910.44	43.31	5939.86	13.89	None
15A23	N 39° 30' 41.08"	W 107° 18' 45.80"	Tree	T208	5953.62	5910.56	43.06	5940.22	13.40	None
15A24	N 39° 30' 40.40"	W 107° 18' 46.93"	Tree	T212	5994.27	5909.77	84.50	5939.08	55.19	None
15A25	N 39° 30' 40.33"	W 107° 18' 45.17"	Tree	T213	5944.60	5912.08	32.52	5935.72	8.88	None
15A26	N 39° 30' 40.28"	W 107° 18' 44.16"	Tree	T214	5944.73	5910.28	34.45	5933.76	10.97	None
15A27	N 39° 30' 40.06"	W 107° 18' 44.00"	Tree	T215	5937.45	5912.19	25.26	5932.51	4.94	None
15A28	N 39° 30' 39.98"	W 107° 18' 44.39"	Tree	T216	5946.01	5912.11	33.90	5932.78	13.23	None
15A29	N 39° 30' 41.37"	W 107° 18' 43.45"	Tree	T223	5939.09	5905.83	33.26	5937.45	1.64	None
15A30	N 39° 30' 41.28"	W 107° 18' 43.29"	Tree	T224	5937.81	5905.75	32.06	5936.79	1.02	None
15A31	N 39° 30' 40.34"	W 107° 18' 43.88"	Tree	T225	5946.04	5909.69	36.35	5933.55	12.49	None
15A32	N 39° 30' 40.55"	W 107° 18' 43.92"	Tree	T226	5942.24	5908.84	33.40	5934.55	7.69	None
15A33	N 39° 30' 41.09"	W 107° 18' 43.25"	Tree	T227	5939.71	5906.25	33.46	5935.83	3.88	None
15A34	N 39° 30' 38.69"	W 107° 18' 45.42"	Tree	T292	5937.61	5916.57	21.04	5928.73	8.88	None
15A35	N 39° 30' 38.69"	W 107° 18' 45.29"	Tree	T293	5938.50	5916.72	21.78	5928.50	10.00	None
15A36	N 39° 30' 39.70"	W 107° 18' 44.77"	Tree	T298	5954.11	5913.14	40.97	5932.19	21.92	None
15A37	N 39° 30' 39.47"	W 107° 18' 44.40"	Tree	T299	5937.51	5911.84	25.67	5930.50	7.01	None
15A38	N 39° 30' 38.40"	W 107° 18' 43.84"	Tree	T301	5934.72	5919.74	14.98	5924.65	10.07	None

14 CFR Part 77 Runway 33 A(V) Approach Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
-	-	-	-	-	-	-	-	-	-	-

14 CFR Part 77 Transitional Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
T1	N 39° 30' 06.10"	W 107° 18' 25.98"	Building	B1	5928.58	5911.57	17.01	5921.48	7.10	None
T2	N 39° 30' 05.05"	W 107° 18' 25.26"	Building	B2	5927.47	5912.26	15.21	5920.85	6.62	None
T3	N 39° 30' 17.12"	W 107° 18' 27.46"	Building	B3	5929.30	5906.38	22.92	5919.30	10.00	None
T4	N 39° 30' 19.96"	W 107° 18' 28.70"	Building	B4	5933.31	5906.98	26.33	5925.22	8.09	None
T5	N 39° 30' 07.40"	W 107° 18' 40.05"	Building	B5	6219.20	6198.77	20.43	6055.38	163.82	None
T6	N 39° 30' 08.78"	W 107° 18' 39.56"	Building	B6	6216.41	6204.13	12.28	6041.81	174.60	None
T7	N 39° 30' 10.58"	W 107° 18' 32.59"	Building	B7	5968.87	5929.45	39.42	5960.16	8.71	None
T8	N 39° 30' 20.65"	W 107° 18' 29.65"	Building	B8	5923.17	5907.55	15.62	5920.41	2.76	None
T9	N 39° 30' 21.83"	W 107° 18' 29.86"	Building	B9	5932.32	5907.13	25.19	5926.43	5.89	None
T10	N 39° 30' 23.39"	W 107° 18' 32.19"	Building	B10	5929.21	5910.45	18.76	5914.16	15.05	None
T11	N 39° 30' 23.89"	W 107° 18' 32.38"	Building	B11	5932.42	5910.74	21.68	5915.75	16.67	None
T12	N 39° 30' 26.82"	W 107° 18' 33.30"	Building	B13	5938.75	5911.36	27.39	5926.97	11.78	None
T13	N 39° 30' 26.17"	W 107° 18' 38.41"	Building	B14	5938.72	5921.51	17.21	5924.60	14.12	None
T14	N 39° 30' 26.78"	W 107° 18' 42.35"	Building	B16	5963.26	5926.24	37.02	5961.33	1.93	None
T15	N 39° 30' 28.68"	W 107° 18' 42.47"	Building	B17	5951.81	5928.86	22.95	5951.37	0.44	None
T16	N 39° 30' 39.25"	W 107° 18' 47.55"	Building	B43	5950.18	5910.89	39.29	5947.71	2.47	None
T17	N 39° 30' 35.25"	W 107° 18' 38.20"	Building	B51	5937.12	5911.41	25.71	5936.41	0.71	None
T18	N 39° 30' 34.07"	W 107° 18' 37.42"	Building	B52	5936.62	5911.28	25.34	5936.17	0.45	None
T19	N 39° 30' 24.35"	W 107° 18' 32.49"	Building	B57	5919.56	5911.04	8.52	5917.85	1.71	None
T20	N 39° 30' 25.72"	W 107° 18' 37.84"	Building	B59	5930.49	5920.18	10.31	5921.27	9.22	None
T21	N 39° 30' 24.77"	W 107° 18' 37.93"	Building	B60	5937.87	5921.08	16.79	5927.81	10.06	None
T22	N 39° 30' 21.60"	W 107° 18' 37.95"	Building	B62	5957.29	5923.04	34.25	5946.66	10.63	None
T23	N 39° 30' 21.65"	W 107° 18' 37.07"	Building	B63	5944.99	5921.61	23.38	5937.32	7.67	None
T24	N 39° 30' 21.59"	W 107° 18' 38.66"	Building	B65	5954.24	5924.83	29.41	5953.93	0.31	None
T25	N 39° 30' 19.17"	W 107° 18' 35.37"	Building	B67	5935.24	5922.34	12.90	5934.54	0.70	None
T26	N 39° 30' 20.05"	W 107° 18' 35.93"	Building	B68	5939.90	5921.40	18.50	5935.09	4.81	None
T27	N 39° 30' 20.15"	W 107° 18' 34.78"	Building	B69	5932.06	5916.49	15.57	5922.76	9.30	None
T28	N 39° 30' 19.18"	W 107° 18' 34.82"	Building	B70	5930.88	5918.42	12.46	5928.80	2.08	None
T29	N 39° 30' 21.22"	W 107° 18' 36.08"	Building	B71	5940.43	5920.67	19.76	5929.75	10.68	None
T30	N 39° 30' 19.07"	W 107° 18' 33.08"	Building	B72	5921.40	5912.30	9.10	5911.71	9.69	None
T31	N 39° 30' 18.48"	W 107° 18' 32.70"	Building	B73	5922.45	5910.94	11.51	5911.39	11.06	None
T32	N 39° 30' 17.91"	W 107° 18' 32.48"	Building	B74	5922.58	5910.41	12.17	5912.70	9.88	None
T33	N 39° 30' 19.41"	W 107° 18' 29.43"	Building	B75	5915.56	5907.64	7.92	5914.32	1.24	None
T34	N 39° 30' 08.45"	W 107° 18' 26.71"	Brush	BR1	5919.49	5910.73	8.76	5914.33	5.16	None
T35	N 39° 30' 13.10"	W 107° 18' 29.64"	Brush	BR2	5915.30	5915.19	0.11	5914.56	0.74	None
T36	N 39° 30' 19.37"	W 107° 18' 33.56"	Brush	BR3	5923.96	5914.01	9.95	5914.80	9.16	None
T37	N 39° 30' 21.40"	W 107° 18' 34.81"	Brush	BR4	5918.38	5914.04	4.34	5915.66	2.72	None
T38	N 39° 30' 22.34"	W 107° 18' 35.41"	Brush	BR5	5925.27	5914.32	10.95	5916.19	9.08	None
T39	N 39° 30' 25.14"	W 107° 18' 37.02"	Brush	BR6	5919.40	5915.55	3.85	5916.37	3.03	None
T40	N 39° 30' 26.25"	W 107° 18' 37.80"	Brush	BR7	5921.96	5916.39	5.57	5917.80	4.16	None

14 CFR Part 77 Horizontal Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
H1	N 39° 31' 00.72"	W 107° 18' 47.30"	Ground	G8	6073.96	6087.86	-13.90	6071.45	2.51	None
H2	N 39° 31' 02.44"	W 107° 18' 49.19"	Ground	G9_DS	6095.81	6111.07	-15.26	6071.45	24.36	None
H3	N 39° 31' 02.73"	W 107° 18' 49.51"	Ground	G9_DT	6107.46	6124.37	-16.91	6071.45	36.01	None
H4	N 39° 31' 06.73"	W 107° 18' 53.89"	Ground	G9_DX	6165.40	6172.22	-6.82	6071.45	93.95	None

14 CFR Part 77 Conical Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
-	-	-	-	-	-	-	-	-	-	-

Notes:

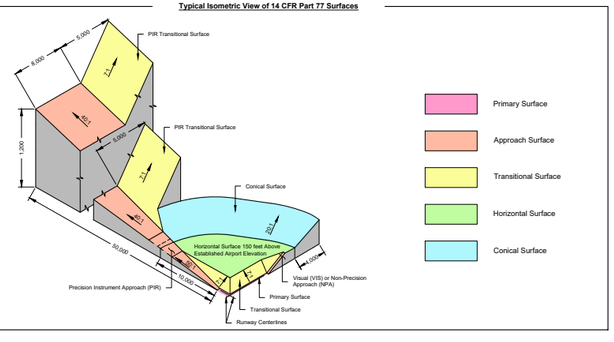
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7. Future and Ultimate 14 CFR Part 77 Surface are unchanged from existing conditions.
8. Profile View for the centerline of Runway 15-33 is shown on Sheet 8 of 14, "Runway 15-33 Centerline Profile".
9. Elevation information for Traverse Ways may be found on Sheets 9, 10, and 11 of 14, "Inner Portion of the Approach Surface Drawings".
10. For clarity purposes, close-in penetrations to the 14 CFR Part 77 Primary, Transitional, and Approach Surfaces have not been labeled on this sheet. These penetrations may be found on Sheet 8 of 14, "Runway 15-33 Centerline Profile" as well as Sheets 9, 10, and 11 of 14, "Inner Portion of the Approach Surface Drawings".

0' 1,000' 2,000' 4,000'

14 CFR Part 77 Surface Dimensions

Surface		Runway 15-33 (Formerly Runway 14-32) Existing/Future/Ultimate A(V)
Airport Elevation		5,921.5'
Primary Surface	Width	250'
Approach Surface	Inner Width	250'
	Outer Width	1,250'
	Length	5,000'
	Slope	20:1
Transitional Surface	Slope	7:1
Horizontal Surface	Elevation	6,071.5'
	Radius	5,000'
Conical Surface	Slope	20:1
	Width	4,000'

Typical Isometric View of 14 CFR Part 77 Surfaces



KGWS Sumers Airpark

No.	Revisions	Date
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DRAFT

Airport Airspace Drawing - Extended Centerline Profile

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	6 of 14
Scale:	1" = 1,000'

14 CFR Part 77 Transitional Surface Obstruction Table (Continued)

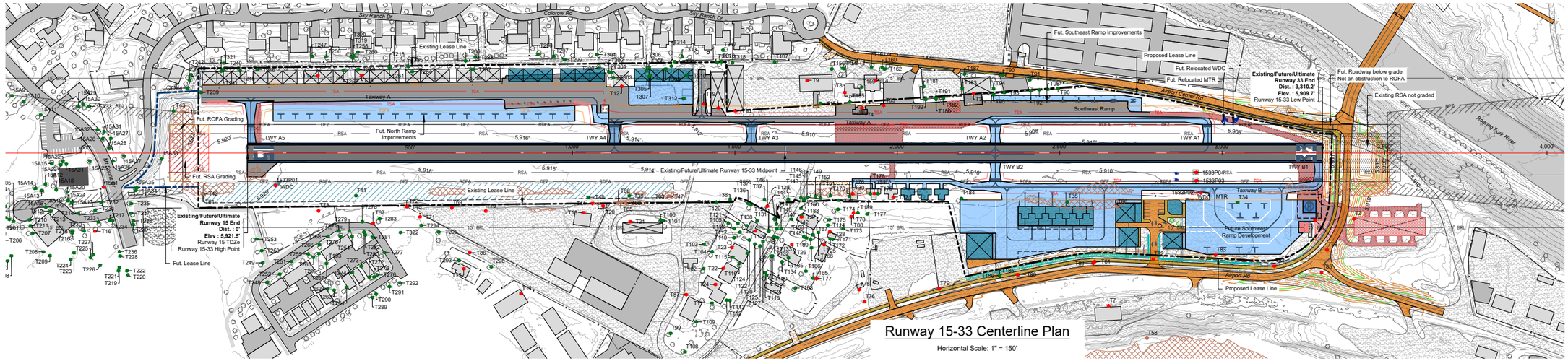
Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
T41	N 39° 30' 32.60"	W 107° 18' 41.77"	Brush	BR8	5923.89	5919.48	4.41	5920.88	3.01	None
T42	N 39° 30' 36.80"	W 107° 18' 44.35"	Brush	BR9	5927.04	5922.73	4.31	5921.61	5.43	None
T43	N 39° 30' 38.72"	W 107° 18' 41.95"	Brush	BR11	5924.16	5922.73	1.43	5923.04	1.12	None
T44	N 39° 30' 26.05"	W 107° 18' 37.94"	Fence	F1	5925.47	5920.23	5.24	5920.38	5.09	None
T45	N 39° 30' 31.07"	W 107° 18' 41.27"	Fence	F2	5927.57	5922.27	5.30	5924.94	2.63	None
T46	N 39° 30' 21.23"	W 107° 18' 35.00"	Fence	F10	5920.68	5916.53	4.15	5918.61	2.07	None
T47	N 39° 30' 24.05"	W 107° 18' 36.35"	Ground	G1	5917.00	5916.93	0.07	5915.94	1.06	None
T48	N 39° 30' 00.52"	W 107° 18' 35.15"	Ground	G2_A	6170.84	6170.38	0.46	6049.08	121.76	None
T49	N 39° 30' 02.03"	W 107° 18' 35.43"	Ground	G2_B	6175.60	6177.57	-1.97	6042.28	133.32	None
T50	N 39° 30' 03.41"	W 107° 18' 35.85"	Ground	G2_C	6182.23	6181.55	0.68	6038.08	144.15	None
T51	N 39° 30' 04.74"	W 107° 18' 36.20"	Ground	G2_D	6183.64	6182.00	1.64	6033.31	150.33	None
T52	N 39° 30' 05.95"	W 107° 18' 36.73"	Ground	G2_E	6187.41	6184.18	3.23	6030.95	156.46	None
T53	N 39° 30' 11.59"	W 107° 18' 41.83"	Ground	G2_EC	6206.01	6207.09	-1.08	6046.91	159.10	None
T54	N 39° 30' 07.52"	W 107° 18' 37.69"	Ground	G2_F	6193.45	6193.98	-0.53	6030.78	162.67	None
T55	N 39° 30' 08.06"	W 107° 18' 39.48"	Ground	G2_G	6213.66	6206.20	7.46	6045.51	168.15	None
T56	N 39° 30' 10.66"	W 107° 18' 42.40"	Ground	G2_H	6203.75	6206.08	-2.33	6058.55	145.20	None
T57	N 39° 30' 09.26"	W 107° 18' 40.06"	Ground	G2_I	6212.61	6203.34	9.27	6043.77	168.84	None
T58	N 39° 30' 09.10"	W 107° 18' 33.06"	Ground	G2_J	5985.74	5984.25	1.49	5974.19	11.55	None
T59	N 39° 30' 08.91"	W 107° 18' 38.81"	Ground	G2_U	6201.91	6196.04	5.87	6033.43	168.48	None
T60	N 39° 30' 11.68"	W 107° 18' 28.96"	Ground	G3	5930.58	5916.80	13.78	5916.68	13.90	None
T61	N 39° 30' 36.80"	W 107° 18' 44.37"	Ground	G4_DR	5922.88	5922.69	0.19	5921.74	1.14	None
T62	N 39° 30' 25.14"	W 107° 18' 37.34"	Ground	G4_S	5920.55	5919.57	0.98	5919.54	1.01	None
T63	N 39° 30' 24.05"	W 107° 18' 36.35"	Ground	G5	5917.00	5916.93	0.07	5915.94	1.06	None
T64	N 39° 30' 38.44"	W 107° 18' 41.81"	Ground	G6_CS	5923.04	5924.02	-0.98	5921.57	1.47	None
T65	N 39° 30' 25.29"	W 107° 18' 37.40"	Ground	G10_DR	5920.28	5920.70	-0.42	5919.28	1.00	None
T66	N 39° 30' 25.35"	W 107° 18' 37.47"	Ground	G10_S	5920.28	5920.77	-0.49	5919.64	0.64	None
T67	N 39° 30' 31.76"	W 107° 18' 42.45"	Light	L2	5935.67	5923.25	12.42	5932.93	2.74	None
T68	N 39° 30' 05.36"	W 107° 18' 26.83"	Light	L3	5942.66	5911.89	30.77	5934.60	8.06	None
T69	N 39° 30' 29.82"	W 107° 18' 40.54"	Misc Polygon	M2	5928.88	5922.70	6.18	5924.82	4.06	None
T70	N 39° 30' 28.85"	W 107° 18' 40.05"	Misc Polygon	M3	5930.55	5923.77	6.78	5925.63	4.92	None
T71	N 39° 30' 30.57"	W 107° 18' 41.41"	Misc Polygon	M4	5934.72	5923.24	11.48	5929.22	5.50	None
T72	N 39° 30' 31.08"	W 107° 18' 41.26"	Misc Polygon	M5	5929.37	5922.33	7.04	5924.72	4.65	None
T73	N 39° 30' 33.42"	W 107° 18' 42.95"	Misc Polygon	M11	5929.47	5919.07	10.40	5928.03	1.44	None
T74	N 39° 30' 19.97"	W 107° 18' 29.89"	Misc Polygon	M13	5927.34	5908.31	19.03	5913.42	13.92	None
T75	N 39° 30' 17.60"	W 107° 18' 36.34"	OH Polygon	OH1	5963.72	5922.04	41.68	5953.75	9.97	None
T76	N 39° 30' 17.30"	W 107° 18' 36.68"	OH Polygon	OH2	5960.93	5922.10	38.83	5959.01	1.92	None
T77	N 39° 30' 18.92"	W 107° 18' 36.70"	OH Polygon	OH3	5961.00	5921.78	39.22	5949.58	11.42	None
T78	N 39° 30' 18.79"	W 107° 18' 33.73"	OH Polygon	OH4	5954.21	5915.17	39.04	5920.00	34.21	None
T79	N 39° 30' 15.44"	W 107° 18' 34.92"	OH Polygon	OH5	5959.46	5923.19	36.27	5952.90	6.56	None
T80	N 39° 30' 13.48"	W 107° 18' 33.06"	OH Polygon	OH6	5959.36	5921.13	38.23	5946.61	12.75	None
T81	N 39° 30' 11.55"	W 107° 18' 31.28"	OH Polygon	OH7	5957.62	5921.14	36.48	5940.87	16.75	None
T82	N 39° 30' 09.99"	W 107° 18' 30.18"	OH Polygon	OH8	5953.58	5917.32	36.26	5939.50	14.08	None
T83	N 39° 30' 08.34"	W 107° 18' 28.95"	OH Polygon	OH9	5948.83	5911.75	37.08	5937.52	11.31	None
T84	N 39° 30' 06.59"	W 107° 18' 28.31"	OH Polygon	OH10	5951.68	5913.00	38.68	5942.15	9.53	None
T85	N 39° 30' 05.21"	W 107° 18' 27.71"	OH Polygon	OH11	5952.47	5913.63	38.84	5944.39	8.08	None
T86	N 39° 30' 28.74"	W 107° 18' 41.80"	OH Polygon	OH12	5962.21	5924.99	37.22	5944.20	18.01	None
T87	N 39° 30' 22.26"	W 107° 18' 39.52"	OH Polygon	OH14	5961.03	5923.60	37.43	5958.92	2.11	None
T88	N 39° 30' 18.80"	W 107° 18' 33.91"	OH Line	OH16	5952.70	5915.57	37.13	5921.77	30.93	None
T89	N 39° 30' 11.57"	W 107° 18' 31.36"	OH Line	OH17	5958.67	5922.58	36.09	5941.56	17.11	None
T90	N 39° 30' 16.57"	W 107° 18' 26.28"	Tree	T1	5951.19	5905.42	45.77	5927.54	23.65	None
T91	N 39° 30' 15.77"	W 107° 18' 25.99"	Tree	T2	5955.35	5906.33	49.02	5925.17	30.18	None
T92	N 39° 30' 15.59"	W 107° 18' 26.35"	Tree	T3	5953.32	5906.63	46.69	5920.38	32.94	None
T93	N 39° 30' 16.29"	W 107° 18' 26.88"	Tree	T4	5949.97	5906.73	43.24	5919.73	30.24	None
T94	N 39° 30' 16.64"	W 107° 18' 26.93"	Tree	T5	5924.94	5906.50	18.44	5921.50	3.44	None
T95	N 39° 30' 16.56"	W 107° 18' 27.14"	Tree	T6	5928.39	5906.46	21.93	5918.87	9.52	None
T96	N 39° 30' 14.88"	W 107° 18' 25.81"	Tree	T7	5940.75	5907.23	33.52	5921.33	19.42	None
T97	N 39° 30' 15.38"	W 107° 18' 26.18"	Tree	T8	5936.13	5907.08	29.05	5920.78	15.36	None
T98	N 39° 30' 15.15"	W 107° 18' 26.01"	Tree	T9	5936.46	5906.98	29.48	5921.04	15.42	None
T99	N 39° 30' 22.16"	W 107° 18' 41.16"	Tree	T12	5983.15	5930.99	52.16	5976.21	6.94	None
T100	N 39° 30' 23.95"	W 107° 18' 37.34"	Tree	T13	5967.59	5920.37	47.22	5926.61	40.98	None
T101	N 39° 30' 23.88"	W 107° 18' 37.32"	Tree	T14	5966.35	5920.36	45.99	5926.84	39.51	None
T102	N 39° 30' 22.14"	W 107° 18' 38.31"	Tree	T15	5966.41	5922.77	43.64	5947.19	19.22	None
T103	N 39° 30' 22.45"	W 107° 18' 37.44"	Tree	T16	5952.80	5922.24	30.56	5936.47	16.33	None
T104	N 39° 30' 22.13"	W 107° 18' 37.55"	Tree	T17	5971.50	5922.51	48.99	5939.48	32.02	None
T105	N 39° 30' 22.07"	W 107° 18' 36.27"	Tree	T18	5954.01	5919.01	35.00	5926.65	27.36	None
T106	N 39° 30' 22.68"	W 107° 18' 35.74"	Tree	T19	5929.83	5915.97	13.86	5917.65	12.18	None
T107	N 39° 30' 22.97"	W 107° 18' 29.79"	Tree	T20	5942.00	5908.08	33.92	5934.95	7.05	None
T108	N 39° 30' 21.52"	W 107° 18' 41.57"	Tree	T21	5986.75	5931.04	55.71	5984.19	2.56	None
T109	N 39° 30' 21.62"	W 107° 18' 40.31"	Tree	T22	5971.24	5927.74	43.50	5970.67	0.57	None
T110	N 39° 30' 20.40"	W 107° 18' 37.37"	Tree	T23	5968.45	5921.58	46.87	5947.79	20.66	None
T111	N 39° 30' 21.44"	W 107° 18' 39.37"	Tree	T24	5976.12	5923.69	52.43	5962.15	13.97	None
T112	N 39° 30' 21.08"	W 107° 18' 39.02"	Tree	T27	5984.00	5924.97	59.03	5960.60	23.40	None
T113	N 39° 30' 20.99"	W 107° 18' 38.97"	Tree	T28	5982.88	5924.84	58.04	5960.64	22.24	None
T114	N 39° 30' 19.32"	W 107° 18' 34.61"	Tree	T30	5969.73	5917.04	52.69	5925.86	43.87	None
T115	N 39° 30' 21.49"	W 107° 18' 37.40"	Tree	T31	5962.31	5921.98	40.33	5941.58	20.73	None
T116	N 39° 30' 21.23"	W 107° 18' 37.51"	Tree	T32	5965.00	5922.14	42.86	5944.26	20.74	None
T117	N 39° 30' 21.63"	W 107° 18' 36.39"	Tree	T33	5955.98	5918.80	37.18	5930.48	25.50	None
T118	N 39° 30' 21.83"	W 107° 18' 36.37"	Tree	T34	5957.39	5918.96	38.43	5929.10	28.29	None
T119	N 39° 30' 21.71"	W 107° 18' 36.68"	Tree	T35	5958.28	5920.04	38.24	5932.94	25.34	None
T120	N 39° 30' 21.53"	W 107° 18' 36.04"	Tree	T36	5946.43	5918.30	28.13	5927.55	18.88	None
T121	N 39° 30' 21.81"	W 107° 18' 36.11"	Tree	T37	5952.27	5918.02	34.25	5926.53	25.74	None
T122	N 39° 30' 21.27"	W 107° 18' 36.51"	Tree	T38	5938.59	5920.15	18.44	5933.80	4.79	None
T123	N 39° 30' 20.32"	W 107° 18' 37.45"	Tree	T39	5983.18	5921.89	61.29	5949.07	34.11	None
T124	N 39° 30' 21.14"	W 107° 18' 37.00"	Tree	T40	5958.28	5921.75	36.53	5939.56	18.72	None
T125	N 39° 30' 20.89"	W 107° 18' 36.52"	Tree	T41	5973.04	5921.11	51.93	5936.21	36.83	None
T126	N 39° 30' 20.65"	W 107° 18' 36.01"	Tree	T42	5971.99	5920.67	51.32	5932.39	39.60	None
T127	N 39° 30' 20.88"	W 107° 18' 36.32"	Tree	T43	5975.60	5921.25	54.35	5934.19	41.41	None
T128	N 39° 30' 20.85"	W 107° 18' 35.87"	Tree	T44	5976.03	5920.55	55.48	5929.77	46.26	None
T129	N 39° 30' 20.46"	W 107° 18' 36.69"	Tree	T45	5947.52	5921.21	26.31	5940.49	7.03	None
T130	N 39° 30' 21.06"	W 107° 18' 36.54"	Tree	T46	5963.30	5920.81	42.49	5935.41	27.89	None
T131	N 39° 30' 20.88"	W 107° 18' 35.84"	Tree	T47	5977.30	5920.35	56.95	5929.27	48.03	None
T132	N 39° 30' 20.63"	W 107° 18' 35.96"	Tree	T48	5972.91	5920.64	52.27	5931.94	40.97	None
T133	N 39° 30' 20.54"	W 107° 18' 35.93"	Tree	T49	5970.09	5920.64	49.45	5932.20	37.90	None
T134	N 39° 30' 20.08"	W 107° 18' 36.70"	Tree	T50	5962.05	5920.75	41.30	5942.80	19.25	None
T135	N 39° 30' 19.96"	W 107° 18' 36.45"	Tree	T51	5966.45	5921.34	45.11	5940.96	25.49	None
T136	N 39° 30' 21.80"	W 107° 18' 35.24"	Tree	T52	5959.13	5915.91	43.22	5917.66	41.47	None

14 CFR Part 77 Transitional Surface Obstruction Table (Continued)

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
T137	N 39° 30' 21.69"	W 107° 18' 35.24"	Tree	T53	5959.06	5916.50	42.56	5918.37	40.69	None
T138	N 39° 30' 21.31"	W 107° 18' 35.70"	Tree	T54	5946.66	5917.47	29.19	5925.28	21.38	None
T139	N 39° 30' 20.85"	W 107° 18' 35.32"	Tree	T55	5960.83	5916.93	43.90	5924.10	36.73	None
T140	N 39° 30' 20.67"	W 107° 18' 35.62"	Tree	T56	5976.81	5918.88	57.93	5928.30	48.51	None
T141	N 39° 30' 20.74"	W 107° 18' 35.47"	Tree	T57	5972.97	5917.93	55.04	5926.34	46.63	None
T142	N 39° 30' 20.40"	W 107° 18' 35.04"	Tree	T58	5950.80	5916.72	34.08	5923.93	26.87	None
T143	N 39° 30' 20.43"	W 107° 18' 34.13"	Tree	T59	5960.05	5912.97	47.08	5914.38	45.67	None
T144	N 39° 30' 20.75"	W 107° 18' 34.39"	Tree	T60	5957.32	5914.37	42.95	5915.23	42.09	None
T145	N 39° 30' 20.33"	W 107° 18' 34.12"	Tree	T61	5966.54	5913.40	53.14	5914.97	51.57	None
T146	N 39° 30' 20.32"	W 107° 18' 34.13"	Tree	T62	5965.79	5913.50	52.29	5915.13	50.66	None
T147	N 39° 30' 20.55"	W 107° 18' 35.56"	Tree	T63	5969.79	5918.63	51.16	5928.34	41.45	None
T148	N 39° 30' 19.83"	W 107° 18' 35.44"	Tree	T64	5960.34	5919.51	40.83	5931.35	28.99	None
T149	N 39° 30' 20.26"	W 107° 18' 34.00"	Tree	T65	5962.80	5913.05	49.75	5914.07	48.73	None
T150	N 39° 30' 20.29"	W 107° 18' 34.49"	Tree	T66	5954.80	5915.46	39.34	5919.01	35.79	None
T151	N 39° 30' 19.90"	W 107° 18' 33.80"	Tree	T67	5974.25	5913.54	60.71	5914.13	60.12	None
T152	N 39° 30' 20.06"	W 107° 18' 33.81"	Tree	T68	5970.28	5912.94	57.34	5913.35	56.93	None
T153	N 39° 30' 19.74"	W 107° 18' 35.44"	Tree	T69	5963.62	5919.75	43.87	5931.90	31.72	None
T154	N 39° 30' 21.17"	W 107° 18' 30.45"	Tree	T70	5942.30	5908.31	33.99	5916.03	26.27	None
T155	N 39° 30' 20.38"	W 107° 18' 29.89"	Tree	T71	5939.71	5908.46	31.25	5916.16	23.55	None
T156	N 39° 30' 21.32"	W 107° 18' 29.05"	Tree	T72	5936.52	5905.28	31.24	5930.92	5.60	None
T157	N 39° 30' 21.03"	W 107° 18' 28.83"	Tree	T74	5933.67	5905.89	27.78	5931.10	2.57	None
T158	N 39° 30' 20.99"	W 107° 18' 28.82"	Tree	T75	5935.21	5906.17	29.04	5930.87	4.34	None
T159	N 39° 30' 20.25"	W 107° 18' 29.16"	Tree	T76	5933.96	5907.89	26.07	5922.59	11.37	None
T160	N 39° 30' 19.96"	W 107° 18' 28.12"	Tree	T78	5949.68	5904.87	44.81	5930.87	18.81	None
T161	N 39° 30' 20.27"	W 107° 18' 28.29"	Tree	T79	5938.29	5905.16	33.13	5931.32	6.97	None
T162	N 39° 30' 19.87"	W 107° 18' 28.13"	Tree	T80	5953.19	5904.87	48.32	5930.29	22.90	None
T163	N 39° 30' 19.37"	W 107° 18' 37.40"	Tree	T81	5956.05	5922.04	34.01	5954.10	1.95	None
T164	N 39° 30' 19.47"	W 107° 18' 35.70"	Tree	T82	5946.04	5922.06	23.98	5936.12	9.92	None
T165	N 39° 30' 19.02"	W 107° 18' 36.74"	Tree	T83	5956.83	5922.62	34.21	5949.42	7.41	None
T166	N 39° 30' 19.31"	W 107° 18' 36.62"	Tree	T85	5971.86	5921.64	50.22	5946.55	25.31	None
T167	N 39° 30' 19.61"	W 107° 18' 35.22"	Tree	T86	5944.73	5919.10	25.63	5930.40	14.33	None
T168	N 39° 30' 19.49"	W 107° 18' 35.04"	Tree	T87	5943.71	5918.62	25.09	5929.23	14.48	None
T169	N 39° 30' 19.60"	W 107° 18' 35.43"	Tree	T88	5961.13	5919.96	41.17	5932.57	28.56	None
T170	N 39° 30' 19.65"	W 107° 18' 33.53"	Tree	T89	5960.47	5912.65	47.82	5912.82	47.65	None
T171	N 39° 30' 19.01"	W 107° 18' 35.04"	Tree	T90	5955.16	5921.31	33.85	5932.05	23.11	None
T172	N 39° 30' 19.08"	W 107° 18' 35.06"	Tree	T91	5953.39	5920.60	32.79	5931.83	21.56	None
T173	N 39° 30' 18.86"	W 107° 18' 34.48"	Tree	T92	5944.66	5917.94	26.72	5927.23	17.43	None
T174	N 39° 30' 19.26"	W 107° 18' 33.88"	Tree	T93	5937.02	5915.49	21.53	5918.73	18.29	None
T175	N 39° 30' 19.37"	W 107° 18' 34.41"	Tree	T94	5978.09	5916.46	61.63	5923.49	54.60	None
T176	N 39° 30' 19.12"	W 107° 18' 33.23"	Tree	T95	5931.44	5912.85	18.59	5912.91	18.53	None
T177	N 39° 30' 18.40"	W 107° 18' 33.54"	Tree	T96	5921.92	5914.49	7.43	5920.48	1.44	None
T178	N 39° 30' 18.59"	W 107° 18' 32.77"	Tree	T97	5924.68	5911.44	13.24	5911.49	13.19	None
T179	N 39° 30' 18.38"	W 107° 18' 32.64"	Tree	T98	5925.89	5910.77	15.12	5911.39	14.50	None
T180	N 39° 30' 18.06"	W 107° 18' 28.30"	Tree	T99	5918.74	5906.52	12.22	5916.76	1.98	None
T181	N 39° 30' 18.57"	W 107° 18' 28.07"	Tree	T100	5923.56	5906.37	17.19	5922.37	1.19	None
T182	N 39° 30' 17.88"	W 107° 18' 28.14"	Tree	T101	5920.94	5906.37	14.57	5917.29	3.65	None
T183	N 39° 30' 17.50"	W 107° 18' 27.46"	Tree	T102	5939.15	5905.92	33.23	5921.74	17.41	None
T184	N 39° 30' 16.04"	W 107° 18' 31.36"	Tree	T103	5930.22	5910.47	19.75	5913.32	16.90	None
T185	N 39° 30' 13.96"	W 107° 18' 33.42"	Tree	T104	5954.67	5920.67	34.00	5947.28	7.39	None
T186	N 39° 30' 13.96"	W 107° 18' 33.42"	Tree	T105	5954.67	5920.67	34.00	5947.28	7.39	None
T187	N 39° 30' 17.63"	W 107° 18' 26.92"	Tree	T106	5931.60	5904.80	26.80	5928.01	3.59	None
T188	N 39° 30' 20.19"	W 107° 18' 34.72"	Tree	T107	5922.38	5916.27	6.11	5921.94	0.44	None
T189	N 39° 30' 18.67"	W 107° 18' 33.66"	Tree	T108	5920.45	5914.76	5.69	5919.96	0.49	None
T190	N 39° 30' 20.42"	W 107° 18' 36.66"	Tree	T109	5944.76	5921.79	22.97	5940.36	4.40	None
T191	N 39° 30' 18.08"	W 107° 18' 28.26"	Tree	T110	5918.97	5906.48	12.49	5917.32	1.65	None
T192	N 39° 30' 18.35"	W 107° 18' 28.49"	Tree	T111	5919.27	5906.48	12.79	5916.69	2.58	None
T193	N 39° 30' 32.49"	W 107° 18' 44.67"	Tree	T120	5963.82	5920.80	43.02	5951.04	12.78	None
T194	N 39° 30' 41.89"	W 107° 18' 49.69"	Tree	T173	5973.27	5902.54	70.73	5963.56	9.71	None
T195	N 39° 30' 41.73"	W 107° 18' 49.78"	Tree	T174	5975.86	5902.64	73.22	5965.01	10.85	None
T196	N 39° 30' 41.60"	W 107° 18' 49.66"	Tree	T175	5976.91	5903.42	73.49	5964.13	12.78	None
T197	N 39° 30' 41.45"	W 107° 18' 50.35"	Tree	T176	5972.91	5902.16	70.75	5972.39	0.52	None
T198	N 39° 30' 41.20"	W 107° 18' 49.87"	Tree	T177	5972.16	5903.03	69.13	5967.69	4.47	None
T199	N 39° 30' 41.24"	W 107° 18' 50.12"	Tree	T178	5975.60	5902.67	72.93	5970.40	5.20	None
T200	N 39° 30' 41.86"	W 107° 18' 48.63"	Tree	T179	5983.61	5906.27	77.34	5951.63	31.98	None
T201	N 39° 30' 41.87"	W 107° 18' 49.08"	Tree	T180	5984.56	5904.69	79.87	5956.70	27.86	None
T202	N 39° 30' 41.87"	W 107° 18' 49.32"	Tree	T181	5985.90	5904.16	81.74	5959.39	26.51	None
T203	N 39° 30' 41.87"	W 107° 18' 49.08"	Tree	T182	5984.56	5904.69	79.87	5956.70	27.86	None
T204	N 39° 30' 41.75"	W 107° 18' 48.62"	Tree	T183	5985.38	5907.69	77.69	5951.91	33.47	None
T205	N 39° 30' 41.61"	W 107° 18' 48.62"	Tree	T184	5984.07	5908.38	75.69	5952.35	31.72	None
T206	N 39° 30' 41.62"	W 107° 18' 49.46"	Tree	T185	5970.98	5903.41	67.57	5961.78	9.20	None
T207	N 39° 30' 40.93"	W 107° 18' 48.71"	Tree	T187	5967.89	5906.96	60.93	5955.45	12.44	None
T208	N 39° 30' 40.38"	W 107° 18' 49.17"	Tree	T188	5965.99	5907.09	58.90	5962.39	3.60	None
T209	N 39° 30' 40.15"	W 107° 18' 49.19"	Tree	T192	5964.78	5907.24	57.54	5963.41	1.37	None
T210	N 39° 30' 41.19"	W 107° 18' 48.28"	Tree	T193	5981.54	5910.20	71.34	5949.84	31.70	None
T211	N 39° 30' 41.09"	W 107° 18' 48.48"	Tree	T194	5977.51	5907.97	69.54	5952.37	25.14	None
T212	N 39° 30' 40.73"	W 107° 18' 47.61"	Tree	T200	5983.18	5908.10	75.08	5943.69	39.49	None
T213	N 39° 30' 40.73"	W 107° 18' 47.61"	Tree	T202	5983.18	5908.10	75.08	5943.69	39.49	None
T214	N 39° 30' 39.95"	W 107° 18' 47.20"	Tree	T209	5984.10	5910.57	73.53	5941.51	42.59	None
T215	N 39° 30' 39.85"	W 107° 18' 47.93"	Tree	T210	5978.49	5908.35	70.14	5950.04	28.45	None
T216	N 39° 30' 39.84"	W 107° 18' 48.00"	Tree	T211	5970.65	5908.27	62.38	5950.92	19.73	None
T217	N 39° 30' 38.99"	W 107° 18' 46.91"	Tree	T261	5948.24	5913.58	34.66	5941.29	6.95	None
T218	N 39° 30' 33.41"	W 107° 18' 36.63"	Tree	T262	5945.09	5909.18	35.91	5939.50	5.59	None
T219	N 39° 30' 38.10"	W 107° 18' 48.41"	Tree	T265	5982.29	5912.76	69.53	5961.02	21.27	None
T220	N 39° 30' 37.76"	W 107° 18' 48.52"	Tree	T267	5969.50	5912.57	56.93	5963.27	6.23	None
T221	N 39° 30' 38.07"	W 107° 18' 48.53"	Tree	T268	5981.08	5912.46	68.62	5962.48	18.60	None
T222	N 39° 30' 37.84"	W 107° 18' 48.38"	Tree	T269	5978.46	5912.90	65.56	5961.53	16.93	None
T223	N 39° 30' 39.53"	W 107° 18' 48.67"	Tree	T272	5960.38	5908.18	52.20	5959.48	0.90	None
T224	N 39° 30' 39.53"	W 107° 18' 48.96"	Tree	T273	5963.99	5907.48	56.51	5962.71	1.28	None
T225	N 39° 30' 39.01"	W 107° 18' 48.56"	Tree	T276	5966.35	5909.49	56.86	5959.83	6.52	None
T226	N 39° 30' 38.65"	W 107° 18' 48.66"	Tree	T277	5972.94	5910.77	62.17	5962.13	10.81	None
T227	N 39° 30' 38.99"	W 107° 18' 48.41"	Tree	T278	5976.32	5911.01	65.31	5958.25	18.07	None
T228	N 39° 30' 38.23"	W 107° 18' 47.98"	Tree	T280	5959.16	5913.43	45.73	5955.77	3.39	None
T229	N 39° 30' 38.29"	W 107° 18' 46.65"	Tree	T285	5954.77	5913.20	41.57	5940.56	14.21	None
T230	N 39° 30' 39.55"	W 107° 18' 47.72"	Tree	T286	5966.38	5909.43	56.95	5948.72	17.66	None
T231	N 39° 30' 39.53"	W 107° 18' 46.80"	Tree	T287	5964.18	5911.80	52.38	5938.36	25.82	None
T232	N 39° 30' 39.47"	W 107° 18' 46.42"	Tree	T288	5954.57	5911.85	42.72	5934.26	20.31	None

14 CFR Part 77 Transitional Surface Obstruction Table (Continued)

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	Disposition
T233	N 39° 30' 39.28"	W 107° 18' 47.17"	Tree	T289	5972.45	5911.01	61.44	5943.29	29.16	None
T234	N 39° 30' 38.90"	W 107° 18' 46.88"	Tree	T290	5957.46	5913.35	44.11	5941.24	16.22	None
T235	N 39° 30' 38.63"	W 107° 18' 45.95"	Tree	T291	5955.46	5914.00	41.46	5931.55	23.91	None
T236	N 39° 30' 38.31"	W 107° 18' 47.84"	Tree	T294	5956.84	5913.12	43.72	5953.96	2.88	None
T237	N 39° 30' 38.51"	W 107° 18' 46.29"	Tree	T295	5940.46	5913.52	26.94	5935.77	4.69	None
T238	N 39° 30' 38.35"	W 107° 18' 46.52"	Tree	T297	5955.92	5913.34	42.58	5938.90	17.02	None
T239	N 39° 30' 38.22"	W 107° 18' 40.82"	Tree	T302	5946.30	5914.65	31.65	5930.19	16.11	None
T240	N 39° 30' 37.99"	W 107° 18' 39.38"	Tree	T303	5944.37	5908.01	36.36	5943.12	1.25	None
T241	N 39° 30' 37.92"	W 107° 18' 39.62"	Tree	T305	5943.25	5911.75	31.50	5940.25	3.00	None
T242	N 39° 30' 38.71"	W 107° 18' 40.58"	Tree	T314	5959.13	5907.93	51.20	5935.72	23.41	None
T243	N 39° 30' 38.73"	W 107° 18' 40.36"	Tree	T315	5954.27	5907.45	46.82	5938.03	16.24	None
T244	N 39° 30' 38.65"	W 107° 18' 40.90"	Tree	T316	5960.11	5908.10	52.01	5932.11	28.00	None
T245	N 39° 30' 37.45"	W 107° 18'



Runway 15-33 Centerline Plan

Horizontal Scale: 1" = 150'

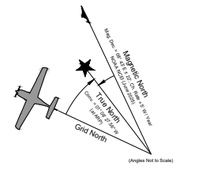
Legend							
Description	**Existing**	**Future**	**Ultimate**	**Description**	**Existing**	**Future**	**Ultimate**
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
On-Airport Building/Hangar				Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
Airport Leasing Line				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Off-Airport Building		-	-	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Roadway / Driveway / Parking (Paved /Unpaved)				2-Light Precision App. Path Indicator (PAPI-2L)			-
Pavement Demolition	-			Wind Cone (WDC)			
Trees		-	-	MicroTower Weather System			-
Water Body & Streams		-	-	Storm Pipes / Culverts & Ditches		-	-
Topographic Contours	1,000'	-	-	Fence	X	X	X

Notes:

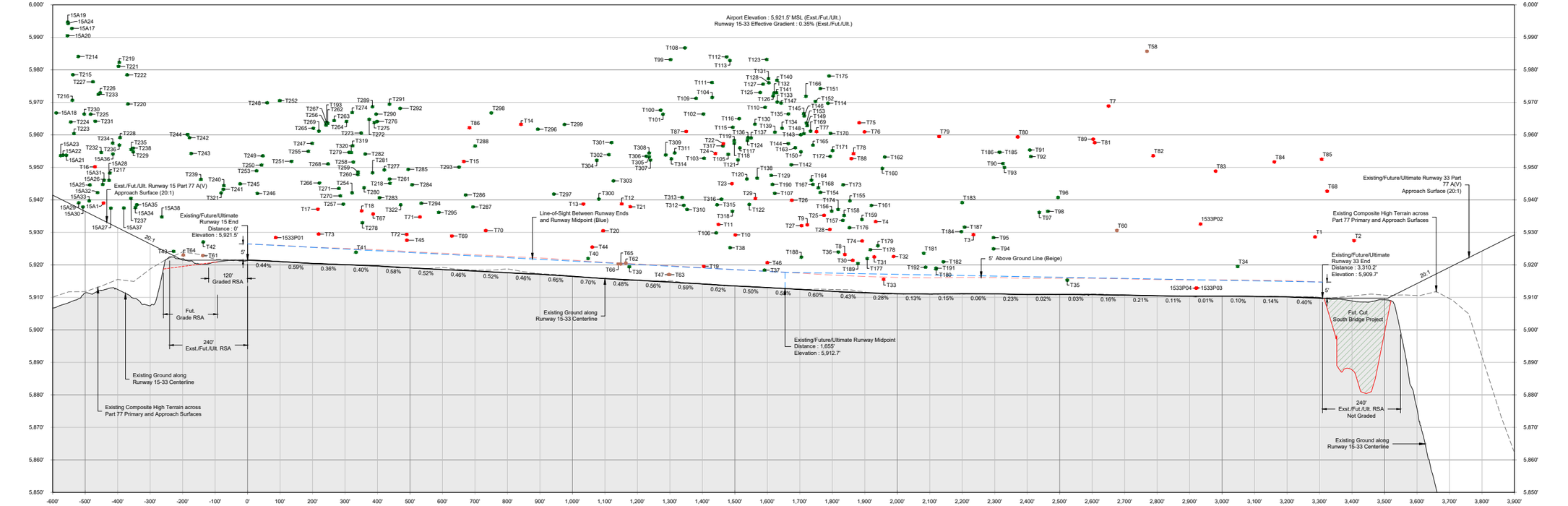
1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. The nearest quadrangle corner is the southeast corner of USGS US Topo Map, Glenwood Springs, CO Quadrangle, 7.5-minute Series. The quadrangle corner is located approximately 3.2 miles east of the existing airport reference point.
5. Section corners shown are GIS data retrieved from the U.S. Bureau of Land Management Geospatial Data platform, Public Land Survey System (PLSS) Section Corners database. Township & Range per the 6th Principal Meridian.
6. Runway 15-33 meets Line-of-Sight (LOS) requirements per FAA Advisory Circular 150/5300-13B, Section 3.8.1.
7. Airspace obstructions from an airspace survey by others in 2021. Whether survey data is pursuant to FAA AC 150 5300-16B, -17C (Change 1), and -18B (Change 1) is unknown.
8. Elevation information for Traverse Ways may be found on Sheets 9, 10, and 11 of 14, "Inner Portion of the Approach Surface Drawings".

Obstruction Legend:

- Man-Made Objects
- Trees & Brushes
- Ground
- Terrain Penetrations



0' 150' 300' 600'



Runway 15-33 Centerline Profile

Horizontal Scale: 1" = 150'
Vertical Scale: 1" = 15'

KGWS Sumers Airpark

No.	Revisions	Date
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RAFT

Runway 15-33 Centerline Profile

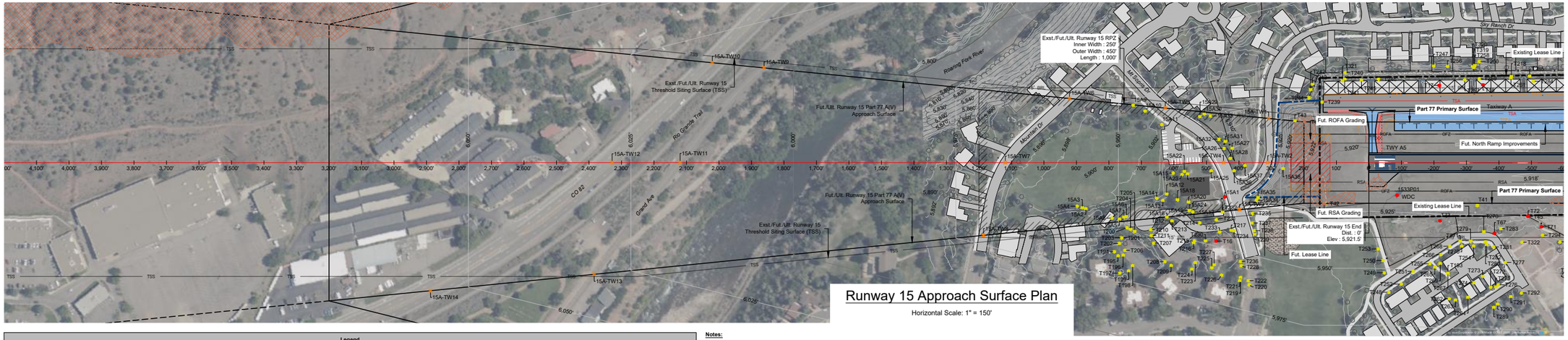
KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	8 of 14
Scale:	1" = 150'



Runway 15 Approach Surface Plan

Horizontal Scale: 1" = 150'

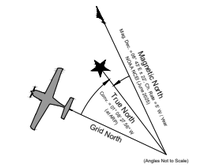
Legend							
Description	**Existing**	**Future**	**Ultimate**	**Description**	**Existing**	**Future**	**Ultimate**
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
On-Airport Building/Hangar				Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
Airport Leasing Line				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Off-Airport Building		-	-	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Roadway / Driveway / Parking (Paved /Unpaved)				2-Light Precision App. Path Indicator (PAPI-2L)			-
Pavement Demolition	-			Wind Cone (WDC)			
Trees		-	-	MicroTower Weather System			-
Water Body & Streams		-	-	Storm Pipes / Culverts & Ditches		-	-
Topographic Contours	1,000'	-	-	Fence	X	X	X

Notes:

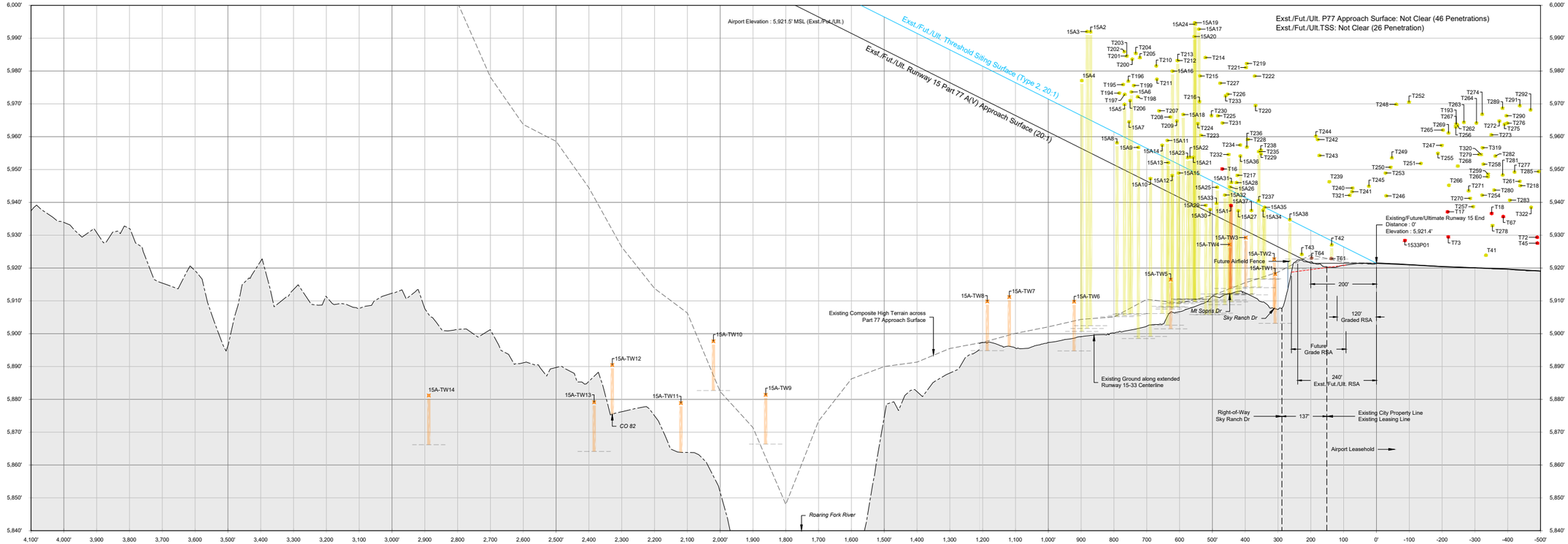
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3. All dimensions shown are horizontal surface measurements.
4. Airspace obstructions from an airspace survey by others in 2021. Whether survey data is pursuant to FAA AC 150 5300-16B, -17C (Change 1), and -18B (Change 1) is unknown.
5. Elevation Adjustments for Traverse Ways, per Title 14 of the Code of Federal Regulations (CFR) Part 77, Subpart B, 77.9 (c), is as follows: 23' for Railways, 17' for Interstate Highways, 15' for other Public Roads, and 10' for Private Roads.
6. Traverse Ways elevations provided in the obstruction tables are exclusive of elevation adjustments,which are provided in a separate column. Traverse Ways are represented on the profile view inclusive of elevation adjustments.

Obstruction Legend:

- Man-Made Objects
- Trees & Brushes
- Ground
- Traverse Ways
- Terrain Penetrations



0' 150' 300' 600'



Runway 15 Approach Surface Profile

Horizontal Scale: 1" = 150'
Vertical Scale: 1" = 15'

KGWS Sumers Airpark

No.	Revisions	Date
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Inner Portion of the Approach Surface Drawing - Runway 15

KGWS Sumers Airpark (GWS)

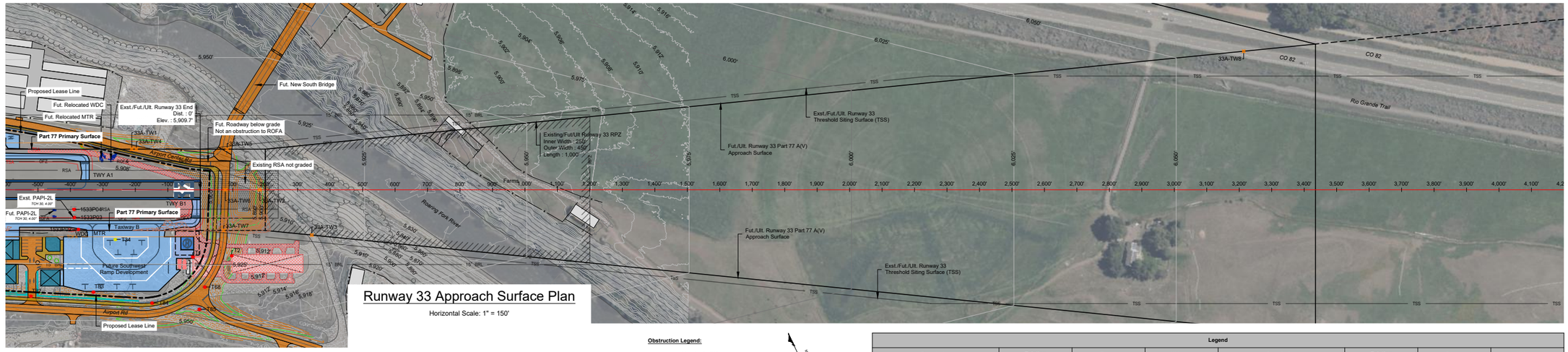
Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	**25-GWS-01**
Drawn:	**TPS**
Checked:	**JVG**
Approved:	**CMD**
Date:	**06/01/2026**
Sheet No.:	**9 of 14**
Scale:	**1" = 150'**

D R A F T



Runway 33 Approach Surface Plan

Horizontal Scale: 1" = 150'

Obstruction Legend:

- Man-Made Objects
- Trees & Bushes
- Ground
- Traverse Ways
- Terrain Penetrations

Magnetic North (Mag. Dec. 08°44'30" E, 2° 1'W)
True North
Grid North
(Angles Not to Scale)

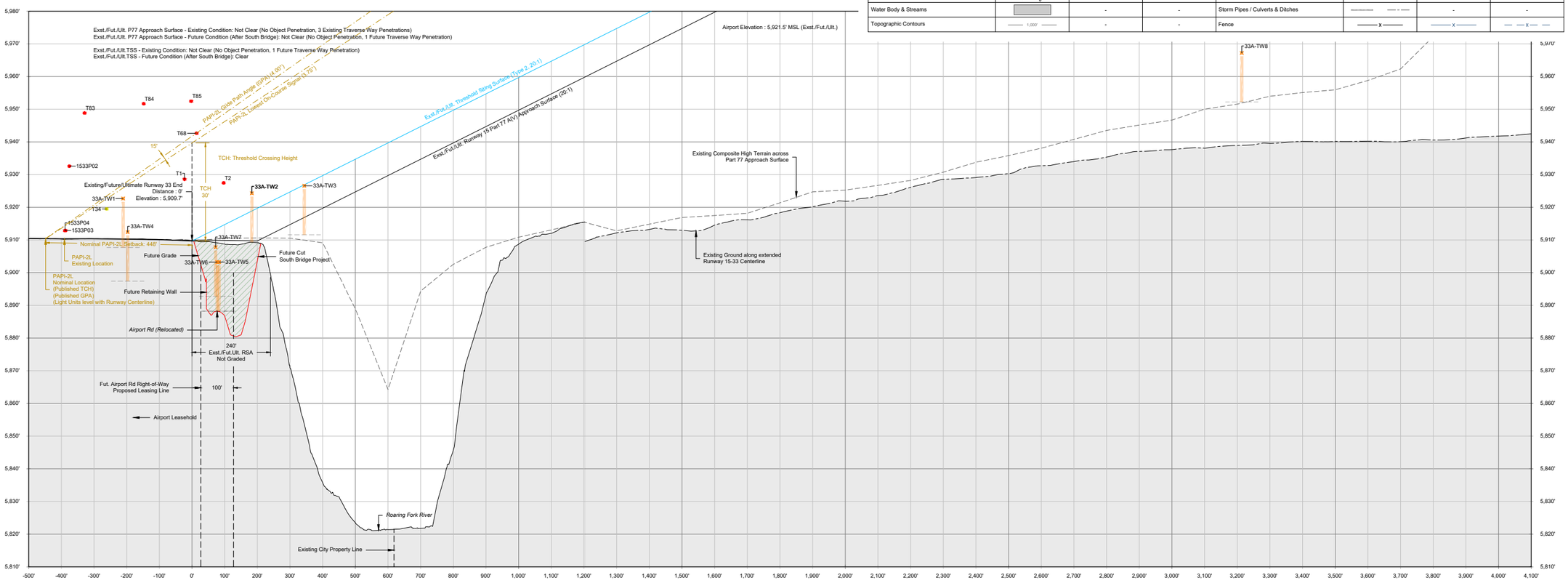
0' 150' 300' 600'

Notes:

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2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. Airspace obstructions from an airspace survey by others in 2021. Whether survey data is pursuant to FAA AC 150 5300-16B, -17C (Change 1), and -18B (Change 1) is unknown.
5. Elevation Adjustments for Traverse Ways, per Title 14 of the Code of Federal Regulations (CFR) Part 77, Subpart B, 77.9 (c), is as follows: 23' for Railways, 17' for Interstate Highways, 15' for other Public Roads, and 10' for Private Roads.
6. Traverse Ways elevations provided in the obstruction tables are exclusive of elevation adjustments,which are provided in a separate column. Traverse Ways are represented on the profile view inclusive of elevation adjustments.

Legend

Description	Existing	Future	Ultimate	Description	Existing	Future	Ultimate
Runway Pavement (AC/PCC)				Runway Safety Area (RSA)	RSA	RSA	RSA
Taxiway and Apron Pavement (AC/PCC)				Runway Obstacle Free Area (ROFA)	ROFA	ROFA	ROFA
On-Airport Building/Hangar				Runway Protection Zone (RPZ)	RPZ	RPZ	RPZ
Building Restriction Line (BRL)	35' BRL	35' BRL	35' BRL	Obstacle Free Zone (OFZ)	OFZ	OFZ	OFZ
Airport Leasing Line				Taxiway Safety Area (TSA)	TSA	TSA	TSA
Off-Airport Building		-	-	Taxiway Obstacle Free Area (TOFA)	TOFA	TOFA	TOFA
Roadway / Driveway / Parking (Paved /Unpaved)				2-Light Precision App. Path Indicator (PAPI-2L)			-
Pavement Demolition	-			Wind Cone (WDC)			
Trees		-	-	MicroTower Weather System			-
Water Body & Streams		-	-	Storm Pipes / Culverts & Ditches		-	-
Topographic Contours	1,000'	-	-	Fence	X	X	X



Runway 33 Approach Surface Profile

Horizontal Scale: 1" = 150'
Vertical Scale: 1" = 15'

KGWS Sumers Airpark

No.	Revisions	Date
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D R A F T

Inner Portion of the Approach Surface Drawing - Runway 33

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	10 of 14
Scale:	1" = 150'

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Scale(s) as noted on this sheet are based on a full size 24" x 36" sheet

14 CFR Part 77 Runway 15 A(V) Approach Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	TSS Elevation at Point (Feet MSL)	TSS Penetration (Feet)	Triggering Event	Disposition
T42	N 39° 30' 36.80"	W 107° 18' 44.35"	Brush	BR9	5927.04	5922.73	4.31	5921.61	5.43	5928.28	-1.24	None	None
T43	N 39° 30' 38.72"	W 107° 18' 41.95"	Brush	BR11	5924.16	5922.73	1.43	5923.04	1.12	5932.84	-8.68	None	None
T61	N 39° 30' 36.80"	W 107° 18' 44.37"	Ground	G4_DR	5922.88	5922.69	0.19	5921.74	1.14	5928.34	-5.46	None	None
T64	N 39° 30' 38.44"	W 107° 18' 41.81"	Ground	G6_CS	5923.04	5924.02	-0.98	5921.57	1.47	5931.34	-8.30	None	None
15A1	N 39° 30' 39.61"	W 107° 18' 45.85"	Light	L1	5939.02	5913.77	25.25	5933.63	5.39	5943.63	-4.61	None	None
15A2	N 39° 30' 43.24"	W 107° 18' 48.67"	Tree	T126	5991.94	5902.44	89.50	5955.00	36.94	5965.00	26.94	None	None
15A3	N 39° 30' 43.35"	W 107° 18' 48.69"	Tree	T127	5992.01	5901.59	90.42	5955.53	36.48	5965.53	26.48	None	None
15A4	N 39° 30' 43.51"	W 107° 18' 48.74"	Tree	T128	5977.08	5900.72	76.36	5956.35	20.73	5966.35	10.73	None	None
15A5	N 39° 30' 42.19"	W 107° 18' 48.45"	Tree	T134	5969.86	5905.50	64.36	5949.83	20.03	5959.83	10.03	None	None
15A6	N 39° 30' 42.03"	W 107° 18' 48.24"	Tree	T135	5973.63	5906.13	67.50	5948.78	24.85	5958.78	14.85	None	None
15A7	N 39° 30' 42.09"	W 107° 18' 48.30"	Tree	T136	5964.55	5905.95	58.60	5949.14	15.41	5959.14	5.41	None	None
15A8	N 39° 30' 42.40"	W 107° 18' 48.55"	Tree	T137	5958.12	5905.17	52.95	5950.99	7.13	5960.99	-2.87	None	None
15A9	N 39° 30' 43.34"	W 107° 18' 44.21"	Tree	T139	5956.74	5898.51	58.23	5947.72	9.02	5957.72	-0.98	None	None
15A10	N 39° 30' 42.94"	W 107° 18' 44.21"	Tree	T141	5947.22	5899.17	48.05	5945.89	1.33	5955.89	-8.67	None	None
15A11	N 39° 30' 42.30"	W 107° 18' 44.39"	Tree	T143	5958.84	5902.57	56.27	5943.31	15.53	5953.31	5.53	None	None
15A12	N 39° 30' 41.24"	W 107° 18' 46.75"	Tree	T195	5948.17	5907.52	40.65	5942.58	5.59	5952.58	-4.41	None	None
15A13	N 39° 30' 41.25"	W 107° 18' 47.04"	Tree	T196	5952.11	5908.33	43.78	5943.15	8.96	5953.15	-1.04	None	None
15A14	N 39° 30' 41.45"	W 107° 18' 47.07"	Tree	T197	5957.39	5906.14	51.25	5944.10	13.29	5954.10	3.29	None	None
15A15	N 39° 30' 41.34"	W 107° 18' 45.91"	Tree	T198	5948.93	5909.13	39.80	5941.57	7.36	5951.57	-2.64	None	None
15A16	N 39° 30' 40.92"	W 107° 18' 47.56"	Tree	T199	5979.97	5908.03	71.94	5942.53	37.44	5952.53	27.44	None	None
T212	N 39° 30' 40.73"	W 107° 18' 47.61"	Tree	T200	5983.18	5908.10	75.08	5943.69	39.49	5951.75	31.43	None	None
15A17	N 39° 30' 40.27"	W 107° 18' 46.92"	Tree	T201	5992.76	5910.44	82.32	5938.51	54.25	5948.51	44.25	None	None
T213	N 39° 30' 40.73"	W 107° 18' 47.61"	Tree	T202	5983.18	5908.10	75.08	5943.69	39.49	5951.75	31.43	None	None
15A18	N 39° 30' 40.86"	W 107° 18' 46.76"	Tree	T203	5966.74	5909.41	57.33	5940.90	25.84	5950.90	15.84	None	None
15A19	N 39° 30' 40.40"	W 107° 18' 46.95"	Tree	T204	5994.70	5909.69	85.01	5939.13	55.57	5949.13	45.57	None	None
15A20	N 39° 30' 40.53"	W 107° 18' 46.65"	Tree	T205	5990.50	5910.42	80.08	5939.19	51.31	5949.19	41.31	None	None
15A21	N 39° 30' 40.93"	W 107° 18' 45.68"	Tree	T206	5953.72	5910.63	43.09	5939.36	14.36	5949.36	4.36	None	None
15A22	N 39° 30' 41.06"	W 107° 18' 45.65"	Tree	T207	5953.75	5910.44	43.31	5939.86	13.89	5949.86	3.89	None	None
15A23	N 39° 30' 41.08"	W 107° 18' 45.80"	Tree	T208	5953.62	5910.56	43.06	5940.22	13.40	5950.22	3.40	None	None
15A24	N 39° 30' 40.40"	W 107° 18' 46.93"	Tree	T212	5994.27	5909.77	84.50	5939.08	55.19	5949.08	45.19	None	None
15A25	N 39° 30' 40.33"	W 107° 18' 45.17"	Tree	T213	5944.60	5912.08	32.52	5935.72	8.88	5945.72	-1.12	None	None
15A26	N 39° 30' 40.28"	W 107° 18' 44.16"	Tree	T214	5944.73	5910.28	34.45	5933.76	10.97	5943.76	0.97	None	None
15A27	N 39° 30' 40.06"	W 107° 18' 44.00"	Tree	T215	5937.45	5912.19	25.26	5932.51	4.94	5942.51	-5.06	None	None
15A28	N 39° 30' 39.98"	W 107° 18' 44.39"	Tree	T216	5946.01	5912.11	33.90	5932.78	13.23	5942.78	3.23	None	None
15A29	N 39° 30' 41.37"	W 107° 18' 43.45"	Tree	T223	5939.09	5905.83	33.26	5937.45	1.64	5947.45	-8.36	None	None
15A30	N 39° 30' 41.28"	W 107° 18' 43.29"	Tree	T224	5937.81	5905.75	32.06	5936.79	1.02	5946.79	-8.98	None	None
15A31	N 39° 30' 40.34"	W 107° 18' 43.88"	Tree	T225	5946.04	5909.69	36.35	5933.55	12.49	5943.55	2.49	None	None
15A32	N 39° 30' 40.55"	W 107° 18' 43.92"	Tree	T226	5942.24	5908.84	33.40	5934.55	7.69	5944.55	-2.31	None	None
15A33	N 39° 30' 41.09"	W 107° 18' 43.25"	Tree	T227	5939.71	5906.25	33.46	5935.83	3.88	5945.83	-6.12	None	None
T232	N 39° 30' 39.47"	W 107° 18' 46.42"	Tree	T288	5954.57	5911.85	42.72	5934.26	20.31	5943.98	10.59	None	None
T235	N 39° 30' 38.63"	W 107° 18' 45.95"	Tree	T291	5955.46	5914.00	41.46	5931.55	23.91	5939.36	16.10	None	None
15A34	N 39° 30' 38.69"	W 107° 18' 45.42"	Tree	T292	5937.61	5916.57	21.04	5928.73	8.88	5938.73	-1.12	None	None
15A35	N 39° 30' 38.69"	W 107° 18' 45.29"	Tree	T293	5938.50	5916.72	21.78	5928.50	10.00	5938.50	0.00	None	None
15A36	N 39° 30' 39.70"	W 107° 18' 44.77"	Tree	T298	5954.11	5913.14	40.97	5932.19	21.92	5942.19	11.92	None	None
15A37	N 39° 30' 39.47"	W 107° 18' 44.40"	Tree	T299	5937.51	5911.84	25.67	5930.50	7.01	5940.50	-2.99	None	None
15A38	N 39° 30' 38.40"	W 107° 18' 43.84"	Tree	T301	5934.72	5919.74	14.98	5924.65	10.07	5934.65	0.07	None	None

14 CFR Part 77 Runway 15 A(V) Approach Surface Traverse Ways Table

Object ID	Latitude	Longitude	Description	Ground Elevation (Feet MSL)	Elevation Adjustment (Feet)	Traverse Way Elevation (Inc. Adj.) (Feet MSL)	Overlying Part 77 Surface	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	TSS Elevation at Point (Feet MSL)	TSS Penetration (Feet)	Triggering Event	Disposition
15A-TW1	N 39° 30' 39.47"	W 107° 18' 42.32"	Sky Ranch Dr	5903.15	15	5,918.15	Approach 15	5,926.88	-8.73	5,936.88	-18.73	-	-
15A-TW2	N 39° 30' 38.90"	W 107° 18' 43.90"	Sky Ranch Dr	5907.69	15	5,922.69	Approach 15	5,927.02	-4.34	5,937.02	-14.34	-	-
15A-TW3	N 39° 30' 39.03"	W 107° 18' 46.04"	Mt Sopris Dr	5914.26	15	5,929.26	Approach 15	5,931.36	-2.10	5,941.36	-12.10	-	-
15A-TW4	N 39° 30' 40.10"	W 107° 18' 44.66"	Mt Sopris Dr	5912.16	15	5,927.16	Approach 15	5,933.82	-6.65	5,943.82	-16.65	-	-
15A-TW5	N 39° 30' 42.43"	W 107° 18' 43.76"	Mt Sopris Dr	5901.47	15	5,916.47	Approach 15	5,942.80	-26.32	5,952.80	-36.33	-	-
15A-TW6	N 39° 30' 45.17"	W 107° 18' 45.08"	Mountain Dr	5894.75	15	5,909.75	Approach 15	5,957.52	-47.76	5,967.52	-57.76	-	-
15A-TW7	N 39° 30' 46.06"	W 107° 18' 48.45"	Mountain Dr	5896.17	15	5,911.17	Approach 15	5,967.39	-56.22	5,977.39	-66.22	-	-
15A-TW8	N 39° 30' 45.67"	W 107° 18' 51.39"	Mountain Dr	5894.82	15	5,909.82	Approach 15	5,970.75	-60.92	5,980.75	-70.92	-	-
15A-TW9	N 39° 30' 53.91"	W 107° 18' 49.30"	Grand Ave	5866.37	15	5,881.37	Approach 15	6,004.51	-123.14	6,014.51	-133.14	-	-
15A-TW10	N 39° 30' 55.39"	W 107° 18' 50.02"	Colorado State Highway 82 (CO 82)	5882.69	15	5,897.69	Approach 15	6,012.47	-114.79	6,022.48	-124.79	-	-
15A-TW11	N 39° 30' 54.93"	W 107° 18' 54.09"	Grand Ave	5,863.87	15	5,878.87	Approach 15	6,017.43	-138.56	6,027.43	-148.56	-	-
15A-TW12	N 39° 30' 56.78"	W 107° 18' 55.27"	Colorado State Highway 82 (CO 82)	5,875.47	15	5,890.47	Approach 15	6,027.89	-137.42	6,037.89	-147.42	-	-
15A-TW13	N 39° 30' 55.77"	W 107° 18' 59.51"	Grand Ave	5,864.13	15	5,879.13	Approach 15	6,030.65	-151.53	6,040.65	-161.53	-	-
15A-TW14	N 39° 31' 00.02"	W 107° 19' 02.93"	Colorado State Highway 82 (CO 82)	5,866.18	15	5,881.18	Approach 15	6,055.84	-174.66	-	-	-	-

14 CFR Part 77 Runway 33 A(V) Approach Surface Obstruction Table

Object ID	Latitude	Longitude	Description	2021 Obstruction Survey Pt. No.	Object Top Elevation (Feet MSL)	Ground Elevation at Point (Feet MSL)	Object Height (Feet AGL)	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	TSS Elevation at Point (Feet MSL)	TSS Penetration (Feet)	Triggering Event	Disposition
-	-	-	-	-	-	-	-	-	-	-	-	-	-

14 CFR Part 77 Runway 33 A(V) Approach Surface Traverse Ways Table

Object ID	Latitude	Longitude	Description	Ground Elevation (Feet MSL)	Elevation Adjustment (Feet)	Traverse Way Elevation (Inc. Adj.) (Feet MSL)	Overlying Part 77 Surface	Part 77 Surface Elevation at Point (Feet MSL)	Part 77 Surface Penetration (Feet)	TSS Elevation at Point (Feet MSL)	TSS Penetration (Feet)	Triggering Event	Disposition
33A-TW1	N 39° 30' 09.21"	W 107° 18' 23.24"	Airport Center Rd	5,907.69	15	5,922.69	Primary	5,910.29	12.40	-	-	-	To Be Relocated
33A-TW2	N 39° 30' 05.17"	W 107° 18' 22.45"	Airport Center Rd	5,909.29	15	5,924.29	Primary	5,909.71	14.59	5,918.87	5.43	-	To Be Relocated
33A-TW3	N 39° 30' 03.14"	W 107° 18' 23.14"	Airport Center Rd	5,911.59	15	5,926.59	Approach 33	5,916.89	9.69	5,926.89	-0.31	-	To Be Relocated
33A-TW4	N 39° 30' 09.09"	W 107° 18' 23.17"	Airport Center Rd (Relocated)	5,897.41	15	5,912.41	Primary	5,910.27	2.14	-	-	South Bridge Project	-
33A-TW5	N 39° 30' 06.61"	W 107° 18' 21.59"	Airport Rd (Relocated)	5,888.24	15	5,903.24	Primary	5,909.71	-6.47	5,913.85	-10.60	South Bridge Project	-
33A-TW6	N 39° 30' 06.11"	W 107° 18' 23.05"	Airport Rd (Relocated)	5,888.22	15	5,903.22	Primary	5,909.71	-6.49	5,913.57	-10.35	South Bridge Project	-
33A-TW7	N 39° 30' 05.61"	W 107° 18' 24.51"	Airport Rd (Relocated)	5,892.79	15	5,907.79	Primary	5,909.71	-1.92	5,913.32	-5.53	South Bridge Project	-
33A-TW8	N 39° 29' 40.16"	W 107° 18' 00.49"	Colorado State Highway 82 (CO 82)	5,952.22	15	5,967.22	Approach 33	6,060.40	-93.18	-	-	-	None

KGWS Sumers Airpark

No.	Revisions	Date
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RAFT

Inner Portion of the Approach Surface Drawing - Data Tables

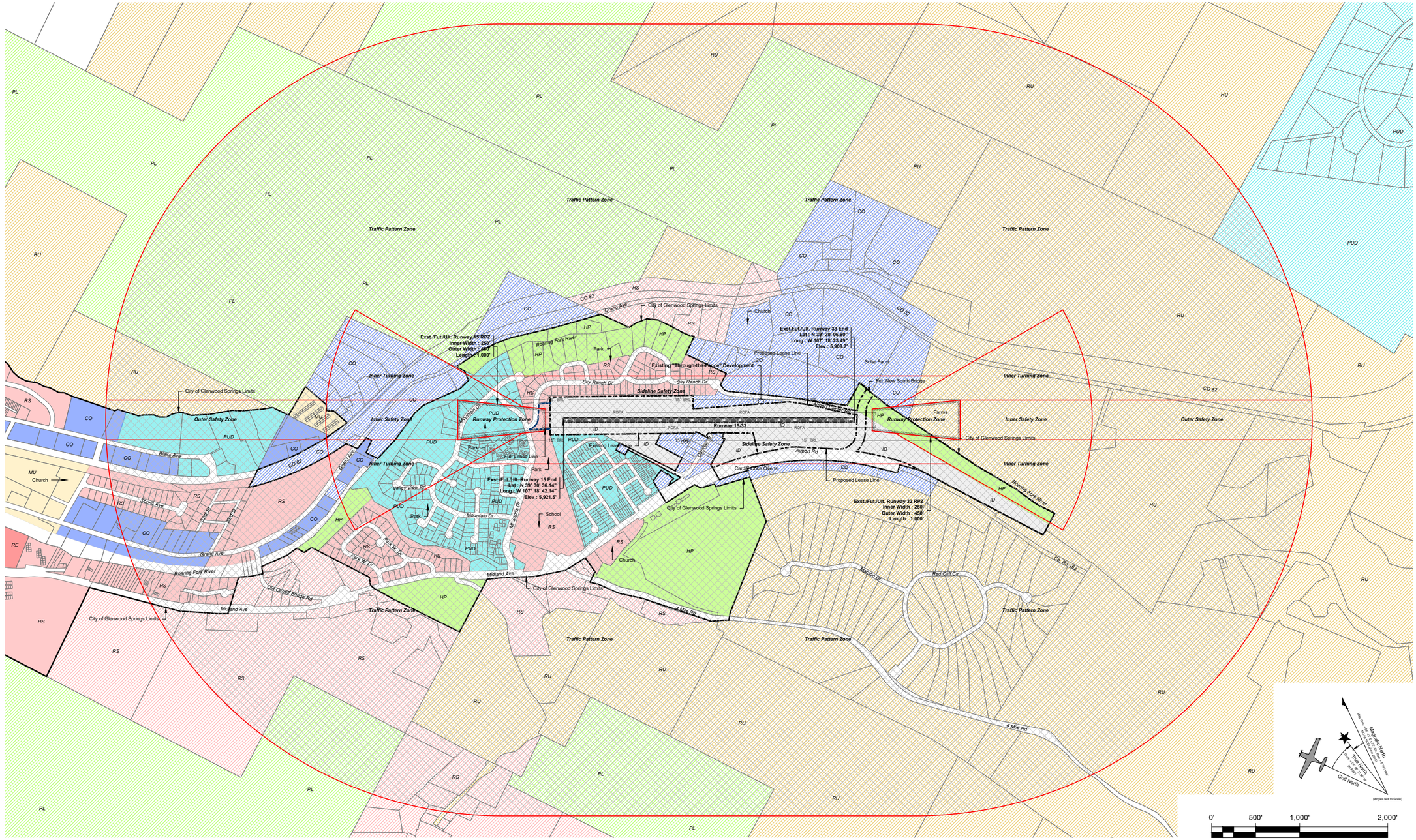
KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	11 of 14
Scale:	N/A



City of Glenwood Springs Land Use Legend	
Description	Existing
Commercial (CO)	CO
Hillside Preservation (HP)	HP
Industrial (L1 & L2)	ID
Mixed Use (M1, M2, M3)	MU
Planned Unit Development (PUD)	PUD
Residential (RR, RL, RM1, RM2, RH, RT)	RS
Resort (RE)	RE

Garfield County Land Use Legend	
Description	Existing
Commercial (General & Limited)	CO
Planned Unit Development	PUD
Public Lands	PL
Residential (MHP, Urban, Suburban)	RS
Rural	RU

Airport Impact Zones Legend	
Airport Impact Zones	ISZ

Airport Leasing Line Legend	
Existing/Proposed Leasing Line	
Future Leasing Line	

Notes:

1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. Off-airport parcel boundaries are current and per the Garfield County Assessor's Office.
5. Off-airport zoning is current (retrieved in May 2026 from GIS sources listed in Note 7) and per:
   The Official Zone District Map of Garfield County, Adopted December 15, 2014, as Amended on May 5, 2016 (latest).
   The Zone Districts Map of the City of Glenwood Springs, Adopted January 27, 2019.
6. Proposed Airport Impact Zones (AIZs) are depicted. Proposed AIZs are based upon the ultimate runway length (which equals the existing runway length at GWS). Airport Impact Zones are usually established for those airports and runways that accommodate smaller general aviation aircraft. These zones allow airports to establish areas where coordination of special off-airport land use regulations with local government jurisdictions is important. Airport Impact Zones are established according to FAA guidance contained in *Land Use Compatibility and Airports, a Guide for Effective Land Use Planning*, as recommended by the FAA's airport land use compatibility program
7. County and City Regulations available at:
   Garfield County, CO: https://www.garfieldcountyco.gov (browse to Offices, Community Development, Planning, Land Use Code)
   City of Glenwood Springs, CO: https://library.municode.com (browse to Code Library, Colorado, Glenwood Springs)

Garfield County Planning Jurisdiction

Garfield County has county-wide zoning regulations as adopted July 15, 2013 and amended September 9, 2024.

As of May 2026, Garfield County has not adopted height restrictions and/or zoning overlay regulations that apply to KGWS Sumers Airpark. Garfield County has airport overlay zoning and land use regulations titled *Airport/Heliport Influence Area Overlay* last updated in September 2023. Those overlay regulations include height restrictions that apply to the Rifle Garfield County Airport (RIL).

For provisions concerning subdivision regulation, zoning, and development standards, reference *Articles 3, 4, 5, 6, 7, and 10* of the Land Use and Development Code of Garfield County, CO.

City of Glenwood Springs, CO Planning Jurisdiction

The City of Glenwood Springs maintains a Code of Ordinances. The Code is current and was last updated in December 2025.

Title 70, *Development Code* of the Code of Ordinances (Municipal Code) of the City of Glenwood Springs currently contains zoning district definitions, use regulations, and development standards. As of May 2026, the City of Glenwood Springs has not adopted height restrictions and/or zoning overlay regulations that apply to KGWS Sumers Airpark. The Airport is currently is zoned Light Industrial (I1).

For provisions concerning subdivision regulation, zoning, and development standards, reference *Title 70, Development Code* of the Code of Ordinances of the City of Glenwood Springs, CO.

KGWS Sumers Airpark

No.	Revisions	Date
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DRAFT

Airport - Community Land Use Compatibility Drawing

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
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Sheet No.:	12 of 14
Scale:	1" = 500'

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Scale(s) as noted on this sheet are based on a full size 24" x 36" sheet.

Notes:

1. Flight tracks shown for illustration purposes only and are approximate.
3. This map is not to be used for navigation purposes.
4. Preferential arrival and departure tracks per established noise abatement procedures.
5. There is no published Traffic Pattern Attitude (TPA) at GWS.
6. SM: Statute Miles

Legend:

Terrain Penetrations to Part 77 Surfaces

Terrain Elevation above Airport:

- At 500 feet AGL (6,500 feet MSL)
- Recommended Pattern Altitude for Piston Aircraft: 1,000 feet AGL (7,000 feet MSL)
- Recommended Pattern Altitude for Turbine Aircraft: 1,500 feet AGL (7,500 feet MSL)

Tracks:

- Recommended Arrival (33)
- Avoid Arrival (15)
- Recommended Departure (15)
- Avoid Departure (33)

0' 1,500' 3,000' 6,000'

Magnetic North (Var. 8°E - Mean for 2025 - Annual change 0° 0' W/Year)
True North (Aligns with Meridians)
Grid North
(Angles Not to Scale)

Existing/Future/Ultimate Part 77 Surfaces

6,250'
6,200'
6,150'
6,100'
Horizontal Surface Elevation: 6,071.5'
Existing/Future/Ultimate Airport Elevation: 5,921.5'
6,100'
6,150'
6,200'
6,250'

Runway 33 Departure Track
Runway 33 Arrival Track - South & East
Runway 15 Arrival Track
Runway 33 Arrival Track - North & West
Runway 33 Arrival Track
Runway 15 Departure Track
Extended Runway Centerline
Extended Runway Centerline
Join Colorado River Canyon

2.5 SM
1 SM
1 SM
½ SM
½ SM

No Published Pattern Altitude at GWS
Recommended Pattern Altitude for Pistons: 7,000' MSL (1,000' AGL)
Recommended Pattern Altitude for Turbine: 7,500' MSL (1,500' AGL)

The canyon is narrow and caution should be exercised.
Terrain may out climb the performance of aircraft.

No Published Pattern Altitude at GWS
Recommended Pattern Altitude for Pistons: 7,000' MSL (1,000' AGL)
Recommended Pattern Altitude for Turbine: 7,500' MSL (1,500' AGL)

The valley is narrow and caution should be exercised.
Terrain may out climb the performance of aircraft.

GLENWOOD SPRINGS
Glenwood Canyon
Colorado River
Roaring Fork River
Cattle Creek
Rio Grande Trl
Midland Trl
Scout Trl
No Name
No Name Bridge
Cemetery Gulch
Spring Valley
Fourmile Cr
Threemile Cr
Paradise Cr
Grandstand Trl
Deerface Trl
Wanderlookin Trl
Wulfsohn Mountain Park Trl
Steve Bob Trl
Colorado Mountain College Glenwood Springs
Limbaugh Cem
Glenwood Springs Municipal Airport
Red Canyon
Hagerman
Fuhston
CO RD 129
CO HWY 120
CO RD 119
CO RD 114
CO RD 167
CO RD 154
CO RD 130
CO RD 131
CO RD 117
CO RD 125
CO RD 126
CO RD 1
EAGLE RD
GRAVEL RD
MIDLAND AVE
SOUTH RIVER RD
AIRPORT RD
SKI RANCH DR
BLAKE AVE
S GLEN AVE
PARK DR
COOPER AVE
SCHOOL TRL
BONNET AVE
PALMER AVE
GRAND AVE
N TRAVER TRL
TURNPIKE TRL
MOUNTAIN DR
GREENWAY DR
AMIGOS DR
ELK SPRINGS DR
JUNIPER CT
MEADOW LN
RIVER BEND WAY
HUEBINGER DR
OAK LN
CHELTON RD
VAN DORN DR
PITKOWSKI DR
MEADOW WOOD RD
SPRUCE KNOLL DR
DRY PARK RD
S OAK WAY
OLD MIDLAND PKWY
FARM TRL RD
OVERLAND VIEW DR
SUN KING RTE 168
MEADOW
PINION LN
ASPEN DR
RIVER CT
ALPINE CT
MEADOW LARK DR
WOODBURY LN
MEADOW RIDGE RD
CLOVELL RIDGE RD
RECTANN RD
MEL RECT
GR RECT
Runway 15 Arrival Track
Runway 33 Arrival Track - North & West
Runway 33 Departure Track
Runway 33 Arrival Track - South & East
Runway 15 Departure Track
Extended Runway Centerline
Extended Runway Centerline
Join Colorado River Canyon

DRAFT

KGWS Sumers Airpark

No.	Revisions	Date
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Airport Area Terrain Map

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	13 of 14
Scale:	1" = 1,500'

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Scale(s) as noted on this sheet are based on a full size 24" x 36" sheet

Existing Airport Property Acquisition History △

Ref. No.	Type of Interest	Acreage				Curr. Garfield Co. Parcel ID	Recording Number	Record Instrument	Grantee	Grantor	Date Acquired	FAA / State Grant No.	Notes
		Fee	Cumul.	Ease.	Cumul.								
1	Fee Simple	27.90	27.90			218527100050 & 218527100045 Others Ground Lease Parcels	Multiple	Multiple	City of Glenwood Springs	Multiple	Multiple	-	Already City Property in 1963. No acquisition records found prior to 1963. Records of Interest may include R-123724, R-124788, R-126124, R-129756, R-138396, and R-197323.
2	Fee Simple	32.02	59.92			218527100050 & 218527100045 Others Ground Lease Parcels	R-220358	Deed	City of Glenwood Springs	George W. Sumers	02/06/1963	-	Recorded Deed Book 347 Page 98.
3	Fee Simple	0.38	60.30			218527100050 & 218527100045 Others Ground Lease Parcels	Unknown	Unknown	City of Glenwood Springs	Unknown	Unknown	-	Conveyed to George W. Sumers by City of Glenwood Springs in Quit Claim Deed R-220359 Dated 02/06/1963. No record found of transfer back to City or boundary adjustment. Parcel excluded in 1982 airport survey, included in 1989 airport survey. May have been sdocumented as an exception to the property 1963 swap.
4	Fee Simple	0.05	60.35			218527100050 & 218527100045 Others Ground Lease Parcels	R-358631	Deed	City of Glenwood Springs	David W. Force, Jr Trustee	01/09/1985	-	Replat of a portion of the Townsite of Cardiff. See R-358620 for Plat.
5	Fee Simple	0.24	60.59			218527100050 & 218527100045 Others Ground Lease Parcels	Unknown	Unknown	City of Glenwood Springs	Unknown	Unknown	-	No record found of deed, boundary adjustment, or Right-of-Way acquisition.
6	Fee Simple	1.14	61.73			218527100050 & 218527100045 Others Ground Lease Parcels	R-900126	Boundary Line Adjustment Plat	City of Glenwood Springs	Airport Mini Storage, LLC	11/21/2017	-	Annexation / Disconection Plat recorded R-900132.

Future Land & Easement Acquisition ○

Ref. No.	Total Acreage	Current Zoning	Current Garfield County Parcel ID	Recording Number	Current Owner	Purpose of Acquisition	Taking (Ac)	Type of Interest
1	0.97	RM1 Residential Medium Density	218522315084	R-551751	Park East Development Company, LLC	Runway 15 RSA	0.97	Fee Simple

Property Legend

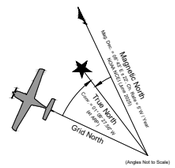
Description	Existing	Future	Ultimate
City Property Line			-
KGWS Sumers Airpark Leasehold Boundary			
City Property		-	-
KGWS Sumers Airpark Leasehold			-
Historic Tract Boundaries (Within Airport Property)		-	-
Current Garfield Co. Parcel Boundaries (Outside Airport Property)		-	-
Future Airport Rd RoW	-		-
PLSS Section Corner		-	-

Legend Note:

*: Where the KGWS Sumers Airpark leasehold boundary follows the City of Glenwood Springs property line, only the property line is shown. The leasehold is best identified by the green solid hatch.

General Notes:

1. Topographic and planimetric surveys performed by Benesch for Dibble in 2025. Airspace survey performed by others in 2021. Topographic information beyond current airport boundaries from a Digital Elevation Model (DEM) for the Southwest Colorado LiDAR QL2 project collected for the Colorado Water Conservation Board, Colorado Hazard Mapping & Risk Map (2016). All coordinates are provided using NAD83(2011) Horizontal Datum and NAVD88 Vertical Datum. Surveyed data not compliant with standards listed under FAA ACs 150/5300-16B, -17C, and -18B. No PACS or SACS are available at GWS. National Geodetic Survey (NGS) control station is ROSEBUD located approximately 4,300 northwest of the runway midpoint. Existing markers near the runway end points were surveyed (set by others) but coordinates reflected hereon were adjusted using runway pavement geometry and markings to reflect the actual center of the runway threshold (i.e., markers are not aligned with the actual runway centerline).
2. Existing airport property boundary obtained from a lot boundary adjustment plat titled "City of Glenwood Springs & Airport Mini Storage, LLC Properties" by Sopris Engineering, LLC and dated June 2017, and from deeds and maps obtained from the Garfield County Recorder's Office. The City of Glenwood Springs (Airport Sponsor) is leasing parts of its property to KGWS Sumers Airpark (Airport Operator) which is generally that land north and west of the realigned Airport Rd and Airport Center Rd. The leasing line is reflected on this sheet. Generally, the leasehold follows the existing city property line on the north half of the Airport (labeled "Existing Lease Line" on this Sheet) and follows the proposed Right-of-Ways for Airport Rd and Airport Center Rd on the south half of the Airport (labeled "Proposed Lease Line" on this Sheet). See Sheet 14 of 14, "Airport Property Map" for additional information on city-owned property and airport leasehold. A Result of Survey was performed under this contract. No boundary survey was performed under this contract.
3. All dimensions shown are horizontal surface measurements.
4. This drawing is not a plat of survey and may not be recorded as such in public records of Colorado.
5. Recording numbers, current owners, and transaction dates were gathered from deeds recorded at the Garfield County Recorder's Office and from the Garfield County GIS website(s). Acreage of existing airport property parcels calculated. No boundary survey was performed under this contract. Off-airport parcel boundaries are current and per the Garfield County GIS website. All property lines should be surveyed prior to any land acquisition.
6. Total airport acreage is 61.73 acres as confirmed by a Result of Survey from Dibble (Date).
7. Planimetric information shown for general reference only.



City of Glenwood Springs, Colorado Approval:	KGWS Sumers Airpark Approval:
Title: _____	Title: _____
Date: _____	Date: _____

0' 150' 300' 600'

Conveyed Property Table ◇

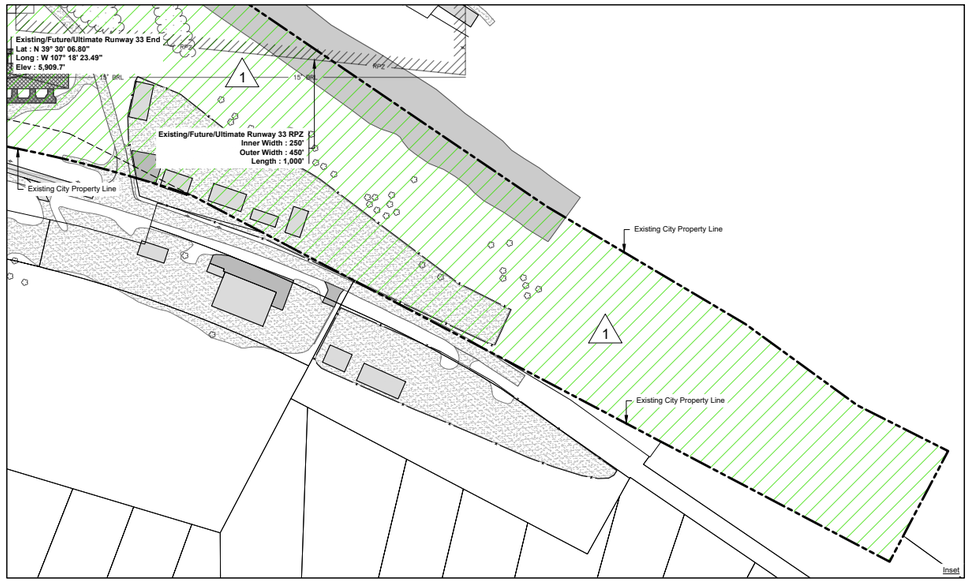
Ref. No.	Grantor	Grantee	Recording Number	Date Disposed	Notes
1	City of Glenwood Springs	David W. Force, Jr Trustee	R-358619	01/09/1985	Part of Airport Property Ref. No. 2 Replat of a portion of the Townsite of Cardiff. See R-358620 for Plat.
2	City of Glenwood Springs	David W. Force, Jr Trustee	R-358619	01/09/1985	Part of Airport Property Ref. No. 2 Replat of a portion of the Townsite of Cardiff. See R-358620 for Plat.
3	City of Glenwood Springs	David W. Force, Jr Trustee	R-358619	01/09/1985	Part of Airport Property Ref. No. 2 Replat of a portion of the Townsite of Cardiff. See R-358620 for Plat.
4	City of Glenwood Springs	Airport Mini Storage, LLC	R-900126	11/21/2017	Part of Airport Property Ref. No. 2 Annexation / Disconection Plat recorded R-900132.

Transaction Notes:

1. The airport property conveyed by George W. Sumers (Existing Ref. No. 2) is subject to reservations, restrictions, and conditions set out in a Deed from G. W. Sumers to the City of Glenwood Springs, dated February 6, 1963 and recorded in Book 347, Page 98 (R-220358). One of the condition set in the deed mandates that the property be used for aeronautical purposes.
2. Avigation easements held on parcels later acquired are not depicted on the property map if the parcel is now owned by the City of Glenwood Springs.
3. Easements whose grantee has quit claim, who have expired, and temporary easements are not depicted on the plan view.

Conveyed Transaction Notes:

1. Transactions are shown for parcels that were conveyed from airport parcels only. Sales prior to 1963 or other City property transactions not shown



KGWS Sumers Airpark

No.	Revisions	Date
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D R A F T

Airport Property Map

KGWS Sumers Airpark (GWS)

Airport Layout Plan (ALP)

Glenwood Springs, Colorado

DIBBLE

Grant No.:	25-GWS-01
Drawn:	TPS
Checked:	JVG
Approved:	CMD
Date:	06/01/2026
Sheet No.:	14 of 14
Scale:	1" = 60'

Scale(s) as noted on this sheet are based on a full size 24" x 36" sheet

Draft Narrative Report

KGWS Sumers Airpark

2025 Airport Layout Plan Update

Prepared for: KGWS Sumers Airpark

May 2026

Airport Project No: TBD

Dibble Project No: 1325062

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Section 1 - Introduction

The KGWS Sumers Airpark (GWS or the Airport) is a publicly owned, privately operated, public-use general aviation airport that serves the aviation needs of Glenwood Springs, Colorado. It is owned by the City of Glenwood Springs and operated by KGWS Sumers Airpark, a 501(c)4 nonprofit organization. Eager to set the course for airport development and to ensure compatibility with City development, the newly elected Airport Board of KGWS Sumers Airpark decided to conduct this Airport Layout Plan (ALP) Update study. Please refer to **Appendix A, *List of Acronyms*, Appendix B, *Glossary of Terms*** and **Appendix C, *External References*** for a list of acronyms and definitions of technical terms used throughout this report, as well as references to external guidance and documentation.

The last ALP Update was conducted in 1999. There is no airport master plan. This present *2025 Airport Layout Plan Update* study will serve as a guide for future development for the next 20 years. This ALP Update presents analyses and findings intended to provide a framework for future airport development that will cost-effectively satisfy aviation demand and safety requirements, while also considering potential environmental impacts. Of paramount importance, this planning document will provide the Airport with solutions to mitigate the planned impacts of the South Bridge Project, an important community project that requires right-of-way acquisition on the south side of KGWS Sumers Airpark, shrinking existing available property, cutting off the Airport from other airport parcels, and impacting existing on-airport facilities including a maintenance hangar that is vital to tenants as well as the overall success of the Airport.

The ALP Update determines the adequate timing of proposed airport improvements by incorporating them into a Capital Improvement Program (CIP), which outlines development projects over a 20-year planning period (2025-2045). Simultaneously, proposed improvements are incorporated into an ALP drawing set that graphically depicts existing, future, and ultimate conditions. The updated 2025 ALP, as adopted by the KGWS Sumers Airpark Airport Board and accepted by the Colorado Department of Transportation, Division of Aeronautics (CDOT-DOA or CDOA), will assist the Airport in the application of funding for those capital improvements, as eligible under the state airport aid programs.

Goals and objectives for this 2025 ALP Update are as follows:

- Update aviation activity forecasts to assess past and future aviation demand at the airport and determine the airport's critical design aircraft through 2045,
- Assess the airport's ability to meet general aviation demand and determine the airport's facility needs through 2045, and identify specific opportunities for improving the airport's facilities, while ensuring the safety and reliability of operations,
- Graphically represent a preferred development scenario that is logical and supports and complements the strategic vision and development of KGWS Sumers Airpark,
- Establish a practical schedule of priorities that considers the financial, environmental, and engineering feasibility of airport improvements. In particular, short-term solutions will be provided to relocate an aircraft maintenance facility and an existing hangar, and
- Prepare a living document that will serve as the airport's official planning guide for capital expenditures for the next 20 years and approve a new ALP.

The 2025 ALP Update process broadly follows FAA guidance published in Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*. In essence, but not in name, this 2025 ALP Update is a "mini master plan" for the KGWS Sumers Airpark. The study will produce a narrative report that documents the rationale of the ALP Update and its findings and recommendations to be used as a reference document by all stakeholders.

Section 2 - Inventory of Existing Conditions

2.1 Airport Background

The KGWS Sumers Airpark is a General Aviation (GA) airport that serves the aviation needs of Glenwood Springs, Colorado, as well as the larger communities of the Roaring Fork Valley and Garfield County, Colorado. The Airport offers services to general aviation aircraft and pilots.

2.1.1 Location

KGWS Sumers Airpark is located in Garfield County, Colorado near Glenwood Springs, at the intersection of the Colorado River and Roaring Fork River. One of two public-use airports in the county, GWS serves the aviation needs of the local community. The other public-use airport located in the county is the Rifle Garfield County Airport (RIL), that serves general aviation as well as large private and business aviation, and large air taxis. Garfield County is a mostly rural county located on the western slope of the Colorado major mountain ranges, between the Grand Mesa and the Flat Tops mountain ranges, and surrounded by the White River National Forest. Most of the land in Garfield County, approximately two-thirds, is under Federal ownership.

Aviation activity throughout the year is heavily skewed towards the summer and is split between local patrons enjoying leisure flying and transient recreational visitors flying in to enjoy Glenwood Springs, its famous natural springs or a quick lunch in a beautiful mountain town. In recent years, the Airport has been used by aerial firefighting helicopters operating in the surrounding White River National Forest. The typical users of the Airport are local leisure flyers and visitors flying in to enjoy local activities. The Airport is also the home base for an air medical transport helicopter. **Figure 2.1** depicts the relative position of GWS within the western half of the State of Colorado.

As depicted on **Figure 2.2**, GWS is located approximately three miles south of Glenwood Springs, Colorado. The area is accessible via Interstate 70 (I-70) west from Denver, southbound on Colorado State Highway 82 (CO 82), and through surface streets. The Airport itself is located off Airport Center Road. The Airport is approximately 125 miles from Denver, Colorado, the state's capital city.

Figure 2.1 - Location Map



Source: Google Earth, June 2025

Figure 2.2 - Vicinity Map



Source: Google Earth, June 2025

2.1.2 Ownership & Management

GWS is owned by the City of Glenwood Springs (Sponsor) and operated by KGWS Sumers Airpark (Operator), a 501(c)4 nonprofit organization. As of this writing, the operation of the Airport is overseen by an Airport Board comprised of seven elected members, including one 1 city council liaison, five pilots, and one non-pilot member. An Airport Manager employed by the nonprofit oversees the day-to-day operation of the Airport. Airport services are also directly provided by the KGWS Sumers Airpark and consist of a self-fueling station, a small single-room pilot's lounge and flight preparation building with free Wi-Fi and restrooms, and a courtesy car.

As the owner and Sponsor of the Airport, the City of Glenwood Springs retains authority over grant application and administration, although those efforts are generally cooperative between the City and the Airport Manager. Grants from CDOA programs are received by the Sponsor (City) and subsequently distributed to the Operator (KGWS Sumers Airpark).

2.1.3 Airport History

The first Glenwood Springs Airport opened in 1913 and was located closer to downtown, at the site of the current high school and the Polo Park neighborhood. Of note, the Airport may have been the fourth oldest purpose built facility in the U.S[1]. Facilities were moved to the current location before World War II on land donated by local families in 1937. Over the next decades, the Airport progressively expanded, and the runway was paved in the 1962, along with a main apron and taxiway to the Runway 32 end. The runway and apron received minimal

[1] *https://www.postindependent.com/news/glenwoods-airport-may-be-fourth-oldest-in-the-u-s/*

maintenance over the next 40 years, with the first rehabilitation occurring in 2004. A surface overlay of the taxiway was completed in 2009, and a full-depth reconstruction of the runway and apron was completed in 2015. All airport pavements received a crack seal and seal coat preservation treatment in 2025.

The Airport regularly added new aircraft storage hangars over the decades. Most recently, six new box hangars with a total of 18 units were constructed on the north side of the airfield between 2000 and 2002. A small pilot lounge with free Wi-Fi is rented by the Airport from a private tenant on private land. In 2023, the City installed two new 12,000 gallon (gal) double wall fuel tanks along with a self-serve station on the apron for both Aviation Gasoline (AvGas) and Jet A.

In April 2024, the City of Glenwood Springs transferred the management of the Airport to a 501(c)4 nonprofit organization and the Glenwood Springs Municipal Airport was subsequently renamed into KGWS Sumers Airpark.

2.1.4 Airport Role

2.1.4.1 National Plan of Integrated Airport Systems

The FAA's National Plan of Integrated Airport Systems (NPIAS) identifies and classifies public-use airports that are deemed significant to national air transportation in the United States (U.S.), and thus eligible to receive federal grants under the Airport Improvement Program (AIP). The NPIAS emphasizes system planning and development to meet current and future aviation needs, and it includes development considered necessary to provide a safe, efficient, and integrated airport system meeting the needs of civil aviation, national defense, and the U.S. Postal Service. KGWS Sumers Airpark is not currently included in the NPIAS.

Surrounding NPIAS airports within a 60-mile radius are listed in **Table 2.1**. Initial screening criteria for the inclusion of a non-NPIAS facility in the NPIAS are contained in FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems (NPIAS) and the Airports Capital Improvement Plan (ACIP)*.

Table 2.1 - Surrounding Public Airports in the NPIAS

City, State	Airport	FAA Loc. ID[1]	Drive[2]	NPIAS[3]	Dist. /Dir.[4]	Longest Runway
Rifle, CO	Rifle Garfield Co.	RIL	30'	GA - Regional	23 / W	7,000'
Eagle, CO	Eagle County Rgnl'	EGE	40'	P - Nonhub	23 / NE	9,000'
Aspen, CO	Aspen/Pitkin Co. - Sardy Fld.	ASE	45'	P - Nonhub	31 / SE	8,006'
Meeker, CO	Meeker Coulter Fld.	EEO	1h20'	GA - Basic	49 / NW	6,503
Leadville, CO	Lake County Rgnl'	LXV	1h55'	GA - Basic	56 / SE	6,400'

Source: 2025-2029 NPIAS. Dibble, June 2025 analysis
Note: [1]: FAA Loc ID: FAA Location Identifier
[2]: Drive Time in Minutes from GWS
[3]: Service Level & Role/Hub from Current NPIAS: P: Primary Commercial Service, GA: General Aviation
[4]: Distance in Statute Miles from GWS as the crow flies, Direction in Cardinal & Ordinal Quadrant Directions

2.1.4.2 Colorado Aviation System Plan

The Colorado Aviation System Plan (CASP) was developed by CDOA to catalogue the existing condition of the state's current aviation system and plan for its future needs. The most recent CASP, which was completed in

2020, classified Colorado airports in one of six categories, from the largest (*Commercial Service*) to the smallest (*GA-Rural*). The 2020 CASP classifies GWS as a *GA-Local* airport, the third-smallest category.

The 2020 CASP defines a series of system objectives for all categories. Those system objectives are not requirements or mandates for airports to meet, rather, they serve as guidelines for airports and CDOA. Amongst others, GWS does not meet the runway length, width, or strength objective for GA-Local airports, as well as none of the lighting and Navigational Aids (NAVAID) objectives. This is mostly due to the daytime, visual only nature of the field as well as terrain constraints. It must be noted that it is not the goal of this ALP Update to propose blanket improvements with the intent to meet the applicable CASP system objectives. A link to the 2020 CASP is included in **Appendix D, *2020 Colorado Aviation System Plan***. **Appendix E, *2025 Colorado Economic Impact Study*** presents the results of the most recent statewide economic impact study for GWS.

2.1.5 Local Setting & Meteorological Data

2.1.5.1 Topography

The Airport is located on the riverbed of the Roaring Fork River, inside a deep canyon that is less than half a mile wide in the vicinity of the Airport. The eastern base of the canyon is located 1,500 feet from the runway and rises upwards 1,000 feet, on average, above the runway elevation, in a near vertical wall. The western base of the canyon is located 1,200 feet from the runway and rises upwards 1,500 feet, on average, above the runway elevation, but elevation gain is gentler. The base of an intermediate ridge is located 500 to the west of the runway, its top 900 feet to the west of the runway, and the ridge rises approximately 300 above runway elevation. The local topographic setting is depicted on **Figure 2.3**.

Because of the surrounding terrain, the winds are easily funneled through adjacent narrow canyons, air is often instable, approaches and departures are steep, and traffic pattern is not standard.

2.1.5.2 Weather Reporting

There are no standard FAA-type Automated Weather Observing System (AWOS) on the Airport; however, a MicroTower system that was installed in November 2021 broadcasts live weather data under METAR format that is similar to an AWOS-3P. Data collected and disseminated include temperature, dew point, wind direction, wind speed, gust speed, visibility, ceiling, altimeter setting, density (pressure) altitude, precipitation accumulation, precipitation type, as well as special observations such as windshear alerts and crosswind alerts. Data is updated every 20 minutes and disseminated via METAR on the 15, 35, and 55 minute marks every hour, and pilots may call up live weather (latest 20-minute report) via the Common Traffic Advisory Frequency (CTAF) frequency 123.000 Mhz. The system is adequate and no new AWOS should be needed during the 20-year planning period.

Because the MicroTower system does not collaborate with other federal systems, a comprehensive set of historical observations is not available. Additionally, there are no stations nearby that offer readings relevant for GWS. Consequently, an appropriate wind coverage analysis cannot be performed, and the adequacy of the existing runway orientation cannot be verified against prevalent winds from a data standpoint.

The current runway is largely oriented with the valley in an northwest-southeast bearing that provides the most room for approaches inside the deep canyon. Physical constraints in the direct vicinity of the Airport dictate the orientation of the runway, and the current runway orientation is the only orientation that can be realistically achieved. User observations mostly report prevalent westerly winds; however, winds are often calm and/or from

the south in the mornings. Terrain is such that westerly winds can funnel down the Three Mile Creek Canyon and be more consistent on the north side of the Airport near the Runway 14 threshold. A tall ridge on the west side of the Airport may create wind waves and/or rotors on the south side of the Airport near the Runway 32 threshold, regularly causing windshear on final approach and takeoff during strong westerly wind conditions. The Roaring Fork River embankment, located 250 feet from the runway threshold on final approach, only adds to that effect. According to Airport Management, it is not uncommon to see windsocks reportedly pointing in different directions from one end of the runway to another.

2.1.5.3 Climate

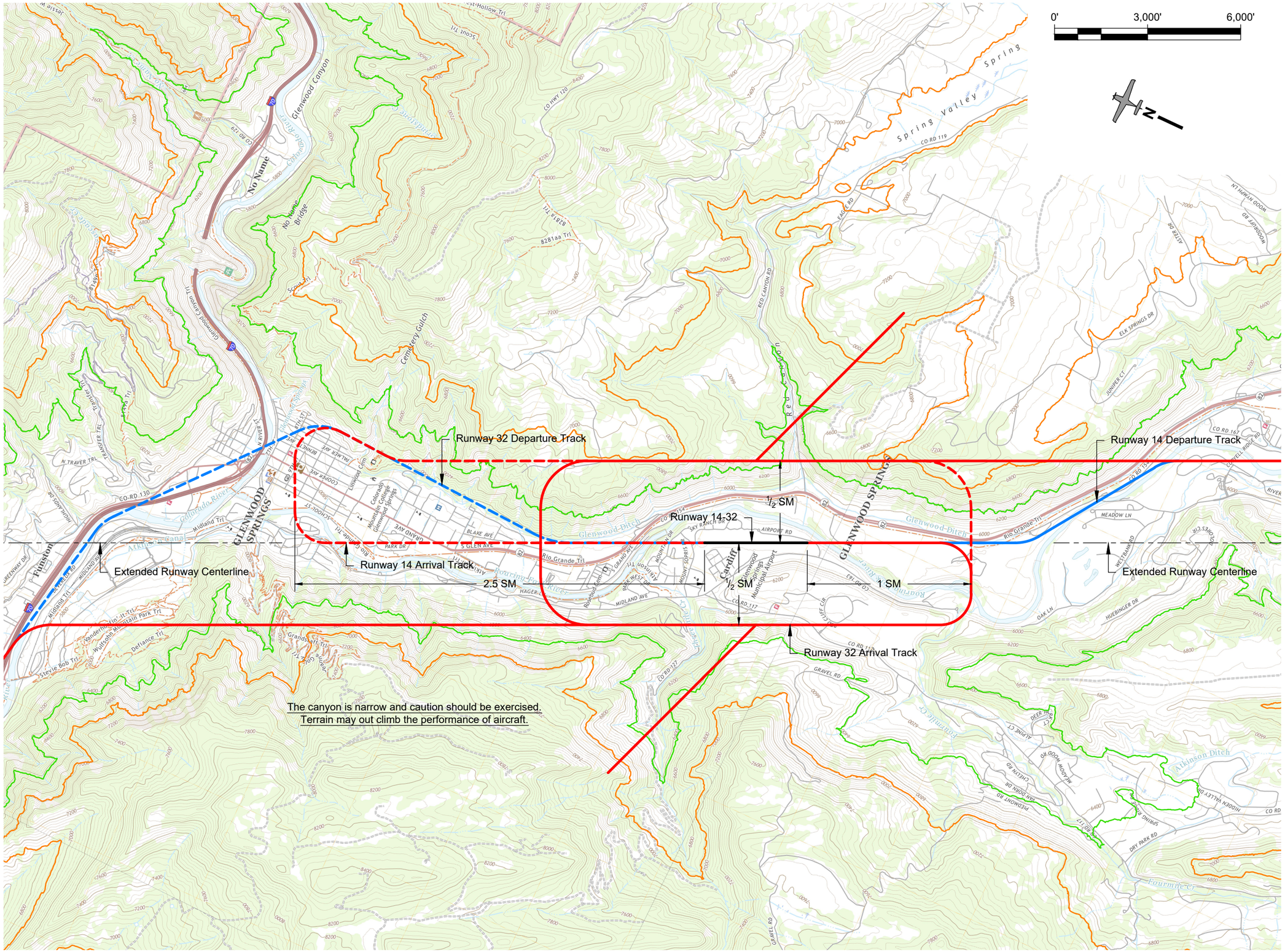
A surface weather observation station recording monthly normal data is available in the immediate vicinity of the Airport, located approximately one mile to the north. Temperature and precipitation data for the area were obtained from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI). The annual low average temperature is 33.1 degrees Fahrenheit (°F) and the high average is 62.2°F. July is the hottest month of the year with an average high temperature of 88.6°F and an average low of 53.4°F. January is the coldest month of the year with an average high temperature of 36.2°F and an average low of 12.3°F. May is the wettest month of the year with an average of 1.69 inches of rainfall, although generally spring and fall see an equal amount of rain. June is the driest month of the year with an average of 0.96 inches of rainfall. January is the snowiest month of the year with an average of 13.70 inches of snowfall.

This information is detailed in **Table 2.2**, where high values have been highlighted in orange, and low values have been highlighted in blue. Precipitation includes rainfall only.

Table 2.2 - Temperature & Precipitation Data

Month	Temperature (°F)		Mean Precipitation (Inches)	Mean Snowfall (Inches)
	Mean Daily Min	Mean Daily Max		
January	12.3	36.2	1.13	13.70
February	19.0	41.6	1.16	6.30
March	26.1	53.0	1.18	2.40
April	32.0	60.0	1.63	0.60
May	39.6	70.6	1.69	0.00
June	46.3	82.4	0.96	0.00
July	53.4	88.6	1.07	0.00
August	52.1	86.0	1.27	0.00
September	43.8	78.2	1.63	0.00
October	33.3	64.8	1.56	0.70
November	23.6	49.1	1.06	4.40
December	15.1	36.4	1.19	10.80
Annual Average (°F)	33.1	62.2	-	-
Total (Inches)	-	-	15.53	38.90

Source: NCEI, *Summary of Monthly Normals*, 1991-2020
Station: GLENWOOD SPGS #2, CO US USC00053359
Legend: Blue = Low; Orange = High



DIBBLE

Legend:

Departure Tracks:

- Recommended (14)
- Avoid (32)

Arrival Tracks:

- Recommended (32)
- Avoid (14)

Elevation above Airport:

- 500' Above
- 1,000' Above

Notes:

- Flight tracks shown for illustration purposes only and are approximate.
- Not for navigational use.
- Preferential arrival and departure tracks per established noise abatement procedures.
- There is no published Traffic Pattern Attitude (TPA) at GWS.
- SM: Statute Miles

Sources:

- Elevation data from the United States Geological Survey (USGS) 1/3 arc-second Digital Elevation Model (DEM), 2020.
- Basemap from current USGS US Topo Map series, 2022. Quandrangles (CO):
  - Carbondale
  - Cattle Creek
  - Center Mountain
  - Glenwood Springs
  - Shoshone
  - Storm King Mountain

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 2.3
Local Topography

K:\2025\1325662 GWS ALP Update & Narrative Reports\6 - AutoCAD\3 - Exhibits\Figure 2.3 - Local Topography.dwg

2.2 Airfield Infrastructure

2.2.1 Airport Design Standards

The FAA publishes airport design standards and recommendations in FAA AC 150/5300-13B, *Airport Design* (or current edition) for airports that are eligible to receive federal funding, i.e. for airports included in the NPIAS. The design standards provide guidelines for physical characteristics and dimensions of various airport components such as runways, taxiways, aprons, protection zones, safety areas and object free areas, parallel runway separation, holding position setbacks, etc. and aim at ensuring smooth, safe, and efficient airport development and operations. The dimensions provided in the advisory circular are based upon the physical characteristics and performance of a critical design aircraft, or grouping of aircraft, as well as the instrument approach capabilities of a runway. Different aircraft, or grouping of aircraft, can be used to size different areas of an airport as applicable. The FAA uses three metrics to classify and group aircraft:

- **Aircraft Approach Category (AAC)**: a grouping of aircraft related to approach speed. This is an operational characteristic.
- **Airplane Design Group (ADG)**: a grouping of aircraft related to wingspan and tail height, whichever is most restrictive. This is a physical characteristic.
- **Taxiway Design Group (TDG)**: a grouping of aircraft based on undercarriage dimensions, for use in taxiway and taxilane design.

A fourth metric, the available (or planned) visibility minimums for a specific runway, is also used in airfield facility planning. In addition, the FAA uses these four metrics to define the following:

- **Runway Design Code (RDC)**: the critical design aircraft's AAC, ADG, as well as the approach visibility minimums expressed in feet of Runway Visual Range (RVR) are combined to form RDC of a particular runway. The RDC of a runway drives all aspects of runway design except for the runway length and pavement strength. Per FAA guidance, the design aircraft for those other aspects of runway design may be a different aircraft.
- **Airport Reference Code (ARC)**: In the case of an airport with multiple runways, a specific design aircraft can and should be used for each runway. The highest RDC, minus the visibility component, was used to form the Airport Reference Code (ARC). The ARC was abandoned as a design standard with the publication of FAA AC 150/5300-13B, *Airport Design* on March 31, 2022, but is still used colloquially.
- Taxiways and taxilanes are designed per the critical design aircraft's ADG and TDG.

Table 2.3 lists these standards as they currently apply to GWS according to the 1999 Airport Layout Plan and the 2020 CASP. Both plans list different design standards for GWS. This ALP Update will reassess the current and future critical aircraft as part of the aviation activity forecasts and reconcile discrepancies. Please refer to **Section 3.3.3, *Critical Design Aircraft*** for more information.

Because GWS is not included in the NPIAS, the use of FAA design standards is recommended by CDOA, but not mandatory. As listed in CDOT's *Airport Sponsor Assurances* that apply to grants issued under the Colorado Discretionary Aviation Grant (CDAG) program, airports are responsible for ensuring compatible land use around airports (Colorado Department of Transportation, Division of Aeronautics, *Programs & Procedures Manual*, Appendix B, *Airport Sponsor Assurances for CDAG Funding*, Section IV.1, *Compatible Land Use*, published August 21, 2024). According to CDOA, "compatible land use and planning in and around airports benefits the state aviation system by providing opportunities for safe airport development, preservation of airport and aircraft operations, protection of airport approaches, reduced potential for litigation and

compliance with appropriate airport design standards." This ALP Update will utilize the FAA airport design standards as guidelines but may deviate from them when necessary to maximize the use of available land if an acceptable level of safety is maintained.

Table 2.3 - GWS Airport Design Standards

Criteria	Definition	1999 ALP	2020 CASP
Aircraft Approach Category (AAC)	A grouping of aircraft, A through E, based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight.	B	B
Airplane Design Group (ADG)	A grouping of aircraft, I through VI, based upon wingspan and tail height.	I (S) (Small Aircraft)	II
Taxiway Design Group (TDG)	A classification of airplanes, 1A through 6, based on Outer-to-Outer Main Gear Width (MGW) and Cockpit to Main Gear distance (CMG).	1A[1]	2A[1]
Visibility Minimums	A classification of a runway's lowest visibility published on an instrument approach chart expressed by RVR values, or VIS for visual-only runways.	VIS	VIS
Runway Design Code (RDC)	A code signifying the design standards to which the runway (and supporting infrastructure) is to be built.	B-I(S)-VIS	B-II-VIS
Airport Reference Code[2] (ARC)	An airport designation that signifies the airport's highest RDC, minus the third (visibility) component of the RDC.[2]	B-I(S)[2]	B-II[2]

Source: 1999 GWS Airport Layout Plan. 2020 CASP. Dibble, June 2025 analysis
Note: [1]: TDG design standards were introduced by the FAA in 2012 with the publication of FAA AC 150/5300-13A, *Airport Design*, after the completion of the 1999 Airport Layout Plan for GWS. The 2020 CASP does not attribute a TDG as an objective for airports. The TDG values in this table are based on common TDG values for B-I(S) and B-II aircraft in the FAA *Aircraft Characteristics Database* published October 2024.
[2]: This standard was abandoned with the publication of FAA AC 150/5300-13B, *Airport Design* on March 31, 2022.

2.2.2 Runway

The Airport has one active asphalt runway, which is oriented northwest/southeast, and is identified as Runway 14-32. A runway's identification is based on the runway's magnetic compass heading, rounded to the nearest multiple of ten, with the final zero omitted. The true bearing of a runway will not change over time, but the magnetic bearing will change as the location of magnetic north shifts. A computation using NOAA NCEI's Magnetic Field Calculator, based on the World Magnetic Model (WMM) showed that the magnetic declination at GWS is currently 8 degrees 43 minutes East (8° 43' E), with an accuracy of 22 minutes (22') and an estimated annual rate of change of 5 minutes West (5' W) per year (June 2025). Runway 14 has a true (geodetic) bearing of 153° 48' 48" (derived from the surveyed runway end points coordinates, Dibble survey, June 2025), which results in a current magnetic bearing of 145° 05' and a runway designation of "Runway 15" that should be updated from "Runway 14". A similar analysis shows that the "Runway 32" designation should be updated to "Runway 33". Based on the current annual rate of change, it is estimated that the runway's magnetic bearing has favored a "Runway 15" designation since 2024.

As published in the FAA's Airport Data and Information Portal (ADIP), Runway 14-32 is 3,305 feet long and 50 feet wide (retrieved June 2025). A computation using NOAA's National Geodetic Survey's (NGS) INVERS3D

Program, a program that calculates the 3-dimensiontal geodetic distance (mark-to-mark distance) between two points, and runway end points coordinates and elevations from the 2025 Dibble survey as input data, shows that Runway 14-32 is 3,310 feet long. According to FAA AC 150/5300-18B, *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards*, Section 2.6.10.5.5, published runway distances are determined using the mark-to-mark distance. The calculated runway length of 3,310 will be reflected on the updated ALP and should be updated in the FAA databases.

Runway pavement is asphalt with no paved shoulders; there are no blast pads at the ends of the runway. The runway pavement surface is not grooved. According to the ADIP, runway pavement surfaces are in good condition as of Spring 2025 (please refer to **Section 2.2.4, *Pavement Strength & Condition*** for further details). The runway is not equipped with any runway lighting and has no displaced thresholds, stopways, or clearways on either end. Declared distances are not used at GWS as the full-length of the runway is available for takeoff, aborted takeoff, and landing.

Overall, approximately 25 percent of operations are performed by rotorcraft to and from the helipad, and 75 percent are performed by fixed-wing aircraft to and from Runway 14-32. Prevailing winds usually favor Runway 14 in the morning and Runway 32 in the afternoon. However, because of noise abatement procedures, Runway 32 is used 87 percent of the time when landing and Runway 14 is used 91 percent of the time for takeoff[2]. About 10 percent of landings and takeoffs are performed into the wind when conditions warrants. Please refer to **Section 2.3.1, *Local Airspace*** for additional information pertaining to runway usage, noise abatement, and local pattern restrictions. The runway is depicted on **Figure 2.4** and **Figure 2.5** (on page 2-11).

Figure 2.4 - Runway 14-32 & Taxiways/Taxilanes



Source: Dibble, May 2025

[2] RunwayStats, between October 1, 2024 and June 10, 2025. Retrieved June 2025.

2.2.3 Taxiways & Taxilanes

The taxiway system at GWS includes a series of interconnected aprons and taxilanes that create a full-length parallel Taxiway A. The parallel taxiway/taxilane and series of aprons are connected to the runway by five taxiway connectors (stubs). Width and pavement condition varies. All taxiway and apron pavement surfaces are constructed of asphalt and are in varying condition, from good to failed[3]. There are no taxiway lights nor taxiway signs. There are no taxiway fillets at most intersections. Generally, the parallel taxiway/taxilane does not meet the ADG I clearance standards. Taxiways and taxilanes are depicted on **Figure 2.4** and **Figure 2.5.**

2.2.4 Pavement Strength & Condition

To adequately monitor pavement conditions at airports throughout the state, CDOA annually updates the statewide Airport Pavement Management System (APMS). Each year, pavement sections at select airports are inspected and Pavement Condition Indexes (PCI) are gathered. An APMS is a systematic approach to provide recommendations for actions required to maintain a pavement network at an acceptable level of service while minimizing the cost of maintenance and repair. The APMS is used to evaluate the present condition of pavement and predict future deterioration with pavement condition indicators.

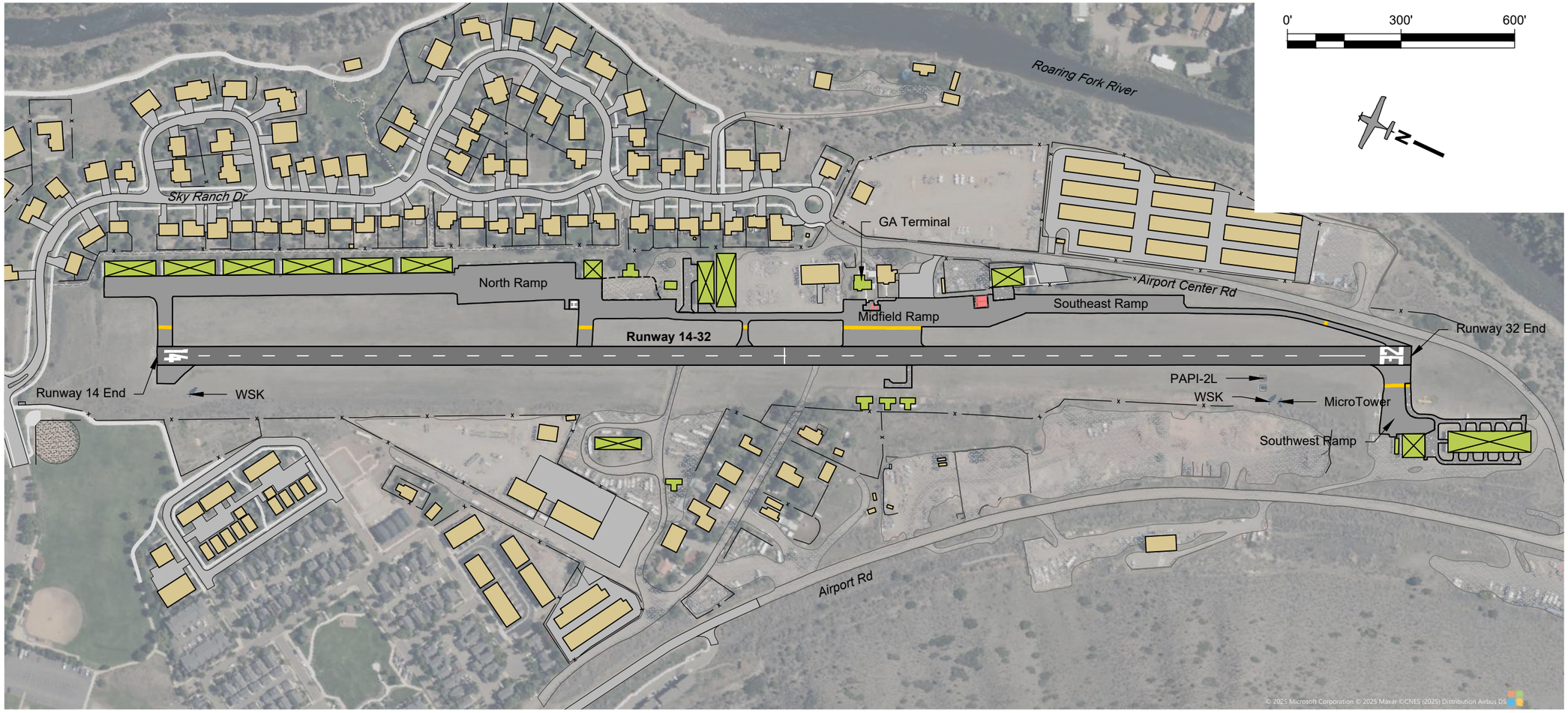
The last inspection at GWS was performed in June 2025, however, only data from June 2022 is currently available as of July 1, 2025. A PCI rating was given to each section of pavement that was inspected and subsequently used to formulate an area-weighted average score for each category, or branch, of pavement, i.e., runway, taxiway, and apron. Airport pavements included in CDOA's inspection only included the runway, the midfield apron, and the southeast apron and parallel taxilane up to the Runway 32 end. To complement CDOA's inspection, Dibble estimated the PCI (high-level estimate) of other airport pavements based on visual observations. Generally, other pavement areas are in worse conditions. A crack seal and seal coat pavement preservation project will be completed in 2025 for all airport pavement surfaces and will likely increase the network-level PCI by an estimated 10 points. Based on the 2022 inspection, CDOA gave a score of 88 to the Airport at the network level, i.e., entire airport, which means airport pavements were in "Good" condition overall. Based on the estimated PCI values for the entire airfield, the projected network-level PCI for 2025 is 75, or "Fair". Each of the pavement sections' individual scores are depicted on **Figure 2.6**.

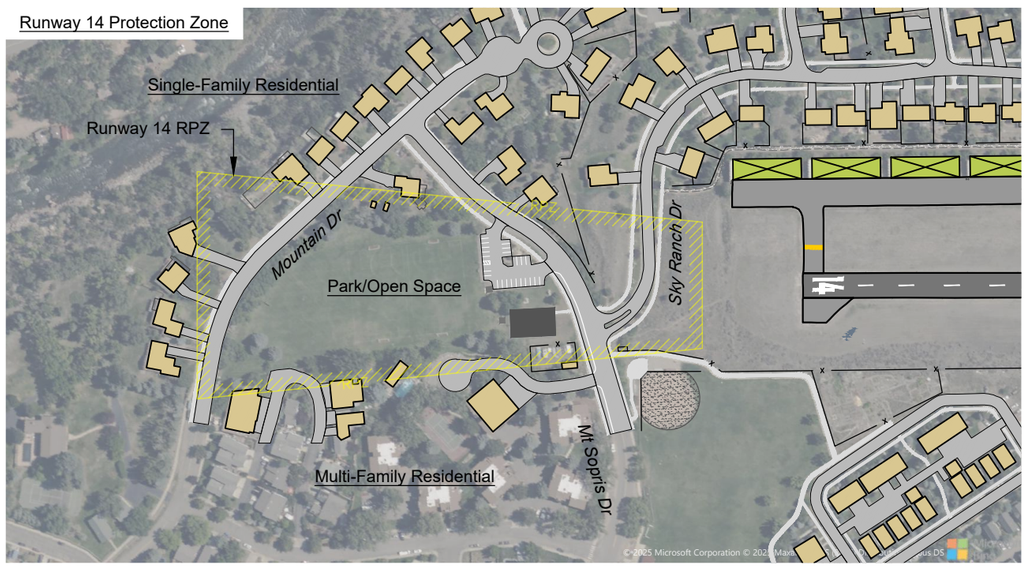
Design pavement strengths and PCI values for each pavement branch are as follows:

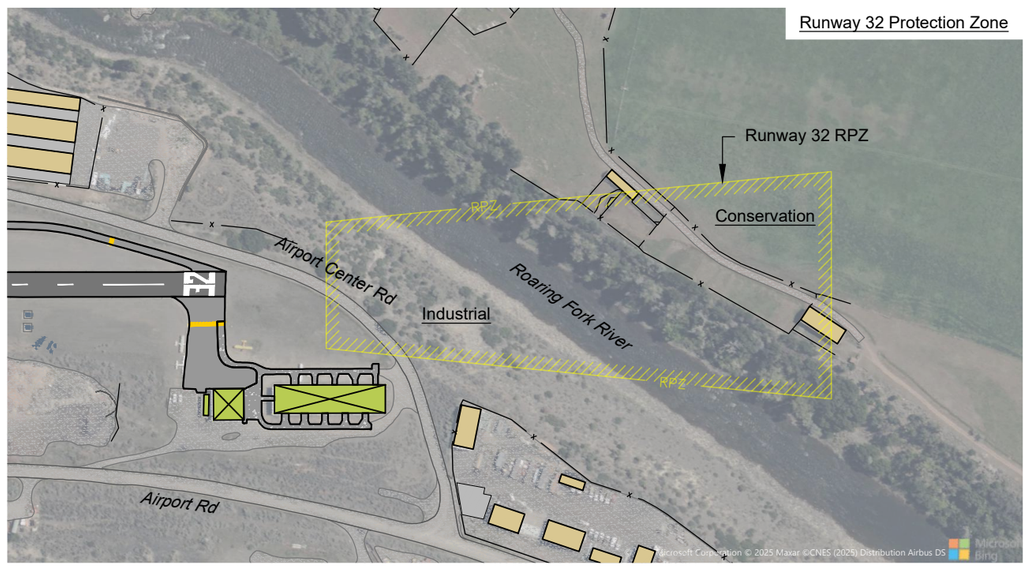
- **Runway Pavements**: Runway 14-32 pavement surfaces are rated to accommodate aircraft with Single-Wheel Main Gear (S) configuration weighing up to a maximum of 15,000 pounds. As presented on **Figure 2.6**, runway pavement surfaces are 10 years old and have an estimated PCI rating of 94 ("Good") as of 2025, after the crack seal and seal coat pavement rejuvenation project.
- **Taxiway & Taxilane Pavements**: Taxiway pavement surfaces are assumed to have a strength rating similar to the runway. The estimated PCI rating for all taxiway surfaces is 73 ("Satisfactory") as of 2025.
- **Apron Pavements**: Apron pavement surfaces are assumed to have a strength rating similar to the runway. The estimated PCI rating for all apron surfaces is 53 ("Poor") and the estimated PCI rating for the helipad is 65 ("Fair") as of 2025.

  Dibble estimates that the condition of those pavement surfaces not inspected by CDOA in 2022 ranges from "Good" for some of the newly constructed ramp sections near the fuel farm and the northern stubs to "Satisfactory" for the box hangar taxilane to "Fair" for the north ramp to "Poor" for the midfield section of parallel taxiway to "Serious" for the southwest ramp and some sections of the north ramp to "Failed" for one of the taxiway stubs and the T-hangar taxilane.

[3] Refer to Section 2.2.4, *Pavement Strength & Condition*







DIBBLE

Legend:

- Runway
- Taxiways & Aprons
- Airport Buildings
- City Buildings
- RPZ — Existing RPZ

City Future Land Use

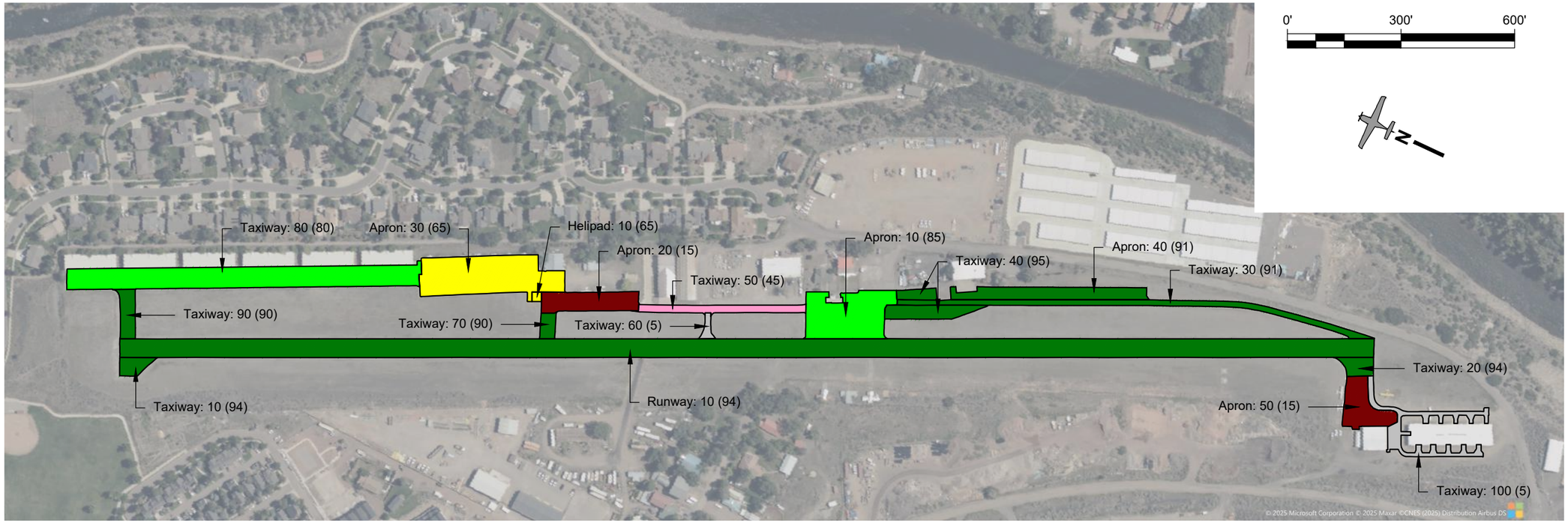
Notes:

- GA: General Aviation
- PAPI: Precision Approach Path Indicator
- WSK: Wind Sock
- Future City land use per the Comprehensive Plan Future Land Use Map.

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 2.5
Airfield Infrastructure

K:\2025\1326062 GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 2.5 - Airfield Infrastructure.dwg



Pavement Condition by Section - 2025

Branch	Section	Surface Type[1]	Area (sf)[2]	% Area	Age[3]	PCI	PCI Rating
Runway	10	AC	163,225	39.9%	10	94[4]	Good
Taxiway	10	AC	3,526	0.9%	10	94[4]	Good
Taxiway	20	AC	3,945	1.0%	10	94[4]	Good
Taxiway	30	AC	18,690	4.6%	16	91[4]	Good
Taxiway	40	AC	11,293	2.8%	3	95[5]	Good
Taxiway	50	AC	8,857	2.2%	Unknown	45[5]	Poor
Taxiway	60	AC	1,415	0.3%	Unknown	5[5]	Failed
Taxiway	70	AC	2,703	0.7%	Unknown	90[5]	Good
Taxiway	80	AC	51,308	12.5%	22	80[5]	Satisfactory
Taxiway	90	AC	5,318	1.3%	Unknown	90[5]	Good
Taxiway	100	PCC	12,602	3.1%	Unknown	5[5]	Failed
Apron	10	AC	26,054	6.4%	10	85[4]	Satisfactory
Apron	20	AC	12,940	3.2%	Unknown	15[5]	Serious
Apron	30	AC	35,193	8.6%	Unknown	65[5]	Fair
Apron	40	AC	16,258	4.0%	16	91[4]	Good
Apron	50	AC	35,193	8.6%	Unknown	15[5]	Serious
Helipad	10	PCC	624	0.2%	Unknown	65[5]	Fair

Source: 2024 CDOA Airport Pavement Management System (APMS). Dibble, July 2025 Analysis.
Notes: [1] : AC = Asphalt Concrete PCC = Portland Cement Concrete
[2] : Value from CAD files.
[3] : Age since last construction.
[4] : Projected 2025 PCI values for rejuvenated runway pavement sections were estimated assuming an increase of 10 points from the projected 2025 value from CDOT APMS.
[5] : Estimated by Dibble based on visual inspection. Estimate only.

Area-Weighted Pavement Condition by Branch - 2025

Branch	Area (sf)[1]	% Area	Area-Wt. Average Age	Area-Wt. Average PCI[1]	PCI Rating
Runway	163,225	39.9%	10	94	Good
Taxiway	119,657	29.2%	Unknown	73	Satisfactory
Apron	125,638	30.7%	Unknown	53	Poor
Helipad	624	0.2%	Unknown	65	Fair
Overall	**409,145**	**100.0%**	**Unknown**	**75**	**Fair**

Source: 2024 CDOA Airport Pavement Management System (APMS). Dibble, July 2025 Analysis.
Notes: [1] : See *Pavement Condition by Section* table for further information and assumptions on individual pavement sections.

PCI Rating Distribution of All Airfield Pavements - 2025

PCI Range	Rating	Area (sf)[1]	% Area
86 - 100	Good	224,958	55.0%
71 - 85	Satisfactory	77,362	18.9%
56 - 70	Fair	35,817	8.8%
41 - 55	Poor	8,857	2.2%
26 - 40	Very Poor	0	0.0%
11 - 25	Serious	48,133	11.8%
0 - 10	Failed	14,017	3.4%

Source: 2024 CDOA Airport Pavement Management System (APMS). Dibble, July 2025 Analysis.
Notes: [1] : See *Pavement Condition by Section* table for further information and assumptions on individual pavement sections.

DIBBLE

Legend:

- 86 - 100 Good
- 71 - 85 Satisfactory
- 56 - 70 Fair
- 41 - 55 Poor
- 26 - 40 Very Poor
- 11 - 25 Serious
- 0 - 10 Failed

Notes:

- PCI values for those pavement areas not inspected by CDOT are provided by Dibble and are intended as a high-level estimate only (i.e., PCI Rating).
- Estimates are provided based on pictures and visual inspection. ASTM D5340-24, *Standard Test Method for Airport Pavement Condition Index Surveys* was not used.
- Values show herein may differ from actual PCI values resulting from an inspection.

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 2.6
Airfield PCI Map

K:\2025\132506Z GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 2.6 - Airfield PCI Map.dwg

2.2.5 Airfield Lighting, Markings & Signage

The Airport is not currently equipped with any edge lighting or airfield signage and there is no airport rotating beacon. Markings for Runway 14 and Runway 32 are consistent with those of a visual runway and include runway landing designator markings and runway centerline markings. All runway markings are white and are in good to fair condition. Some centerline markings are faded near aircraft touchdown zones. All runway markings are to be repainted during the crack seal and seal coat pavement preservation project later in 2025.

Taxiway markings include taxiway centerline markings and holding position markings. All taxiway markings are yellow and are in satisfactory to poor condition. Markings are depicted in **Figure 2.7**.

Figure 2.7 - Airfield Markings



Source: Dibble, May 2025

2.2.6 Weather, Navigational Aids & Visual Aids

Weather reporting systems and electronic or visual navigational aids (NAVAIDS) are important components at an airfield that provide guidance/position information and visual cues to airborne aircraft. GWS has several aids to help pilots navigate into and around the Airport:

- **Weather Reporting System**: Automated airport weather stations are automated sensor suites which are designed to serve aviation and meteorological observing needs for safe and efficient aviation operations, weather forecasting, and climatology. There are several types of automated airport weather reporting stations. These include the Automated Weather Observing System (AWOS), the Automated Surface Observing System (ASOS), and the Automated Weather Sensor System (AWSS).

  The Airport is equipped with a MicroTower system that is an alternate solution to ASOS or AWOS. This system reports the following parameters: temperature, dew point, wind direction, wind speed, gust speed, visibility, ceiling, altimeter setting, density (pressure) altitude, precipitation accumulation, precipitation type, as well as special observations such as windshear alerts and crosswind alerts. Data dissemination occurs every 20 minutes on the 15, 35, and 55 minute marks via the CTAF VHF air band radio frequency 123.000 Mhz. The MicroTower system is located west of Runway 14-32 approximately 370 feet northwest of the Runway 32 end. The system is in excellent condition. The system is adequate and no new AWOS should be needed during the 20-year planning period.

- **Visual Aids**: The Airport is equipped with two non-standard, non-lighted windsocks located near each runway end. The windsock near the Runway 32 end is elevated an estimated 25 feet above ground level to counter the effects of nearby terrain. There is no segmented circle at GWS.

- **Visual Approach Aids**: This type of lighting assists pilots when landing by indicating whether the aircraft is above, below, or on the correct glide path, or descent path, to the runway threshold. The Precision Approach Path Indicator (PAPI) is common at many GA airports. Runway 32 is equipped with a two-box PAPI (PAPI-2L) lighting system. The PAPI-2L is in good working order, although it is dated. The visual Glide Path Angle (GPA) is 4.0 degrees, and the Threshold Crossing Height (TCH) is 30 feet.

- **NAVAIDs**: Electronic NAVAIDS are ground based devices used to provide course or altitude information to pilots. Examples of radio NAVAIDs include Very High Omni-directional Range (VORs) with Distance Measuring Equipment (VOR/DME), Very High Frequency Omni-directional Range with Tactical Information (VORTACs), and Tactical Air Navigational Aids (TACANs). None of these devices are located on the Airport itself. The nearest electronic NAVAIDS to GWS include the Snow, Rifle, and Red Table VOR/DMEs.

Visual aids are depicted in **Figure 2.8**. Visual aids are in fair condition overall.

Figure 2.8 - Airfield Visual Aids



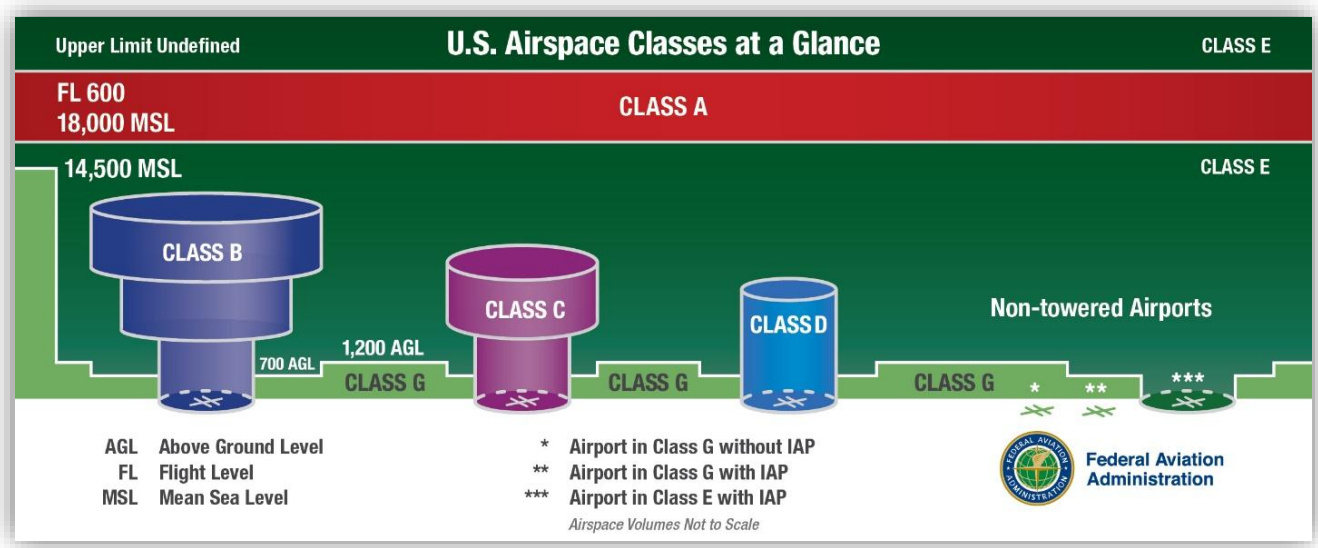
Source: Dibble, May 2025

2.3 Airspace

2.3.1 Local Airspace

The National Airspace System (NAS) consists of various classifications of airspace that are regulated by the FAA. Airspace in the U.S. is classified as *Controlled*, *Uncontrolled*, *Special Use*, or *Other*. The various types and classifications of airspace are depicted on **Figure 2.9**. Depending on the location and altitude, airspace is defined using absolute altitude (using Above Ground Level or AGL, measured in feet), true altitude (using Mean Sea Level or MSL, measured in feet) or pressure altitudes (using Flight Levels or FL, measured in hundreds of feet). Pilots flying in controlled airspace are subject to Air Traffic Control (ATC) and must follow either Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) requirements. These requirements include combinations of operating rules, aircraft equipment and pilot certification, and vary depending on the Class of airspace. Please refer to **Appendix B** for a definition of Airspace Classifications.

Figure 2.9 - Airspace Classifications in the U.S.



Source: FAA, *Aeronautical Information Manual (AIM) Basic*, Effective February 20, 2025

General definitions of the controlled and uncontrolled classes of airspace include:

- **Class A Airspace**: Airspace from 18,000 feet MSL up to and including FL 600.
- **Class B Airspace**: Airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements.
- **Class C Airspace**: Generally, airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower.
- **Class D Airspace**: Airspace from the surface up to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports with an operational control tower.
- **Class E Airspace**: Generally, controlled airspace that is not Class A, Class B, Class C or Class D.
- **Class G Airspace**: Generally, uncontrolled airspace that is not designated Class A, Class B, Class C, Class D, or Class E.

GWS is located within Class G uncontrolled airspace. Class G near the Airport extends from the surface up to (but not including) 1,200 feet AGL. Class E airspace above starts at 1,200 feet AGL and extends up to (but not including) 18,000 feet MSL. Class E airspace requires all IFR aircraft to maintain two-way radio contact with the appropriate Air Traffic Control (ATC) facility. All other VFR aircraft are not required to contact ATC within Class E airspace.

Local traffic patterns at the Airport are not standard due to the surrounding terrain:

- Noise abatement procedures listed in the FAA Chart Supplements dictate to use Runway 32 for arrivals and Runway 14 for departures, wind and weather permitting.
- The FAA Chart Supplements also lists touch and go operations as not permitted.
- The FAA Chart Supplements does not list a published Traffic Pattern Altitude (TPA).

- **Runway 14**: On average, 91 percent of departures use this runway for takeoff.[4] The traffic pattern for departures is a straight-out track that then follows the river upstream and southward towards Carbondale. When needed (approx. 13 percent of the time) the traffic pattern for arrivals is a non-standard left-hand traffic pattern with an extended downwind to clear the mountain ridges on the east side of the Airport, with a base turn over downtown Glenwood Springs and a final approach up the Roaring Fork River.
- **Runway 32**: On average, 87 percent of arrivals use this runway for landing.[4] The traffic pattern for arrivals is a quasi-standard left-hand traffic pattern with a slightly extended downwind to clear the ridge on the west side of the Airport, and a steep 4.0 degrees GPA. When needed (approx. 9 percent of the time) the traffic pattern for departures is a straight-out track that follows the river downstream, hugs the right side of the canyon, then turns westward over downtown Glenwood Springs to follow the Colorado River downstream.

Flight tracks are depicted on **Figure 2.3**. Pilots should also be aware of high gusty winds and wildlife in vicinity of airport, as well as paragliding operations one to two miles northwest of the Airport up to 18,000 feet MSL. The Airport does not have an Air Traffic Control Tower (ATCT). Instead, all pilots, either operating on the airfield or in the traffic pattern, use the CTAF 123.000 to broadcast their position.

Two Class D airports (EGE and ASE) with Class E extensions (both surface and 700 feet AGL) and one Class E airport (RIL) with both surface and 700 feet AGL extensions are located nearby. The closest Victor Airways (low altitude airways, usually between 1,000 feet AGL and 18,000 feet MSL) are V8 and V108 to the north of the Airport, and V134 to the south. All three routes radiate either from the Rifle or the Red Table VOR/DMEs. Two J-Routes and two Q-Routes (high altitude airways, between 18,000 feet MSL and FL 600), J60, J80, and Q88, Q114 pass through or near the Red Table VOR/DME and another two Q-Routes, Q134 and Q136, are located nearby to the north of the Airport. **Figure 2.10** and **Figure 2.11** depict the local VFR airspace and the enroute low altitude IFR airspace, respectively.

The Airport is located within the jurisdiction of the Denver Air Route Traffic Control Center (ARTCC) and the Denver Flight Service Station (FSS). Radar coverage below 14,000 feet MSL is limited to non-existent because of the top of the surrounding mountains. In the past, controllers use to have to keep planes farther apart in the air than usual in order to provide the appropriate safety margins, and had to conduct “one in, one out” operations. In the early 2010s, the FAA worked with CDOA to install a technology called Wide Area Multilateration, or WAM, that relies on a series of Automatic Dependent Surveillance - Broadcast (ADS-B) receiver stations to relay aircraft position information to the air traffic control facilities, thence improving IFR coverage and operations along the I-70 corridor. The Denver FSS provides additional weather data and other pertinent information to pilots on the ground and enroute.

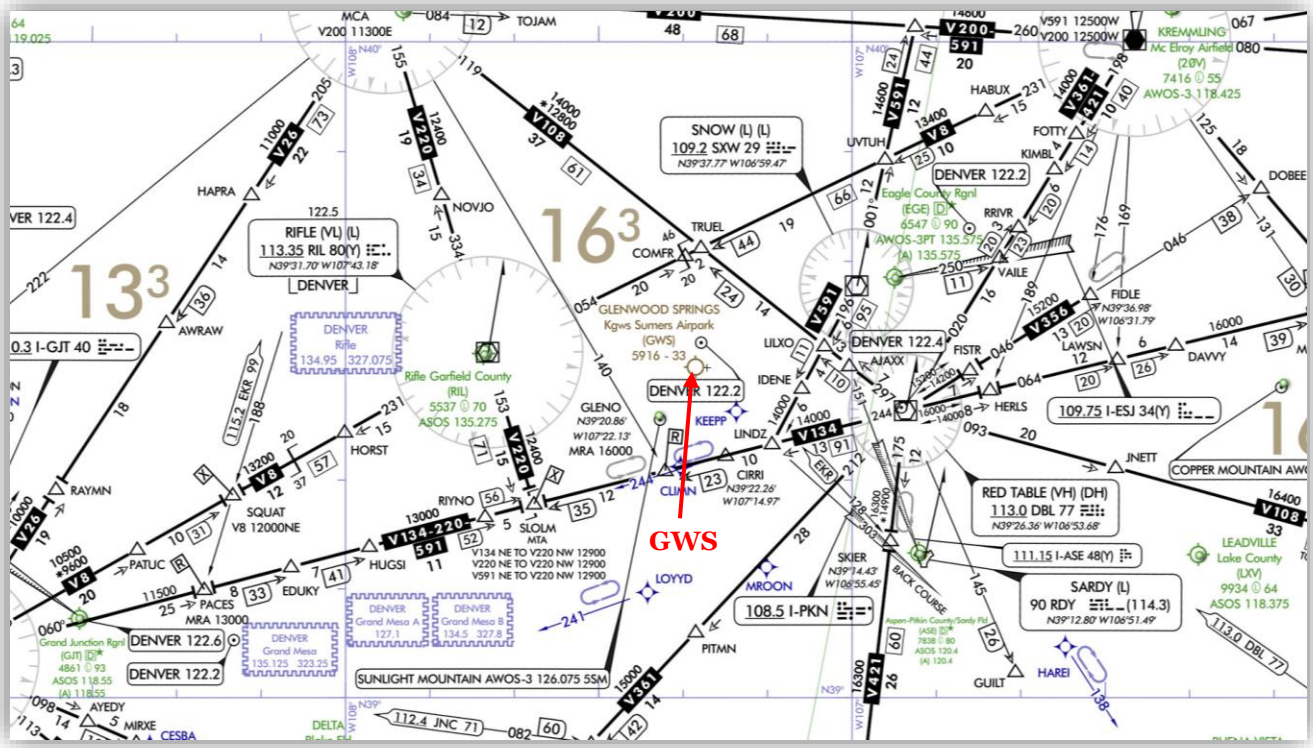
[4] RunwayStats, between October 1, 2024 and June 10, 2025. Retrieved June 2025.

Figure 2.10 - Local VFR Airspace



Source: FAA, *Denver Sectional Aeronautical VFR Chart*, effective April 17, 2025 to June 12, 2025

Figure 2.11 - Local IFR Enroute Low Altitude Airspace



Source: FAA, *L-09 IFR Enroute Low Altitude Aeronautical Chart*, effective April 17, 2025 to June 12, 2025

While the Airport is not located near any designated Special Use airspace such as Military Operation Areas (MOAs), Prohibited or Restricted Areas, or other Alert Areas, it is located near some designated "Other airspace areas". "Other airspace areas" is a general term referring to the majority of the remaining airspace that is not considered controlled, uncontrolled, or special use airspace. Other airspace areas near GWS are as follows:

- Other Airspace Areas:
    - **Wildlife, Wilderness and National Parks**: Airspace that surrounds those noise sensitive areas where pilots are asked to avoid flight below 2,000 AGL. There are some wilderness and special conservation area airspace nearby, including Flat Tops Wilderness Area to the north and the Maroon Bells and Raggeds Wilderness Areas to the south. Some of those areas are depicted on **Figure 2.10**.

2.3.2 Terminal Procedures Publications

Terminal Procedures Publications (TPP) are published every 28 days by the FAA and document available terminal instrument flight procedures at all airports. TPPs may include Instrument Approach Procedure (IAP) charts, Departure Procedure (DP) charts, Standard Terminal Arrival (STAR) charts, Charted Visual Flight Procedure (CVFP) charts, and Airport Diagrams (AD). Also included are Takeoff, Radar, and Alternate Minima textual procedures. The FAA has not published any TPPs for GWS. All approaches and departures are daytime visual only.

2.3.3 Airport Imaginary Surfaces

Ideally, airports should be designed so the surrounding airspace is free and clear of obstructions that could be hazardous to aircraft on approach or departure paths. Regulations to protect airspace in the vicinity of public-use airports have been established by defining a set of imaginary airspace surfaces. Those surfaces are defined in Title 14 of the Code of Federal Regulations (CFR), namely the Federal Aviation Regulations (FAR), Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace*. The imaginary surfaces and their geometry are defined in Subpart C, 77.19 *Civil Airport Imaginary Surfaces* of 14 CFR Part 77. Penetration to these imaginary surfaces represents an obstruction to air navigation. Obstructions are presumed hazards to air navigation unless further aeronautical study conducted by the FAA concludes that the object is not a hazard.

The current published pavement strength of Runway 14-32 is 15,000 pounds (S). The current definition of a *Utility Runway* as listed in 14 CFR Part 77, Subpart A, 77.3 *Definitions* is "a runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less." Runway 14-32 was reconstructed in 2015 slightly over the 12,500 pounds threshold in order to enjoy a longer useful pavement life cycle. However, the runway is intended to be used by propeller driven aircraft of 12,500 pounds or lower. In fact, over 99.9 percent of aircraft using the runway have a maximum gross weight under 12,500 pounds.[5] Consequently, this ALP Update will continue to designate Runway 14-32 as a utility runway, in line with the 1999 ALP, and will use the imaginary surface dimensions associated with visual utility runways.

The dimensions of the Part 77 surfaces currently applicable to GWS are specified in **Table 2.4**. The dimensions assume Runway 14-32 is a utility runway. Likewise, **Figure 2.12** illustrates a typical layout of Part 77 surfaces. For a more detailed definition of the Part 77 surfaces, please refer to **Appendix B**.

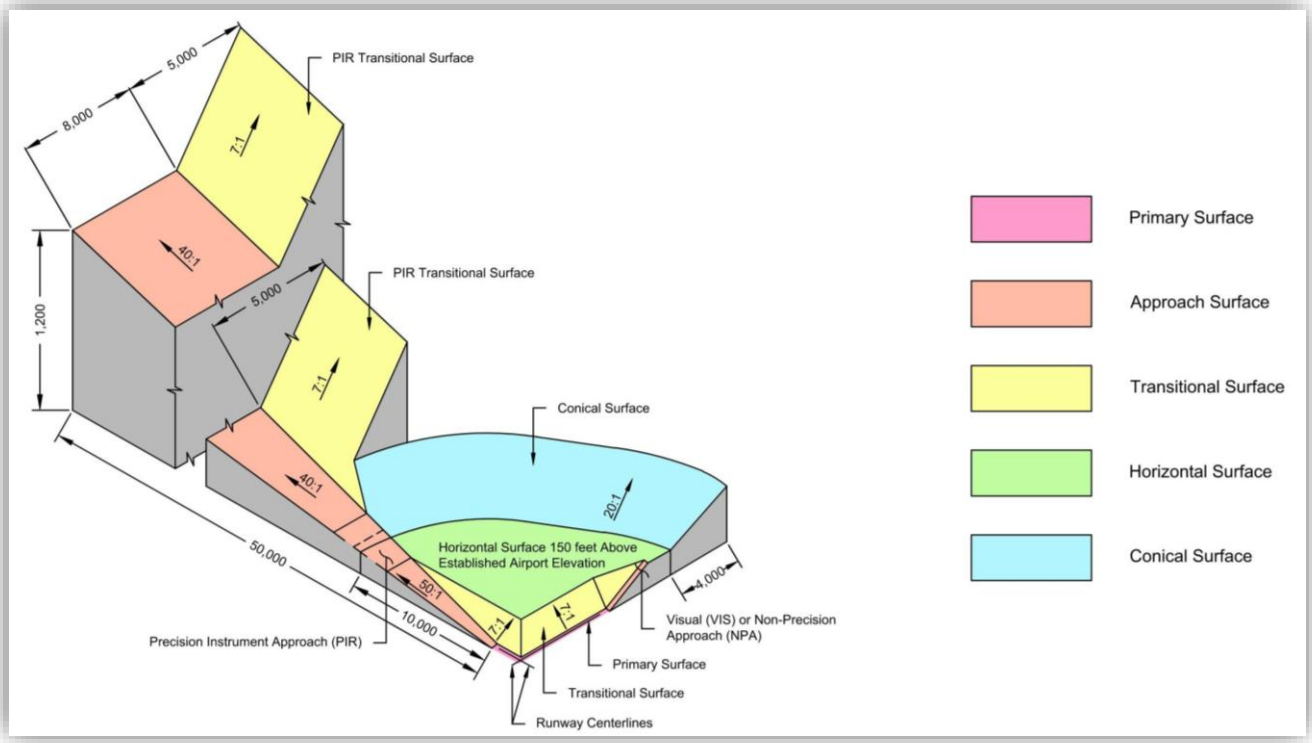
[5] RunwayStats, between October 1, 2024 and June 10, 2025. Retrieved June 2025. Includes "Unknown" weight class, assumed to be smaller aircraft or experimental/ultralight not reporting weight.

Table 2.4 - 14 CFR Part 77 Surfaces Dimensions

Surface	Orientation	Cat.	Dimensions	Slope
Primary	Longitudinally centered on the Runway	P	250' (W) & 200' (O) from EOR Airport Elevation 5,921.5'	-
Approach	Upwardly sloped from the ends of the primary surface	A	250' (IW) x 1,250' (OW) x 5,000' (L)	20:1
Horizontal	Arcs on either end of the runway connected by tangents	H	5,000' (R) Horizontal Surf. Elevation 6,071.5'	-
Transitional	Extends outward and upward from Primary and Approach surfaces	T	Terminates at Horizontal Surface	7:1
Conical	Extends outward and upward from horizontal surface	C	4,000' (O) Outer Edge Elevation 6,271.5'	20:1

Source: Dibble, June 2025
Notes: W: Width IW: Inner Width OW: Outer Width L: Length R: Radius O: Offset EOR: End of Runway
Cat.: Category P: Primary A: Approach H: Horizontal T: Transitional C: Conical

Figure 2.12 - 14 CFR Part 77 Surfaces Diagram (Typ.)



Source: Dibble, June 2025

2.4 Terminal Area & Landside Facilities

General aviation facilities, including the pilot's lounge, ramp, aircraft storage hangars, and automobile parking are located on the east side of the Airport. The terminal area facilities, including support facilities hereinafter described, are depicted in **Figure 2.13** through **Figure 2.18**.

2.4.1 General Aviation Terminal Building

The GA terminal facility, also referred to as the airport administration/Fixed Base Operator (FBO)/pilot lounge building, is a single room facility on the east side of the Airport. The facility serves as an office for the Airport Manager and as the pilot and visitor lounge. Basic amenities include Wi-Fi, a land line, radios, a small shop area, a flight planning area, a restroom, and a courtesy car. The facilities are leased by KGWS Sumers Airpark from a private residence near the main transient apron, and consist of a wooden, lodge-type building on private property. The second half of the structure is a residence. The facility is staffed part-time and is open to the public seven days a week, 365 days a year. **Figure 2.13** and **Figure 2.18** depict the GA terminal building/FBO.

Figure 2.13 - GA Terminal Building



Source: Dibble, May 2025

2.4.2 General Aviation Aircraft Aprons

The Airport has multiple aircraft parking aprons, that can be categorized as follows:

- **North Ramp (Based Aircraft)**: This section of apron is located north of the terminal building and the Classic Air Medical hangar. It is constructed of asphalt and covers approximately 3,400 square yards. The apron space consist of a taxilane and 12 parking positions (tie-downs) for small single-engine piston aircraft. All tie-down positions have concrete tires to moor aircraft. The pavement is in satisfactory condition

- **North Ramp Annex (Based Aircraft)**: This section of apron is located just south of the main based aircraft apron. It is constructed of asphalt and covers approximately 1,100 square yards. The apron space consist of a taxilane and 3 parking positions (tie-downs) for small single- and twin-engine piston aircraft. All tie-down positions have anchors to moor aircraft. Some of those anchors are damaged and currently unusable. The pavement is in poor condition
- **Midfield Ramp (Transient Aircraft)**: This section of apron is located directly adjacent to the terminal building. It is constructed of asphalt and covers approximately 2,800 square yards. The apron space consist of taxilane space and pull up parking space. The pavement is in satisfactory condition.
- **Southeast Ramp (Transient Aircraft)**: This section of apron is located south of the terminal building and the fuel farm. It is constructed of asphalt and covers approximately 2,200 square yards. The apron space consist of a taxilane, 8 parking positions (tie-downs) for small single-engine piston aircraft, as well as three parking positions (tie-downs) for helicopters. All tie-down positions have anchors to moor aircraft. Some of those anchors are damaged and currently unusable. The pavement is in satisfactory condition.

There are no stormwater drainage structures on the apron; stormwater drains off the edge of the apron directly into ditches. There is one drain on the north hangars taxilane/apron. There are no known drainage issues. The apron is depicted in **Figure 2.14** and **Figure 2.18**.

Figure 2.14 - Aircraft Aprons



Source: Dibble, May 2025

2.4.3 Aircraft Hangars & Storage

There are three types of hangar facilities found at most airports - conventional hangars (or box hangars), T-hangars, and shade structures. Conventional hangars provide aircraft storage and are often referred to as box hangars, which are square or rectangular in shape and can be built in various sizes. T-hangars are rectangular aircraft storage hangars with several interlocking "T" units that minimize the need to build individual units; they are usually two-sided with either bi-fold or sliding doors. Shade structures provide a more economical way to keep an aircraft protected from the elements because they only have a roof over an aircraft. Aircraft hangars can be public use (owned by the airport and leased out), private, exclusive, or non-exclusive. Exclusive hangars are those hangars that are leased exclusively, or privately owned, by individuals or corporations. Non-exclusive hangars are defined as those hangars owned by the sponsor but shared by various tenants and considered common use.

All hangars at GWS are privately owned, with the Airport holding ground leases only. All hangars are constructed using rigid frame steel and corrugated steel panels and are in fair to good condition. Aircraft storage hangars are depicted in **Figure 2.15** and **Figure 2.18** on the following pages and consist of the following:

- One 50' x 50' Conventional Hangar providing approx. 2,500 square feet of storage space,
- Four Single-T Port-a-Port Hangars providing approx. 1,000 square feet of storage space each,
- One 45' x 110' Conventional Hangar with two units providing approx. 5,000 square feet storage space,
- Six 135' x 40' Box Hangars with three units each providing approx. 1,800 square feet of storage space,
- One 10-Unit T-Hangar, and
- Private hangars with "through-the-fence" access:
    - One 140' x 50' Share Structure providing approx. 7,000 square feet of storage space,
    - One 60' x 50' Conventional Hangar with 25-foot side building providing approx. 3,000 square feet of storage space,
    - One Single - Port-a-Port Hangars providing approx. 1,000 square feet of storage space, and
    - One 120' x 35' Share Structure providing approx. 4,200 square feet of storage space.

The Airport maintains a waiting list for hangar tenants. According to Airport management, there currently are 49 patrons waiting for hangars of varying sizes at GWS, sometimes for more than one aircraft each.

Through-The-Fence (TTF) agreements, sometimes called Residential Through-The-Fence (RTTF) agreements, allow people who own (residential) property with aircraft storage facilities near but off-airport to access airfield facilities "through the fence". Executed RTTF agreements are an important aspect of controlling and managing airport access, safety, and security. Those agreements ensure compliance with the terms and conditions of Section 136 of the *FAA Modernization and Reform Act of 2012* in a way that does not impede the sponsor's ability to comply with its federal grant assurances. At GWS, five aircraft owners that store their aircraft at three hangars with TTF access pay "access fees", but there are no recorded agreements for these hangar owners.

Figure 2.15 - Aircraft Storage Hangars



Source: Dibble, May 2025

2.4.4 Aircraft Servicing & Maintenance

Aircraft Repair LLC is a FAA Licensed Mechanics that provides airframe and powerplant repair and maintenance services including minor and major repairs, alterations, restoration, avionics repair and installation, as well as diagnostic and inspection services to based and transient aircraft. Aircraft Repair LLC owns and operates out of a 60 feet x 60 feet conventional (box) hangar on the west side of Runway 14-32, located near the Runway 32 threshold. A 1,500 square yard asphalt apron (referred to as the southwest ramp) and a mobile trailer complement the maintenance facility. The aircraft maintenance facility is depicted on **Figure 2.16** and **Figure 2.18**.

Figure 2.16 - Aircraft Maintenance Facility



Source: Dibble, May 2025

2.4.5 Airport Access & Parking

The terminal building/FBO is accessed from Airport Center Road, which connects to Airport Road/County Road 116 on the south side of the Airport, and downtown Glenwood Springs to the north. Free short-term automobile parking is provided near the terminal building/FBO through the same lease and consist of a paved pad providing five to six parking spaces.

The South Bridge Project will provide a new link across the Roaring Fork River from Airport Road to CO 82, greatly enhancing access to the Airport. The project will change the alignment and elevations of Airport Road and Airport Center Road and build a new span bridge that will impact airport facilities. Facility No. 11 (Aircraft Maintenance Hangar) and No. 12 (10-Unit T-Hangar) will be demolished as part of the project and will need to be relocated. Additionally, the current roadway design shows an embankment abutting the pavement edge at the Runway 32 threshold. The project is currently in the final stages of design and is targeting a start of construction in the Spring of 2026.

2.5 Support Facilities

2.5.1 Aircraft Fuel Storage

The Airport offers both 100LL AvGas and Jet A aircraft fuel. The City owns, and the Airport operates two 12,000 gallon above-ground, double wall fuel tanks – one for Jet-A and one for AvGas. The fuel tanks were installed in 2023. The fuel farm is located on the south side of the main transient aircraft apron. The fuel farm is equipped with a QTPod self-serve aviation fueling terminal. The 2024/2025 annual fuel flowage[6] was over 22,600 gallons

[6] Calculated from May 1, 2024 to April 31, 2025, after the change of management.

for Jet A and approximately 19,900 gallons for AvGas. Spill kits are available near the fuel tanks. Fuel storage tanks are depicted in **Figure 2.17** and **Figure 2.18**. **Table 2.5** presents historical fuel flowage.

Before the installation of the new fuel farm in 2023, the Airport used a 12,000-gallon underground AvGas fuel storage tank located near the Terminal building/FBO (age unknown) as well as a 500-gallon trailer mounted Jet A fuel tank and a 2000-gallon feed truck that were installed in 2019. As of 2025 the underground tank is decommissioned and is no longer used to store fuel. An old Jet A tank was removed in 1998. Between 1998 and 2019, the airport was only selling AvGas.

Figure 2.17 - Fuel Storage Tanks



Source: Dibble, May 2025

Table 2.5 presents historical fuel flowage at the Airport for both 100LL AvGas and Jet A.

Table 2.5 - Historical Fuel Flowage

Year	AvGas (gal)	Jet A (gal)
2018	28,000	0
2019	29,000	7,000
2020	31,000	15,000
2021	18,000	19,000
2022	16,000	17,000
2023	19,000	20,000
2024	19,868	22,602

Source: 2024: KGWS Sumers Airpark, from May 1, 2024 to April 31, 2025
2023 and prior: Data per City of Glenwood Springs Budget Books, estimated based on aggregated fuel sales and estimated fuel prices, rounded to nearest thousand gallons. Estimates only.

2.5.2 Aircraft Rescue & Fire Fighting

There is no Aircraft Rescue and Fire Fighting (ARFF) department at the Airport. The closest fire department is the Glenwood Springs Fire Department District Station 3, located 5 minutes away to the west off 4 Mile Road. Emergency vehicles may access the airfield in several locations on the east and west sides of the Airport.

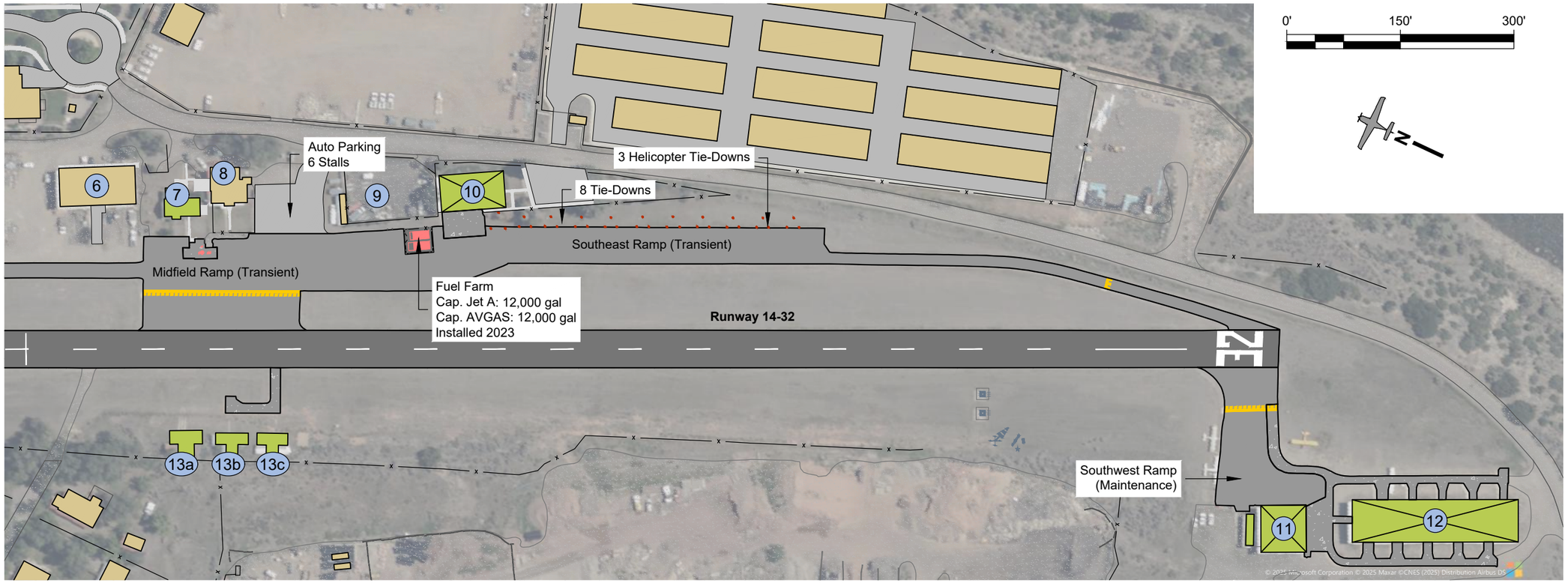
2.5.3 Airport Fencing & Security

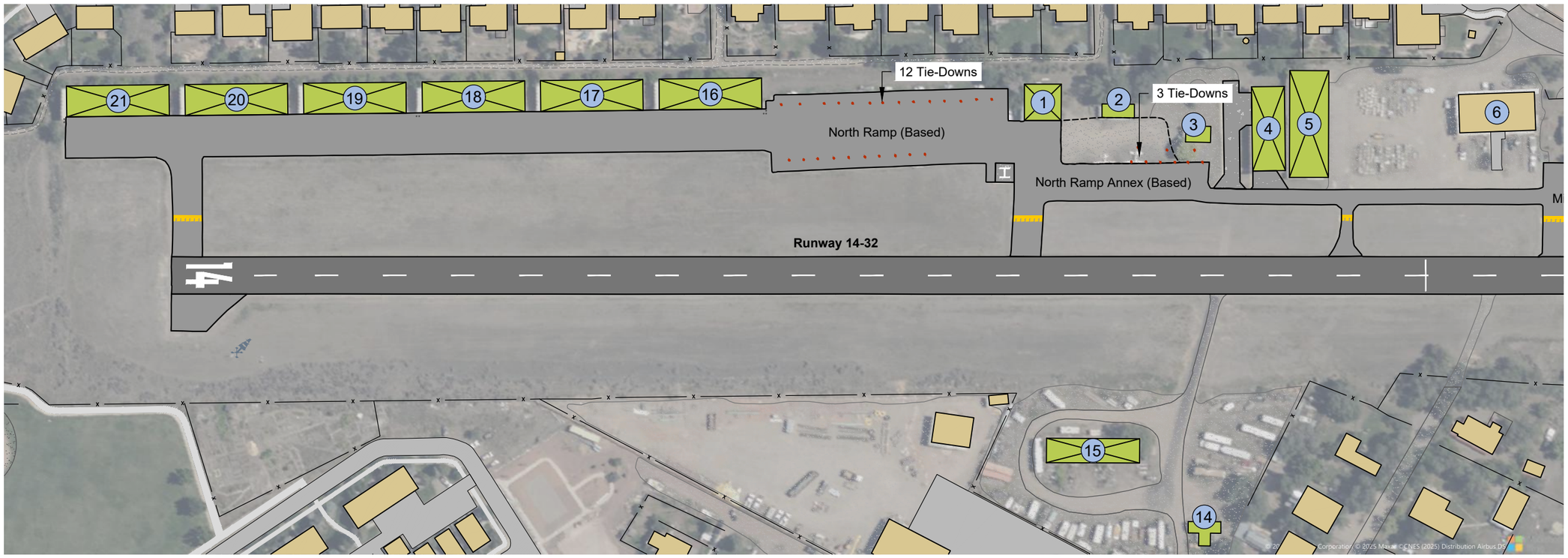
There is no security or wildlife fencing around the airfield. According to the Airport, there have been occasional wildlife sightings near and on active airfield pavements, but no safety concerns have been reported by airport users to date. Similarly. no security concerns have been reported by airport users to date.

2.5.4 Utilities

The following utilities are available at GWS (Facility numbers reference **Figure 2.18**):

- *Power*: The City of Glenwood Springs purchases electricity from renewable energies through the Municipal Energy Agency of Nebraska (MEAN) and provides power City-wide. Power is provided to all on-airport facilities.
- *Water*: The City of Glenwood Springs provides drinking water to the surrounding area. Running water is provided at the Airport only at Facilities No. 7, 10, and 11.
- *Communications*: Communication lines and internet connections are not provided to aircraft storage hangars except for the maintenance hangar. The pilot's lounge building (Facility No. 7) has Comcast Wi-Fi readily available. The City of Glenwood Springs also provides the local community with fiber optic-based internet through its Community Broadband Network (CBN) which is expected to start service to Facilities No. 1 and 16 through 21 in July 2025.
- *Natural Gas*: Black Hills Energy provides natural gas to the surrounding area. Natural gas is provided to Facilities No. 10, 11, and 16 through 21. Facility No. 1 uses propane heat.
- *Sanitary Sewer:* Wastewater is not collected. Facilities No. 7, 10, and 11 each are on a separate septic system.
- *Stormwater Management*: A Stormwater Management Plan was completed by Wright Water Engineers, Inc. in January 2013. Stormwater infrastructure is minimal on the Airport. Outfall is to the south near the Runway 32 end. There are no reported ponding or drainage issues. Due to the nature of the soil, most stormwater infiltrates before running off property.





DIBBLE

Legend:

- Runway
- Taxiways & Aprons
- Roadways
- Buildings
- Existing Property Line
- 1 Building No.

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 2.18A
Terminal Facilities & Buildings

K:\2025\1325662 GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 2.18 - Terminal Facilities & Buildings.dwg

Existing Buildings & Facilities									
No.	**Usage**	**Exclusive / Non-Exclusive**	**Owner**	**Operator / Tenant**	**Approximate Area (sf)**	**Aircraft Housed**		**Year Built**	**Top Elev. (feet MSL)**
1	Box Hangar	Exclusive	Private (Heuer)	Classic Air Medical	2,500	N429CH	Bell 429 GlobalRanger	-	23 Feet
2	Single-T Port-a-Port	Exclusive	Private (Sinclair)	Sinclair	1,000	N7542C	Forney F-1	-	13 Feet
3	CAP Building	Vacant	EAA	KGWS Sumers Airpark	700	-		-	11 Feet
4	Box Hangar (2 Units)	Exclusive	Private (Rudd)	Rudd	5,000	N474GE N8414P N90783 N442SH N7033G N4407B N8569C N2538B N5497G	Piper PA-18-150 Super Cub Piper PA-24-400 Comanche Robinson R22 Robinson R44 Raven II Robinson R66 De Havilland Canada DHC-1B-2-S3 Chipmunk T2 Piper PA-18-135 Super Cub Stinson L-13 Cessna 421C Golden Eagle	-	21 Feet
5	2-Unit Shade Structure	Non-Exclusive	Private TTF (Rudd)	Multiple TTF	7,000	N9127W N4362Q	Piper PA-28-235 Cherokee Cessna 172L Skyhawk	-	18 Feet
6	Warehouse & Storage Yard	-	Private	Industrial Storage	-	-		-	-
7	GA Terminal / Pilot's Lounge	-	Private TTF (Rudd)	KGWS Sumers Airpark	200	-		-	15 Feet
8	Residential	-	Private	Residential	-	-		-	-
9	Storage Yard	-	Private	Industrial Storage	-	-		-	-
10	Conventional Hangar	Exclusive	Private TTF (Reeves)	Reeves	3,000	N36724	Beechcraft 95-B55 Baron	-	25 Feet
11	Conventional Hangar	Exclusive	Aircraft Repair LLC	Aircraft Repair LLC	3,600	-		-	21 Feet
12	10-Unit T-Hangar	Non-Exclusive	Private (Rudd)	Multiple	12,320	N9277W N7145E N2602R N42349 N20HM N7683M N759CY N180C	Piper PA-28-235 Cherokee Cessna 182B Cessna 182K Cessna 182L Beechcraft A36 Bonanza Cessna 175 Cessna 182Q Skylane Cessna 180	-	18 Feet
13a	Single-T Port-a-Port	Exclusive	Private (Brown)	Brown	1,000	N170MW	Cessna 170B	-	13 Feet
13b	Single-T Port-a-Port	Exclusive	Private (Gwost)	Gwost	1,000	N7922T	Cessna 175A	-	13 Feet
13c	Single-T Port-a-Port	Exclusive	Private (Brown)	Brown	1,000	N9161G	Cessna 182N	-	13 Feet
14	Single-T Port-a-Port	Exclusive	Private TTF (Terry)	Terry	1,000	N7914V	Cessna 180H	-	13 Feet
15	1-Unit Shade Structure	Exclusive	Private TTF (Force)	Force	4,200	N242DF	Force Dave Colorado Condor	-	Unknown
16	Box Hangar	Exclusive	Private (Multiple)	Multiple	5,600	N27782 N732MY N496MG N569DV	Stinson SR-10E Reliant Cessna T210M Turbo Centurion Aviat A-1 Husky Cessna T182T Skylane	-	18 Feet
17	Box Hangar	Exclusive	Private (Multiple)	Multiple	5,600	N5755V N7887P N448TW N232AS	Beechcraft A23-24 Musketeer Super III Piper PA-24-250 Comanche Cessna T206H Turbo Stationair Cessna T310R	-	18 Feet
18	Box Hangar	Exclusive	Private (Multiple)	Multiple	5,600	N2545D N58064 N67WW N1964G	Cessna 170B Mooney M20K Cessna 180H Piper PA-28R-201T Turbo Arrow III	-	18 Feet
19	Box Hangar	Exclusive	Private (Multiple)	Multiple	5,600	N46RE N787TR N8786P N9308X N6910R	Van's RV-6 Van's RV-7A Piper PA-24-400 Comanche Cessna 182E Cessna T210H Turbo Centurion	-	18 Feet
20	Box Hangar	Exclusive	Private (Multiple)	Multiple	5,600	N8340T N889TM N8291L N123DD	Cessna 175C Skylark Cirrus SR22 Cessna 172H Skyhawk Cessna T210L Turbo Centurion	-	18 Feet
21	Box Hangar	Exclusive	Private (Multiple)	Multiple	5,600	N3939G N6198B N5546H	Cessna TU206C Turbo Super Skywagon Cessna 182A Cessna T182 Skylane	-	18 Feet

Notes: There are 8 additional aircraft based at the airport that are stored on the apron:

- N2203G Cessna 182A
- N1532X Piper PA-34-200T Seneca II
- N221HR Beechcraft 56TC Baron
- N3783Y Cessna 210D Centurion
- N71518 Cessna 182M
- N94VV Zenair Zenith Stol CH 701
- N6850B Cessna T210M Turbo Centurion
- N6698T Cessna 150A

DIBBLE

Legend:

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 2.18B
Terminal Facilities & Buildings

K:\2025\1320462.GWS.ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 2.18 - Terminal Facilities & Buildings.dwg

2.6 Compatible Land Use

The Airport currently sits on the edge of the incorporated limits of the City of Glenwood Springs. Future land use designations for the City are found in the Glenwood Springs Comprehensive Plan that was adopted in March 2023. The Comprehensive Plan created a Future Land Use Map (FLUM) that uses ten future land uses categories and identifies the current City Boundaries. It also identifies a 2023 Urban Growth Boundary (UGB) that shows the ultimate extents of the incorporated city limits. The Airport itself is categorized as *Industrial*. Future land use around the Airport is mostly *Single-Family Residential*, *Multi-Family Residential*, and *Parks/Open Space* to the north, *Low Density Residential* and *Parks/Open Space* to the southwest with *Mixed-Use* and *Multi-Family Residential* along Airport Road, and *Mixed-Use* and *Conservation* space to the southeast across the river. Current City zoning mostly reflects those future land use designations, although some parcels identified on the FLUM are currently unincorporated and under the zoning jurisdiction of Garfield County. Current County zoning around the Airport is mostly *Commercial* or *Rural*. Residential encroachment around the Airport is significant.

Garfield County adopted the Garfield County Comprehensive Plan 2030 in 2010 (amended 2020). The county plan also created a separate FLUM for the county jurisdiction that also uses ten future land uses categories. Most of the future land uses around the Airport are *Residential Medium*, *Residential Medium High*, *Residential High* to the southwest, and *Commercial* to the east. Current County zoning mostly reflects those future land use designations, although most of the future residential uses to the southwest are currently zoned county *Rural* and are identified to be incorporated into the City in the future.

Existing City of Glenwood Springs land use (per the current zoning) and existing Garfield County land use (per the current zoning) will be shown on **Sheet 12 of 14, *Airport/Community Land Use Compatibility Drawing*** of the updated ALP. Standard Airport Impact Zones will also be shown on the same sheet. No noise contours were developed prior to this study, and this study will not develop new noise contours.

2.7 Environmental Overview

Although GWS is a non-NPIAS airport and is not eligible to receive FAA funding, there may be cases where on-airport development projects impacts environmental resources. The following sections provide a succinct summary of resources that can be found in the vicinity of the Airport for each of the environmental categories.

National, state, and county regulations and databases were reviewed to identify environmental considerations that could affect future airport development at GWS. Information was collected based upon the guidelines set forth in FAA Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*, which includes the environmental impact categories that must be addressed in compliance with NEPA. As this overview is not intended to satisfy the environmental clearance requirements under NEPA, the various resource categories are assessed as appropriate for the scope of this ALP Update. The goal is to provide a succinct overview of environmental resources that may be potentially impacted by future projects should they trigger federal actions.

The resource category *Coastal Resources* is not covered in this report. The Airport is located away from coastal areas.

As a note, the resource categories *Climate* and *Environmental Justice*, and the concept of *Cumulative Impacts* were removed as required areas of analysis with the cancellation of the previous FAA order that outlined NEPA procedures, FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*.

2.7.1 Aviation Emissions & Air Quality

The National Ambient Air Quality Standards (NAAQS) were established by the EPA under the *Clean Air Act* (CAA) to protect public health, the environment, and the quality of life from the detrimental effects of air pollution. NAAQS have been set for the following six common air pollutants:

- Carbon monoxide (CO)
- Lead (Pb)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Particulate Matter (PM)
- Sulfur Dioxide (SO_2)

The EPA designates areas of poor air quality that do not meet the NAAQS as "nonattainment areas," and requires that these areas have a State Implementation Plan (SIP) that outlines mitigation measures and a timeline to attain NAAQS compliance, at which time the area's designation is changed to "maintenance area." The Airport is located in Garfield County, which is currently in attainment for all NAAQS[7].

Albeit not required unless a federal action is necessary, future construction projects at GWS should strive to meet standards for construction related emissions, as exhaust from heavy equipment, delivery trucks, and construction workers traveling to and from the site, dust from earthwork/grading, equipment movement on unpaved areas, storage/transfer of raw materials, and production of asphalt or concrete, are all sources of construction-related emissions, per the FAA *Aviation Emissions and Air Quality Handbook*.

2.7.2 Biological Resources

2.7.2.1 Protected Species

Certain species are federally protected under the *Endangered Species Act of 1973* (ESA). **Table 2.6** identifies the protected species listed in the vicinity of the Airport according to the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) and Environmental Conservation Online System (ECOS) planning tools. The IPaC listed no critical habitats surrounding GWS. Additionally, certain birds are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Any activities that may affect migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures.

[7] EPA, Green Book, "Colorado Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants," https://www3.epa.gov/airquality/greenbook/anayo_co.html (Retrieved June 11, 2025).

Table 2.6 - Protected Species in Garfield County

Common Name	Scientific Name	Federal Status
Birds		
Bald Eagle[1]	*Haliaeetus Leucocephalus*	No Concern
Golden Eagle[1]	*Aquila Chrysaetos*	No Concern
Greater Sage-Grouse[2]	*Centrocercus Urophasianus*	Resolved Taxon
Mexican Spotted Owl[1,2]	*Strix Occidentalis Lucida*	Threatened
Misc. Migratory Birds (12)[1]	-	-
Yellow-Billed Cuckoo[1,2]	*Coccyzus Americanus*	Threatened
Fishes		
Bonytail[1,2]	*Gila Elegans*	Endangered
Colorado Pikeminnow[1,2]	*Ptychocheilus Lucius*	Endangered
Humpback Chub[1,2]	*Gila Cypha*	Threatened
Razorback Sucker[1,2]	*Xyrauchen Texanus*	Endangered
Flowering Plants		
Colorado Hookless Cactus[2]	*Sclerocactus Glaucus*	Threatened
DeBeque Phacelia[2]	*Phacelia Submutica*	Threatened
Parachute Beardtongue[2]	*Penstemon Debilis*	Threatened
Ute Ladies'-Tresses[1,2]	*Spiranthes Diluvialis*	Threatened
Insects		
Monarch Butterfly[1,2]	*Danaus Plexippus*	Proposed Threatened
Silverspot[1,2]	*Speyeria Nokomis Nokomis*	Threatened
Suckley's Cuckoo Bumble Bee[1,2]	*Bombus Suckleyi*	Proposed Endangered
Mammals		
Canada Lynx[1,2]	*Lynx Canadensis*	Threatened
Gray Wolf[1]	*Canis Lupus*	Experimental Pop.
Little Brown Bat[2]	*Myotis Lucifugus*	Under Review
Long-Eared Myotis[2]	*Myotis Evotis*	Species Of Concern

Source: [1]: USFWS, *Information for Planning and Consultation (IPaC)*, retrieved June 11, 2025
[2]: USFWS, *Environmental Conservation Online System (ECOS)*, retrieved June 11, 2025

2.7.2.2 Wildlife Management

Wildlife are potential hazards to aviation. There have been no noted significant wildlife issues at GWS and the FAA Wildlife Strike Database does not have any records for GWS. There is no wildlife fencing around the airfield.

2.7.3 Department of Transportation Act, Section 4(f) & Section 6(f)

Section 4(f) of the *Department of Transportation Act of 1966* recodified at Title 49 U.S.C § 303(c), provides protection to publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic sites. Multiple sites surround the Airport, including:

✈ Conservancy Park	City of GS Parks & Recreation	(0.25 miles)
✈ Sopris Park	City of GS Parks & Recreation	(0.3 miles)
✈ Sullivan Fields	City of GS Parks & Recreation	(0.4 miles)
✈ Bush Creek Mountain Park	City of GS Parks & Recreation	(0.6 miles)
✈ Rosebud Cemetery	City of GS Parks & Recreation	(0.9 miles)
✈ White River National Forest	Rifle Ranger District	(3 miles NE)
✈ White River National Forest	Sopris Ranger District	(6 miles SW)

The distances listed above are as the crow flies from the runway center. No public lands directly abut the Airport, but the U.S. Forest Service owns and operates a storage yard on the northwest side of Airport Center Road.

2.7.4 Farmlands

The *Farmland Protection Policy Act of 1981* (FPPA) was enacted to minimize the unnecessary and irreversible conversion of farmland to non-agricultural uses. Under the FPPA, farmlands can include areas with soils classified by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) as Prime and Statewide Important farmlands and may not be currently used for agriculture. Based on review of soil data from the USDA NRCS, there are no soil classified as Prime farmland on or near the Airport.

2.7.5 Hazardous Materials, Solid Waste, & Pollution Prevention

Solid waste impacts at an airport are generally a result of construction projects. None of the proposed development projects at GWS are anticipated to be a regular or significant source of solid waste generation outside of the construction phase. Some raw materials can be stockpiled on airport property. The South Canyon Landfill is operated by the City of Glenwood Springs and is located 7 miles from the Airport. The Garfield County Landfill is located 32 miles from the Airport.

Hazardous waste sites are regulated by the *Resource Conservation and Recovery Act* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act* of 1980 (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986* (SARA). In general, hazardous materials include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present danger to public health or welfare, or to the environment, when released or otherwise improperly managed.[8]

A preliminary search of the NEPAssist's online database for hazardous materials showed that several hazardous materials and air pollution facilities are located near the Airport but are unrelated. There are no brownfields nearby.

[8] RCRA Subtitle C, 40 CFR Part 251.

2.7.6 Historical, Architectural, Archaeological, & Cultural Resources

At this juncture, the Colorado State Historic Preservation Office (SHPO) does not make surveyed information publicly available. It is assumed that there are no known historic properties located on or adjacent to the Airport property. Future projects that would impact previously undisturbed areas should be coordinated through the SHPO office to ensure no archaeological surveys are required.

2.7.7 Land Use

The Airport currently sits on the edge of the incorporated limits of the City of Glenwood Springs. The City of Glenwood Springs' current zoning regulations were adopted in January 2019. Land around the Airport is zoned mostly as either Planned Unit Development (PUD), Residential Medium Density (RM1), or Hillside Preservation (HP). The Airport itself is zoned Light Industrial (I1). The city adopted a Comprehensive Plan that also plans for future land uses around the Airport, including future annexations of county land into the City.

Garfield County current zoning regulations were adopted in July 2013 and last amended in September 2024. Land around the Airport is zoned as either Rural or Commercial. The County adopted a Comprehensive Plan 2030 that also plans for future land uses around the Airport. Off-Airport land-use is depicted on **Sheet 12 of 14, *Airport / Community Land Use Compatibility Drawing***, of the ALP.

Garfield County adopted updated airport overlay zoning regulations in September 2023, titled *Airport/Heliport Influence Area Overlay*. Those overlay regulations include height restrictions by zones which are modeled onto those imaginary surfaces defined in 14 CFR Part 77, Subpart C, 77.19. Those restrictions apply to the Rifle Garfield County Airport (RIL) and do not apply to KGWS Sumers Airpark. The City of Glenwood Springs does not have overlay zoning regulations that apply to KGWS Sumers Airpark.

Runway Protection Zones (RPZ) are protection zones near the end of every runway that serve to enhance the protection of people and property on the ground. Airport owner control and implementation of compatible land use principles for each RPZ is the optimum method of ensuring the public's safety in these areas. While the Airport is not federally obligated, attention should be given to land use and ownership within RPZs during the development process of this study. The primary goals are to clear the RPZ areas of incompatible objects and activities and ensure this area remains clear of such objects and activities. Runway Protection Zones are depicted on **Figure 2.5** and on **Sheets 02 of 14, *Airport Layout Drawing***, of the ALP.

2.7.8 Natural Resources & Energy Supply

A project creates an impact on natural resources and energy supply when its construction, operation, or maintenance would cause demands that would exceed available or future natural resource or energy supply. Proposed future improvements and development at GWS may consist of additional aprons and hangars, parallel and connector taxiways, and entrance road enhancements. None of these proposed developments are anticipated to require natural resources in short supply. Some utilities may need to be extended should the county elect to connect new hangars and structures.

2.7.9 Noise & Noise-Compatible Land Use

There are no noise analysis requirements for low-activity general aviation airports. Analyses have shown that airports with less than 90,000 annual propeller operations or 700 annual jet operations do not produce noise exposure contours at significant levels. In the absence of aircraft noise exposure contours, airports can define Airport Impact Zones (AIZ) and identify appropriate land use zoning for each impact zone. Those regulations can be incorporated in a city or a county's land use and zoning ordinance as overlay zoning, for example.

As stated above, the City of Glenwood Springs and Garfield County do not yet have such airport overlay zoning that applies to KGWS Sumers Airpark. Suggested AIZs will be depicted on **Sheet 12 of 14, *Airport / Community Land Use Compatibility Drawing***, of the ALP. No land use or zoning restrictions will be associated with any of the zones at this stage.

2.7.10 Socioeconomics, Children's Health & Safety Risks

The closest school, Sopris Elementary School, is located adjacent to the Airport property to the northwest. The playground/ball field is directly adjacent to the Airport property line, while the school building itself is located approximately 1,000 feet from the Runway 14 threshold. The second closest school is Riverview K8 School, located approximately 1.75 miles to the south.

2.7.11 Visual Effects

Light emissions should be taken into consideration during improvement projects because of the bothersome effects they could have on surrounding residents and wildlife. Projects proposed with this ALP Update may include hangars and associated taxilanes/aprons, none of which cause significant light pollution. Hangars generally have exterior lighting like flood lights and parking lot lighting, none of which would pose a significant impact on surrounding light-sensitive land uses, such as homes, especially if they adopt dark-sky rated lighting. The installation of runway and taxiway edge lights, or lighted windsocks, if proposed, would result in additional light emissions in the vicinity of GWS and should be evaluated as part of the NEPA documentation for that project should NEPA be triggered. No significant visual effects are anticipated.

2.7.12 Water Resources

2.7.12.1 Surface Waters, Groundwater, & Water Quality

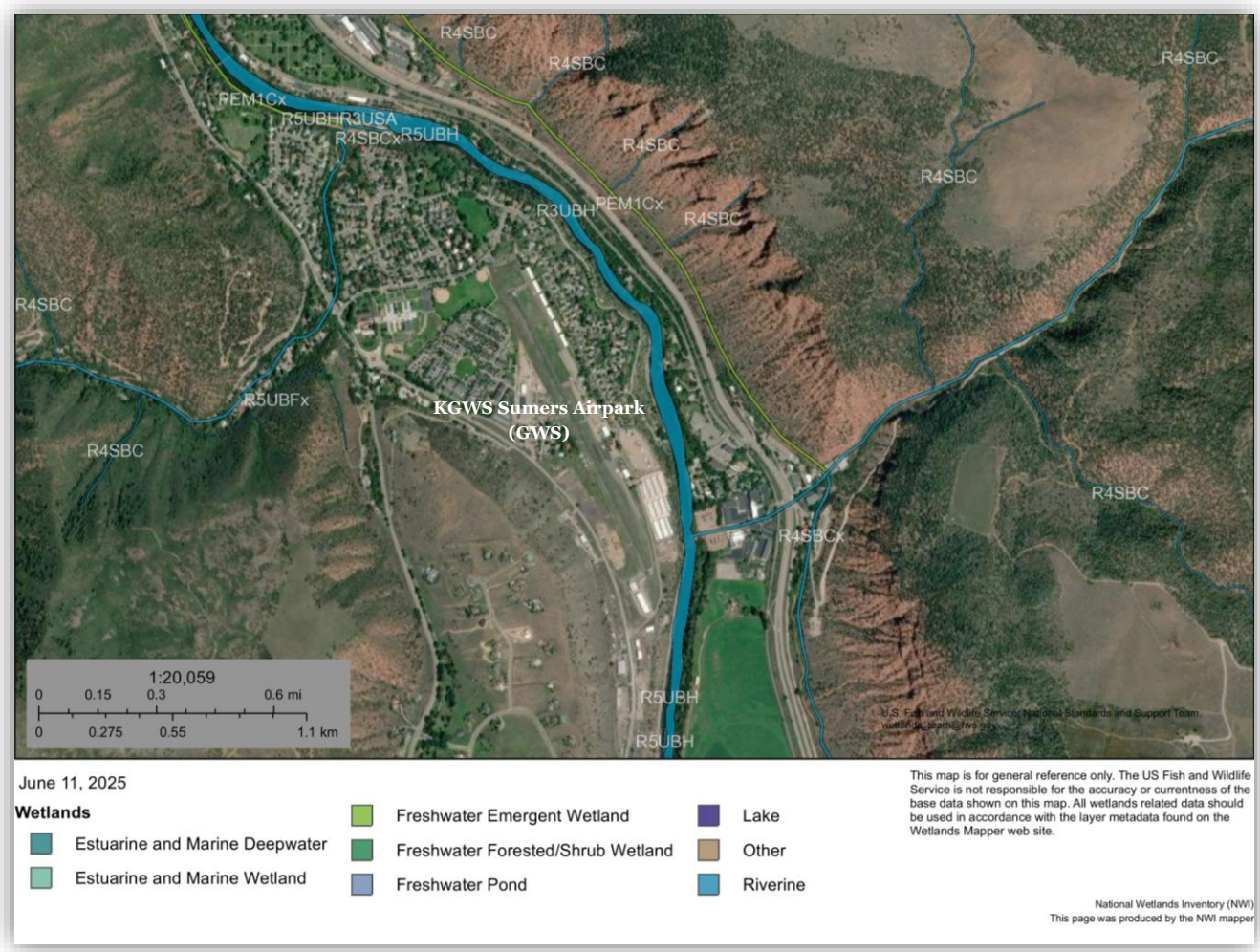
The Airport is located within the Colorado Headwaters Basin, with Three Mile Creek approximately 0.5-mile northwest of the Airport, Four Mile Creek approximately 1.2 miles south, the Roaring Fork River 0.2-mile east, and the Colorado River approximately 3 miles north. The Colorado Department of Public Health & Environment (DPHE), Water Quality Control Division is responsible for administering the *Clean Water Act* Section 303(d) guidelines in Colorado. Based on the most recent Section 303(d) Integrated Report published in 2024, both the Roaring Fork River and the Colorado River are on the 303(d) List of Impaired Waters in the vicinity of the Airport. Both Three Mile Creek and Four Mile Creek are on the Monitoring and Evaluation (M&E) List.

2.7.12.2 Wetlands & Jurisdictional Waters

Potential wetlands in the vicinity of GWS were mapped using the US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) mapping tool and are presented on **Figure 2.19**. No delineations are available. Delineated wetlands fall under the jurisdiction of the US Army Corps of Engineers (USACE). The NWI is a mapping resource, and cataloged wetlands and streams are an approximation only. Approval of wetland delineations and any necessary *Clean Water Act* (CWA) Section 404 permits would fall under the jurisdiction of the USACE Albuquerque District.

According to the NWI mapper, there are no wetlands in the vicinity of the Airport except for riverine habitats.

Figure 2.19 - NWI Wetlands & Streams

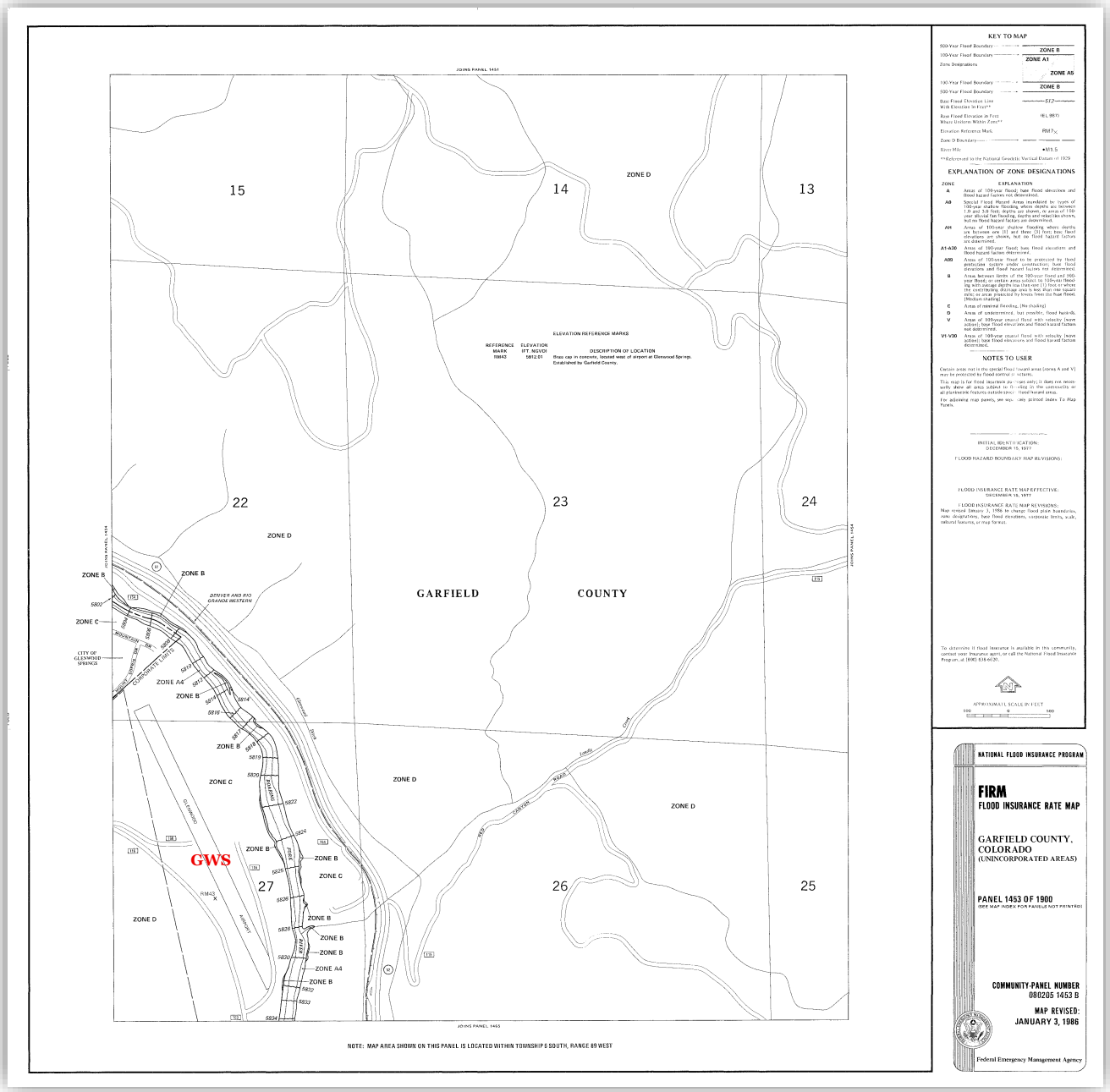


Source: USFWS, National Wetlands Inventory (NWI) Mapper, Retrieved June 2025

2.7.12.3 Floodplains

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) were reviewed for the area. **Figure 2.20** presents the FIRM product relevant to the Airport. The Airport is located in Zone C, which is the area of minimal flooding (now Unshaded Zone X in current FEMA designation nomenclature). There are no 100-year floodplains on or directly adjacent to the Airport property. The closest floodplain is Zone A Base Flood (100-year floodplain) associated with the Roaring Fork and located approximately 300 to 900 feet east of the runway centerline.

Figure 2.20 - Flood Insurance Rate Maps (FIRMs)



Source: FEMA, FIRM Panel, Retrieved June 2025

2.7.12.4 Wild & Scenic Rivers

The *Wild and Scenic Rivers Act* was implemented to facilitate the protection of rivers possessing "outstandingly remarkable scenic, recreational, geological, fish and wildlife, historic, cultural, or any other similar values." The US Department of the Interior maintains a national inventory of river segments that qualify for inclusion in the National Wild and Scenic River System. No national wild and scenic streams or rivers are located in the vicinity of GWS.

Section 3 - Aviation Activity Forecasts

This section presents the forecasts of aviation demand at KGWS Sumers Airpark. Assessing the future aviation activity is critical to the overall planning process at an airport. The development of aviation activity forecasts allows planners to assess the Airport's ability to accommodate future demand. For this planning study, forecasts of aviation demand were prepared in five- and ten-year increments over a 20-year planning period, with the planning period starting in 2025 (base year, last year of available data year-round) and projecting through 2045.

Typically, forecasting of aviation activity as small, non-federal, single-runway general aviation airports can be limited to the identification of the existing and future critical design aircraft - which in turn drives the size of airport facilities. While a forecast of based aircraft and annual aircraft operations are usually indicative metrics for general aviation airports, the FAA does not require them at non-towered, low activity airports with less than 90,000 annual operations. Consequently, only a basic forecast of based aircraft and annual aircraft operations will be developed for this ALP Update.

The methodologies used to project aviation demand, as well as their findings, are included within this chapter. Any aviation demand forecast is not absolute. There are typically short-term fluctuations in airport activity due to unanticipated events. The purpose of these forecasts is to provide a useful blueprint that guides future and long-range development needs.

The following outlines the process and assumptions used to derive the forecasts:

- Data and Assumptions
- Aviation Activity Profile
- Aviation Activity Forecasts
    - Based Aircraft & Based Aircraft Fleet Mix
    - Aircraft Operations & Operational Fleet Mix
    - Critical Design Aircraft

3.1 Data Sources, Forecast Assumptions, & Methodologies

This chapter contains annual aviation activity forecasts for the base year (2025, actual data), the short-term (2030), the mid-term (2035), and the long-term (2045). The assumptions in the following forecasts are based on input from airport management, tenants, previous studies, relevant literature, and professional experience. Forecasting, however, is by nature not an exact science. Variations from local and national economic forecasts could have a significant effect on the forecasts presented herein. These uncertainties increase toward the end of the 20-year forecast period when new technologies, business strategies, changes in work and recreational practices may have unforeseeable impacts on aviation activity.

For these reasons, the forecasts should be periodically compared to actual activity levels and airport plans and policies should be adjusted accordingly. In order to reflect such uncertainty in forecasting, Planning Activity Levels (PALs) will be established when assessing capacity shortfalls and during the implementation phase of the study to correspond to the 5-, 10-, and 20-year forecast levels as defined above. Planning Activity Levels provide airports with an operational milestone, or trigger point, rather than a year to be considered when evaluating the need for improvements. In this section, forecast levels will be referred to in terms of years; however, from Section 4 onward they will be referred to by their respective PALs.

3.1.1 Data Sources

Sources of aviation activity at non-towered GA airports have historically been somewhat limited. Airport staff usually tracks aircraft manually to estimate daily traffic on a day that may be representative of an average day, which then gets upscaled to an annual number that gets reported to the FAA during a 5010 inspection. Those numbers along with based aircraft counts are then fed into the FAA's Terminal Area Forecast (TAF). Because the TAF does not develop an active forecast for future operations, enplanements, or based aircraft at non-towered airports, those metrics typically remain constant.

In the recent years there have been efforts to render more accurate counts, first with the introduction of the National Based Aircraft Inventory program (NBAIP) periodically updated online by airport managers, and more recently with the introduction of new real-time tracking software that allow airports to collect a more accurate picture of local aviation activity. While aircraft not equipped with Automatic Dependent Surveillance - Broadcast (ADS-B) Out capabilities or transponder systems are still not captured by real-time tracking equipment, those are becoming far fewer thanks to the FAA's rule on ADS-B within airspace designated by 14 CFR Part 91.225 that took effect on January 1, 2020. There are many an example of Airports that have seen their aircraft operations counts drastically shift from previously reported numbers after the installation of a virtual tower software.

The following sources of data were used in the forecast:

- **FAA Airport Master Record**: The FAA Form 5010, *Airport Master Record* is a survey form that includes information on airport facilities and annual aviation activity at airports and that feeds into the FAA's centralized ADIP database. General aviation airports in the NPIAS get inspected annually to triennially by the FAA and/or CDOA; the last inspection date was June 12, 2025. Since 2007, based aircraft counts on Form 5010 (and thus in the TAF) come from NBAIP data. As of September 2024, information on aircraft operations is no longer available through the 5010, but data was retrieved from older reports, as available, to corroborate current estimates.
- **FAA Aerospace Forecast**: The Aerospace Forecast is developed to support budget and planning needs of the FAA and contains information on global aviation trends. In particular, *Active General Aviation and Air Taxi Aircraft* (Table 28) and *Active General Aviation and Air Taxi Hours Flown* (Table 29) data was retrieved from the Aerospace Forecast, FY 2025-2045 published in April 2025.
- **CDOA Colorado Aviation System Plan**: As mentioned in **Section 2.1.4.2, *Colorado Aviation System Plan*** the CASP was developed by CDOA to inventory the existing condition of the state's current aviation system and plan for its future needs. Based aircraft and operations data was obtained from the 2020 CASP.
- **RunwayStats**: In October 2024, the Airport procured a software program, RunwayStats, that enables real-time tracking of aircraft operational data using ADS-B and transponder data. RunwayStats is a powerful software that offers a much more accurate representation of actual aviation activity levels at an airport compared to other traditional data sources at non-towered airports. Additionally, RunwayStats also offers airports the ability to track based aircraft, and can provide detailed reports on a range of metrics. A full year of data was retrieved for GWS, calendar year 2025.
- **KGWS Sumers Airpark**: Airport management provided based aircraft and hangar data for this ALP Update. A detailed list of hangar owners, renters, and aircraft stored with registration numbers was provided.

3.1.2 Forecasting Assumptions

The general assumptions listed below are common industry standards that allow for the use of linear forecasting methodologies such as trend or regression analyses in aviation activity forecasting. Those assumptions refer to major unforeseeable events resulting in a dramatic decrease in aviation activity at the Airport, either temporary or permanent, such as a major economic recession, a major oil shock or crisis, or a major environmental catastrophe impacting the Airport. Local economic conditions are discussed in later subsections. The selected forecast assumptions are presented below:

- **Unconstrained Demand Forecasts**: For the purpose of this study, activity forecasts were developed unconstrained.
- **Economic Assumptions**: This study assumes no major economic downturn over the planning period. Local, national, and international economies usually follow short-term cycles where economies fluctuate. However, it is assumed such short- and medium-term highs and lows will offset each other over the course of the 20-year planning period.
- **Environmental Factors**: For the purpose of this study, it is assumed that the Airport will not be impacted by any major and drastic changes in the natural environment such any major weather events, pandemics, or any other "Acts of God."
- **Regulatory Assumptions**: No new regulatory restrictions affecting the types of aircraft operating at GWS are assumed. There will be no nighttime restrictions on aircraft operations.
- **Management Assumptions**: For the purpose of this study, it is assumed that the Airport will remain open and operated by KGWS Sumers Airpark.
- **General Aviation Taxes and Fees**: Future fuel taxes and other fees related to general aviation at GWS will remain unchanged except for adjustments to inflation.
- **Fuel Cost Assumptions**: The cost of fuel is assumed to grow gradually and consistently with inflation. No major fluctuations or increases in fuel prices or taxes that would drastically decrease aviation activity over a longer period of time are assumed.

3.1.3 Forecasting Methodologies

The following methodologies were used to develop forecasts for based aircraft and aircraft operations at GWS. While the methodologies presented here below are widely recognized as appropriate forecasting techniques, it must be emphasized that a forecast prepared using mathematical relationships must ultimately withstand the test of rational judgment.

- **Growth Rate Analysis**: A growth rate methodology is a simple bottom-up approach to forecasting. It applies a fixed growth rate to a value, or a set of values that can be later aggregated and extends a time series into the future. The fixed growth rate can be derived from local historical data or other forecast data that is linked to the time series to be forecast. Growth rate analyses are the simplest form of forecasting. They are fast and efficient, but may lack context, and are usually oversimplified.

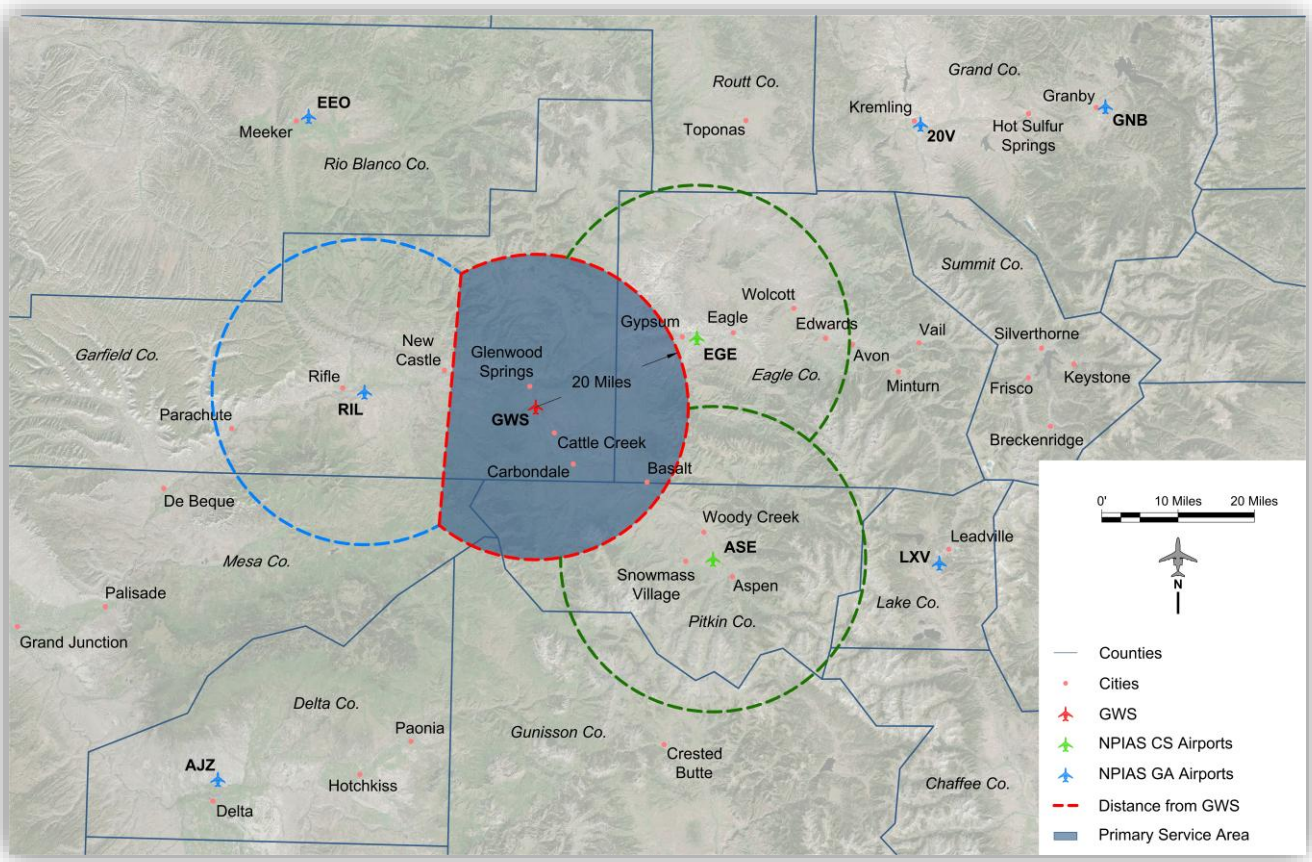
3.2 Aviation Activity Profile

3.2.1 Airport Service Area

The service area of an airport represents the surrounding geographic area that contains most users or potential users of the airport based on driving times. The service area can also be defined by that area where most socioeconomical factors have a greater likelihood to be correlated to aviation activity. Given the location of surrounding airports and driving times to nearby cities, GWS's service area is estimated to include most of the Roaring Fork Valley and a stretch of I-70, including Glenwood Springs, Carbondale, Cattle Creek, Basalt, New Castle, and potentially Gypsum.

Figure 3.1 illustrates the airport service area for GWS that is represented by a typical 20-mile radius circle representing a catchment area defined by a 30-minute drive. The catchment area for nearby commercial service airports depicts the catchment area of general aviation users only.

Figure 3.1 - Airport Service Area



Source: Dibble, June 2025 analysis

3.2.2 Typical Airport Activity

Aviation activity at GWS is skewed towards the summer. The summer months are very prone to local leisure flying as well as personal point-to-point travel. **Table 3.1** presents the types of aeronautical activities that are typical throughout the year.

Table 3.1 - Typical Aircraft Activity

Activity Type	Frequency
Personal/Recreational	Daily
Business/Corporate	Daily
Air Freight/Cargo	Occasionally
Air Taxi/Charter	Occasionally
Police/Law Enforcement	Occasionally
Flight Training	Weekly
Military Training	Occasionally
Search & Rescue (SaR)	Occasionally
Air Ambulance/Medical/Medevac	Daily
Firefighting	Occasionally
Aerial Photography & Surveying	Occasionally
Skydiving	Occasionally

Source: Dibble, May 2025

3.3 Aviation Activity Forecasts

3.3.1 Aircraft Operations

Comprehensive data sources are not available for GWS; therefore, data was consolidated where possible. **Table 3.2** presents historical aircraft operations by user type and local/itinerant split as recorded by the FAA Airport Master Record (AMR), the Colorado CASP, and RunwayStats (RS), for available years.

Table 3.2 - Historical Aircraft Operations

Year	Aircraft Operations					Total	Data Source[1]
	Air Taxi	General Aviation		Military			
	Itinerant	Itinerant	Local	Itinerant	Local		
1994	1,000	8,500	13,600	60	0	23,160	AMR
1997	1,040	9,051	16,809	100	0	27,000	AMR
2018	20	4,400	17,600	0	0	22,020	CASP
2025	1,183	3,748		4		4,935	RS

Source: As Indicated. Retrieved February 2026. Totals may not add up due to rounding.
Notes: [1]: AMR: FAA Airport Master Record CASP: Colorado Aviation System Plan RS: RunwayStats

Because RunwayStats does not evaluate whether an operation is local or itinerant (i.e., whether an aircraft remains in the local traffic pattern or local practice areas, or departs to/arrives from another airport), operations from RunwayStats cannot be classified using the traditional FAA categorization. Instead, RunwayStats identifies whether an aircraft is based or transient (among other metrics). RunwayStats data in **Table 3.2** only reflect total numbers for each user class (i.e., Air Taxi, General Aviation, and Military).

Because on this limitation, and because RunwayStats is the only real-time data available, it is more practical and of better use to the Airport to forecast the number of operations by aircraft type. The base year number of operations was forecast for each aircraft type using a moderate Compound Annual Growth Rate (CAGR) of 2.0 percent. For comparison, the 2020 CASP forecast the number of annual operations to grow by 0.3 percent CAGR between 2018 and 2038 at GWS.

Table 3.3 presents the results of the aircraft operations forecast. Because air taxi operations typically use aircraft similar in size and performance to the remaining general aviation fleet, they are included in the numbers presented in **Table 3.3**. It is anticipated that air taxi operations will grow to approximately 3,000 annual operations by 2045. Military operations are also included below. Most military operations are performed by rotorcraft and are expected to continue fluctuating depending on the needs of the military. Military operations are typically not included for project justification when receiving grants from CDOA. Of note, most military operations are classified as *Transitions* by RunwayStats and thus not included in operations totals even if Airport management reports those rotorcraft are using fueling facilities at GWS.

Table 3.3 - Aircraft Operations Forecast

Year	Aircraft Operations						
	SE Piston[1]	ME Piston[1]	SE Turbo	ME Turbo	Jet	Rotor	Total
2025	3,205	87	346	2	2	1,293	4,935
2030	3,539	96	382	2	2	1,428	5,449
2035	3,907	106	422	2	2	1,576	6,016
2045	4,762	129	514	3	3	1,921	7,333
2025-2045 Compound Annual Growth Rates (CAGRs)							
	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

Source: Dibble, February 2026 analysis. Totals may not add up due to rounding.
Notes: [1]: Includes Gliders, Light Sport Aircraft, Ultralights, and Unknown aircraft.
Abbrvs: SE: Single-Engine ME: Multi-Engine Turbo: Turboprop-powered Jet: Turbojet, Turbofan
Rotor: Rotorcraft (Turboshaft, Helicopters, Gyroplanes)

According to RunwayStats, operations by based aircraft account for 28 percent of the total number of operations, on average, and operations by transient aircraft account for 72 percent of operations.

3.3.2 Based Aircraft

Table 3.4 presents historical based aircraft as recorded by the FAA Airport Master Record (AMR), the Colorado CASP, and Airport Management. **Table F.1** in **Appendix F, *Current Based Aircraft*** contains a detailed list of aircraft based at the Airport as of May 2025. That count is used as the count of based aircraft for the base year. As detailed in **Table F.1**, all single-engine and multi-engine aircraft currently based at the Airport are piston-powered aircraft.

Table 3.4 - Historical Based Aircraft

Year	Based Aircraft						Data Source
	SE[1]	ME	Jet	Rotor	Glider	Total	
1994	58	4	0	2	0	64	AMR
1997	57	6	0	2	0	65	AMR
2018	59	3	0	7	0	69	CASP
2022	64	3	0	5	1	73	AMR
2025[2]	50	5	0	4	0	59	Airport

Source: As Indicated. Retrieved May & June 2025. Totals may not add up due to rounding.
Notes: [1]: Includes Light Sport Aircraft (LSA) and Ultralights
[2]: These aircraft are currently based at the Airport as of May 2025. See Appendix F for detailed list.
Abbrvs: SE: Single-Engine ME: Multi-Engine UL: Ultralight Rotor: Rotorcraft (Helicopters)

Similar to the number of aircraft operations, the number of based aircraft was forecast for each aircraft type using a moderate CAGR of 2.0 percent. For comparison, the 2020 CASP forecast the number of based aircraft to grow by 0.5 percent CAGR between 2018 and 2038 at GWS.

In addition to the anticipated growth of aircraft types that are already present at the Airport, the forecast expects at least two new single-engine turboprop aircraft to be based at the Airport by the end of the planning period, consistent with the anticipated growth of the turboprop fleet that is reflected in the FAA Aerospace Forecast. Multi-engine turboprop aircraft are not expected to be based at the Airport in the future, mostly due to the constraints of the existing airfield (runway length available), pressure altitude, and surrounding terrain. **Table 3.5** presents the results of the based aircraft forecast.

Table 3.5 - Based Aircraft Forecast

Year	Based Aircraft						
	SE Piston[1]	ME Piston	SE Turbo	ME Turbo	Jet	Rotor	Total
2025	50	5	0	0	0	4	59
2030	55	6	0	0	0	4	65
2035	61	6	1	0	0	5	73
2045	74	7	2	0	0	6	90
2025-2045 Compound Annual Growth Rates (CAGRs)							
	2.0%	2.0%	-	-	-	2.0%	2.1%

Source: Dibble, February 2026 analysis. Totals may not add up due to rounding.
Notes: [1]: Includes Gliders, Light Sport Aircraft, and Ultralights
Abbrvs: SE: Single-Engine ME: Multi-Engine Turbo: Turboprop-powered Jet: Turbojet, Turbo-fan
Rotor: Rotorcraft (Turboshaft, Helicopters)

3.3.3 Critical Design Aircraft

Per FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, the critical aircraft is "the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of an airport, defined as 500 annual operations or more." As also defined in AC 150/5000-17, "similar characteristics" refers to the practice of grouping aircraft by comparable operational performance and/or physical dimensions. In other words, the "similar characteristics" concept allows planners to:

- Group aircraft with similar characteristics together. For example, aircraft having the same AAC or ADG can be grouped, and their operations totaled to achieve the 500 annual operations threshold when making the critical aircraft determination. Refer to AC 150/5000-17, Appendix B, Example 4.
- Include aircraft with more restrictive characteristics among the grouping of aircraft with less restrictive characteristics in the event the lower grouping does not reach the 500 total annual operations threshold. However, this rule has a limitation: aircraft having a higher (more restrictive) AAC or ADG can only be included in the counts of a grouping of aircraft having a lower AAC or ADG only if the other component of the AAC - ADG pair is the critical grouping. For example, if there are more than 500 annual operations of ADG III aircraft, and only 450 annual operations of AAC B aircraft, any operations by C-III or D-III aircraft can be counted towards the AAC B total to reach 500 annual operations. On the other hand, any operations by C-IV, D-IV or D-V aircraft cannot be counted towards the AAC B total. Similarly, if there are more than 500 annual operations of AAC B aircraft, and only 400 annual operations of ADG II aircraft, any operations by B-III or B-IV aircraft can be counted towards the ADG II total to reach 500 annual operations. On the other hand, any operations by C-III, C-IV, D-III, D-IV, or D-V aircraft cannot be counted towards the ADG II total. Refer to AC 150/5000-17, Appendix B, Example 5, and Example 8. Planners should be careful when applying this second rule if volumes of more restrictive aircraft are low and fluctuate substantially from year to year.

The guidance contained in FAA AC 150/5000-17 recommends that the existing critical aircraft be identified using the FAA's Traffic Flow Management System Counts (TFMSC) database, although some alternate sources and records of aeronautical activity can be used such as landing fee reports, flight racking systems (such as RunwayStats), fuel sales logs, letters from operators, etc... The TFMSC is usually a great source of data to determine the existing critical aircraft. The database captures operations when pilots files a flight plan and/or when flights are detected by the NAS, usually via radar. Due to factors such as incomplete flight plans, limited radar coverage, and VFR operations, the TFMSC provides an accurate reflection of IFR activity only. It does not fare well at non-towered GA airports without published IAPs where most of the traffic is local VFR traffic.

Because GWS is a daytime VFR, mountain airport, the TFMSC captured less than 60 annual operations for any year between 2011 and 2024. Consequently, the TFMSC cannot be used to make a determination on the existing critical aircraft, and RunwayStats was used instead. RunwayStats uses ADS-B to provide accurate real-time counts of aircraft type by AAC and ADG, allowing that determination. RunwayStats data by AAC and ADG was also projected linearly using the forecast of annual aircraft operations to determine the future critical aircraft. **Table 3.6** presents a summary of operations per AAC and ADG, as well as the estimated projections of traffic.

Table 3.6 - Forecast of Aircraft Operations by AAC & ADG

AAC - ADG Grouping	2025	2030	2035	2045
A-I[1]	3,570	3,942	4,352	5,305
A-II	0	0	0	0
B-I	70	77	85	104
B-II	0	0	0	0
C-II	2	2	2	3
Rotorcraft	1,293	1,428	1,576	1,921
Total	**4,935**	**5,449**	**6,016**	**7,333**

Source: RunwayStats. Dibble, February 2026 analysis. Totals may not add up due to rounding.
Notes: [1]: Includes *Unknown* aircraft.

As shown in **Table 3.6** operations by aircraft in the AAC B grouping are not expected to reach the 500 operations threshold by the end of the planning period. Similarly, operations by aircraft in the ADG II grouping are also not anticipated to reach the 500 operations threshold.

Results presented in **Table 3.6** suggest that the existing and future critical aircraft at GWS is a grouping of A-I aircraft. As presented in **Table 2.8**, the 1999 ALP and the 2020 CASP attribute different ARCs to GWS, the former listing GWS as a B-I(S) airfield, and the later listing GWS as a B-II airfield (the "(S)" denotes "Small Aircraft" with a maximum gross weight of 12,500 pounds or less). While the 2020 CASP provides a more recent analysis, it is worth noting that:

- AAC A and AAC B aircraft follow the same FAA design standards for airfield facilities,
- Most general aviation aircraft in the A-I grouping have a TDG of 1A, or are tailwheel aircraft with a TDG of 1B,
- The runway is intended to be used by propeller driven aircraft of 12,500 pounds or lower that currently account for over 99.9 percent of annual operations,
- RunwayStats data does not support a critical aircraft of A/B-II, and
- Airfield facilities at GWS are already constrained and in cases do not even meet FAA design standards associated with a Runway Design Code (RDC) of A/B-I(S).

Furthermore, the planning team is anticipating having to adopt less restrictive design guidelines (i.e., smaller clearances) when planning improvements to existing facilities or designing future facilities during the facilities development phase of the ALP Update. Therefore, it is the recommendation of this ALP Update that the **existing and future critical aircraft** be a **grouping of A-I(S) Small Aircraft** with a **TDG of 1A**. Representative aircraft in this grouping include small single-engine piston aircraft such as the Cessna 172 Skyhawk or the Piper PA-28 Cherokee. The Airport is expected to continue having a significant number of helicopter/rotorcraft operations that do not fit in the traditional aircraft classification categories.

Table 3.7 summarizes the current and future runway classification, as well as the existing and future critical aircraft.

Table 3.7 - Forecast of Critical Design Aircraft

	Runway 14-32 Existing	Runway 14-32 Future
Runway Design Code (RDC)	A/B-I(S)-VIS	A/B-I(S)-VIS
Critical Design Aircraft Grouping	A-I(S)-1A	A-I(S)-1A
Critical Design Aircraft (Typ.)	Cessna 172 Skyhawk	Cessna 172 Skyhawk

Source: Dibble, June 2025 analysis.

The existing/future RDCs as estimated herein matches the existing and future critical design aircraft and RDCs listed on the Glenwood Springs Municipal Airport Layout Plan dated August 1999.

Aviation activity forecasts for NPIAS airports are usually reviewed and approved by the FAA's local Airport District Office (ADO). Since GWS is a non-NPIAS airport, forecasts were submitted to CDOA for review on July 9, 2025 and were found reasonable. In February 2026, forecasts were updated to reflect a full year of available RunwayStats data for 2025. Annual aircraft operations were updated; no other changes were made.

Section 4 - Facility Requirements

The goal of this section is to compare existing capacity to forecast demand to identify any capacity constraints and improvements that may be necessary during the 20-year planning period, effectively conducting a gap analysis. Several FAA advisory circulars were utilized to guide analyses including AC 150/5060-5, *Airport Capacity and Delay*, AC 150/5300-13B, *Airport Design*, and AC 150/5325-4B, *Runway Length Requirements for Airport Design*. The Airport Cooperative Research Program (ACRP) Report 113, *Guidebook on General Aviation Facility Planning* was also used, as well as the *Small Aircraft Runway Length Analysis Tool* (SARLAT). Other guidance is referenced where appropriate. Subsequent subsections provide technical assessments of the following:

- Airport Role - within national (NPIAS) and statewide (SASP) airport system plans.
- Airport Design Standards - critical aircraft characteristics and applicable design standards.
- Airfield Facility Requirements – capacity and design of the runway system, taxiways, and aprons, visual aids and NAVAIDs.
- Terminal Area and Landside Facility Requirements - design and capacity of the general aviation terminal building, apron space, aircraft storage space, and automobile parking.
- Support Facility Requirements - design and capacity of fueling, aircraft rescue and firefighting, aircraft maintenance and airport maintenance facilities, as well as other items such as fencing and utilities.
- Land Acquisition - required land acquisition, if any.

Excess capacity and/or shortfalls will be identified for each component of the Airport. Findings will guide airport development proposed in **Section 5, *Alternatives Development & Evaluation*** and **Section 6, *Implementation Plan***.

Many of the significant improvements needed at an airport are driven by the demand level, not by a time frame or a specific year. In AC 150/5070-6B, *Airport Master Plans*, the FAA recommends that planners develop Planning Activity Levels (PALs) based on the forecast. Instead of referring to years as development targets, PALs are selected activity levels that represent a trigger for additional capacity. The use of PALs focuses the airport sponsor and the public on the need to plan for aviation activity levels rather than a specific timeline. For this study, the PALs and their respective anticipated planning horizons (years) are as follows:

- **Base Year**: 2025
- **PAL 1**: 2030 (Short-Term)
- **PAL 2**: 2035 (Mid-Term)
- **PAL 3**: 2045 (Long-Term)

PAL 1, PAL 2, and PAL 3 are defined as the aviation activity levels that are anticipated to occur at the forecast horizon years. Throughout the following sections, facility requirements will be defined by the level of aviation activity of a specific PAL.

Table 4.1 summarizes the PALs and expected activity levels according to the aviation activity forecasts. The use of PALs will enable the airport and other stakeholders to track aviation activity and implement proposed improvements when activity levels actually warrant those improvements, effectively creating a flexible implementation plan. For example, according to the forecast, aviation activity defined by PAL 2 is expected to occur in 2035, but sluggish growth could delay PAL 2 activity levels to 2036 or 2037. On the other hand, greater growth than expected could see PAL 2 activity levels occur in 2034 or 2033.

Table 4.1 - Planning Activity Levels (PALs)

	Base Year	PAL 1	PAL 2	PAL 3
Anticipated Planning Horizon	2025	2030	2035	2045
Activity Indicators				
Based Aircraft	*59*	*65*	*73*	*90*
Based Aircraft - Turboprops	*0*	*0*	*1*	*2*
Annual Aircraft Operations	*4,935*	*5,449*	*6,016*	*7,333*
Critical Aircraft for RDC (AAC - ADG - TDG)	*A-I(S)-1A*	*Same*	*Same*	*Same*

Source: Dibble, July 2025 analysis.

Additionally, in an effort to provide a comprehensive development picture, attention will be given to the needs of the Airport beyond the 20-year planning horizon. At times, a specific facility, or a component thereof, may not be justified by the forecast but its significance or its likelihood may make it an important component to consider when planning the layout of other facilities over the next twenty years. For example, when considering hangar expansion plans, only some hangars may be justified by the forecast but showing a full built-out development option may be more representative to the sponsor and provide a broader, ultimate framework to work within. In terms of nomenclature for this AMP:

- Improvements that are justified by the forecast and expected to occur within the 20-year planning period (or within the demand levels of the PALs) are designated as *Future* throughout this report.
- Improvements that are expected to occur beyond that timeframe are designated as *Ultimate* throughout this report.

4.1 Airport Role

A preliminary analysis based on elements collected during this study for the inventory of existing conditions shows that GWS does not meet the initial screening criteria for inclusion of an existing public use general aviation airport in the NPIAS. Additionally, the 2020 CASP did not identify GWS as an airport eligible for consideration for inclusion into future NPIAS reports, and CDOA did not recommend that it be considered for inclusion. This ALP Update anticipates no change in the Airport's role during the planning period. Additionally, no change from the 2020 CASP classification of *GA-Local* airport is expected to occur during the planning period.

4.2 Airport Design Standards

This section provides an overview of applicable FAA design standards for airfield infrastructure based on the existing and future critical design aircraft. Please refer to **Section 2.2.1, *Airport Design Standards*** for a complete definition of FAA design standards, codes, and categories. Modified, less stringent "standards" derived from the FAA standards are also defined in this section. Their applicability will be investigated during the development of alternatives to maximize the use of available land if an acceptable level of safety is maintained.

4.2.1 Critical Aircraft Characteristics

As determined in **Section 3.3.3, *Critical Design Aircraft***, the existing and future family of critical design aircraft falls within an ADG - AAC aircraft grouping of **A-I(S)** and a TDG of **1A**. Typical aircraft in that grouping

include the Cessna 172 Skyhawk (high wing) or the Piper PA-28 Cherokee (low wing), types currently based at the airport. **Figure 4.1** depicts the typical aircraft in the existing and future critical aircraft grouping. **Table 4.2** summarizes its characteristics.

Figure 4.1 - Existing & Future Critical Aircraft



Source: Public Domain, retrieved July 2025.

Table 4.2 - Existing & Future Critical Design Aircraft Characteristics

Aircraft Type (Typ.)	Approach Speed (kts)	AAC	Wingspan (ft)	Tail Height (ft)	ADG	CMG (ft)	MGW (ft)	TDG	MTOW (lbs)
Cessna 172 Skyhawk	62	A	36.1	8.9	I	5.4	8.4	1A	2,550
Piper PA-28 Cherokee	70	A	35.0	7.3	I	6.2	10.5	1A	2,440

Source: FAA, *Aircraft Characteristic Database,* October 2024.

4.2.2 Applicable Design Standards

Prior to the publication of FAA AC 150/5300-13B, *Airport Design* on March 31, 2022, FAA guidance used the highest RDC, minus the visibility component, to form the ARC. The design standard had been in place since the publication of the original airport design guidance, FAA AC 150/5300-13, *Airport Design*, on September 29, 1989. For years, the ARC had been a familiar component of airport planning and design and allowed easy reference to the largest aircraft that an airport is designed for. The ARC was abandoned with the publication of FAA AC 150/5300-13B, *Airport Design* on March 31, 2022 and is no longer a design standard. Airport planners

must now reference each runway's individual RDC. In the case of an airport with multiple runways, reference to the highest RDC, minus the visibility component, is no longer recognized.

This ALP Update will no longer use the ARC as a facility objective. However, for commonality, the hypothetical ARC for GWS can be referenced as **A/B-I(S)**.

4.2.2.1 Modification of Standards

As previously mentioned, the use of less stringent "standards" may be used for the development of airfield facilities at GWS to maximize the use of the land available. For those airports that subject to FAA grant assurances, including the use of FAA design standards, this is traditionally referred to as a Modification of Standards (MoS).

As detailed in **Section 2.2.1, *Airport Design Standards*** CDOA does not have their own separate set of airport design standards, and CDOT's *Airport Sponsor Assurances* only ascertains that airports need to adopt "appropriate designs standards" that ensure normal airport operations and an acceptable level of safety. In other words, the use of FAA design standards is recommended by CDOA, but not mandatory.

The FAA usually considers MoS that result in an acceptable level of safety and efficiency on a case-by-case basis. For GWS, "modified standards" and reduced setbacks (i.e., MoS) are proposed below and their feasibility will be investigated during the development of alternatives. The planning team will work with Airport management and CDOA to ensure all stakeholders agree that an appropriate level of safety and efficiency is maintained by the preferred development alternative. The modified standards will not be considered as an interim measure; rather, they will be adopted as the standard for infrastructure development at GWS.

Per guidance contained in FAA AC 150/5300-13B, *Airport Design* the FAA does not consider any request from a NPIAS airport to modify design standards associated with the following:

- Runway Safety Area (RSA) dimensions,
- Obstacle Free Zone (OFZ) dimensions, that drive holding position and parallel taxiway setbacks,
- Approach or departure surface dimensions, and
- Standards established within a regulation (e.g., stopway, clearway).

The development plan for GWS should, at a minimum, strive to follow the FAA design standards associated with the items listed above as these are fundamental to the FAA's efforts to continue enhancing airport safety. However, modified standards may be adopted for these items as well if elected by all stakeholders.

4.2.2.2 Runway Design Standards

Table 4.3 presents the FAA design standards for A/B-I Small Aircraft runways, per the existing and future critical design aircraft, as well as modified standards. Small Aircraft are those aircraft with a maximum gross weight of 12,500 pounds or less.

Instrument Flight Procedures (IFPs) into the airport are discussed in **Section 4.3.7 Navigational & Visual Approach Aids**. No changes are anticipated in the future and the Airport is expected to remain visual only. This translates into an existing and future Runway 14-32 RDC of **A/B-I(S)-VIS**.

Table 4.3 - Existing & Future Runway Design Standards

Item	A/B-I Visual (Small Aircraft)	Modified Standards[5]
Runway Design		
Runway Width	60’	Same
Shoulder Width	10’	Same
Blast Pad Width	80’	Same
Blast Pad Length	60’	Same
Crosswind Component	10.5 kts	Same
Runway Protection		
Runway Safety Area (RSA)		
Length Beyond Departure End[1,2]	240’	Same
Length Prior to Threshold	240’	Same
Width	120’	Same
Runway Object Free Area (ROFA)		
Length Beyond Departure End	240’	Same
Length Prior to Threshold	240’	Same
Width	250’	175’
Runway Obstacle Free Zone (ROFZ)		
Length Beyond Runway End	200’	Same
Width	250’	175’
Runway Protection Zone (RPZ)		
Length	1,000’	Same
Inner Width	250’	Same
Outer Width	450’	Same
Runway Separation (Runway Centerline to)		
Holding Position	125’	87.5’
Parallel Taxiway/Taxilane Centerline[3,4]	150’	105’

Source: FAA, AC 150/5300-13B, *Airport Design*

Notes: [1]: The RSA length beyond the runway end begins at the runway end when a stopway is not present. When a stopway is present, the length begins at the stopway end.
[2]: The RSA length beyond the runway end may be reduced to that required to install an EMAS (the designed set-back of the EMAS included).
[3]: The runway to taxiway/taxilane centerline separation standards are for airports at sea level. For airports at higher elevations, an increase to these separation distances may be required to keep taxiing and holding aircraft clear of the inner-transitional OFZ. This standard cannot be used to justify a decrease in runway to taxiway/taxilane separation.
[4]: For approaches with visibility less than 1/2-statute mile, runway centerline to taxiway/taxilane centerline separation increases to 400 feet.
[5]: Modified standards for runway protection and separation have been calculated based on an aircraft wingspan of 39 feet (Cessna T210 Turbo Centurion). Lengths prior to threshold and beyond runway ends have not been altered in order to offer the same level of protection against undershoots and overruns.

4.2.2.3 Taxiway Design Standards

Table 4.4 presents applicable taxiway design standards for the existing and future grouping of ADG I and TDG 1A aircraft, as well as modified standards.

Table 4.4 - Existing & Future Taxiway Design Standards

Item	ADG I - TDG 1A	Modified Standards[1]
Taxiway & Taxilane Protection		
Taxiway Safety Area (TSA) Width	49’	39’
Taxiway Object Free Area (TOFA) Width	89’	79’
Taxilane Object Free Area ($T_{/L}$OFA) Width	79’	69’
Taxiway & Taxilane Separation		
Taxiway Centerline to:		
Parallel Taxiway/Taxilane Centerline	70’	59’
Fixed or Moveable Object	44.5’	39.5’
Taxilane Centerline to:		
Parallel Taxilane Centerline	64’	54’
Fixed or Moveable Object	39.5’	34.5’
Taxiway & Taxilane Design		
Width (Straight)	25’	20’
Taxiway Edge Safety Margin (TESM)	5’	3.5’
Taxiway Shoulder Width	10’	None

Source: FAA, AC 150/5300-13B, *Airport Design*
Notes: [1]: Modified standards for taxiway protection and separation have been calculated based on the standard FAA wingtip clearance for TOFAs and $T_{/L}$OFAs applied to a maximum aircraft wingspan of 39 feet (Cessna T210 Turbo Centurion) instead of the standard 49 feet of the critical aircraft for the ADG I grouping.
Similarly, modified standards for taxiway design have been calculated based on a reduced FAA TESM applied to a maximum aircraft MGW of 13 feet and a maximum CMG of 11 feet (Cessna 340) instead of the standard 15 feet and 20 feet, respectively, of the critical aircraft for the TDG 1A grouping.

4.3 Airfield Facilities Requirements

4.3.1 Wind Coverage

As listed in **Section 2.1.5, *Local Setting & Meteorological Data*** an appropriate wind coverage analysis cannot be performed because no historical wind data is available. Therefore, the adequacy of the existing runway orientation cannot be verified against the prevalent winds from a data standpoint. The surrounding topography, however, makes another runway orientation impossible to achieve at this location. Consequently, the wind coverage of Runway 14-32’s existing alignment is considered adequate for the purpose of this ALP Update.

4.3.2 Airfield Capacity

Given the level of activity that has historically been observed at the airport, a full runway and airspace capacity analysis is not warranted. This study will limit this analysis to the calculation of the Annual Service Volume (ASV) and the ratio of PAL 3 forecast operations to the ASV. As defined by the FAA in AC 150/5060-5, *Airport Capacity and Delay*, the ASV is the number of aircraft operations that can be accommodated on a system of runways in one year with an acceptable level of delay. In general, the FAA recommends that airports begin planning for additional capacity once annual aircraft operations reach 60 percent of an airport's calculated ASV. Development (i.e., design and construction) of those improvements that increase capacity should start when annual aircraft operations reach 80 percent of the ASV.

A standard methodology for calculating an airport's ASV is contained in FAA AC 150/5060-5, *Airport Capacity and Delay*, issued in 1983. Typically, for a single-runway GA airports with significant small piston engine aircraft activity, the standardized FAA methodology yields an ASV of 230,000 annual aircraft operations. In the case of GWS, this number is not reflective of local conditions.

A second methodology is offered by ACRP Report 79: *Evaluating Airfield Capacity*, published in 2012. The report (and associated capacity spreadsheet model) offer alternative methodologies that considers input unique to the individual airport, thence resulting in a more accurate ASV estimate. The 2020 CASP calculated the ASV for all Colorado airports using one of the ACRP models as well as available airport-specific data including operational fleet mix, the amount of touch and go operations that occur, the percentage of the year the airport is affected by Visual Meteorological Conditions (VMC), runway configuration, runway exit and parallel taxiway availability, and whether the airport has an ATCT. The resulting estimated ASV for GWS is approximately 87,900 operations per year. According to the forecast, annual demand is projected to reach 12,672 annual operations in PAL 3, which represents approximately 14 percent of the estimated ASV. No capacity constraints exist or are expected to develop over the planning period, and a single runway is adequate to meet current and future demand.

While the 2020 CASP recommends that all airports complete their own capacity analyses, those calculations are usually done during airport master plans to support additional capacity improvements. In the case of GWS, off-airport encroachment, including residential areas and terrain, means that there is no room for those airfield improvements that traditionally offer additional runway capacity (i.e., runway extensions, parallel runways, etc.). Consequently, more detailed ASV calculations would be superfluous and may even be impossible given the lack of data available for input into the spreadsheet models. The Airport's ASV should be adequate for the planning period.

4.3.3 Runway Design

4.3.3.1 Runway Identification

Runway end identification numbers are based on magnetic north. To calculate a runway's magnetic bearing, the magnetic declination (angle between magnetic north and true north) at the runway's location is deducted from its true bearing, then rounded to the nearest multiple of ten degrees. The final zero is then omitted to obtain a runway designation number. By convention, magnetic declination is positive when magnetic north is east (right) of true north, and negative when it is to the west (left) of true north. The result is a number between 1 and 36 for each runway end, with the bearings being 180° apart. As the earth's magnetic field varies over time and the magnetic declination changes, it is possible that re-designation of a runway is required. **Table 4.5** presents calculations for Runway 14 and Runway 32.

Table 4.5 - Runway Designation

Runway	Runway 14	Runway 32
True Bearing[1,2]	153° 48' 48"	333° 48' 59"
Current Magnetic Declination at ARP (June 2025)[2]	8° 43' East (± 22')	
Magnetic Declination Change Rate (June 2025) [2]	0° 4' West / Year	
Existing Magnetic Bearing (2025)	145° 06'	325° 06'
Future Magnetic Bearing (2045)	146° 26'	326° 26'
Existing Runway Designation (2025)	15	33
Future Runway Designation (2045)	15	33

Sources [1]: Runway End Point Coordinates Surveyed, June 2025.
[2]: NOAA NGS, Program INVERS3D (July 2025), Forward & Back Azimuths
[3]: NOAA NCEI, *Magnetic Field Calculator*, World Magnetic Model (WMM) 2024-2029, Sea Level (June 2025)

Based on the results presented in **Table 4.5**, it is estimated that the runway's magnetic bearing reached 145° 00' in 2024, and the current runway designation is outdated. Runway 14-32 should be renamed "Runway 15-33" during the next pavement maintenance or rehabilitation project, or during the next marking rejuvenation project.

4.3.3.2 Runway Length

A complete analysis is contained in **Appendix G, *Runway Length Analysis***. **Table 4.6** summarizes and presents the results of the runway length analysis.

Table 4.6 - Runway Length Analysis Summary

Methodology	Aircraft Group / Runway Conditions	Takeoff Distance[1] (ft)
FAA AC 150/5325-4B	Aircraft 12,500 lbs. or less - V_{ref} >=50 kts - >=10 Seats	7,200[2]
	Aircraft 12,500 lbs. or less - V_{ref} >=50 kts - <10 Seats - 95% of Fleet	7,200
	Aircraft 12,500 lbs. or less - V_{ref} >=50 kts - <10 Seats - 100% of Fleet	7,200
SARLAT	A/B-I Small Aircraft at 100% Load, Dry	6,700
	A/B-I Small Aircraft at 100% Load, Wet	7,700
	Most A/B-I Small Aircraft at 50% Load, Dry	4,000[3]
	Most A/B-I Small Aircraft at 50% Load, Wet	4,500[3]
	All Single-Engine Piston A-I Small Aircraft at 50% Load, Dry	3,200[4]
	All Single-Engine Piston A-I Small Aircraft at 50% Load, Wet	3,600[4]
CDOA	2020 CASP GA-Local Objective[5]	7,200[3]

Source: Dibble, July 2025 analysis
Notes: [1]: All figures rounded to the next multiple of a hundred.
[2]: For airport elevations above 3,000 feet MSL, use the 100% of fleet grouping of aircraft with fewer than 10 seats.
[3]: Runway length requirements for most aircraft, i.e., excludes obvious outliers on Figure G.3 (55 & 58 Baron, Commander 690B)
[4]: Excludes Cirrus SR-20
[5]: Objective for GA-Local airports is to accommodate 100% of small aircraft adjusted for elevation and mean maximum daily temp during hottest month

The existing length of Runway 14-32 is 3,310 feet. According to **Table 4.6**, the existing runway length is sufficient to accommodate all but one small single-engine piston aircraft in the A-I grouping at 50 percent load. While runway length recommendations for general aviation airports are typically predicated on the critical aircraft at 100 percent load (i.e., all A/B-I small aircraft at 100 percent load), off-airport land uses and topography are currently constraining runway length at GWS, and a runway extension is unlikely to be considered. As shown in **Table 4.6** (and in more detail in **Appendix G**) most aircraft operate under weight restrictions.

According to RunwayStats data, operations by small single-engine piston aircraft in the A-I category represent over 90 percent of the total annual operations on average, and most aircraft operate at low loads during VMC. Thence, the runway length is just about adequate for most of its user base in dry conditions.

4.3.3.3 Runway Width

The current width of Runway 14-32 is 50 feet, which does not satisfy the runway width requirement for RDC A/B-I(S)-VIS. This study recommends widening the runway to 60 feet. Of note, the 2020 CASP objective for GA-Local airports is 75 feet, which would meet a larger RDC B-II-VIS.

4.3.3.4 Runway Shoulders & Blast Pads

FAA AC 150/5300-13B, *Airport Design* requires the presence of turf shoulders (or aggregate-turf, soil cement, lime or bituminous stabilized soil) for runways serving ADG I aircraft. Runway 14-32 currently has no specially prepared shoulders. It is recommended that 10-foot shoulders be added to satisfy the requirements of RDC A/B-I(S)-VIS. Those shoulders should at a minimum use a specially prepared stabilized surface such as turf.

FAA AC150/5300-13A, *Airport Design,* requires the presence of turf blast pads (or aggregate-turf, soil cement, lime or bituminous stabilized soil) for runways serving ADG I aircraft. Runway 14-32 currently has no blast pads on either runway ends. It is recommended that 80 feet by 60 feet blast pads be added to satisfy the requirements of RDC A/B-I(S)-VIS. Blast pads should at a minimum use a specially prepared stabilized surface such as turf.

4.3.3.5 Runway Markings

The current markings on Runway 14-32 are consistent with those of visual runways, which satisfies the requirements of RDC A/B-I(S)-VIS. Marking schemes include runway landing designator markings and runway centerline markings. Marking schemes are non-standard. Existing runway centerline markings are 12 inches wide which meets requirements for visual runways, but the length of stripes and gaps are not standard. Runway landing designator markings are non-standard and need to be updated to reflect a runway designation of 15-33 consistent with the current runway magnetic bearing.

4.3.3.6 Runway Surface Gradients

The longitudinal gradient standards for the centerline of a 3,310-foot-long RDC A/B-I(S)-VIS runway, and transverse gradients, are as follows:

- Longitudinal grades and grade changes should be kept to a minimum.
- Longitudinal grades should remain between ±2.0 percent.
- Longitudinal grade changes should remain between ±2.0 percent.

- Vertical curves for longitudinal grade changes should be parabolic. The required length of vertical curve is a minimum of 300 feet for each 1.0 percent of change.
- The minimum allowable distance between the points of intersection of vertical curves is 250 feet multiplied by the sum of the grade changes (in percent) associated with the two vertical curves.
- Transverse grades should follow a center crown distribution with equal, constant transverse grades on either side that remain between -1.0 & -2.0 percent (negative slopes).
- Transverse grades for any specially-prepared stabilized surface shoulders remain between -1.5 & -5.0 percent (negative slopes) for either RDC.

Runway 14-32 satisfies the surface gradient requirements of the RDC. Any runway extension should follow those same surface gradient requirements.

4.3.3.7 Runway Line of Sight

FAA AC150/5300-13B, *Airport Design,* requires runways with a full-length parallel taxiway to meet the following Line of Sight (LoS) requirements along their individual centerlines: any point 5 feet above the runway centerline must be mutually visible with any other point 5 feet above the runway centerline for a distance equal to half the length of the runway length. Runway 14-32 satisfies this LoS requirement (See **Sheet 08 of 14, *Runway Centerline Profile***, of the Airport Layout Plan). There are no existing or planned intersecting runway(s) at GWS.

4.3.3.8 Runway Safety Areas

In order to protect aircraft during runway excursion events, the FAA requires that a RSA surround the landing surface of a runway. An RSA enhances the safety of aircraft which undershoot, overrun, or veer off the runway, and provides greater accessibility for firefighting and rescue equipment during incidents. The RSA must be cleared and graded smoothly with no surface variations (humps, ruts, or depressions), drained, capable (under dry conditions) of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage and should be free of objects (except for frangible objects that need to be located in the RSA because of their function). Dimensional and grading standards for RDC A/B-I(S)-VIS runways are as follows:

- Dimensions: 240 feet beyond departure end, 240 feet prior to threshold, and 120 feet in width.
- Objects within the RSA with a height greater than 3 inches should be frangible.
- Longitudinal grades for that part of the RSA between the runway ends are the same as the comparable standards for the runway surface.
- Longitudinal grades should be kept between 0.0 & -3.0 percent for the first 200 feet of the RSA beyond the runway ends, with any slope being downward from the ends.
- Maximum allowable positive longitudinal grade should be such that it does not penetrate any applicable approach surface or clearway plane for the remainder of the RSA. The maximum allowable negative longitudinal grade is 5.0 percent and longitudinal grade changes should be a maximum of +/- 2.0 percent per 100 feet.
- Transverse grades should be kept to a minimum but consistent with the drainage requirements.
- Transverse grades should be kept between -1.5 & -5.0 percent for that portion of the RSA that is not paved on each side of the runway and up to 200 feet beyond the runway end (negative slopes).

- Transverse grades beginning 200 feet beyond the runway end can be between ±5.00 percent with surface smoothness required.
- Construction should include a 1.5-inch drop between paved and unpaved surfaces and maintain a -3.0 to -5.0 percent grade for 10 feet of unpaved surface adjacent to the paved surface.

At GWS, actual field conditions do not comply with the standard RSA surface grading requirements of the RDC A/B-I(S)-VIS:

- Runway 14 End: The RSA is graded from the runway end for a distance of approximately 120 feet. Beyond 120 feet, there is a small embankment with positive grades up to 10 percent, and there is no surface smoothness. The last 90 feet (approx.) of RSA fall outside of airport property.
- Runway 32 End: The RSA is graded along the extended runway centerline for a distance of approximately 130 feet from the runway end. However, a public road encroaches within the RSA at a slant angle from the threshold inwards. The roadway pavement crosses the extended runway centerline approximately 150 feet from the runway threshold. The RSA is not graded beyond the road, and negative grades up to 65 percent down the Roaring Fork River canyon can be observed. The portion of the RSA beyond the road is City (sponsor) property but is not under the jurisdiction of the Airport.
- Between runway ends: Grades are consistent with standards and surface smoothness can be observed.

The proposed development plan should adopt RSA setbacks that follow FAA standards to the extent possible. However, reduced setbacks may be investigated during the development of alternatives. The South Bridge project is anticipated to further reduce the availability of a standard RSA at the Runway 32 End.

4.3.3.9 Runway Object Free Areas

The FAA also requires that a Runway Object Free Area (ROFA) surround the paved surface and be clear of above-ground objects protruding above the nearest point of the RSA. The ROFA is a clear area that provides wingtip protection during runway excursion events. Some fixed-by-function objects may be located in the ROFA. To the extent practicable, those objects located in the ROFA should meet the same frangibility requirements than those located in the RSA. Dimensional and grading standards for RDC A/B-I(S)-VIS runways are as follows:

- Dimensions: 240 feet beyond departure end, 240 feet prior to threshold, and 250 feet in width.
- Objects within the ROFA that exceed the elevation of the nearest point on the RSA should be frangible to a practical extent.
- Transverse grades from the edge of the RSA into the ROFA should be zero or negative (unlimited) to drain water away from the RSA. If not practical, a maximum allowable positive slope of 8:1 must be maintained for 40 feet from the edge of RSA, then apply a 4:1 positive slope to the edge of the ROFA.

At GWS, actual field conditions do not comply with the standard ROFA surface grading and object clearing requirements of the RDC A/B-I(S)-VIS:

- Runway 14 End: An embankment is located inside the standard ROFA. The last 90 feet (approx.) of ROFA fall outside of airport property.
- Runway 32 End: A public road is located inside the standard ROFA.
- Between runway ends: Hangar structures, aprons and taxilanes are located inside the standard ROFA.

The development plan should evaluate the use of modified ROFA standards against the use of FAA standards.

4.3.3.10 Runway Obstacle Free Zones

The OFZ is a volume of airspace, centered on the runway, which is intended to protect aircraft operating on the runway by precluding aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. Its shape is dependent on the approach minimums for a specific runway end and the aircraft on approach, and thus, the OFZ for a particular operation may not be the same shape as that used for design purposes. Several surface sub-components make up an OFZ for a runway; however, the Runway Obstacle Free Zone (ROFZ) is the only sub-component that would be active at any time for GWS and is the only one used for design purposes:

- *Runway Obstacle Free Zone (ROFZ)*: The ROFZ dimensions for either the existing or future RDC is a 250-foot wide surface, centered on the runway centerline, and extending 200 feet beyond each runway end. The ROFZ is the airspace above said surface, which has an elevation at any point that is the same as the elevation of the nearest point on the runway centerline.

At GWS, actual field conditions do not comply with the OFZ requirements listed above. A public road, hangar structures, aprons, and taxilanes are located inside the standard ROFZ, and portions of the ROFZ fall outside of airport property near both runway ends. The development plan should evaluate the use of modified ROFZ standards against the use of FAA standards.

Current visibility minimums (visual only) at GWS only warrant the ROFZ to be active at any time. No visibility minimums reductions are planned that would trigger the activation of the Inner-approach OFZ (IA-OFZ), the Inner-transitional OFZ (IT-OFZ), and/or the Precision Obstacle Free Zone (POFZ).

4.3.3.11 Runway Protection Zones

The Runway Protection Zone (RPZ) is a two-dimensional area that is designed to enhance the protection of people and property surrounding an airport. According to the FAA, this is best achieved through fee simple control by the airport sponsor over the land encompassed by RPZs. Some land uses are incompatible and should not be located inside an RPZ.

The standard RDC A/B-I(S)-VIS approach and departure RPZs for Runway 14-32 are depicted on **Figure 2.5** in the inventory section. Land use inside the RPZs is as follows:

- Runway 14 End: Land use consists of residential roads, parking, and city park, which are typically incompatible with an RPZ. Residential parcels encroach inside the RPZ, but no home structures are located inside the RPZ. The Airport sponsor controls none of the RPZ.
- Runway 32 End: Land uses consist of open, undeveloped land as well as agricultural, which are compatible with the RPZ. The Airport sponsor controls approximately 40 percent of the RPZ.

Planning studies typically recommend a continued effort to purchase the remainder of RPZs in fee simple. At a minimum, the City and/or the Airport should seek avigation easements over both RPZs.

4.3.4 Taxiway Design

4.3.4.1 Taxiway Layout

Taxiways offer access from the runway to terminal areas, aprons, and hangar areas, and vice-versa. In order to ensure a safe and efficient design of taxiways, the FAA has developed design methods, presented in FAA AC 150/5300-13B, *Airport Design*, that include the following:

- Taxi Method - taxiways are designed for "cockpit over centerline" taxiing with a pavement buffer to allow for wander, as well as aircraft asymptotic realignment in curves and intersections. Curve and fillet radii and fillet lead-in length were designed in order to ensure a Taxiway Edge Safety Margin (TESM).
- Curve Design - design should be such that the nose gear steering angle is no more than 50 degrees. Design turns less than 90 degrees in a way that allows pilots to maintain an efficient taxi speed. Design turns to be 90 degrees wherever possible; when not possible, intersections should use standard angles of 30, 45, 60, 120, 135, and 150 degrees.
- Three-Path Concept - avoids complex intersections by limiting the number of choices at an intersection: left, right, and forward.
- Channelized Taxiing - abide by standard taxiway widths and fillet design and avoid large expanses of pavements. Taxiway widths wider than the standard result in signs being located further from the centerline and from the pilot's eye.
- Runway Access from Apron - avoid connecting an apron directly with a runway as this layout can lead to loss of situational awareness and a runway incursion. Design these taxiways to make at least one right-angle (or near right-angle) turn prior to reaching a runway hold line.

There is no true full-length parallel taxiway at GWS, however, a series of interconnecting aprons and taxilanes form a full length parallel taxilane path on the east side of the runway that is considered a full-length parallel Taxiway A. Runway 14-32 is served by five taxiway connectors (no designations) that intersect the runway at a 90-degree angle, except for the southernmost stub that connects to the Runway 32 end at a shallow angle. Additionally, another stub connects to the Runway 32 end on the west side and serves the maintenance hangar.

The current taxiway system at GWS is adequate but does not follow FAA design methods or standard widths and fillets. There are multiple direct apron-to-runway access points. Subsections below highlight specific issues. The development plan should propose a feasible solution to standardize taxiway infrastructure across the airfield. If modified standards are used, larger aircraft in the ADG I and TDG 1A groupings will require back-taxi.

4.3.4.2 Runway-to-Parallel-Taxiway Separation

Runway-to-taxiway separation standards are predicated on the RDC and the existing/future visibility minimums expected. The higher the RDC and the lower the visibility minimums, the greater the runway to taxiway separation distances. Please refer to **Section 4.3.7 *Navigational & Approach Aids*** for a discussion of future visibility minimums at GWS.

The runway-to-parallel-taxiway separation requirements for RDC A/B-I(S)-VIS is 150 feet. The existing runway-to-parallel-taxiway separation varies between 80 feet and 170 feet. The development plan should evaluate the use of modified separation standards against the use of FAA standards.

4.3.4.3 Entrance / Exit Taxiway Locations

As previously mentioned, there are no capacity issues related to the taxiway system. Exit taxiway locations usually have some impact on the runway occupancy time, thence affecting capacity. At GWS, the location of exit taxiways (other than at the runway ends) is adequate. The FAA's Runway Exit Design Interactive Model (REDIM) was not used.

4.3.4.4 Taxiway & Shoulder Width

The TDG 1A requirements for the width of straight section of taxiways is 25 feet. No taxiway or taxilane currently matches this width at GWS. A potential modified standard based on a smaller outer-to-outer main gear width (MGW) of 10 feet would require a standard taxiway width of 20 feet.

FAA AC 150/5300-13B, *Airport Design,* requires the presence of turf shoulders (or aggregate-turf, soil cement, lime or bituminous stabilized soil) for taxiways serving ADG I aircraft. Taxiways at GWS currently have no specially prepared shoulders. The addition of shoulders is not recommended by this ALP Update.

4.3.4.5 Taxiway Markings

Current taxiway markings are non-standard. There are no taxiway centerline markings. Existing holding position markings are located 78 feet from the runway centerline, a distance that does not meet the 125 feet standard of RDC A/B-I(S)-VIS but provides additional room for taxiways, aprons, and landside facilities. This report recommends adding taxiway centerline markings on all taxiways. The development plan should evaluate the use of modified holding position setbacks against the use of FAA standards.

4.3.4.6 Taxiway Fillet

There are no taxiway fillets at any intersection. Future taxiways should provide TDG 1A standard fillets to the extent possible. Modified fillets using a smaller MGW and CMG should be evaluated in the development plan.

4.3.4.7 Taxiway Safety Areas

Taxiway Safety Areas (TSA) are designed to provide room for rescue and fire-fighting operations. Like an RSA, a TSA must be cleared and graded smoothly, drained, capable (under dry conditions) of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft, and free of objects (except for frangible objects that need to be located in the TSA because of their function). The width of the TSA must be increased at intersections and turns where curved taxiway or taxilane centerline pavement markings, reflectors, or lighting are provided, meaning that TSA standards must be met for the same distance from the taxiway/taxilane edge in straights and within intersections and curves.

At GWS, all taxiways are considered taxilanes beyond the hold bars due to the lack of clear, separate airfield infrastructure and non-movement area boundary. There are no taxiway or taxilane centerline markings at GWS, therefore, it is unknown whether taxiways and taxilanes currently satisfy TSA requirements. The development plan should evaluate the use of modified separation standards for future infrastructure.

4.3.4.8 Taxiway Object Free Areas

Taxiway Object Free Areas (TOFA) and Taxilane Object Free Areas ($T_{/L}$OFA) are designed to provide clearing standards. Like a ROFA, a TOFA or a $T_{/L}$OFA prohibits service vehicle roads, parked aircraft, and other objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes, to be located within it.

At GWS, all taxiways are considered taxilanes beyond the hold bars due to the lack of clear, separate airfield infrastructure and non-movement area boundary. There are no taxiway or taxilane centerline markings at GWS, therefore, it is unknown whether taxiways and taxilanes currently satisfy TOFA and $T_{/L}$OFA requirements. The development plan should evaluate the use of modified separation standards for future infrastructure.

4.3.5 Pavement Strength & Condition

Pavement strength and condition for each branch is assessed below. Pavement maintenance and repair recommendations from the 2022 update of the CDOA APMS are outdated and thus cannot be incorporated into the Capital Improvement Plan (CIP).

Pavement strength requirements are as follows:

- **Runway Pavements**: Runway 17-35 pavement surfaces are rated to accommodate aircraft with Single-Wheel Main Gear (S) configuration weighing up to a maximum of 15,000 pounds. The existing and future critical aircraft family is a family of A/B-I small aircraft with MTOWs of 12,500 lbs. or under Representative aircraft in that family of aircraft are the Cessna 172 Skyhawk and the Piper PA-28 Cherokee that has a Single Wheel Main Gear (S) configuration. Consequently, the pavement strength of Runway 14-32 should remain adequate throughout the planning period.

  Runway pavement surfaces are ten years old as of 2025 (reconstructed 2015) and have estimated PCI ratings of 94 (Good) as of 2025 after a crack seal and seal coat project. While the seal coat temporarily rejuvenated the pavement, a complete mill-and overlay will be needed in the mid-term.

- **Taxiway Pavements**: Taxiway pavement surfaces ratings are unknown, but it is assumed that they are similar to the runway pavement surface ratings and thus deemed adequate. The age of inspected taxiway pavement surfaces is 63 years old as of 2024 but was overlaid 16 years ago. Estimated PCI rating is 81 (Satisfactory) as of 2025. Some taxiway pavement surfaces were not inspected by CDOA but are in poor condition and should be rehabilitated.

- **Apron & Taxilane Pavements**: Apron and taxilane pavement surfaces ratings are unknown, but it is assumed that they are similar to the runway pavement surface ratings and thus deemed adequate. The age of inspected taxiway pavement surfaces is 10 years old as of 2025. Estimated PCI rating is 76 (Satisfactory) as of 2025. Some apron and taxilane pavement surfaces were not inspected by CDOA but are in poor condition and should be rehabilitated.

4.3.6 Lighting, Markings & Signage

The Airport is not currently equipped with any lighting or signage and there is no airport rotating beacon. Markings for Runway 14 and Runway 32 are consistent with those of a visual runway. This is consistent with standards for visual runways set forth in FAA AC 150/5300-13B, *Airport Design,* FAA AC 150/5340-30J, *Design and Installation Details for Airport Visual Aids*, AC 150/5340-1M, *Standards for Airport Markings*, and AC 150/5340-18G, *Standards for Airport Sign Systems*.

This report recommends no improvements to lighting, markings, or signage as long as the Airport remains a low-activity VFR daytime-only airport. Runway landing designator markings need to be updated to reflect a runway designation of 15-33 consistent with the current estimated runway magnetic bearing.

4.3.7 Navigational & Visual Approach Aids

Existing visual approach aids are adequate for a VFR daytime-only airport. The existing windsocks are non-standard but adequate. There is no need for a segmented circle with traffic patterns indicators at GWS. The existing Runway 32 PAPI-2L is adequate but is dated and should be replaced with a Light-Emitting Diode (LED) PAPI-2L when appropriate. When replaced, the distance to the threshold and aiming angles should be checked and certified again. Because of noise abatement procedures that restrict landings from the north, a PAPI-2L is not needed for Runway 14. Additionally, close-in obstruction would penetrate the Obstacle Clearance Surface

(OCS) and the Light Signal Clearance Surface (LSCS) of a Runway 14 PAPI-2L. Runway End Identifier Lights (REIL) are not required for visual runways. The MicroTower weather reporting system is adequate for the Airport. There are no electronic NAVAIDs on the Airport.

No IAP or other Instrument Flight Procedures (IFPs) are expected to be published for GWS because of the surrounding terrain. The airport is expected to remain a VFR daytime-only airport. Consequently, the existing and future RDC at GWS is A/B-I(S)-VIS.

4.4 Terminal Area & Landside Facilities Requirements

4.4.1 General Aviation Terminal Building

The general aviation terminal facilities (also referred to as "FBO") provide space that caters to the needs of general aviation pilots, passengers, and visitors to the Airport. The Airport Cooperative Research Program (ACRP) Report 113: *The Guidebook on General Aviation Facility Planning*, published in 2014, recommends using 100 to 150 square feet per design peak hour passenger to estimate demand for general aviation terminal space. For GWS, a 100-square foot per passenger value was used to conserve space. It was assumed that 90 percent of arrivals and departures (i.e., operations) use GA terminal facilities, and the average passenger count per aircraft was estimated at 2.5 per ACRP Report 113 guidance.

Design peak hour operations were estimated based on RunwayStats data. In 2025, the peak month was September that accounted for 13 percent of annual operations. Additionally, the peak hour of the Average Day of the Peak Month (ADPM) accounted for 13 percent of operations during the ADPM between 9AM and 10 AM. **Table 4.7** provides a summary of the GA terminal space requirements following ACRP recommendations. The ACRP space calculation does not include secondary space such as exterior walkways, entrance plazas, landscaping, etc.

Table 4.7 - General Aviation Terminal Building Area Requirements

Item	Base Year	PAL 1	PAL 2	PAL 3
Total Annual Operations	4,935	5,449	6,016	7,333
Peak Month Operations (13%)	642	708	782	953
ADPM Operations (30)	21	24	26	32
Peak Hour Operations (13%)	3	3	3	4
Peak Hour Operations using Facilities (90%)	3	3	3	4
Peak Hour Passengers using Facilities (2.5)	6	7	8	9
Required Terminal Capacity (sf)	**626**	**691**	**762**	**929**
Existing Terminal Capacity (sf)		150		
Net surplus/(Deficiency) (sf)	**(476)**	**(541)**	**(612)**	**(779)**

Source: ACRP Report 113. Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.

Table 4.7 shows that existing GA terminal facilities are undersized. Plans for a new terminal building / FBO should be incorporated into the development concept. A new building with a floor area between 1,500 square feet and 2,000 square feet should meet the forecast need over the planning period and beyond.

4.4.2 Aircraft Hangars & Storage

General aviation airports typically store aircraft using one of three methods: open-air tie-down parking stalls (tie-downs), T-hangars and small box hangars (and the single-T and shade structure variants), and larger conventional hangars. Different types of aircraft have different storage requirements. For example, T-hangars, small box hangars, and tie-downs are well suited for small piston engine aircraft; however, turboprops and helicopters are almost always stored in a larger conventional hangar. Shade structures, a less expensive but less desired option than hangars, can provide additional storage space as well. It is assumed that the Airport will continue to use all three storage methods at the same rate than currently.

4.4.2.1 T-Hangars

Table 4.8 details the existing and future needs for T-hangar and small box hangar space (including single-Ts and shade structures). Currently, approximately 80 percent of single-engine pistons and 20 percent of multi-engine pistons are stored in T-hangars, small box hangars, and under shade structures at GWS. It is assumed that these splits will remain and carry for future based aircraft. Also reflected in **Table 4.8** is the planned demolition of Facility No. 12, a 10-Unit T-Hangar, as it is expected to be impacted by the South Bridge Project.

Table 4.8 - T-Hangar & Small Box Hangar Space Requirements

Item	Base Year	PAL 1	PAL 2	PAL 3
Single-Engine Piston Forecast	50	55	61	74
Multi-Engine Piston Forecast	5	6	6	7
Required T-Hangar & Box Units	**40**	**45**	**50**	**61**
Existing Units Available (sf)	36	26[1]	26[1]	26[1]
Net surplus/(Deficiency) (Units)	**(4)**	**(19)**	**(24)**	**(35)**

Source: ACRP Report 113. Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.
Notes: [1]: The demolition of Facility No. 12 (10-Unit T-Hangar) is planned for 2026.

4.4.2.2 Conventional Hangars

Table 4.9 presents the future demand for conventional hangars and their associated apron space. Currently at GWS, approximately 10 percent of single-engine piston aircraft, 40 percent of multi-engine piston aircraft, and 100 percent of rotorcraft are stored in conventional hangars. The following has been assumed for projections:

- 95 percent of total hangar space is assumed to be hangar floor space
  - 60 percent of SE pistons are stored in box hangars — 1,400 square feet per aircraft
  - 60 percent of ME pistons are stored in box hangars — 1,700 square feet per aircraft
  - 100 percent of turboprops are stored in box hangars — 4,100 square feet per aircraft
  - 100 percent of jets are stored in box hangars — 4,100 square feet per aircraft
  - 100 percent of rotorcrafts are stored in box hangars — 1,900 square feet per aircraft
- 5 percent of the total hangar space is assumed to be office space
- Hangar floor space + office space = total hangar space

The ACRP Report 113 also recommends, as a good planning guideline, that apron space be allocated directly in front of the hangar at a ratio of 1:1 to allow maneuvering of aircraft outside the hangar but clear of TOFAs and T/LOFAs. For GWS, this guideline will be observed where possible and appropriate. Those apron areas are directly related to hangar space and thus are not included in any apron space requirements in the following subsection.

Table 4.9 - Conventional Hangar Space Requirements

Item	Base Year	PAL 1	PAL 2	PAL 3
Conventional Hangar Space Required				
Single-Engine Piston	7,000	7,700	8,540	10,360
Multi-Engine Piston	3,400	4,080	4,080	4,760
Turboprop	0	0	4,100	8,200
Jet	0	0	0	0
Rotorcraft	7,600	7,600	9,500	11,400
Total Hangar Floor Area (sf)	18,000	19,380	26,220	34,720
Hangar Office Area (sf)	947	1,020	1,380	1,827
Total Hangar Area (sf)	**18,947**	**20,400**	**27,600**	**36,547**
Existing Space Available (sf)		11,750		
Net surplus/(Deficiency) (sf)	**(7,197)**	**(8,650)**	**(15,850)**	**(24,797)**
Apron Space Recommended				
Apron Space Recommended (sy)	2,105	2,267	3,067	4,061

Source: ACRP Report 113. Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.

4.4.3 General Aviation Terminal Apron

The main ramp areas at GA airports are used by both transient (i.e., visiting) aircraft and based aircraft. They provide space for storage, maneuvering, and servicing aircraft. At GWS, approximately 5,000 square yards are available for based aircraft parking on the north ramps, and approximately 4,500 square yards are available for transient aircraft parking on the midfield and southeast ramps, including pull-up space by the GA terminal building. There are 11 tie-downs available for based aircraft, and 15 tie-downs available for transient aircraft, including three parking spots reserved for helicopters. Some existing tie-downs are in poor shape and need replacement.

4.4.3.1 Based Aircraft

Table 4.10 presents the future demand for based aircraft tie-down parking at GWS. Currently, approximately 12 percent of single-engine piston aircraft and 40 percent of multi-engine piston aircraft based at the Airport are stored on an apron. The following has been assumed for projections:

- 10 percent of SE pistons are stored on tie-down aprons — 400 square yards per aircraft
- 40 percent of ME pistons are stored on tie-down aprons — 650 square yards per aircraft

Table 4.10 - Based Aircraft Tie-Down Requirements

Item	Base Year	PAL 1	PAL 2	PAL 3
Single-Engine Piston	6	6	6	7
Multi-Engine Piston	2	2	2	3
Turboprop, Jet, Rotorcraft	0	0	0	0
Total Based Aircraft Tie-Downs Required	**8**	**8**	**9**	**10**
Existing Based Aircraft Tie-Downs		11		
Net surplus/(Deficiency)	**3**	**3**	**3**	**1**

Source: ACRP Report 113. Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.

4.4.3.2 Transient Aircraft

Transient pilots will typically park their aircraft on an apron adjacent to the general aviation terminal to use the terminal facilities and services provided by the terminal or FBO. To calculate the required apron space for transient aircraft, the following has been assumed:

- Transient will arrive and depart the same day,
- 82 percent of ADPM operations are by transient aircraft. See **Section 3.3.1, *Aircraft Operations*** for percentage of operations by transient aircraft. ADPM operations are per **Table 4.7**,
- 90 percent of ADPM transient arrivals (operations divided by 2) require parking on the transient apron,
- 40 percent of the ADPM transient arrivals will be on the ground at the same time requiring parking,
- The fleet mix of transient aircraft is assumed to be equal to the overall operational fleet mix per **Table 3.3** and is 70 percent single-engine piston, 1 percent multi-engine piston, 6 percent turboprop, 0 percent jet, and 24 percent rotorcraft,
- 400 square yards are required per tie-down or parking space for single-engine piston aircraft,
- 650 square yards are required per tie-down or parking space for multi-engine piston aircraft, and
- 850 square yards are required per parking space for turboprop aircraft, jet aircraft, and rotorcraft.

Table 4.11 summarizes the transient apron parking requirements.

Table 4.11 - Transient Aircraft Apron Space Requirement

Item	Base Year	PAL 1	PAL 2	PAL 3
ADPM Operations	43	47	52	63
ADPM Transient Arrivals (82%)	17	19	21	26
ADPM Transient Arrivals Requiring Parking (90%)	16	17	19	23
ADPM Transient Parking Demand (40%)	6	7	8	9
ADPM Transient Parking Demand (sy)	**3,364**	**3,715**	**4,101**	**4,999**
Existing Transient Parking Capacity (sy)		4,500		
Net surplus/(Deficiency) (sy)	**1,136**	**785**	**399**	**(499)**

Source: ACRP Report 113. Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.

The assumption that only 90 percent of transient aircraft require parking excludes the 10 percent of aircraft and pilots that will depart immediately after landing (note: touch and goes are not allowed at GWS) or only use the fueling ramp. The assumption that 40 percent of arrivals will require parking simultaneously accounts for the distribution of arrivals and departures within the ADPM.

4.4.4 Aircraft Servicing & Maintenance Facilities

Aircraft Repair LLC is a FAA Licensed Mechanics that provides airframe and powerplant inspection, diagnostic, maintenance, and repair services to based and transient aircraft at GWS. Aircraft Repair LLC currently owns and operates out of Facility No. 11, a 60 feet x 60 feet box hangar that offers 3,600 square feet of hangar floor and shop space for maintenance activities. A 1,500 square yard asphalt apron and a mobile trailer complement the maintenance facility. This level of aircraft maintenance service is exceptional and must be retained.

As mentioned in **Section 2.4.5, *Airport Access & Parking*** the South Bridge Project is expected to impact Facility No. 11 and demolition of the facility is anticipated in 2026. Relocation of the maintenance hangar prior to demolition is of paramount importance to the Airport and the business owner. A new facility must be constructed. Discussions with the business owner suggests that a larger facility would be preferred, potentially a new 80 feet x 80 feet hangar with a lean-to side building for office and shop space. The development plan will identify a preferred location for the new aircraft maintenance hangar.

4.4.5 Automobile Parking & Airport Access

Automobile parking for hangar and terminal facilities should be integral to the planning and design of each of the facilities. The number of parking spaces for private hangars are at the discretion of each owner. Based on the estimated number of ADPM and peak hour operations, a new 2,000 square foot GA terminal building should accommodate approximately 25 automobile parking stalls, including accessible stalls.

Good planning ensures that automobile parking avoids restricting future airfield development. Safety considerations should be part of the planning process, notably ensuring that no active airfield pavements are crossed by roads, that vehicles do not have to back out of the stall directly into a primary road, or that pedestrians do not have to cross a road to reach their destination. Providing adequate safe parking will also create a positive impression of the facility and create opportunities for landscaping.

The South Bridge Project will provide a new link across the Roaring Fork River from Airport Road to CO 82, greatly enhancing access to the Airport. While access from Airport Rd and Airport Center Rd is currently unpaved, the project will change the alignment and elevations of both roads, pave the roads, create a new intersection to the southeast of the Airport, and build a new span bridge across the river. The project is currently in the final stages of design and is targeting a start of construction in the Spring of 2026.

Currently, there are only two vehicle bridges and three pedestrian/bike bridges over the Roaring Fork River in Glenwood Springs. In addition to enhancing access to the Airport and the surrounding residential communities, the South Bridge Project will increase vehicular traffic near the Airport to and from CO 82, as well as pedestrian and bike traffic to and from the Rio Grande Trail. The additional traffic will provide opportunities for on-airport commercial land use development such as a restaurant, a coffee shop, or a community project such as an aircraft viewing park, potentially near a future GA terminal building.

4.5 Support Facilities Requirements

4.5.1 Aircraft Fuel Storage

Annual fuel flowage amounts were provided by Airport management for 2024. Fuel flowage figures were estimated for the peak month, assumed to represent 15 percent of the annual fuel flowage (same as the ratio of annal to peak month operations). An average fuel flowage per departure was subsequently calculated for AvGas and for Jet A fuel. This average fuel flowage per departure was held constant throughout the planning period to estimate future average daily flows. The forecast of aircraft operations by aircraft and engine type presented in **Table 3.3**, as well as the ratio of annal to peak month aircraft departures estimated at 15 percent, were used to determine the number of peak month departures by piston and turbine (including turboshaft) aircraft.

Results of the fuel storage requirements analysis are presented in **Table 4.12** and **Table 4.13**.

Table 4.12 - AvGas Fuel Storage Requirements

Item	Base Year	PAL 1	PAL 2	PAL 3
Peak Month Fuel Flow (gal)	2,980	-	-	-
Peak Month Piston Departures	452	499	551	672
Average Flow per Departure (gal)	6.59	6.59	6.59	6.59
Average Daily Piston Departures	15	17	18	22
Average Daily Flow (gal)	99	110	121	148
Storage Required for 30-day Supply (gal)	**2,980**	**3,290**	**3,633**	**4,428**
Existing Fuel Storage Capacity (gal)		12,000		
30-day Supply Net Surplus/(Deficiency) (gal)	**9,020**	**8,710**	**8,367**	**7,572**

Source: Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.

Table 4.13 - Jet A Fuel Storage Requirements

Item	Base Year	PAL 1	PAL 2	PAL 3
Peak Month Fuel Flow (gal)	3,390	-	-	-
Peak Month Turbine Departures	187	207	228	278
Average Flow per Departure (gal)	18.10	18.10	18.10	18.10
Average Daily Turbine Departures	6	7	8	9
Average Daily Flow (gal)	113	125	138	168
Storage Required for 30-day Supply (gal)	**3,390**	**3,743**	**4,133**	**5,038**
Existing Fuel Storage Capacity (gal)		12,000		
30-day Supply Net Surplus/(Deficiency) (gal)	**8,610**	**8,257**	**7,867**	**6,962**

Source: Dibble, July 2025 analysis. Numbers may not exactly add up due to rounding.

The Airport currently gets fuel deliveries on-call four to five times a year, for both types of aviation fuels, which amounts to about a delivery every other month. **Tables 4.12** and **4.13** suggest that the existing fuel tank capacities should remain adequate throughout the planning period.

4.5.2 Aircraft Rescue & Fire Fighting

The Airport is not a Part 139 Certificated Airport. Consequently, there are no requirements for ARFF. There is no fire station at the Airport.

The closest fire station is the Glenwood Springs Fire Department District Station 3, located 5 minutes away to the west off 4 Mile Road. Emergency vehicles may access the airfield in several locations on the east and west sides of the Airport. This level of emergency response availability should remain adequate throughout the planning period.

4.5.3 Aircraft Deicing Facilities

The Airport currently has no deicing facilities. According to NOAA NCEI data, the mean daily low temperature of the coldest month of the year (January) is 12.3°F and the average snowfall is 13.70 inches (See **Section 2.1.5, Local Setting & Meteorological Data**). Consequently, individual small aircraft owners based at the airport and storing their aircraft on the apron may need to use various mechanisms to remove contaminants from their aircraft after a snow or icing event. If used, small (negligible) amounts of deicing fluids may be drained into the stormwater system. Additionally, most operations at GWS are leisure and recreational flying which do not typically fly in IFR. While icing conditions regularly occur during the winter, there is no need for a specialized deicing pad for small aircraft.

4.5.4 Airport Maintenance Facilities

The Airport does not own any airport maintenance equipment. Airport maintenance is performed through in-kind services and/or on a voluntary basis by tenants using tenant-owned equipment that is stored in an open area on the Airport. Discussion with Airport management suggested that the Airport should own its own equipment (i.e., mowers, plows, building maintenance, etc.) in the future and store equipment in an airport-owned maintenance building/shack.

4.5.5 Airport Fencing & Security

There is no security or wildlife fencing around the airfield. Some adjacent properties have installed security or privacy fences around their own properties. There have been no safety or security concerns reported by airport users to date, consequently, no specific improvements are recommended.

As previously mentioned, the South Bridge Project is anticipated to generate an increase of vehicular traffic near the Airport to and from CO 82, as well as pedestrian and bike traffic to and from the Rio Grande Trail. While the additional pedestrian traffic is an opportunity for non-aeronautical, revenue generating facilities neat the south side of the airport, improvements such as a low-profile property fence or a security fence would prevent pedestrian to accidentally or purposedly wander onto airport property.

4.5.6 Utilities

Generally, Airport facilities have satisfactory utilities. Existing hangars are privately owned and upgrades to utilities are at the discretion of each hangar owner. Power, water, sanitary sewer, and natural gas main lines as well as fiber optic lines are available in the vicinity of the Airport.

The South Bridge Project is expected to expand utilities in the area along the extended alignments of Airport Rd and Airport Center Rd, completing a loop around the Airport. Utilities included in the project include:

- City of Glenwood Springs underground power, including new light poles along Airport Rd,
- City of Glenwood Springs water main lines, including new hydrant lines and hydrants,
- City of Glenwood Springs CBN fiber optic lines, and
- Black Hills Energy main gas lines,

The South Bridge Project does not include any new sanitary sewer lines.

Power, water, sanitary sewer, natural gas, and high-speed internet connections should be included in any new GA terminal building design. The Airport may need to continue using septic facilities if sanitary sewer is not available.

4.6 Land Acquisition

KGWS Sumers Airpark, the nonprofit organization operating and managing the Airport, is leasing land from the City of Glenwood Springs, the Airport Sponsor and landowner. The City has no intention of increasing the footprint of the Airport, partially because of off-airport residential encroachment. Additionally, the South Bridge Project is slated to reduce the footprint of the Airport. The area leased by KGWS Sumers Airpark will shrink accordingly and follow the new alignments of Airport Rd and Airport Center Rd. All future airport development will need to be contained within the leased area.

This ALP Update study included a survey to confirm the extents of existing City property as well as a result of survey that shows land currently leased by KGWS Sumers Airpark from the City of Glenwood Springs. The extents of City property as well as the area leased to KGWS Sumers Airpark will be shown on the ALP.

4.7 Summary of Facility Requirements

Table 4.14 presents a summary of the facility requirements and improvements throughout the planning period.

Table 4.14 - Summary of Facility Requirements

Item	Facility Requirements			
	Base Year	PAL 1	PAL 2	PAL 3
Airport Role				
NPIAS	Not included in NPIAS			
Airport Design Standards				
Critical Design Aircraft	Cessna 172 Skyhawk			
Runway Design Code (RDC)	A/B-I(S)-VIS			
Taxiway Design Group (TDG)	1A			
Airfield Facility Requirements				
Runway	Renumber ASAP. Assess impact of South Bridge		Widen to 60 feet. Add turf blast pads, shoulders	
Taxiways	Adequate. Develop taxiway and taxilanes as necessary			
Lighting, Markings, Signage	Adequate			
NAVAIDs and Visual Aids	Adequate. Replace Runway 32 PAPI-2L with LED when needed			
Terminal Area & Landside Facility Requirements				
GA Terminal Space (sf)	New 1,500 / 2,000 sf GA terminal building & automobile parking			
T-Hangar & Box Hangar (Unit)	+4	+19	+24	+35
Conventional Hangar Space (sf)	+7,000	+9,000	+16,000	+25,000
Apron Space (sy)	-	-	-	+500
Aircraft Maintenance	Provide replacement facility			
Support Facility Requirements				
Fuel Storage	Adequate. Relocate fuel farm with a new ga terminal building.			
Aircraft Rescue & Fire Fighting	Not Applicable			
Aircraft Deicing	None needed			
Airport Maintenance Facilities	Adequate. Consider airport-owned equipment and on-airport storage.			
Airport Fencing & Security	Adequate. Add fence around south side after completion of SB project			
Utilities	As Needed			
Land Acquisition				
Proposed Land Acquisition	None			
Proposed Easements	None			

Source: Dibble, July 2025 analysis.

Section 5 - Alternatives Development & Evaluation

This section presents the rationale behind the development of alternative options addressing the various recommendations that have been identified in **Section 4, *Demand/Capacity Analysis & Facility Requirements***. The preferred final development concept provides a cohesive framework that will bolster growth and ensure the sustainable development of facilities at the Airport. The goal of the alternative analysis is to present KGWS Sumers Airpark with alternative development options for consideration and provide a recommendation for preferred development. Primary objectives for all development concepts include maximizing the use of existing leased Airport property, mitigating the impacts of the South Bridge Project, maintaining safety levels, and providing facilities that can sustain long-term growth.

The areas of focus in this section include:

- **Main Airport Alternatives** - Provide alternatives for the development of runway and taxiway areas, safety areas and object free areas, runway protection zones, as well as visual aids and NAVAIDs, and approach minimums. This alternative also includes proposed general aviation hangar and aprons in straightforward areas that do not require further investigation.
- **Civil Air Patrol Site Alternatives** - This site is located between two hangars near an old Civil Air Patrol (CAP) building near midfield on the east side of the runway and was further examined separately because of the size of the area and the various possibilities for hangar development. These sub-alternatives provide options for the development of new general aviation hangars.
- **Rodeo Grounds Site Alternatives** - This site is located in the southwest quarter of the airport and was further examined separately because of the size of the area. These sub-alternatives provide options for the development of based and transient general aviation facilities such as terminal (FBO) facilities, hangars, apron space, aircraft maintenance space, fuel farm, and airport access and parking.

The final development plan, consisting of all preferred alternatives as well as any land acquisition required to enable proposed development, will be incorporated into the ALP.

As specified in **Section 4, *Demand/Capacity Analysis & Facility Requirements*** proposed development will be shown either as *Future* or *Ultimate*. *Future* development is any proposed development that is justified by the forecast and expected to occur within the 20-year planning period (or within the demand levels of the PALs). *Ultimate* development is any proposed development that is anticipated to occur beyond that timeframe.

5.1 Alternatives Development, Evaluation, & Selection Process

The development, evaluation, and selection of alternatives for the GWS ALP Update was an iterative process that involved several review meetings between the planning team, KGWS Sumers Airpark, airport tenants, and the City of Glenwood Springs. Given the tight timeline dictated by the South Bridge project - which was the primary trigger for this ALP Update - the alternative development process initially focused on finding a suitable new location for those hangar facilities impacted by the roadway realignments. Special attention was also given to the location of the Runway 32 (33) threshold and its proximity to a future embankment. Once these facilities were evaluated, proposed development options were investigated for the remainder of the airport.

An initial set of alternatives was developed and presented to KGWS Sumers Airpark for review and input. Alternatives were then either discarded or refined into the alternatives presented in this Section. This set of initial alternatives is not further discussed herein but graphics are included for reference in **Appendix H, *Initial Development Alternatives***.

Refined Alternatives were reviewed by the Airport in September 2025 and were presented to the PAC at the PAC Meeting No. 2 on October 2, 2025. Input and recommendations from the PAC were incorporated into the refined alternatives, and a preferred alternative was selected by the Airport after third round of review in October 2025. Adjustments were made to the preferred Rodeo Grounds Site Alternative in November 2025 for those facilities that are to be relocated in 2026.

While master planning efforts typically ensure that proposed development is flexible, a specific layout is still represented on the ALP. Development of GA facilities such as aprons and hangars is always subject to actual demand and the proposed layout shown on the ALP may be adjusted as necessary to fit the needs of a particular tenant. While the general concept may remain the same, sizes of individual plots, hangars, and aprons may vary as needed.

5.2 Main Airport & CAP Site Alternatives

Two main airport alternatives were developed and presented to the Airport for review. Alternatives seek to maximize the use of space and address impacts caused by realigned roads in the South Bridge Project. Generally, airfield facilities are designed using the modified standards defined in **Table 4.3** and **Table 4.4**, which are a derivative of AAC A/B, ADG I, and TDG 1A.

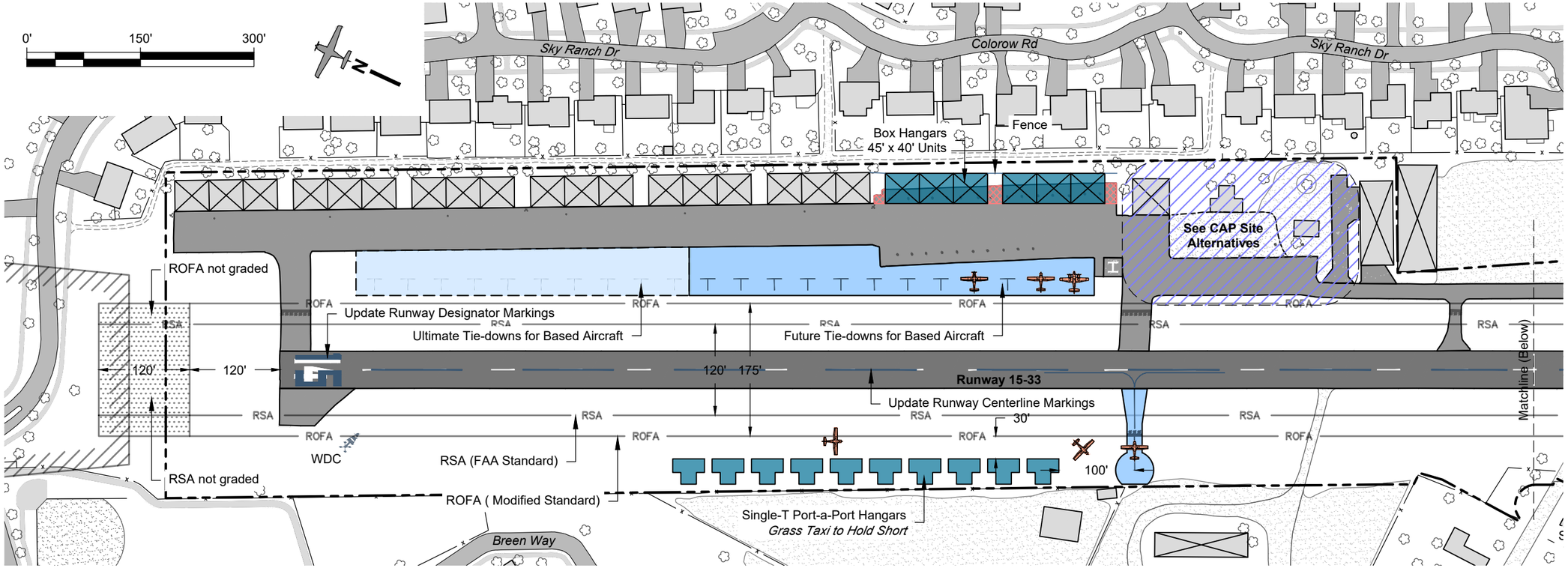
The two concepts were refined after review of initial options presented to the Airport. The initial set of main alternatives included an option to shorten the runway to enable a standard RSA prior to the Runway 14 (15) threshold. This specific option was discarded but is attached in **Appendix H**.

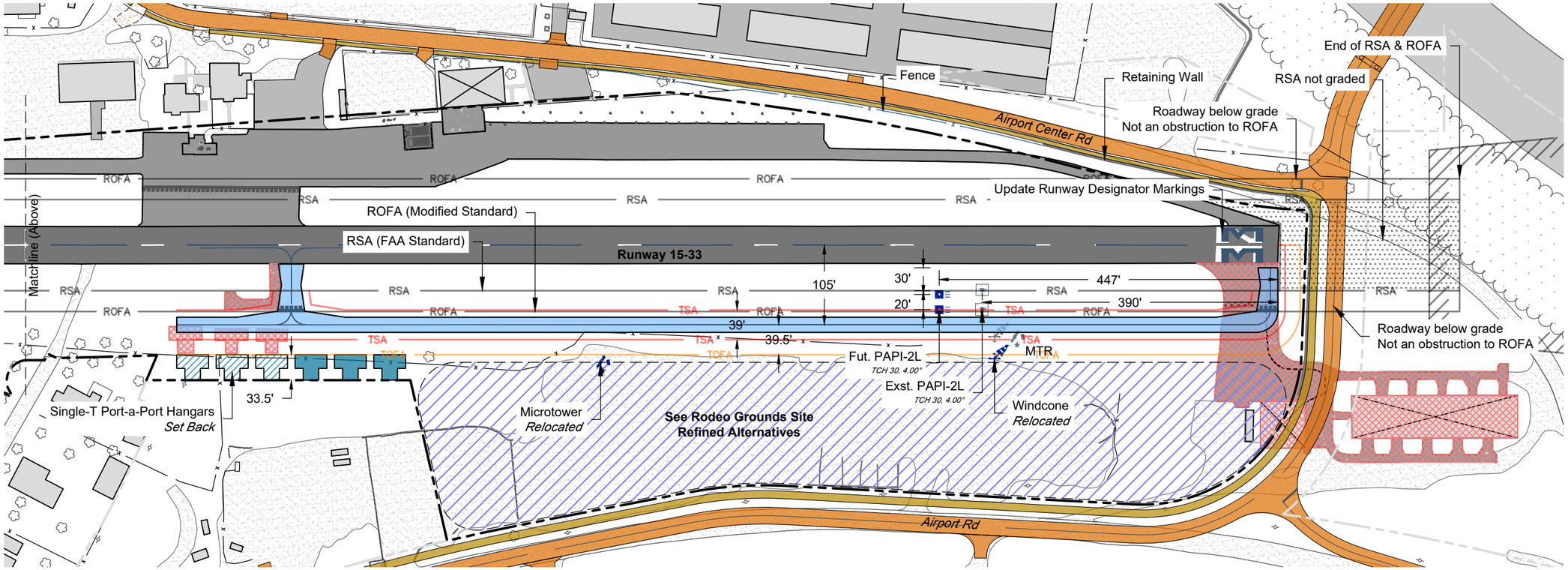
Main Airport Alternative 1 - No Improvements to Runway

In this alternative, the existing runway length and width are maintained and no improvements to the RSA or to existing facilities on the east side of the runway are proposed:

- Update runway designator markings, centerline markings,
- New LED PAPI-2L, adjust/confirm position for TCH 30 feet, GPA 4.00°,
- Relocate MicroTower system, Runway 32 (33) wind cone,
- GA facilities north ramp:
  - Improve and expand tie-downs northward along the taxilane across from existing box hangars (gain of 7 tie downs + 10 ultimate tie downs),
  - Two 3-Unit 45 feet x 40 feet box hangars (loss of 7 tie downs),
- GA facilities west side:
  - New row (10 hangars shown) of Single-T Port-a-Port hangars with grass taxi to a paved hold short taxiway stub,
  - Three new Single-T Port-a-Port hangars near existing row,
- Security/property fence improvements on south side of airfield, and
- West side taxiway for Rodeo Grounds site. See Rodeo Grounds Site Concepts 1, 2, and 3 below.

The Main Airport Alternative 1 is presented on **Figure 5.1**.





DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

Notes:

- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.1 - Refined Main Alternative 1 - No Improvements

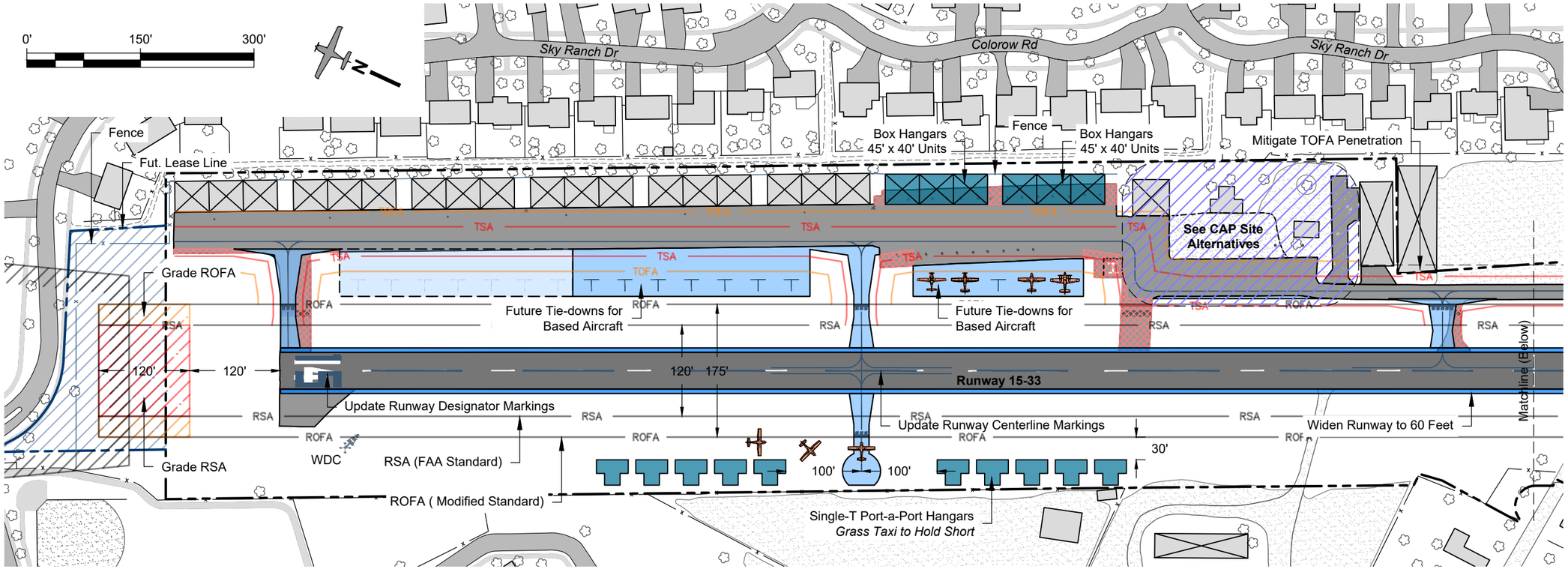
K:\2025\1325662.GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 5.1 - Refined Main Alternative 1.dwg

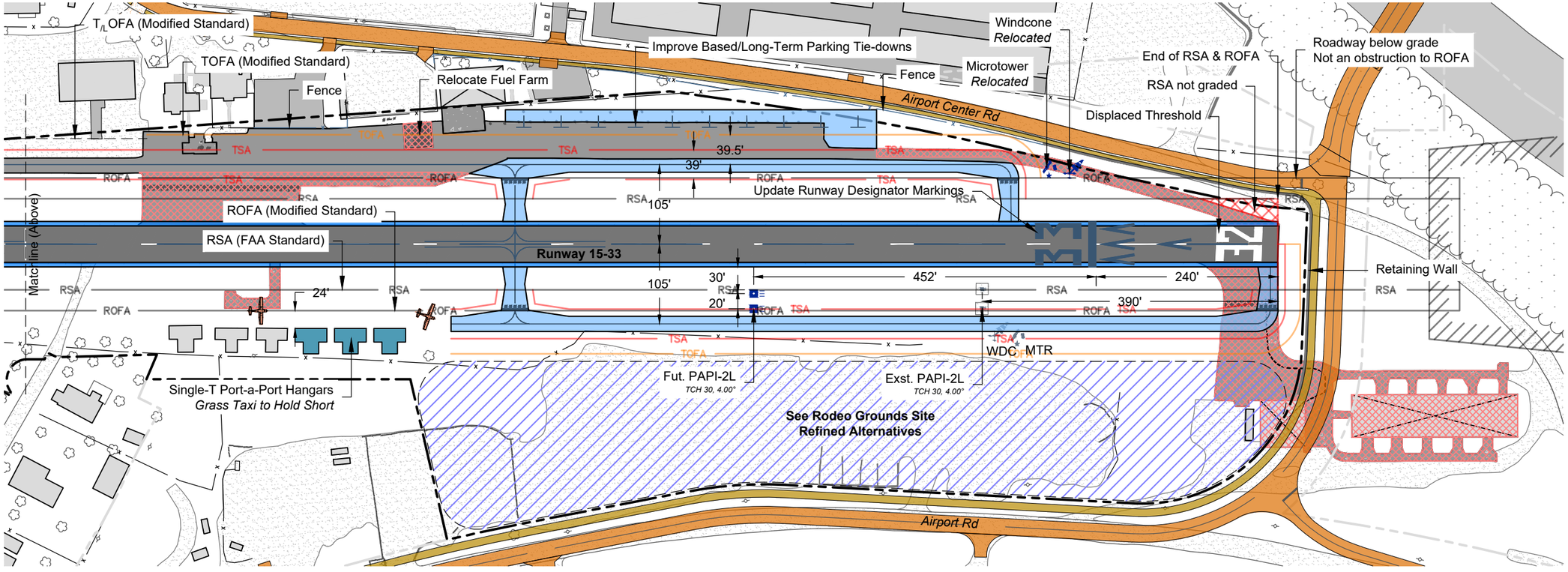
Main Airport Alternative 2 - Displaced Threshold

In this alternative, the existing runway length is maintained but the Runway 32 (33) threshold is displaced by 240 feet to accommodate the RSA prior to the threshold. Sone portion of the RSA remains ungraded on the east side of the runway. This alternative also includes improvements to existing facilities on the east side of the runway:

- Displace Runway 32 (33) threshold by 240 feet, Landing Distance Available (LDA) shortened to 3,070 feet,
- Widen Runway 14-32 (15-33) from 50 feet to 60 feet,
- Grade Runway 14 (15) RSA and ROFA beyond the runway end for an additional 120 feet (requires land acquisition by City),
- Update runway designator markings, centerline markings, install displaced threshold markings,
- New LED PAPI-2L, TCH 30 feet, GPA 4.00°, update location based on new threshold,
- Relocate MicroTower system, Runway 32 (33) wind cone,
- Improve aircraft circulation on east side taxiway, improved and straightened taxiway stubs,
- GA facilities north ramp:
  - Improve and expand tie-downs northward along the taxilane across from existing box hangars (gain of 7 tie downs + 7 ultimate tie downs),
  - Two 3-Unit 45 feet x 40 feet box hangars (loss of 7 tie downs),
- GA facilities west side:
  - New row (10 hangars shown) of Single-T Port-a-Port hangars with grass taxi to a paved hold short taxiway stub,
  - Three new Single-T Port-a-Port hangars near existing row,
- GA facilities midfield ramp:
  - Remove connection between ramp and runway,
  - Relocate fuel farm to Rodeo Grounds Site,
- Improve and pave southeast ramp (based/long term parking apron, loss of 1 tie down),
- Security/property fence improvements around the airfield, and
- West side taxiway for Rodeo Grounds site. See Rodeo Grounds Site Concepts 1, 2, and 3 below.

The Main Airport Alternative 2 is presented on **Figure 5.2**.





DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Future Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

Notes:

- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.2 - Refined Main
Alternative 2 - Disp. Threshold

K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 5.2 - Refined Main Alternative 2.dwg

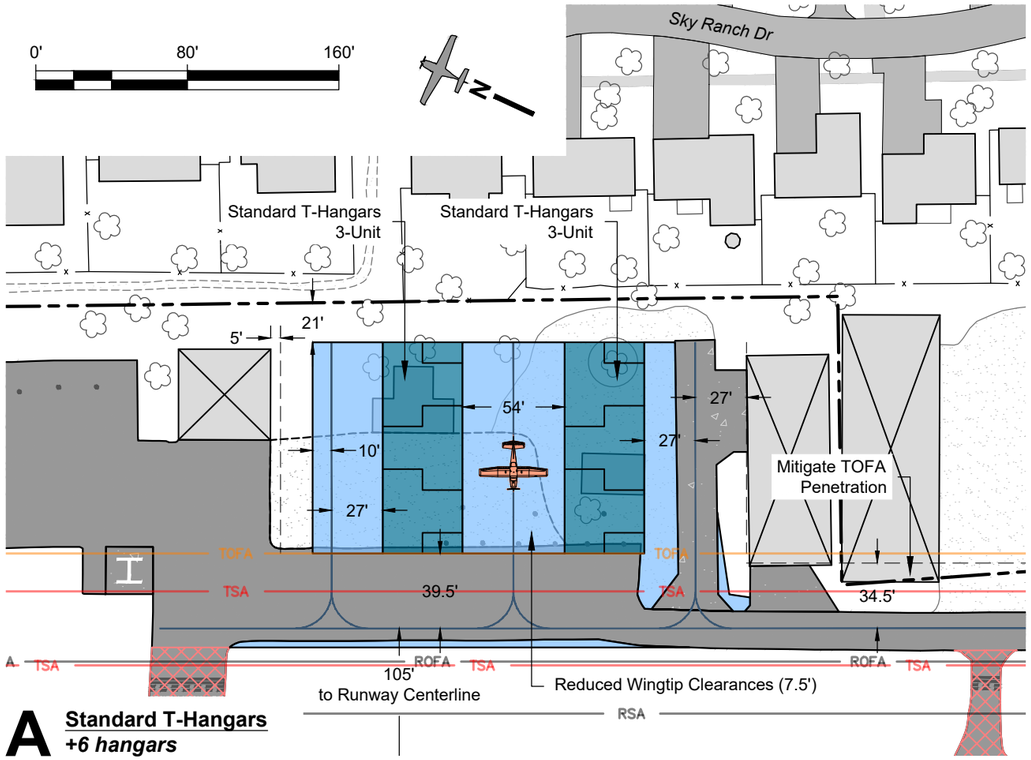
CAP Site Alternatives

Six alternatives were developed for the CAP Site. The objective was to provide options for hangar versus tiedown storage and considered noise impacts to neighboring residential areas during runup and taxi. The following alternatives were considered:

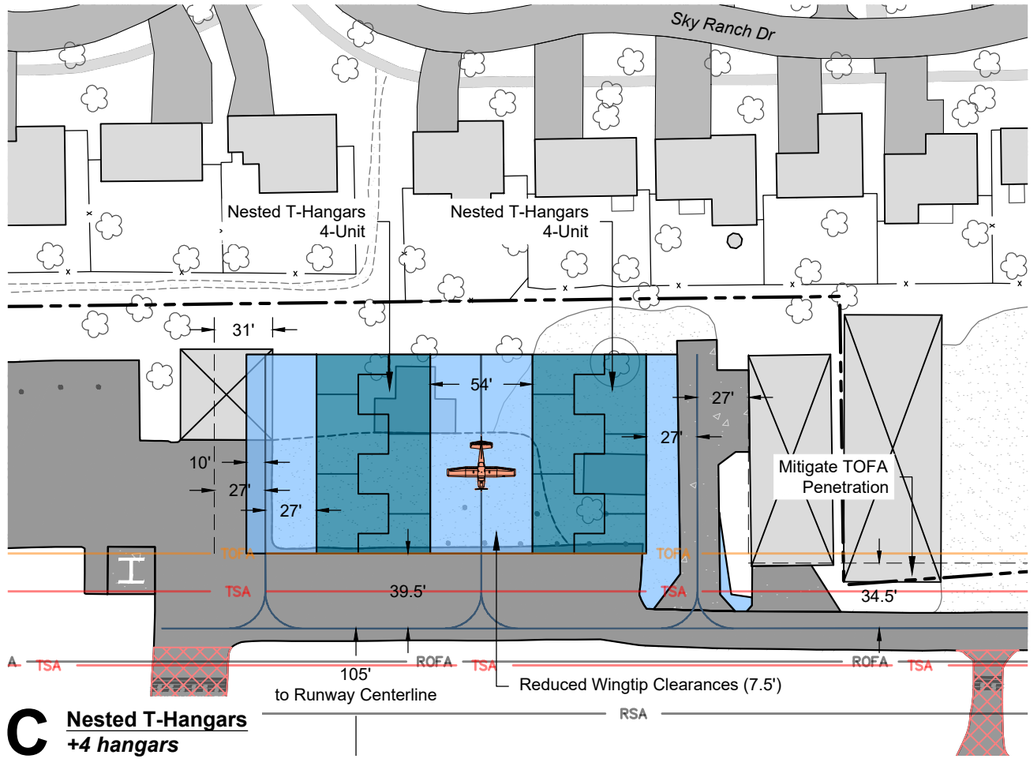
- Alternative A: Two standard 3-Unit T-hangars. This alternative provides 6 new aircraft storage units.
- Alternative B: One 4-nit box hangar and five tie-downs. This alternative provides 9 new aircraft storage units/tie-downs. This alternative provides the most aircraft storage, provides a man-made noise barrier to a residential neighborhood, and continues the current pattern of box hangars.
- Alternative C: Two nested 4-Unit T-hangars. This alternative provides 8 new aircraft storage units. This alternative encroaches into an existing hangar to the north.
- Alternative D: One 2-Unit box hangar & one nested 4-Unit T-hangar. This alternative provides 6 new aircraft storage units.
- Alternative E: One 4-Unit box hangar & one standard 4-Unit T-hangar. This alternative provides 8 new aircraft storage units. This alternative encroaches on the setback from the leasing line.
- Alternative F: One nested 8-Unit T-hangar. This alternative provides 8 new aircraft storage units.

The CAP Site alternatives are presented on **Figure 5.3** and **Figure 5.4**. After review and evaluation, Alternative B was selected as the preferred CAP Site Alternative.

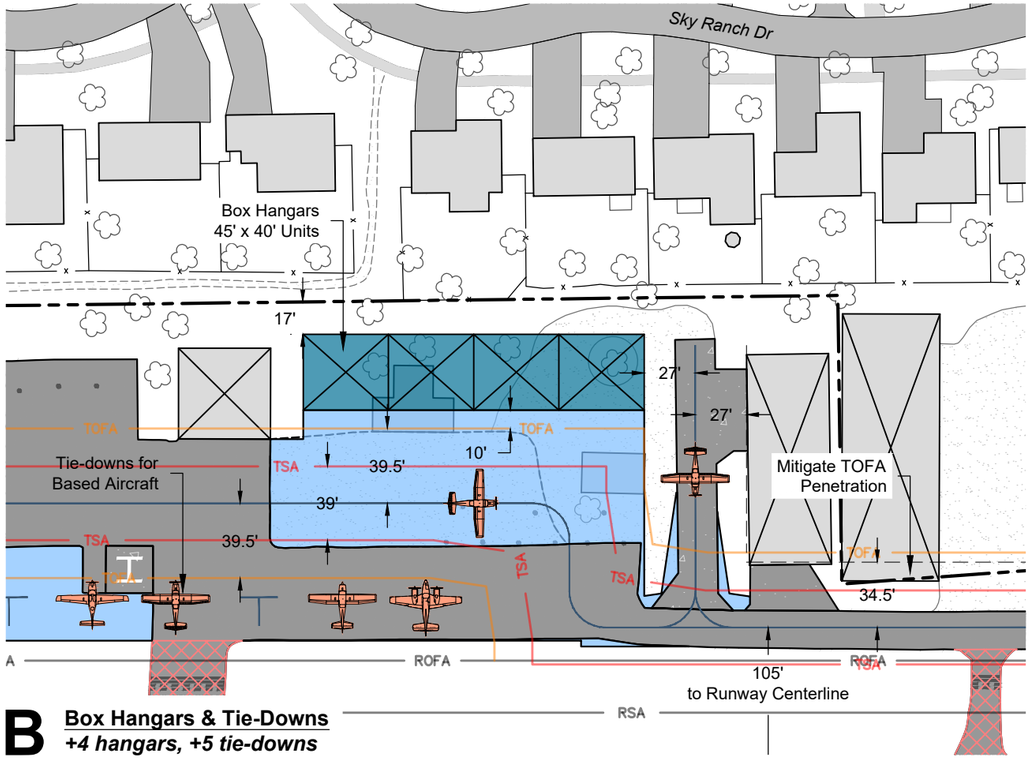
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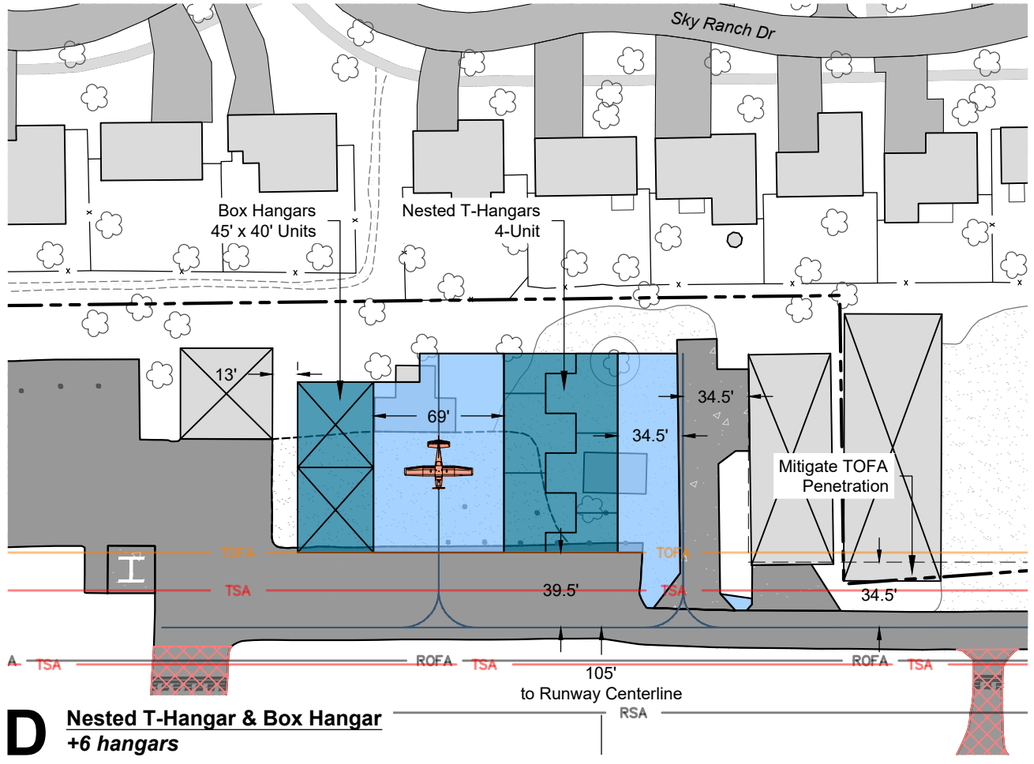
A **Standard T-Hangars**
+6 hangars



C **Nested T-Hangars**
+4 hangars



B **Box Hangars & Tie-Downs**
+4 hangars, +5 tie-downs



D **Nested T-Hangar & Box Hangar**
+6 hangars

DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Future Lease Line
- RSA — Existing RSA (Strd)
- ROFA — Existing ROFA (Mod.)
- TSA — Future TSA (Mod.)
- TOFA — Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

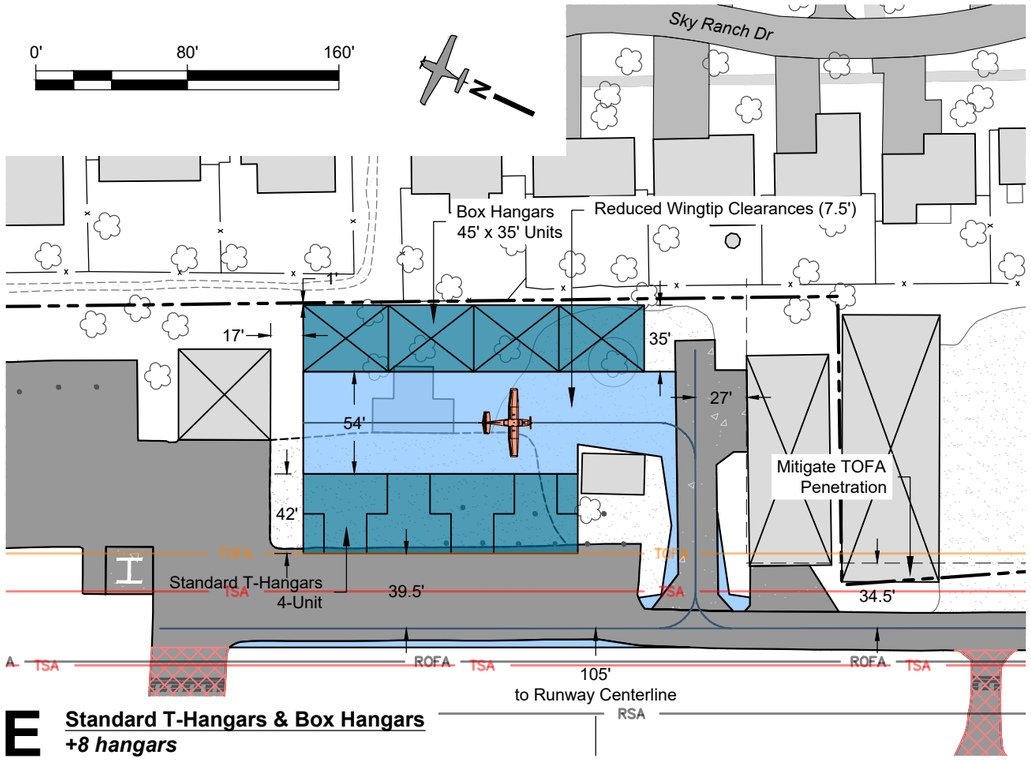
Notes:

- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

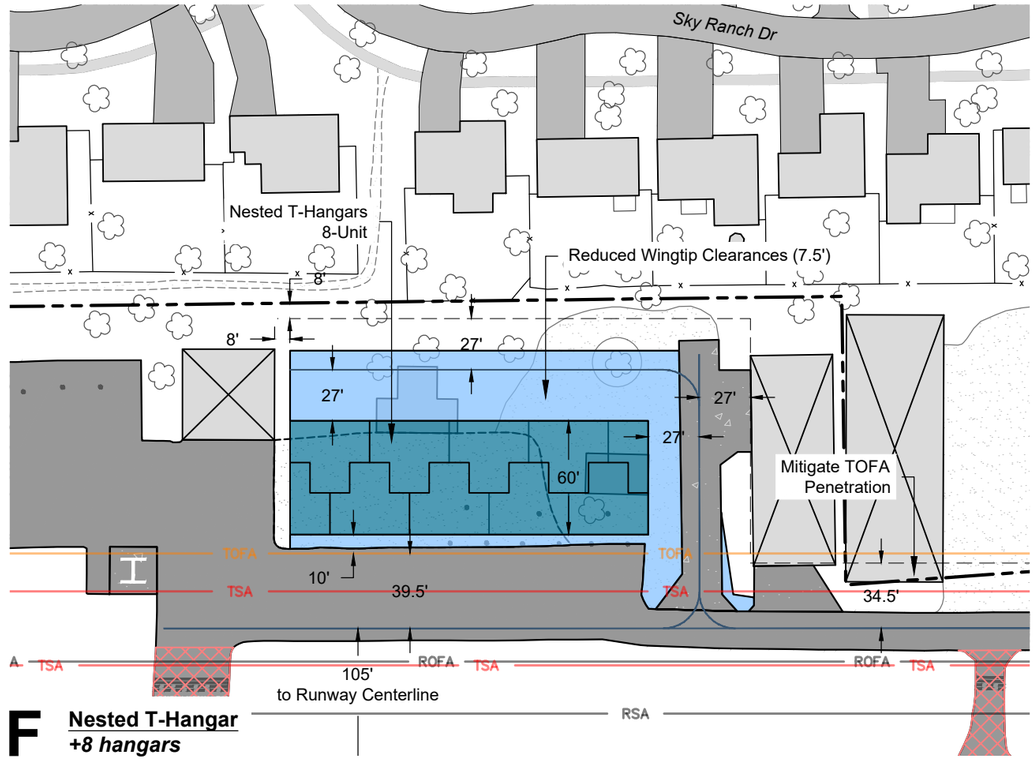
Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.3 - Refined CAP Site Alternatives A, B, C & D

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E **Standard T-Hangars & Box Hangars**
+8 hangars



F **Nested T-Hangar**
+8 hangars

Blank

Blank

DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Future Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

Notes:

- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

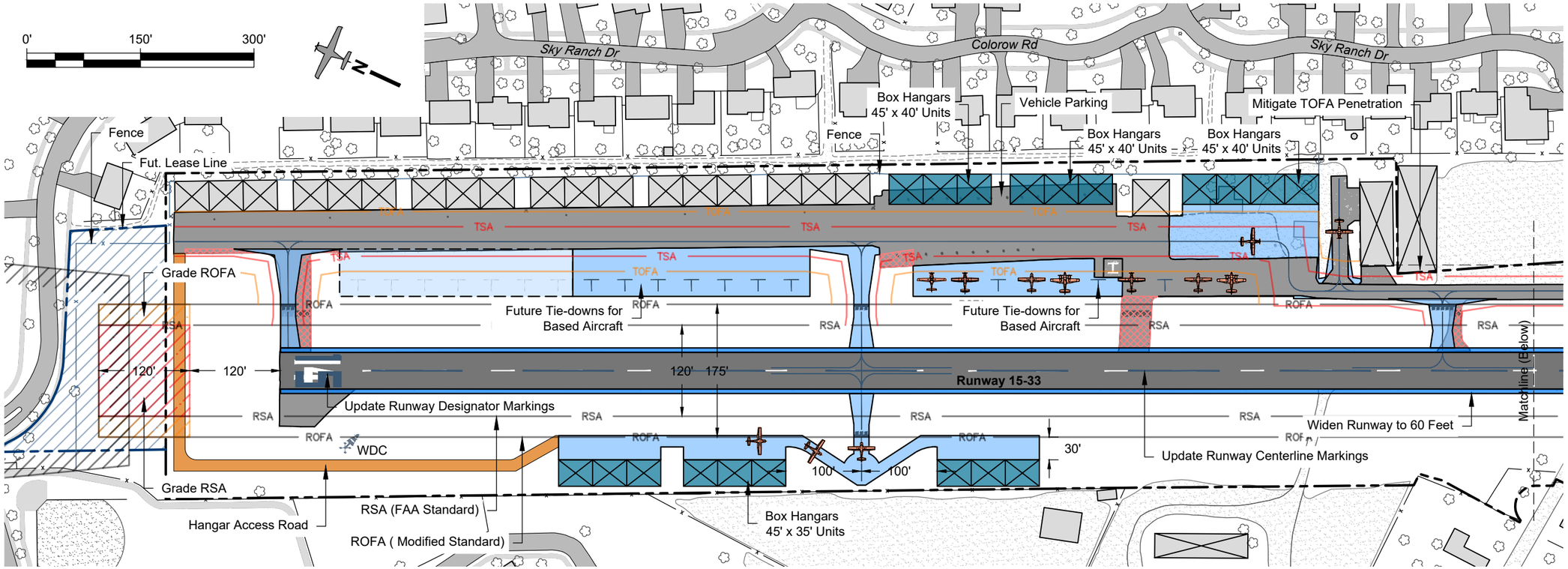
KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.4 - Refined CAP Site Alternatives E & F

K:\2025\135962 GWS ALP Update & Narrative Reports\5 - AutoCAD\3 - Exhibits\Figure 5.4 - Refined CAP Site Alternatives 2.dwg

Preferred Main & CAP Site Alternative - Improvements to Runway & No Displaced Threshold

After review and evaluation, a combination of both alternatives was selected as the preferred Main Airport Alternative. The preferred alternative mostly takes away from Alternative 2, but no displaced threshold is recommended, similar to Alternative 1. The preferred Main Airport Alternative is presented on **Figure 5.5** and will be incorporated into the ALP. The preferred CAP Site Alternative is also incorporated on **Figure 5.5**. The preferred alternative retains the following:

- Existing runway length is maintained, no displaced threshold,
- Widen Runway 14-32 (15-33) from 50 feet to 60 feet,
- Grade Runway 14 (15) RSA and ROFA beyond the runway end for an additional 120 feet (requires land acquisition by City),
- Update runway designator markings, centerline markings,
- New LED PAPI-2L, adjust/confirm position for TCH 30 feet, GPA 4.00°,
- Relocate MicroTower system, Runway 32 (33) wind cone,
- Improve aircraft circulation on east side taxiway, improved and straightened taxiway stubs,
- GA facilities north ramp:
    - Improve and expand tie-downs northward along the taxilane across from existing box hangars (gain of 12 tie downs + 7 ultimate tie downs),
    - Two 3-Unit 45 feet x 40 feet box hangars (loss of 7 tie downs),
    - One 4-Unit 45 feet x 40 box hangar (CAP Site),
- GA facilities west side:
    - Three 3-Unit 45 feet x 35 feet box hangars with small paved taxilane to a paved hold short taxiway stub,
    - One 3-Unit 45 feet x 35 feet box hangar near existing row with small paved taxilane to the future parallel taxiway on the west side,
    - Access road around the Runway 14 (15) end through the RSA to access new hangars,
- GA facilities midfield ramp:
    - Remove connection between ramp and runway,
    - Relocate fuel farm to Rodeo Grounds Site,
- Improve and pave southeast ramp (based/long term parking apron, loss of 1 tie down),
- Security/property fence improvements around the airfield, and
- West side taxiway for Rodeo Grounds site. See Rodeo Grounds Site Concepts 1, 2, and 3 below.



DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Future Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

Notes:

- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.5 - Preferred Main Alternative - No Disp. Threshold

K:\2025\1325962 GWS ALP Update & Narrative Report\5 - AutoCAD\5 - Exhibits\Figure 5.5 - Preferred Main Alternative.dwg

5.3 Rodeo Grounds Site Alternatives

In addition to the main airport alternatives, four alternatives were developed for an area in the southwest quadrant of the airport. Because this area contains former rodeo grounds, it has been nicknamed the Rodeo Grounds Site for continuity. This site is important for the development of the Airport as it is the last "green" site available for aeronautical development. Additionally, it is located along the existing and future alignments of Airport Road, with direct access to CO 82 after completion of the South Bridge Project, which would enable better access to Airport facilities overall. Consequently, this area is prime for future transient traffic facilities such as a new GA terminal (FBO) facility, a transient apron, the fuel farm, the maintenance hangar, as well as corporate hangars. All alternatives were evaluated for fuel delivery truck access from Airport Road to the relocated fuel farm assuming an 18-wheeler tractor and trailer.

As for main airport alternatives, Rodeo Grounds site alternatives seek to maximize the use of space and address impacts caused by realigned roads in the South Bridge Project. Generally, airfield facilities are designed using the modified standards defined in **Table 4.3** and **Table 4.4**, which are a derivative of AAC A/B, ADG I, and TDG 1A.

The four concepts were refined after review of initial options presented to the Airport. The initial set of main alternatives included a total of six options that presented various concepts for access to the parcel and the location of the future GA terminal (FBO). All six initial alternatives are attached in **Appendix H**.

Rodeo Grounds Site Alternative 1A - GA Terminal North of Site

In this alternative, the new GA terminal building is located to the north of the site along with parking and the site access drive:

- New site enabled by a new retaining wall (not included in South Bridge Project),
- New 2,000 square feet GA terminal/FBO building at north of site,
- New access driveway to terminal (24 feet) with longitudinal grade approximately 10 percent (maximum allowed, dependent on final design grades),
- New parking, pick-up/drop/off lane, and turn around area.
- New access drive to hangar facilities (24 feet) at back of site,
- New ADG I transient apron with 12 parking stalls/tie downs, perpendicular to runway/prevalent wind,
- Pull-up apron space for two aircraft,
- One 70 feet x 50 feet (+ 3,500 square feet) transient hangar operated by the Airport,
- One 80 feet x 80 feet (+ 6,400 square feet) maintenance hangar with dedicated access taxilane, apron space for storing up to six aircraft, and auto parking,
- Four 60 feet x 60 individual box hangars (+ 14,400 square feet) with two tie downs,
- Relocated fuel farm, fueling aircraft located withing a low usage taxilane, and a concrete helipad for heavy transient helicopters,
- One 400 square feet airport maintenance building to house mowers, plows, etc...., and
- Security/property fence improvements around the site, gated access.

The Rodeo Grounds Site Alternative 1A is presented on **Figure 5.6**.

Rodeo Grounds Site Alternative 1B - GA Terminal North of Site

This alternative is similar to Alternative 1A, to the exception of the following:

- ADG I transient apron is shrunk with only six parking stalls/tie downs,
- Only two 60 feet x 60 individual box hangars (+ 7,200 square feet) with two tie downs,
- One 3-Unit 45 feet x 40 feet box hangar (+ 5,400 square feet), and
- One 6-Unit nested T-hangar.

The Rodeo Grounds Site Alternative 1B is presented on **Figure 5.7**.

Rodeo Grounds Site Alternative 2 - GA Terminal Middle of Site

In this alternative, the new GA terminal building is located to the middle of the site along with parking and the site access drive:

- New site enabled by a new retaining wall (not included in South Bridge Project),
- New 2,000 square feet GA terminal/FBO building near middle of site,
- New access driveway to terminal (24 feet) with longitudinal grade approximately 10 percent (maximum allowed, dependent on final design grades),
- New parking, pick-up/drop/off lane, and turn around area.
- New access drive to hangar facilities to the north (24 feet) at back of site,
- New ADG I transient apron with five parking stalls/tie downs,
- Pull-up apron space for two aircraft,
- One 70 feet x 60 feet (+ 4,200 square feet) transient hangar operated by the Airport,
- One 80 feet x 80 feet (+ 6,400 square feet) maintenance hangar with dedicated access taxilane, apron space for storing up to six aircraft, and auto parking,
- Two 3-Unit 45 feet x 40 feet box hangars (+ 10,800 square feet),
- One 8-Unit nested T-hangar,
- Two 60 feet x 60 individual box hangars (+ 7,200 square feet) with two tie downs,
- Relocated fuel farm, fueling aircraft located withing a low usage taxilane, and a concrete helipad for heavy transient helicopters,
- One 400 square feet airport maintenance building to house mowers, plows, etc...., and
- Security/property fence improvements around the site, gated access

The Rodeo Grounds Site Alternative 2 is presented on **Figure 5.8**.

Rodeo Grounds Site Alternative 3 - GA Terminal Middle of Site

This alternative is similar to Alternative 2, to the exception of the following:

- Only one 3-Unit 45 feet x 40 feet box hangar (+ 5,400 square feet), and
- Two 6-Unit nested T-hangar.

The Rodeo Grounds Site Alternative 3 is presented on **Figure 5.9**.

Preferred Rodeo Grounds Site Alternative

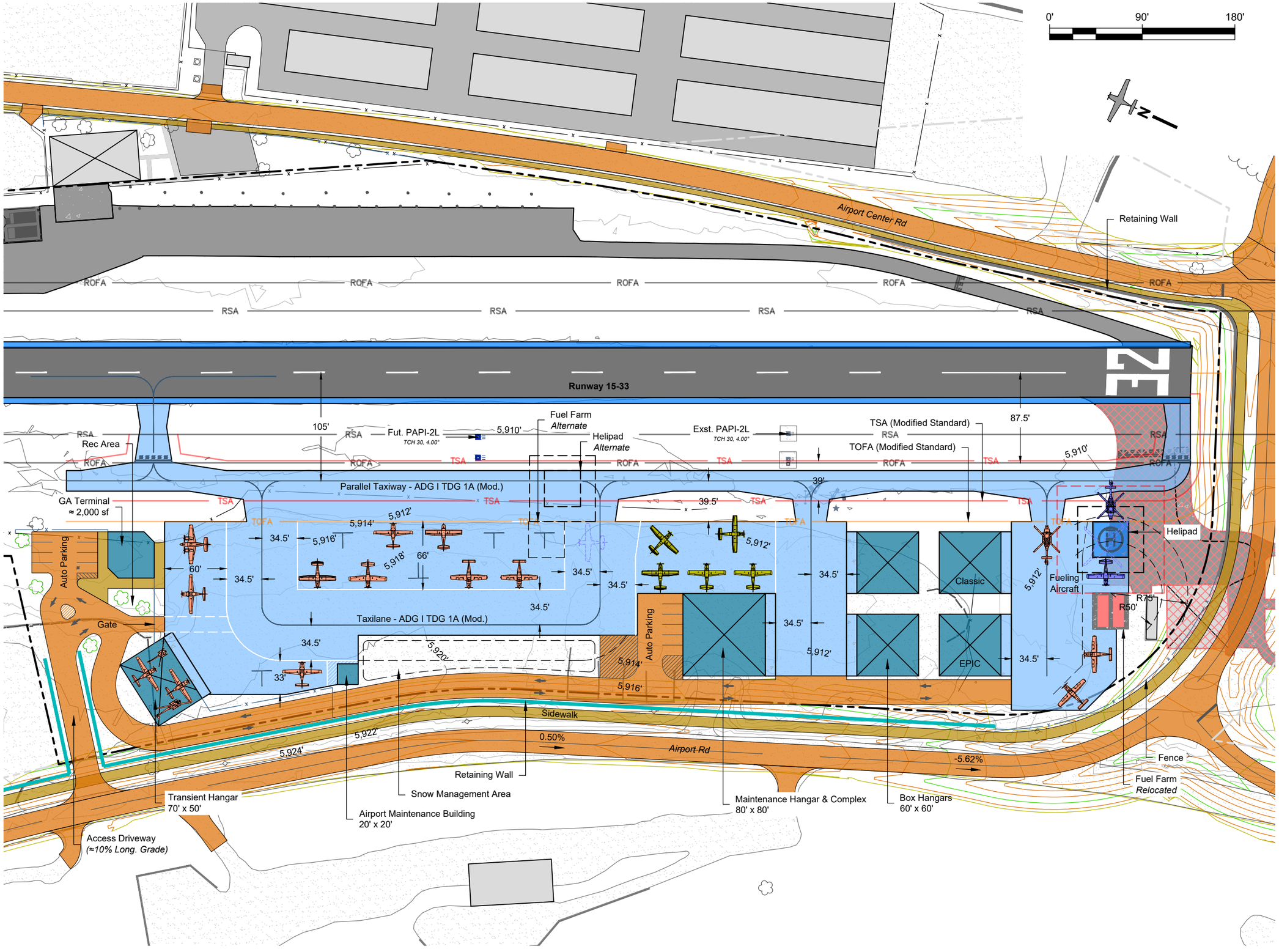
After review and evaluation, a blend of several alternatives was adopted as the preferred Rodeo Grounds site alternative. The preferred alternative mostly takes away from Alternative 3, but a larger apron that provides nine parking stalls/tie downs was preferred, similar to Alternative 1. Corporate box hangars are located directly north of the future GA terminal (FBO), the maintenance hangar is located at the north of the site with a dedicated apron that can store up to seven aircraft, and a 10-Unit T-hangar was placed between the maintenance and corporate hangars. Additionally, this alternative does not require a retaining wall for facilities north of the FBO. A retaining wall would still be required to enable the transient facilities and apron south of the terminal.

Additional room was allocated near the fuel farm for fueling aircraft and queuing aircraft. Special attention was given to the separation of rotorcraft and fixed wing aircraft, with AvGas and Jet A dispensers located on opposite sides of the fuel farm for better segregation. In this layout, a heavy rotorcraft can land and refuel, takeoff while piston planes are refueling and queuing on the other side of the fuel farm. Additionally, the fuel farm is now located on the main apron, which provides enhanced awareness to transient aircraft, and an easier walk to the GA terminal building (FBO). The preferred Rodeo Grounds site Alternative is presented on **Figure 5.10** and will be incorporated into the ALP

5.4 Final Preferred Concept

Additional changes were made to the preferred alternative in May 2026. Those changes are reflected in **Section 6, *Implementation Plan***, on **Figure 6.1** on Page 6-12, and on the ALP. The changes include:

- Adjust proposed lease line between airport and city yard on west side to 150 feet from centerline, other bearing to coke oven remains identical,
- Adjust all proposed development to remain beyond the setbacks for City zoning Light Industrial (I1), i.e. 20 feet front setback and 10 feet side and rear setbacks. In particular, the layout of the new Southwest Ramp was adjusted slightly to fit,
- Adjust the location of proposed connectors Taxiway A3 and Taxiway A4 to the location of existing connectors,
- Fill west side of North Ramp with future tie-downs,
- Specify the need to relocate an existing hydrant water line in front of proposed box hangars on Northwest Ramp,
- Replace proposed box hangars on west side near existing Single-T Port-a-Port Hangars with additional Single-T Port-a-Port Hangars, and
- Remove specific layout for proposed northwest hangars, replace with “Reserved Ultimate Hangar Development”.



K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.6 - Refined Rodeo Grounds Site Alternative 1A.dwg

DIBBLE

Legend:

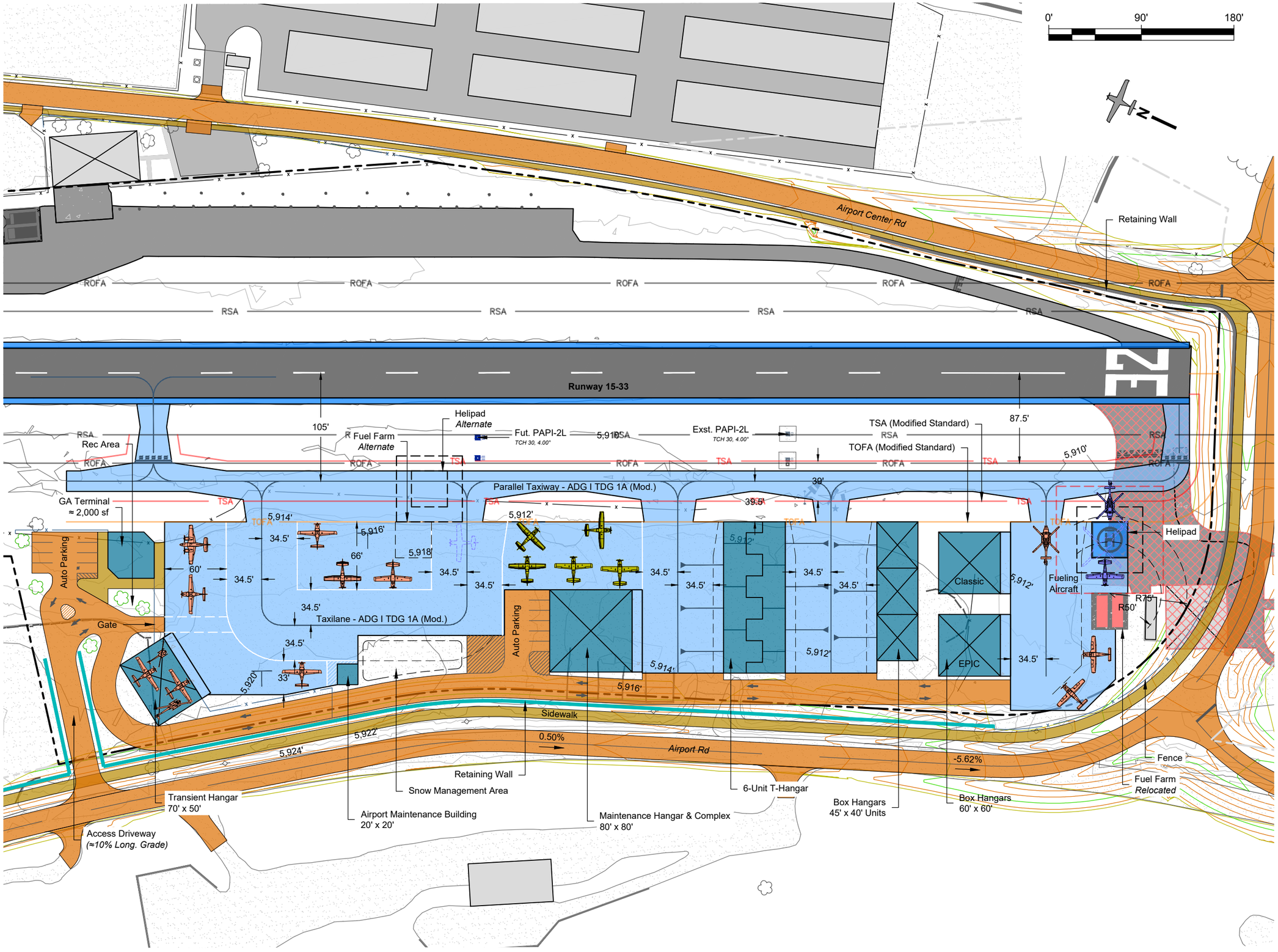
- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

Notes:

- Tie-down Design Aircraft
  (Transient Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 10'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.6 - Refined Rodeo Grounds Site Alternative 1A



DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

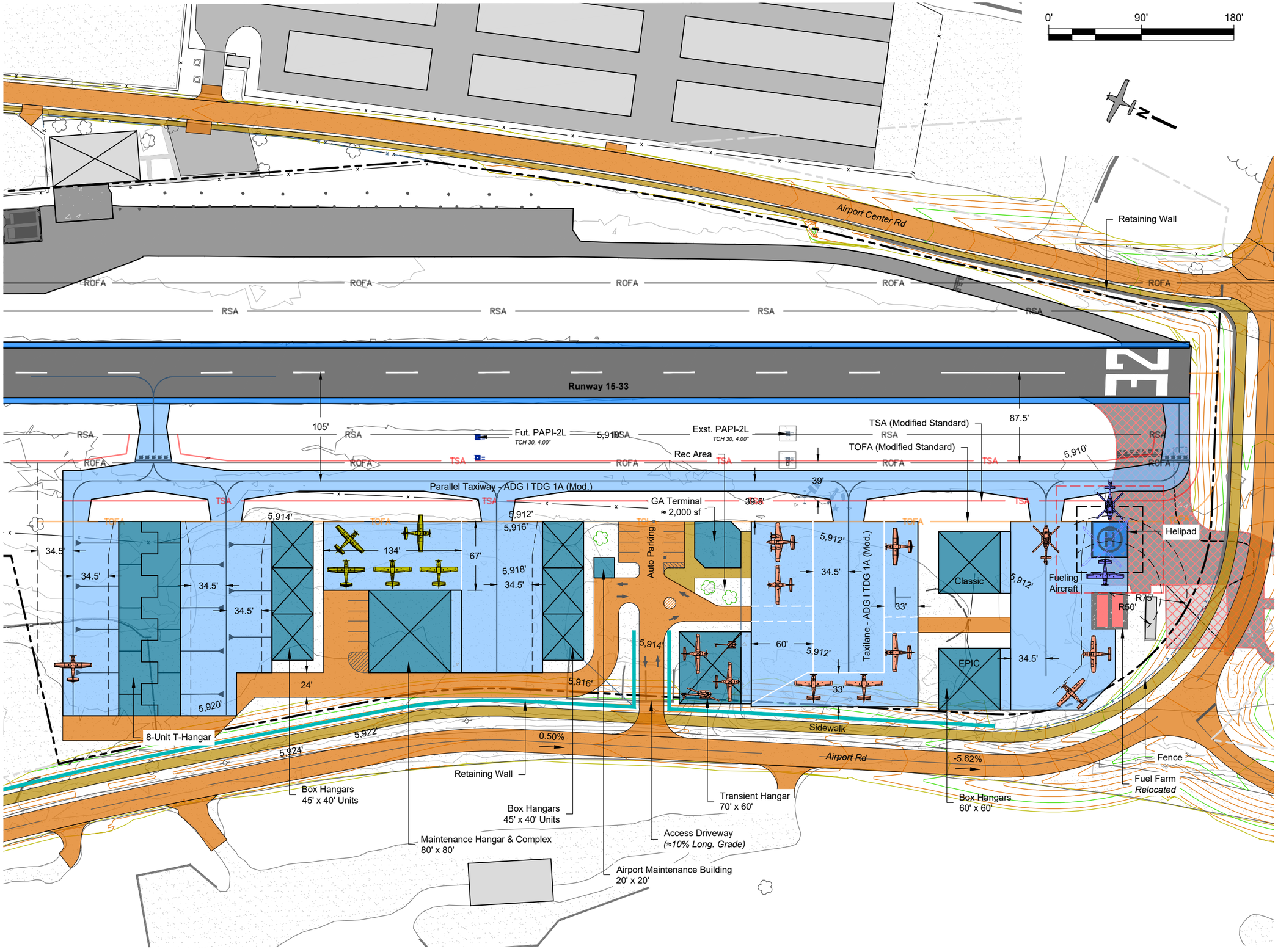
Notes:

- Tie-down Design Aircraft
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  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 10'
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- BRL: Building Restrict. Line
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- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.7 - Refined Rodeo Grounds Site Alternative 1B

K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.7 - Refined Rodeo Grounds Site Alternative 1B.dwg



DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

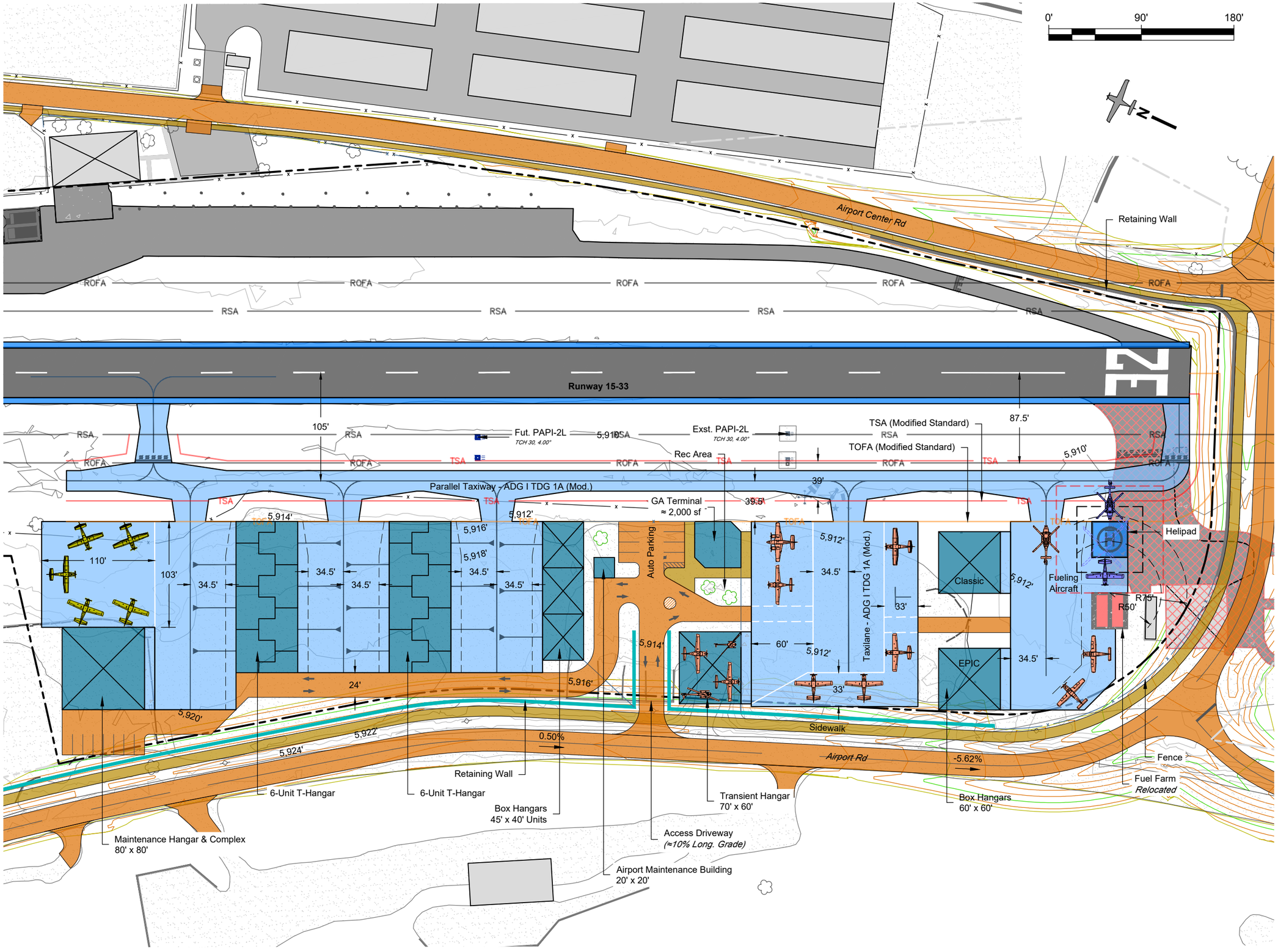
Notes:

- Tie-down Design Aircraft
  (Transient Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 10'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.8 - Refined Rodeo Grounds Site Alternative 2

K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.8 - Refined Rodeo Grounds Site Alternative 2.dwg



K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.9 - Refined Rodeo Grounds Site Alternative 3.dwg

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Legend:

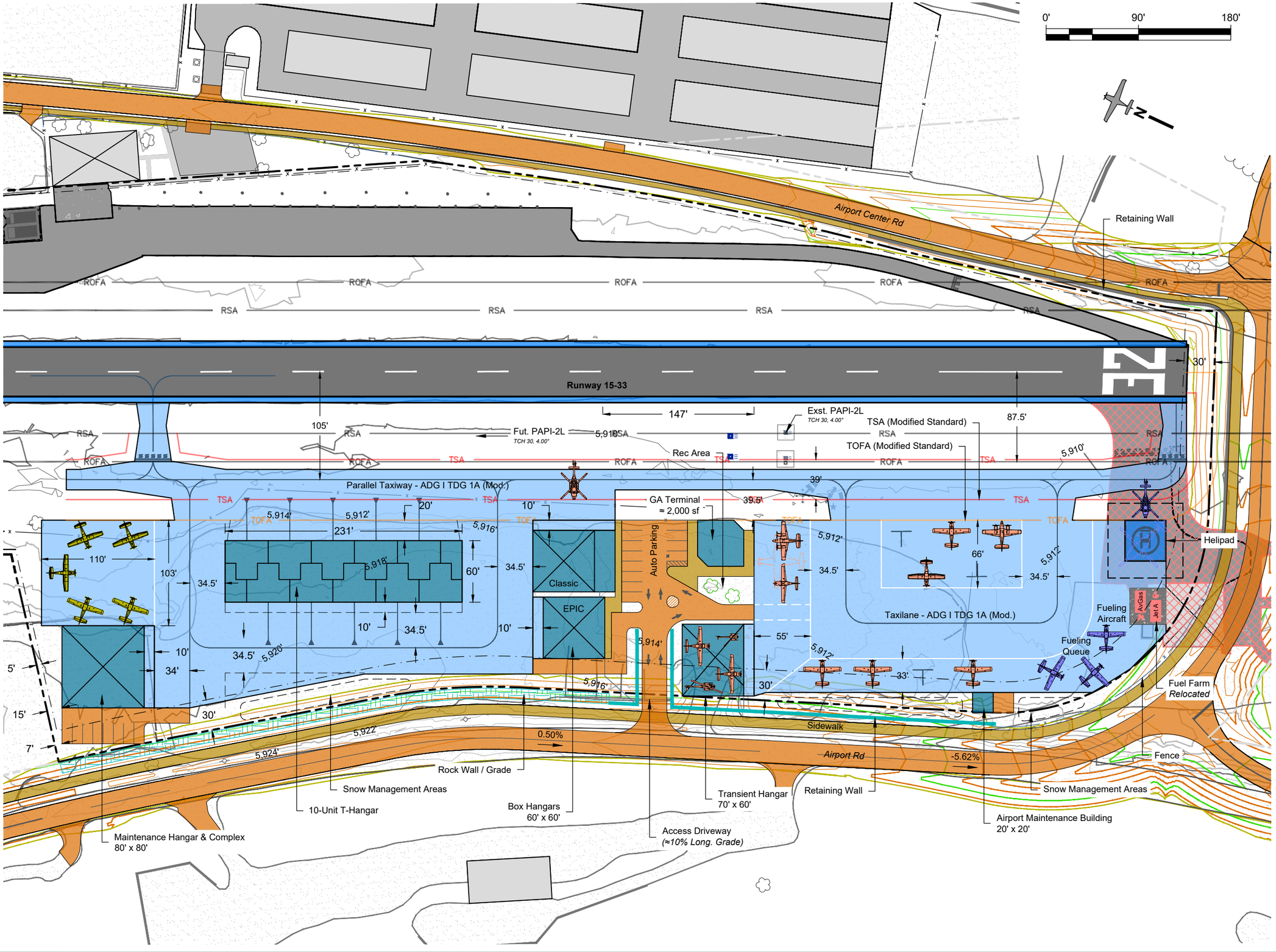
- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

Notes:

- Tie-down Design Aircraft
  (Transient Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 10'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.9 - Refined Rodeo Grounds Site Alternative 3



K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.10 - Preferred Rodeo Grounds Site Alternative V3.dwg

DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
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- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.10 - Preferred Rodeo Grounds Site Alternative

Section 6 - Implementation Plan

The implementation of recommended airport development as presented in the previous section is guided by a Capital Improvement Plan (CIP). The CIP applies basic financial and management rationale to each individual development item of the preferred alternative to establish a timeframe, present cost estimates, and organize airport development into a realistic schedule over the next 20 years. The CIP presented herein will subsequently feed into the recuring annual CIP process during which airport sponsors coordinate requests for federal and/or state funding for the next five years. A well-planned CIP helps an airport identify the level of staffing and financial resources needed for each project, and provides a road map for airport development, including the timing of preliminary stages for the projects, such as engineering design, land acquisition, and environmental reviews. It also identifies capital improvement funding sources on the federal, state, and local levels.

The CIP organizes capital improvement projects into short-, medium-, and long-term projects. Short-term projects are anticipated to occur within the next five years (2026-2030, assuming a base year of 2025 to match the forecast horizons). Medium-term projects are anticipated within the 6-10-year timeframe (2031-2035), and long-term projects are anticipated within the 11-20-year timeframe (2036-2045). Short-, medium-, and long-term horizons are also defined below using their PAL equivalent.

6.1 Funding Sources

Several funding resources and streams are traditionally available to airports for capital improvement projects. These funding sources range from federal and state programs to local mechanisms based on airport revenue and user fees. The following sections provide an overview of each of those potential funding sources.

6.1.1 Federal Funding Assistance

The FAA has long recognized the need for a grant-in-aid program to help airports meet the nation's long-term aviation needs. Following a series of federal airport funding programs, the Airport Improvement Program (AIP) was established by Congress on behalf of the FAA through the Airport and Airway Improvement Act of 1982. Funds obligated for the AIP are drawn from the Aviation Trust Fund, a trust fund established in 1970 that helps finance the FAA. The fund runs parallel to the General Fund and is designed to support the improvement of the country's air transportation system by funding construction and safety improvements at airports, technological upgrades to the air traffic control system, as well as FAA operations, including providing air traffic control, overseeing commercial space launches, and conducting safety inspections. The Trust Fund receives revenue through taxes on aviation fuels, airline ticket sales, and air cargo. The authority to collect aviation excise taxes and to spend from the Aviation Trust Fund must be reauthorized periodically, most recently in the *FAA Reauthorization Act of 2024*, which was enacted on May 16, 2024. If the FAA's authorization were to expire without an extension, then the agency would be unable to spend any revenues allocated from the Trust Fund.

Airports included in the NPIAS are eligible to receive FAA grants. In general, the FAA provides the most significant portion of the funding required for the implementation of eligible capital improvement projects at general aviation airports. Each project is subject to eligibility and justification requirements. The following funding steams are available:

- Airport Improvement Program (AIP): AIP funds are allocated and distributed to the different categories of publicly owned, public-use airports included in the NPIAS using a variety of formulas. Some exceptions are made for those public-use airports under private ownership, as identified in the NPIAS. Federal grants are awarded to airports for a percentage of the estimated total eligible project cost. A

typical federal share is 90 percent for small hub, nonhub primary airports, and non-primary airports including GA airports. The following types of AIP funding are available for GA airports:

- General Aviation Entitlements: Allocated annually to non-primary general aviation airports though a formulary distribution, general aviation entitlements funds currently consist of the lesser of $150,000, or one fifth of an airport's five-year development cost listed in the current NPIAS.
- State Apportionment: Allocated annually to all states based on an area-population formula. These federal funds are utilized at the discretion of the individual states.
- Discretionary: Because the capital requirements of airports often exceeds the limits of their annual entitlement funding, the FAA also distributes AIP discretionary grants. Discretionary funding levels for the NPIAS are established annually by the FAA and result from federal funds that remain available after the distribution of entitlements. Congress sets the requirements for how discretionary funds are allocated by the FAA, with certain amounts set aside for projects of special interest (e.g., airport safety, noise mitigation, the military airport program, etc…). Generally, airports within similar categories (general aviation, reliever, primary, etc.) compete for these discretionary grants, which are typically awarded based on priority ratings given by the FAA to each potential project. Given the lack of adequate discretionary funding available, this prioritization process tries to ensure that the most important and beneficial projects (as viewed by the FAA) are given priority.

- Infrastructure Investment and Jobs Act (IIJA): In addition to AIP funding, special funding streams have been created for airports as part of the IIJA, also known as the Bipartisan Infrastructure Law (BIL). Three new fundings streams, namely the Airport Infrastructure Grant (AIG) program, the Airport Terminal Program (ATP), and the FAA Contract Tower (FCT) Competitive Grant Program, have been created and are available to airports included in the NPIAS between FY 2022 and FY 2026. Similar to AIP, those fundings streams will be distributed using a variety of formulas (AIG), or on a discretionary basis for competitive grants (ATP and FTC).

Because KGWS Sumers Airpark (GWS) is currently not included in the NPIAS, it is not eligible to receive federal funds under the AIP or BIL. Additionally, the 2020 CASP did not identify GWS as meeting eligibility requirements for consideration for inclusion into future NPAIS reports. Consequently, this report assumes that federal funding assistance will be unavailable to the Airport over the next 20 years.

6.1.2 State Funding Assistance

In Colorado, CDOA provides grants-in-aid from state funds for construction and development of eligible airport projects. The source for state airport improvement funds is the Colorado Aviation Fund which is supported exclusively by excise and sales taxes levied on aviation fuel at Colorado airports. Each year, the Colorado Aeronautical Board (CAB) administers the distribution of the Colorado Aviation Fund through the Colorado Discretionary Aviation Grant (CDAG) Program. The following types of aid are available to airports in Colorado through the CDAG Program:

- Federal Matching Grants: For federally funded projects, state grants matching the federal grant are typically awarded for up to 50 percent of the remaining costs after the federal share up to a limit of $250,000 per fiscal year per airport, typically 5 percent of total costs. Since GWS is not included in the NPIAS, they are not eligible to receive federal grants or federal matching grants from CDOA.
- Discretionary State & Local Grants: CDOA provides discretionary grants to eligible airports for up to 90 percent of eligible project costs for projects of local, regional, or State significance, including those

projects that may not otherwise be funded or eligible under federal programs. This funding program typically requires a 10 percent local match component to support State funding. Typical eligible projects include airport related construction projects for runways, taxiways, aircraft parking ramps, aircraft storage facilities (hangars), fueling facilities, general aviation terminal buildings or pilot lounges, utility services (power, water, sewer, etc.) to the airport runway or taxiway lighting, approach aids (electronic or visual), ramp lighting, airport fencing, airport drainage, land acquisition, planning studies, and under certain conditions, the preparation of plans and specifications for airport construction projects. As opposed to general eligibility rules for federal grants, some revenue-generating projects such as aircraft storage hangars or fuel farms may be considered.

- Airfield Maintenance & Crack Sealant Program: The airport system in Colorado is a multimillion dollar investment of public and private funds that must be protected and preserved. This program is designed to encourage Colorado airports to use preventive pavement maintenance practices proven to extend the lifespan of both concrete and asphalt runways, taxiways, and apron surfaces. Airports are eligible for reimbursement of 90 percent of the cost of crack sealant materials up to $10,000 per state fiscal year, and crack fill machines are available in each region free to use.
- Automated Weather Observing System (AWOS) Program: During its 2000 session, the Colorado General Assembly acknowledged the need for improved aviation weather reporting in the mountainous terrain along the Continental Divide. With shared funding from the Legislature and the Colorado Aviation Fund, 13 state-owned AWOS sites were installed at critical mountain passes most vulnerable to weather-dependent aircraft accidents. In addition, CDOA provides funding for maintenance of non-state owned AWOS through their Airport AWOS Maintenance Program. Each airport that owns and operates an AWOS and has its weather information continuously disseminated to the National Weather Database and/or the flying public is eligible for reimbursement of maintenance expenses not to exceed 90 percent of eligible costs up to $10,000 of state funding annually.
- Surplus Airport Equipment Program: Used airport operations equipment, snow removal equipment, striping equipment, or aircraft rescue and firefighting equipment is often sold by large Colorado airports as they purchase newer equipment to maintain compliance with certification requirements. The surplus program is designed to provide Colorado's public-use airports with affordable access to used airport equipment for sale. Participation from CDOA is typically 80 of eligible costs for an airport's first pick and 50 percent for picks two and three.
- State Infrastructure Bank (SIB): This unique funding source is supported by the Colorado Transportation Commission and helps fund transportation facilities with funds available through a low-interest revolving loan program. Loans awarded to airports from the SIB have been used for projects such as capital airport improvements, air traffic control towers, snow removal equipment, and pavement reconstruction. Loans have also been utilized for land acquisitions protecting airports from incompatible adjacent land uses. The Aviation Element of the SIB currently administers loans benefiting six Colorado communities, with $34.7 million in outstanding loan balances as of December 31, 2024.
- Aviation Fuel Tax Revenue Disbursement: Eligible Colorado public-use airports are recipients of aviation fuel excise and sales tax disbursements on aviation fuel. GWS received $1,927 in 2024.

6.1.3 Local Funding

For projects funded through federal and/or state programs, local grant matches are typically required. For federally funded projects, airport sponsors are typically responsible for 50 percent of the remaining costs after the federal share, typically 5 percent of total costs. For State funded projects, airport sponsors are typically

responsible for 10 percent of the project costs per CDAG funding rules. Local funding at GA airports may come from several sources. At this Airport, local funding sources include the Sponsor (City of Glenwood Springs), the Operator (KGWS Sumers Airpark) as follows:

- Airport Operator Revenues: FAA Order 5190.6B, *FAA Airport Compliance Manual* provides comprehensive guidance on the legal requirement that airport fees be fair, reasonable, and not unjustly discriminatory. The objective of the policy is to provide guidance to airports in establishing rates and charges that will help the airport work towards financial sustainability. In general, CDOA applies similar rules. Examples of typical airport revenue are landing fees, aircraft tie-down and hangar rentals, fuel sales, long-term ground leases, parking revenue, or cash reserves.
- City of Glenwood Springs General Fund Revenues: General fund revenues are those provided by the airport sponsor from their general tax revenues. Airport capital development expenditures from general fund sources have been somewhat difficult to obtain in recent years. One reason for this difficulty is the seemingly universal shortfall in local general fund revenues. Budgetary problems have created an environment where local funding is uncertain.
- Bank Financing: Some airport sponsors and operators use bank financing as a means of funding the local share of airport development. Typical bank loan transaction rules apply, including ability to repay the loan, and collateral.
- Force Accounts, In-kind Service, and Donations.

6.1.4 Other Funding Assistance

Other funding sources may be sought for capital improvement projects at airports. In Colorado and Garfield County, those sources may include, but are not limited to:

- Colorado Department of Local Affairs (DOLA): The DOLA has a long history of funding projects that boost local economic development in rural communities, and some of those grants were awarded for projects at local airports. Over the past three years alone, DOLA has funded several aviation related projects such as a runway reconstruction project for the Walden-Jackson County Airport ($1M grant), a taxiway widening and strengthening project for the Yampa Valley Regional Airport ($0.8M grant), a market study for the San Luis Valley Regional Airport - Bergman Field ($25k grant), a new GA terminal (FBO) for the Colorado Plains Regional Airport ($0.6M grant), and a new fuel farm for the Salida Airport - Harriet Alexander Field ($1M grant). More grants for airport development may be available from DOLA.
- Colorado Office of Economic Development and International Trade (OEDIT): The Rural Opportunity Office (ROO) of the OEDIT supports Colorado's rural communities, economic development offices, business support organizations, and small businesses by connecting them to relevant OEDIT and State Partner programs to work toward a resilient future. While grants may not be directly available from the OEDIT, it is a great resource for connections and information on available grants throughout the state. The Colorado Economic Development Commission (EDC) is a body of the OEDIT that promotes and guide economic development in Colorado.
- Garfield County Economic Development: Over the past year, Garfield County has approved more than half a million dollars in grants to local nonprofit organizations providing vital services for area residents and working to strengthen the local economy. Some grants may be available for airport development at KGWS Sumers Airpark.
- Municipal Bonds: There are several municipal bonding options available including general obligation bonds, limited obligation bonds, and revenue bonds:

- General obligation bonds are a common form of municipal bond which is issued by voter approval and is secured by the full faith and credit of the Town. Town tax revenues are pledged to retire the debt. As instruments of credit, and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most secure type of municipal bond and are generally issued at lower interest rates and carry lower costs of issuance
- Limited obligation bonds (sometimes referred to as self-liquidating bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and, therefore, are considered, for the purpose of financial analysis, as part of the debt burden of the local community.
- Revenue bonds are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a lease revenue bond is secured with the income from a lease assigned to the re-payment of the bonds. Revenue bonds have become a common form of financing airport improvements and present the opportunity to provide those improvements without direct burden to the taxpayer. Revenue bonds normally carry a higher interest rate because they lack the guarantees of general and limited obligation bonds.

✈ Leasehold Financing / Private & Third Party Funds: Some developers or tenants may be able to finance improvements such as aircraft storage hangars, FBOs, or other facilities, under a long-term ground lease. Leasehold financing relieves the community of all responsibility for raising the capital funds for improvements. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term.

6.2 Capital Improvement Plan

6.2.1 Project Categories

According to the National Priority System (NPS) that is defined in FAA Order 5090-5, *Formulation of the NPIAS and ACIP*, federal and state funding is usually allocated to safety enhancement projects first (i.e., obstruction removals, safety area improvements, hot spot mitigation, etc.) as well as projects that advance airport security, then to environmental projects pursuant to NEPA, then to pavement infrastructure preservation projects (i.e., reconstructions, rehabilitations, and pavement rejuvenation projects), then to capacity enhancement projects, and then to other projects such as planning projects, projects that rectify non-standard conditions, or other projects. While not tied to federal funding rules, this ALP Update follows a similar project prioritization, and adds an aircraft storage type project, not usually considered for federal funding. Projects are categorized and prioritized as follows:

1. **Safety** - Safety projects at airports are those projects that promote the safe operation of aircraft and equipment. These projects can consist of runway safety areas and object free areas grading, obstruction clearing (for airfields and NAVAIDs), property acquisitions to promote control of protection zones, installation of additional NAVAIDs, parallel taxiways to eliminate the need for back-taxi operations, etc.

2. **Security** - Security projects are those projects that ensure safe and efficient airport operations and protect from the outside environment, whether that be wildlife or human threats. These projects often consist of airfield fencing or security systems.
3. **Environmental** - Resulting actions required to comply with NEPA and other federal, State, or local environmental laws, regulations, and initiatives.
4. **Infrastructure Preservation** - Pavement maintenance projects extend the usable life of existing pavement surfaces. Full-depth pavement reconstructions are included in this category. They promote the safe use of the existing airfield and prevent the creation of Foreign Object Debris (FOD).
5. **Capacity** - Airfield capacity projects are those that enhance the movement of aircraft in the air and on the ground, therefore decreasing dwell times and increasing capacity. These projects vary in range but usually consist of additional pavement areas, from additional entrance/exit taxiways in specific locations, to additional runways. These projects are typically associated with major capital investments and are tied to the demand.
6. **Storage** - Storage projects are those that increase the ability of the airport to handle additional based aircraft. These projects can include fuel farms, and additional aircraft storage hangars or aircraft apron parking, and auto parking areas. Those projects are usually not eligible for federal or state funding if they are revenue-generating.
7. **Planning** - Planning projects include airport master plans, airport layout plans, focused planning studies, as well as environmental studies such as EAs and EISs.
8. **Design Standards** - Design standards projects bring airfield components up to current FAA standards. These projects can include relocation of runways, taxiways, as well as upgrades to taxiway fillet geometry. Unless related to safety-critical items, design standard updates typically occur during pavement reconstruction projects at the end of a pavement's useful life. If a non-standard condition creates a safety issue (e.g., hot spots), projects can be considered as safety projects.
9. **Other** - Other projects are those remaining projects that can enhance or increase the practicality or developability of airside or landside areas. They can include specialized development areas such as airport maintenance areas. Those projects are usually not eligible for federal or state funding.

6.2.2 Development Program Phasing

Projects are divided into short-, mid-, and long-term projects by priority. Only future projects are programmed into the 20-year CIP. Ultimate projects, by definition, are anticipated to occur beyond the planning period and are not programmed into the CIP.

The following subsections present the preferred breakdown and phasing of capital improvement projects that were identified in the preferred development alternative of this ALP Update, as well as a brief description of each project. Anticipated project years are listed in Federal Fiscal Years (FFY). An estimate of construction costs (in 2026 dollars) was evaluated for each CIP project, inclusive of planning, environmental, design, and construction administration services when those phases are not listed under separate projects. Note that this listing is the best estimate of anticipated projects at the time of this ALP Update; however, it should be understood that many of these projects may change in scope or in timing based on future requirements. Therefore, the CIP must be reviewed, assessed and updated on a regular basis (typically annually).

The projects listed hereinbelow do not in any way constitute a commitment on the part of the United States, the State of Colorado, or any other entity or organization, to participate in any proposed development, or confirmation that development is environmentally acceptable in accordance with appropriate public laws.

6.2.2.1 Short-Term Projects, PAL 1

Projects planned for the short term (PAL 1, or 1-5 Years, FFY 2026 to FFY 2030) include:

- **FFY 2026 Airfield Pavement Maintenance** - This project consists of regular pavement maintenance on runway and taxiway surfaces and includes crack filling, seal coating, and new pavement markings. The project also includes the midfield ramp and taxiways northward up to Hangar 1. Additionally, the project includes bringing existing runway markings to standard dimensions as well as the re-designation of Runway 14-32 as Runway 15-33.
  Project Category: Infrastructure Preservation
  Included in Current Airport CIP: Yes

- **FFY 2026 Rodeo Grounds Grading & Drainage (Design)** - This project consists of the design phase for the grading and drainage improvements for the (former) Rodeo Grounds site.
  Project Category: Other
  Included in Current Airport CIP: Yes

- **FFY 2027 Rodeo Grounds Grading & Drainage (Construction)** - This project is a major enabling project for the Airport and includes grading and drainage of the Rodeo Grounds site, and generally consists of excess excavation that needs to be relocated off-Airport, and drainage improvements. A significant portion of the Rodeo Grounds site has been covered in soil and other unsuitable materials from a land slide. The objective of this project is to provide a graded and pad-ready site to enable the development of the (former) Rodeo Grounds Site. This project can occur in parallel with the South Bridge Project, but half of the Rodeo Grounds will be used as a laydown yard and staging area for the South Bridge Project.
  Project Category: Other
  Included in Current Airport CIP: Yes

- **FFY 2027 Hangars Ph. I** - This project is a major development project for the Airport and is currently slated for FFY 2027. This project follows the completion of the Rodeo Grounds Grading and Drainage project and mitigates the impact of the South Bridge Project onto existing airport facilities. This project includes the construction of a new 80 feet x 80 feet maintenance hangar with a dedicated overflow storage apron and a new 10-unit T-hangar on the north half of the Rodeo Grounds Site. This project also builds a new partial parallel taxiway and taxilanes, automobile parking near the maintenance hangar, as well as a semi-temporary access driveway from Airport Rd. Taxilanes are designed using the modified ADG I and TDG 1A standards. Hangars are anticipated to be NFPA Group III, Type II or Type III hangar structures. It is anticipated that funding for those hangars will be provided by the City of Glenwood Springs. Other elements of the project may be funded by third parties. Those hangars will be privately owned. The project also includes the demolition and removal of the existing maintenance hangar, 10-unit T-hangar, taxilanes and southwest ramp, as well as the impacted connector taxiway on the east side of the Runway 33 end.
  Project Category: Storage
  Included in Current Airport CIP: Yes

- **FFY 2027 Taxiway Improvements Ph. I** - This project reconnects the south end of Taxiway A to the runway following the demolition of the existing taxilane during the *FFY 2027 Hangars Ph. I* project and standardizes the geometry of the parallel taxiway along the southeast ramp. It sets a taxiway centerline at the modified runway-to-taxiway centerline separation standard of 105 feet and construct a new taxiway connector that allow runway crossings to the southwest Rodeo Ground site and ramp. The taxiway is designed using the modified ADG I and TDG 1A standards.
  Project Category: Safety & Design Standards
  Included in Current Airport CIP: Yes

- **FFY 2027 Southeast Ramp Improvements** - This project expands the southeast ramp to the east towards the fence to provide a completely paved surface for parking of aircraft and rotorcraft and allows the installation of new tie-down anchors. The projects allows for parking of larger aircraft, rotorcraft, and facilitates snow removal on the ramp. The project also includes crack filling and seal coating existing pavements on the southeast ramp, as well as new pavement markings. This project may be combined with the previous *FFY 2027 Taxiway Improvements Ph. I* for economies of scale.
  Project Category: Storage
  Included in Current Airport CIP: Yes

- **FFY 2028 Fuel Tank Removal** - This project removes the existing underground AvGas tank and mitigates any potential environmental issues.
  Project Category: Environmental
  Included in Current Airport CIP: Yes

- **FFY 2029 North Ramp Improvements** - This project expands the north ramp on the west side of the existing taxilane and allows the installation of new and additional tie-downs for a total of 21 tie-downs on the west side between Hangar 1 and Hangar 21. The projects also includes the reconstruction of the existing taxiway connector near Hangar 1. Taxilanes are designed using the modified ADG I and TDG 1A standards. This project enables the construction of future hangars on the east side of the taxilane without losing tie-down capacity. The project also includes crack filling and seal coating existing pavements on the southeast ramp, as well as new pavement markings.
  Project Category: Storage
  Included in Current Airport CIP: No

- **FFY 2030 Hangars Ph. II** - This project builds two 3-unit, 40 feet x 45 feet box hangars and one 4-unit, 40 feet x 45 feet box hangar on the east side of the north ramp. Hangars are anticipated to be NFPA Group III, Type II or Type III hangar structures. It is anticipated that funding for those hangars will be provided by third parties, and that those hangars will be privately owned. The project also includes expanding the north ramp between Hangar 1 and Hangar 4 and removing Hangar 2 and Building 3.
  Project Category: Storage
  Included in Current Airport CIP: No

6.2.2.2 Mid-Term Projects, PAL 2

Projects planned for the mid-term (PAL 2, or 6-10 Years, FFY 2031 to FFY 2035) include:

- **FFY 2031 Land Acquisition Runway 15** - This land acquisition project enables the grading of the RSA and ROFA beyond the Runway 15 End, providing the standard recommended length and furthering safety upon takeoff and landing.
  Project Category: Safety
  Included in Current Airport CIP: Yes

- **FFY 2032 RSA Improvements Runway 15** - This project consists of the grading of the RSA and ROFA beyond the Runway 15 End. It includes earthwork, drainage, as well as the installation of a new security/wildlife fence.
  Project Category: Safety
  Included in Current Airport CIP: Yes

- **FFY 2033 Hangars Ph. III** - This project builds two 60 feet x 60 feet corporate box hangars near the middle of the Rodeo Grounds site and may include office space in separate lean-to buildings. Hangars are anticipated to be NFPA Group III, Type II or Type III hangar structures. It is anticipated that funding for those hangars will be provided by third parties, and that those hangars will be privately owned.

  Project Category: Storage
  Included in Current Airport CIP: No

- **FFY 2034 NAVAID & VISAIDs Relocation** - This project consists of the relocation of the Microtower system, Runway 33 wind cone, and the Runway 33 PAPI-2L. This project enables the future construction of the new southwest ramp and parallel taxiway. Existing equipment may be preserved and re-used, but new equipment such as a lighted primary wind cone LED L-807(L) or new LED PAPI-2L should be purchased if funding allows. The location of the PAPI-2L should be checked against the published values of 30 feet TCH and 4.0° GPA and account for the longitudinal runway gradient as well as the height of the PAPI light units.

  Project Category: Safety
  Included in Current Airport CIP: Yes

- **FFY 2035 New Southwest Ramp** - This project is a major development project for the Airport and includes the construction of new transient aircraft facilities including a new 2,000 square-foot GA terminal building (FBO), a new 3,000 square feet transient hangar owned by the Airport, a new 7,000 square yards transient apron with nine tie-downs and two pull up parking positions, a relocated fuel farm with queuing space for fixed-wing aircraft and a new 40 feet x 40 feet concrete helipad for rotorcraft that allows simultaneous Jet A and AvGas fueling, a parallel taxiway extended to the Runway 33 threshold, as well as a new access drive from Airport Rd and auto parking, and security/wildlife fencing. The layout allows fuel delivery trucks (18-wheelers) to access the relocated fuel farm through the proposed facilities. The development needs to include a retaining wall at the edge of the Airport Rd ROW in order to be feasible. The project also includes the removal of portions of the midfield ramp that connect to the runway once airport operations have been moved from the existing terminal area to the new southwest area and that ramp is no longer needed (large expanses or pavements directly connecting to the runway are not recommended). The new transient hangars are anticipated to be NFPA Group III, Type II or Type III hangar structures. Funding for this project may be provided by a combination of public and private parties.

  Project Category: Storage
  Included in Current Airport CIP: No

6.2.2.3 Long-Term Projects, PAL 3

Projects planned for the long term (PAL 3, or 11-20 Years, FFY 2036 to FFY 2045) include:

- **FFY 2037 Hangars Ph. IV** - This project builds three new Single-T Port-a-Port Hangars on the west side of the runway near exiting Hangar 13a, b, and c. Because the original manufacturer of Single-T Port-a-Port Hangars no longer produces new kits, hangars will have to be purchased used and relocated. It is anticipated that funding for those hangars will be provided by third parties, and that those hangars will be privately owned. The project also includes a small taxilane that would allow slow taxi to the new southwest parallel taxiway and remove direct taxi to the runway.

  Project Category: Storage
  Included in Current Airport CIP: No

- **FFY 2041 Runway 15-33 Rehabilitation & Widening** - This project includes the widening of Runway 15-33 from 50 feet to 60 feet to satisfy the modified AAC A/B and ADG I standards. This project

also rehabilitates existing runway pavement surfaces with a 2-inch mill and overlay, as applicable for the PCI of existing pavements at the time of construction. The estimated 2026 PCI value is 85, last maintenance was a crack seal and seal coat project in 2026, and last full-depth pavement reconstruction was completed in 2015. PCI is expected to drop to 75 by 2030, and will continue to drop into the 2030s until it meets the eligibility threshold for rehabilitation (PCI less than 70).

Project Category: Infrastructure Preservation & Design Standards
Included in Current Airport CIP: Yes

- **FFY 2043 Taxiway Improvements Ph. II** - This project reconstructs and standardizes the geometry of the last two taxiway connectors per the modified ADG I and TDG 1A standards. The location of the two taxiway stubs remains the same.

  Project Category: Design Standards
  Included in Current Airport CIP: No

- **FFY 2044 ALP Update & Narrative Report** - After most or all the recommended improvements contained herein have been implemented, the airport may look very different, priorities may have shifted, and an update to the development plan will be required. An update to the ALP may be needed.

  Project Category: Planning
  Included in Current Airport CIP: No

6.2.3 Capital Improvement Program Summary

Table 6.1 presents the CIP. As presented, an estimated $27.9 million dollars of funds will be required to complete capital improvement projects over the next twenty years at GWS. **Table 6.1** also provides a breakdown of how funds will be allocated between state grants, local funds, and other funds. Projects slated to occur over the next 20 years are depicted on **Figure 6.1**. Detailed breakdowns of estimated costs for each project are provided in **Appendix I, *CIP Cost Estimates***.

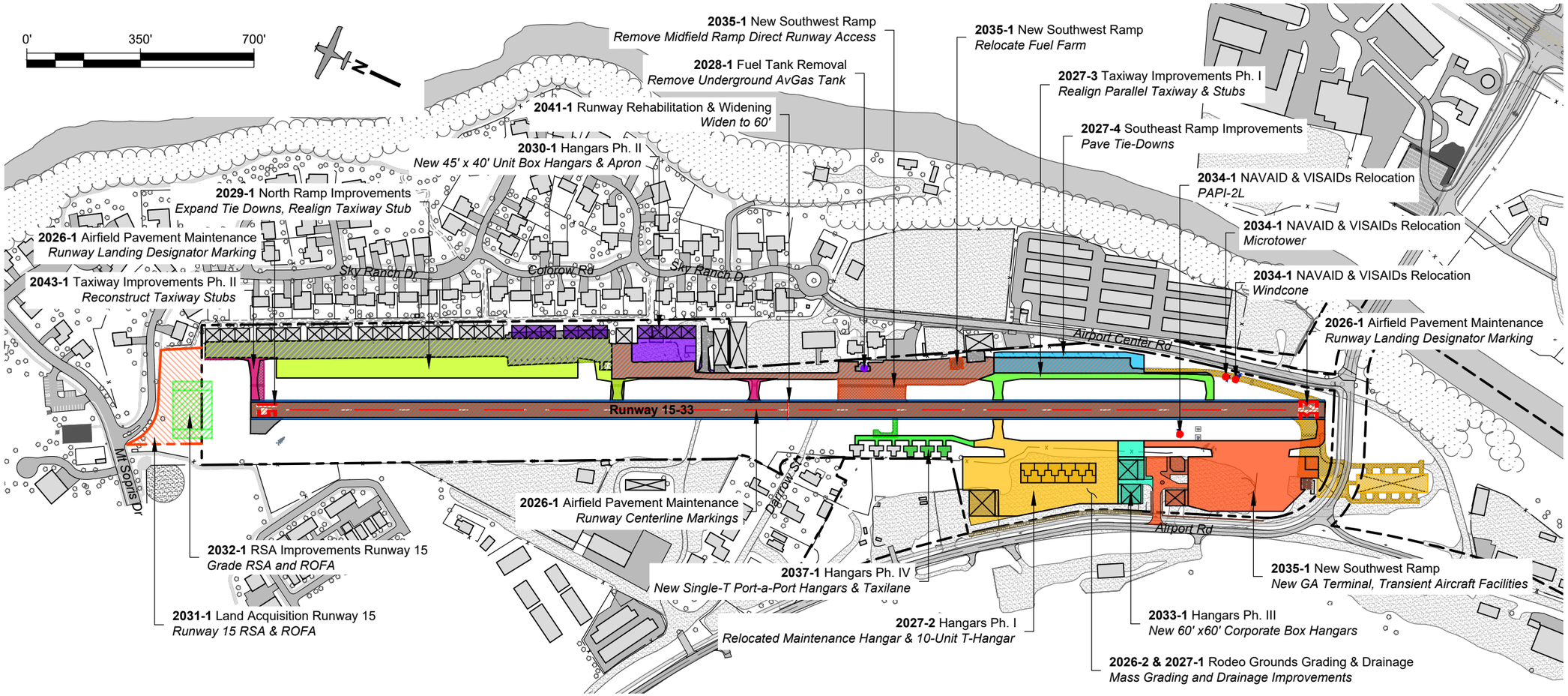
As an ALP is a conceptual document, implementation of these capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects will require further planning before implementation. Priorities may change, and demand may shift. The CIP presented below is a planning tool and may be adjusted on an annual basis as necessary.

Table 6.1 - 20-Year Capital Improvement Plan Summary Table (FY 2026-2045)

Seq.	Priority	FFY	Project[1]	Included in Current CIP	PAL Trigger	Total Cost (2026 Dollars)[2]	Funding Breakdown				
							Federal	State	Local Sponsor	Local Operator	Other[3]
Short-Term, PAL 1 (1 - 5 Years, 2026 - 2030)	Infrastructure Preservation	2026	Airfield Pavement Maintenance	Yes	-	$109,445	$0	$98,500	$0	$10,945	$0
	Other	2026	Rodeo Grounds Grading & Drainage (Design)	Yes	-	$222,223	$0	$200,000	$0	$22,223	$0
	Other	2027	Rodeo Grounds Grading & Drainage (Construction)	Yes	-	$4,360,000	$0	$0	$4,360,000	$0	$0
	Storage	2027	Hangars Ph. I	Yes	-	$5,800,000	$0	$0	$0	$0	$5,800,000
	Safety & Design Standards	2027	Taxiway Improvements Ph. I	Yes	-	$500,000	$0	$0	$250,000	$250,000	$0
	Storage	2027	Southeast Ramp Improvements	Yes	-	$400,000	$0	$0	$0	$400,000	$0
	Environmental	2028	Fuel Tank Removal	Yes	-	$180,000	$0	$0	$180,000	$0	$0
	Storage	2029	North Ramp Improvements	No	-	$1,400,000	$0	$0	$0	$1,400,000	$0
	Storage	2030	Hangars Ph. II	No	-	$3,900,000	$0	$0	$0	$0	$3,900,000
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
				Short-Term Subtotal		**$16,871,668**	**$0**	**$298,500**	**$4,790,000**	**$2,083,168**	**$9,700,000**
Mid-Term, PAL 2 (6 - 10 Years, 2031 - 2035)	Safety	2030	Land Acquisition Runway 15	Yes	-	$220,000	$0	$0	$220,000	$0	$0
	Safety	2031	RSA Improvements Runway 15	Yes	-	$220,000	$0	$198,000	$0	$22,000	$0
	Storage	2031	Hangars Ph. III	No	-	$2,100,000	$0	$0	$0	$0	$2,100,000
	Design Standards	2033	Taxiway Improvements Ph. I	Yes	-	$220,000	$0	$198,000	$0	$22,000	$0
	Safety	2034	NAVAID & VISAIDs Relocation	Yes	-	$5,000,000	$0	$2,000,000	$2,000,000	$1,000,000	$0
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
				Mid-Term Subtotal		**$7,760,000**	**$0**	**$2,396,000**	**$2,220,000**	**$1,044,000**	**$2,100,000**
Long-Term, PAL 3 (11 - 20 Years, 2036 - 2045)	Storage	2037	Hangars Ph. IV	No	-	$500,000	$0	$0	$0	$0	$500,000
	Infra. Preserv. & Design Stds	2041	Runway Widening	Yes	-	$2,200,000	$0	$1,980,000	$0	$220,000	$0
	Design Standards	2044	Taxiway Improvements Ph. II	No	-	$400,000	$0	$0	$0	$400,000	$0
	Planning	2044	ALP Update	No	-	$150,000	$0	$135,000	$0	$15,000	$0
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
				Long-Term Subtotal		**$3,250,000**	**$0**	**$2,115,000**	**$0**	**$635,000**	**$500,000**
				Total		**$27,881,668**	**$0**	**$4,809,500**	**$7,010,000**	**$3,762,168**	**$12,300,000**

Source: Dibble, May 2026 analysis.

Notes: [1]: The projects listed herein do not in any way constitute a commitment on the part of the United States, the State of Colorado, or any other entity or organization, to participate in any proposed development, or confirmation that development is environmentally acceptable in accordance with appropriate public laws. This CIP is subject to revision on an annual basis and is to be kept up to date by the Sponsor and/or the Operator.
[2]: Costs are presented as a high-level, preliminary planning cost only and are not an engineer's opinion of probable costs.
[3]: Projects may require other types of funding in addition to Federal, state, and local funding.



Capital Improvement Projects
2026 - 2045

State Funding (& Local Match)

- **2026-1**: Airfield Pavement Maintenance (S, LO)
- **2026-2**: Rodeo Grounds Grading & Drainage (Design) (S, LO)
- **2032-1**: RSA Improvements Runway 15 (S, LO)
- **2034-1**: NAVAIDs & VISAIDs Relocation (S, LO)
- **2035-1**: New Southwest Ramp (S, LS, LO)
- **2041-1**: Runway 15-33 Rehabilitation & Widening (S, LO)
- NS **2044-2**: ALP Update (S, LO)

Local (Sponsor & Operator) & Other Funding

- **2027-1**: Rodeo Grounds Grading & Drainage (Construction) (LS)
- **2027-2**: Hangars Ph. I (Maintenance Hangar & T-Hangar) (O)
- **2027-3**: Taxiway Improvements Ph. I (LS, LO)
- **2027-4**: Southeast Ramp Improvements (LO)
- **2028-1**: Fuel Tank Removal (LS)
- **2029-1**: North Ramp Improvements (LO)
- **2030-1**: Hangars Ph. II (Box Hangars & Apron) (O)
- **2031-1**: Land Acquisition Runway 15 (LS)
- **2033-1**: Hangars Ph. III (Corporate Box Hangars) (O)
- **2037-1**: Hangars Ph. IV (Single Ts & Taxilane) (O)
- **2043-1**: Taxiway Improvements Ph. II (LO)

The projects listed hereon do not in any way constitute a commitment on the part of the United States, the State of Colorado, or any other entity or organization, to participate in any proposed development, or confirmation that development is environmentally acceptable in accordance with appropriate public laws.

DIBBLE

Legend:

- Existing Facilities
- Future Development
- Demolition / Removal
- Existing Property Line
- Future Property Line

Notes:

- Funding Types:
  - F: Federal
  - S: State
  - LS: Local Sponsor
  - LO: Local Operator
  - O: Other
- NS: Not Shown

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 6.1
Capital Improvement Projects

K:\2025\1325662.GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 6.1 - Capital Improvement Projects.dwg

Section 7 - Airport Layout Plan

The recommended airport development outlined in this document, including the preferred airfield and general aviation facilities development options, are incorporated into an Airport Layout Plan (ALP) drawing set. The ALP is a group of drawings that serve as the primary tool for the guidance of future growth at the Airport. The full-size ALP drawing set is 24-inches by 36-inches but is included within this section (starting at page 7-4) as an 11-inch by 17-inch drawing set (not to scale). This ALP set is comprised of 14 unique plan sheets, which include the following:

- Cover Sheet
- Airport Data Sheet & Airport Layout Drawing (ALD)
- Terminal Area Drawings (x2)
- Airport Airspace Drawings (x3)
- Runway Centerline Profile
- Inner Portion of the Approach Surface Drawings (x3)
- Airport / Community Land Use Compatibility Drawing
- Airport Area Terrain Map
- Airport Property Map

The following sections are brief descriptions of each sheet and their elements, as well as the timeline for review and approval by the Airport and CDOA.

7.1 Airport Layout Plan Sheets

7.1.1 Cover Sheet

The Cover Sheet (**Sheet 1 of 14**) lists sheets included in the drawing set and identifies the airport sponsor and the parties responsible for preparing the plans. For orientation purposes, graphic representations of Colorado, Garfield County, and the general airport location are provided.

7.1.2 Airport Data Sheet & Airport Layout Drawing (ALD)

The Airport Data Sheet & ALD (**Sheet 2 of 14**) is a combination of two traditional ALP sheets:

- The Airport Data Sheet that includes key airport data in a tabular format. Included are the Airport Data Table, Runway Data table, Taxiway Data Table, and Wind Data Tables and Wind Roses, as well as Declared Distance Table and Modifications of Standard (MOS) Table. Information includes airport and runway elevations, runway end coordinates, airport reference point (ARP) coordinates, mean maximum daily temperature in the hottest month, Runway Design Codes (RDC), approach categories, RSA, ROFA, RPZ, and RVZ surface dimensions, pavement dimension and strength information, wind coverage, and more. While an outdated standard, the Airport Reference Code (ARC) was listed in the Airport Data Table for reference.
- The ALD Sheet that depicts existing facilities and recommended future and ultimate improvements such as runway widening, new taxiways and taxilanes, new aprons, new hangars, new parking and access roads, new VISAIDs and NAVAIDs, etc.

7.1.3 Terminal Area Drawing

The Terminal Area Drawing (**Sheets 3 and 4 of 14**) provides a larger-scale depiction of the existing facilities and proposed development as shown in those areas of interest on the ALD.

7.1.4 Airport Airspace Drawings

The Airport Airspace Drawings (**Sheets 5, 6, and 7 of 14**) incorporate graphic representation of the imaginary surfaces as described within 14 CFR Part 77 (a.k.a. Federal Aviation Regulation Part 77, or FAR Part 77), Part 77.19, intended to protect airspace within the vicinity of public airports, including a profile depiction of airspace surfaces, runway centerline profile, and terrain along extended runway centerline profiles, and document obstruction data. The imaginary surfaces are established in relation to runway elevation and the runway ends. Penetration of these surfaces by an object or structure may result in an obstruction affecting navigable airspace. The size and slope of the imaginary surfaces is based on the runway category and type of approach.

7.1.5 Runway Centerline Profile

The Runway Centerline Profile (**Sheet 8 of 14**) depict longitudinal gradients along the runway centerline and extended runway centerline within the RSA.

7.1.6 Inner Portion of the Approach Surface Drawings

The Inner Portion of the Approach Surface Drawings (**Sheets 9, 10, and 11 of 14**) contain plan and profile views of the existing and future final approach areas. Surfaces depicted include the 14 CFR Part 77 Approach Surfaces and Threshold Siting Surfaces (TSS), and other surfaces as applicable. These sheets also include topography, roads, structures, and obstructions within these critical areas, as available. A table of the penetrations to these surfaces is included.

7.1.7 Airport / Community Land Use Compatibility Drawing

The Airport / Community Land Use Compatibility Drawing (**Sheet 12 of 14**) provides a graphic representation of existing and future land use (airfield, GA, support, open space, etc…) within Airport property and well as development guidelines for off-airport property within Airport Impact Zones (AIZs), and any property acquisition areas. The plan depicts off-airport land use in order to ensure compatibility with future airport operations.

7.1.8 Airport Area Terrain Map

The Airport Area Terrain Map (**Sheet 13 of 14**) provides a visual representation of terrain in the vicinity of the Airport and depicts terrain heights at the recommended pattern altitudes. This sheet emphasizes the narrow aspect of the Roaring Fork River canyon.

7.1.9 Airport Property Map

The Airport Property Map (**Sheet 14of 14**) identifies land comprising the airport and provides details concerning the existing parcels of land. This information is based upon information gathered in part from the Garfield County Recorder's Office and from the Result of Survey performed by Dibble, and includes recording information as available. Future property acquisition is identified.

7.2 Review & Approval of ALP

[**Placeholder**][After sponsor review in June of 2026, the draft ALP documentation was submitted to CDOA on June XX, 2026 for review along with the standard Appendix A, *ALP Review Checklist* of the ARP SOP 2.00, *Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)*. While the checklist is not a requirement for submission of ALPs to CDOA for non-NPIAS airports, it was provided for quality assurance.]

[**Placeholder**][The CDOA review was completed on July XX, 2026 and XX comments were received. Comments were addressed and a draft final ALP was resubmitted on July XX, 2026. Generally, CDOA agrees with the ALP as submitted for review; however, CDOA does not provide approval or signature of ALPs. Final documentation was issued for local signature by KGWS Sumers Airpark and the City of Glenwood Springs on July XX, 2026. Final signed documentation was distributed to the Airport, the City, and CDOA on July XX, 2026.]

Appendices

To the Draft Narrative Report

Appendix A - List of Acronyms

The following list references acronyms used throughout the document, as well as the ALP Set, sorted alphabetically by the first letter:

AAC	Aircraft Approach Category
AC	Advisory Circular
ACN	Aircraft Classification Number
ADG	Airplane Design Group
ADIZ	Air Defense Identification Zone
AGL	Above Ground Level
ALP	Airport Layout Plan
ALS	Approach Lighting System
ALSF-2	High Intensity ALS with SFL (Conf. 2)
AOA	Aircraft Operations Area
APBN	Airport Beacon
APM	Airport Master Plan
APPR	Approach
APV	Approach with Vertical Guidance
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Fire Fighting
ARP	Airport Reference Point
ASDA	Acceleration-Stop Distance Available
ATCT	Air Traffic Control Tower
AvGas	Aviation Gasoline
AWOS	Automated Weather Observing System
BRL	Building Restriction Line
CAGR	Compound Annual Growth Rate
CAT	Category
CFA	Controlled Firing Area
CIP	Capital Improvement Plan
CLUP	Comprehensive Land Use Plan
CTAF	Common Traffic Advisory Frequency
dB	Decibel
DEMO	Demolition
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level
DOT	Department of Transportation
DPTR	Departure
Dr	Drive
E	East
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Environmental Overview
EXST	Existing
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FBO	Fixed-Base Operator
FCT	Federal Contract Tower
FRZ	Flight Restricted Zone
FUT	Future
GA	General Aviation
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GS	Glideslope Antenna
HIRL	High Intensity Runway Edge Lights
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
LAA	Local Airport Advisory
LAAS	Local Area Augmentation System
Lbs	Pounds
LDA	Landing Distance Available
LDA	Localizer Type Directional Aid
LDIN	Lead-in Lighting System
LED	Light-Emitting Diode
LIRL	Low Intensity Runway Lights
Ln	Lane
LOC	Localizer Antenna
MAC	Missed Approach Course
MALS	Medium Intensity ALS
MALSF	Medium Intensity ALS with SFL
MALSR	Medium Intensity ALS with RAIL
MDA	Minimum Descent Altitude
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Edge Lights
MLS	Microwave Landing System

MLW	Maximum Landing Weight
MOA	Military Operation Area
MP	Maximum Payload
MPU	Master Plan Update
MRW	Maximum Ramp Weight
MTOW	Maximum Takeoff Weight
MTR	Military Training Route
MZFW	Maximum Zero Fuel Weight
N	North
NAS	National Airspace System
NAVAID	Navigation Aid
NDB	Non-Directional Beacon
NOTAM	Notice to Airmen
NPA	Non-Precision Approach
NPIAS	National Plan of Integrated Airport Systems
NSA	National Security Area
ODALS	Omnidirectional ALS
OEW	Operating Empty Weight
OFA	Object Free Area
OFZ	Obstacle Free Zone
OM	Outer Marker
PA	Precision Approach
PAPI-2L	2-Box Precision Approach Path Indicator
PAPI-4L	4-Box Precision Approach Path Indicator
PAR	Precision Approach Radar
PBN	Performance-Based Navigation
PCC	Portland Cement Concrete
PCI	Pavement Condition Index
PCN	Pavement Classification Number
POFZ	Precision Obstacle Free Zone
PRM	Precision Runway Monitor
RAIL	Runway Alignment Indicator Lights
Rd	Road
RDC	Runway Design Code
REIL	Runway End Identifier Lights
RNAV	Area Navigation
RNP	Required Navigation Performance
ROFA	Runway Obstacle Free Area
ROW	Right-Of-Way
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RVR	Runway Visual Range
RVZ	Runway Visibility Zone
RWY	Runway
SFL	Sequenced Flashing Lights
SGC	Segmented Circle
SID	Standard Instrument Departure
SOP	Standard Operating Procedure
SSALR	Simplified Short ALS with RAIL
STAR	Standard Terminal Arrival Route
TACAN	Tactical Air Navigation System
TDG	Taxiway Design Group
TDZ	Touchdown Zone
TDZE	Touchdown Zone Elevation
TDZL	Touchdown Zone Lighting
TERPS	Terminal Instrument Procedures
TF	Trip Fuel
TFR	Temporary Flight Restriction (TFR)
TODA	Takeoff Distance Available
TORA	Takeoff Run Available
TRSA	Terminal Radar Service Area
TSA	Taxiway Safety Area
TWY	Taxiway
ULT	Ultimate
UNICOM	Universal Communication
VA	Visual Approach
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omnidirectional Range
VORTAC	VOR & TACAN
W	West
WAAS	Wide Area Augmentation System
WME	Wind Measuring Equipment
WS	Wingspan
WSK	Lighted Windsock

Appendix B - Glossary of Terms

The following terms with appropriate definitions are provided to assist the reader in understanding the technical language included in this document.

A

Above Ground Level (AGL): The elevation of a point or surface above the ground.

Accelerate-Stop Distance Available (ASDA): Please see Declared Distances for further reference.

Advisory Circular (AC): External publications issued by the FAA consisting of non-regulatory material providing recommendations relative to a policy, guidance, and information relative to a specific aviation subject.

Aircraft: A transportation craft that is used or intended to be used for flight.

Aircraft Approach Category (AAC): A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

Aircraft Operation: The landing, takeoff, or touch-and- go procedure by an aircraft on a runway at an airport.

Aircraft Operations Area (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

Aircraft Rescue and Fire Fighting (ARFF): A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

Aircraft Weight Class *(per FAA's Air Traffic Organization (ATO) division):* A classification of aircraft weights as follows:

- *Super*: Airbus A380-800 and Antonov An-225.
- *Heavy*: Aircraft having a MTOW of 300,000 pounds or more (whether or not they are operating at this weight during a particular phase of flight).
- *Large*: Aircraft having a MTOW of more than 41,000 lbs., up to but not including 300,000 lbs.
- *Small+*: Aircraft having a MTOW of more than 12,500 lbs., up to but not including 41,000 lbs.
- *Small*: Aircraft having a MTOW of 12,500 pounds or less.

Aircraft Weight Class *(per FAA's Aviation Policy and Plans 130 (APO130) division)*: A classification of aircraft weights as follows:

- *Heavy*: Aircraft having a MTOW of 255,000 lbs. or more.
- *B757*: Boeing 757, all series.
- *Large Jet*: Turbojet aircraft having a MTOW of more than 41,000 lbs., up to but not including 255,000 lbs.
- *Large Commuter*: Turboprop aircraft having a MTOW of more than 41,000 lbs., up to but not including 255,000 lbs.
- *Medium*: Turbojet and turboprop aircraft having a MTOW of more than 12,500 lbs., up to but not including 41,000 lbs.
- *Small*: Turbojet, turboprop and piston aircraft having a MTOW of 12,500 lbs. or less.
- *Other*: Other aircraft.

Airfield: The portion of an airport which contains the facilities necessary for the operation of aircraft.

Airframe: The fuselage, booms, nacelles, cowlings, fairings, airfoil surfaces (including rotors but excluding propellers and rotating airfoils of engines), and landing gear of an aircraft and their accessories and controls.

Airplane Design Group (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

Airport: An area of land or water that is used or intended to be used for the landing and taking off of aircraft, and includes its buildings and facilities, if any (14 CFR Part 1).

Airport Master Plan (AMP): The APM is the stakeholders' concept for the long-term development of an airport. An APM provides a road map for efficiently meeting aviation demand through the foreseeable future while preserving the flexibility necessary to respond to changing industry conditions.

Airport Layout Plan (ALP): An ALP serves as a critical planning tool that depicts both existing facilities and planned development for an airport. Sponsors of airport development carried out at federally obligated airports must accomplish the improvement in accordance with an FAA-approved ALP. An FAA-approved ALP is mandated for all airport within the NPIAS.

Airspace Categories: The categories and types of airspace are dictated by the complexity or density of aircraft movements, nature of the operations conducted within the airspace, the level of safety required, and national and public interest. Airspace in the United States is classified as follows:

- *Controlled Airspace:*
    - *Class A*: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All aircraft must operate under IFR and use Flight Levels as reference.

- *Class B*: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published IAPs to the airport. An air traffic control clearance is required for all aircraft to operate in the area.
- *Class C*: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.
- *Class D*: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure. Two-way radio communication must be established unless otherwise authorized.
- *Class E*: Class E airspace is the controlled airspace not classified as Class A, B, C, or D airspace. A large amount of the airspace over the United States is designated as Class E airspace. This provides sufficient airspace for the safe control and separation of aircraft during IFR operations. Sectional and other charts depict all locations of Class E airspace with bases below 14,500 feet MSL. In areas where charts do not depict a Class E base, Class E begins at 14,500 feet MSL. In most areas, the Class E airspace base is 1,200 feet AGL. In many other areas, the Class E airspace base is either the surface or 700 feet AGL. Some Class E airspace begins at an MSL altitude depicted on the charts, instead of an AGL altitude. Class E airspace typically extends up to, but not including, 18,000 feet MSL (the lower limit of Class A airspace). All airspace above FL 600 is Class E airspace.

✈ *Uncontrolled Airspace:*

- *Class G*: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E.

✈ *Special Use Airspace:*

- Prohibited Areas
- Restricted Areas
- Warning Areas
- Military Operation Areas (MOAs)
- Alert Areas
- Controlled Firing Areas (CFAs)

✈ *Other Airspace Areas*:

- Local Airport Advisory (LAA)
- Military Training Route (MTR)
- Temporary Flight Restriction (TFR)
- Published VFR routes
- Terminal Radar Service Area (TRSA)

- National Security Area (NSA)
- Air Defense Identification Zones (ADIZ)
- Flight Restricted Zones (FRZ) in vicinity of Capitol and White House
- And others….

Approach Lighting System (ALS): A lighting system installed on the approach end of a runway and consisting of a series of lightbars, strobe lights, or a combination of the two that extends outward from the runway end. An ALS usually serves a runway that has a published Instrument Approach Procedure (IAP) and allows the pilot to acquire visual cues, identify the runway environment and transition from IFR to visual landing upon arriving at a prescribed decision point on an instrument approach.

Approach Procedures Classification: There are several types of approach procedures published by the FAA in the Terminal Procedure Publications (TPP). They are classified between four categories and include the following approaches and respective typical visibility minimums (Aircraft Category C/D) for clear approach paths:

- ✈ Precision Approach (PA)
  - ILS CAT I (DH 200, RVR 2400)
  - ILS CAT II (DH 100, RVR 1200)
  - ILS CAT IIIa (DH 0, RVR 700)
  - ILS CAT IIIb (DH 0, RVR 150)
  - ILS CAT IIIc (DH 0, RVR 0)
  - GLS
  - MLS
  - PAR
- ✈ Approach with Vertical Guidance (APV)
  - LPV (DH 200, RVR 2400)
  - RNP AR (DH 200, RVR 2400)
  - LNAV / VNAV (DH 250, RVR 4000)
- ✈ Non-Precision Approach (NPA)
  - LP (MDH 300, RVR 4000)
  - LNAV (MDH 400, RVR 5000)
  - LOC (MDH 450, RVR 5000)
  - VOR (MDH 450, RVR 5000)
  - VOR/DME (MDH 450, RVR 5000)
  - NDB (MDH 500, RVR 5000)
- ✈ Visual Approach (VA)
  - Visual

Approach Surface: Please see Part 77 Surfaces for further reference.

Area Navigation (RNAV): Please see Performance-Based Navigation (PBN) for further reference.

Airworthiness: The measure of an aircraft's suitability for safe flight. Certification of airworthiness is conferred by a certificate of airworthiness from the FAA and is maintained by performing the required maintenance actions.

B

Base Leg: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See “traffic pattern.”

Based Aircraft: The general aviation aircraft that use a specific airport as a home base.

Bearing: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

Blast Pad: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

Building Restriction Line (BRL): A line which identifies suitable building area locations on the airport.

C

Capital Improvement Plan (CIP): The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

Ceiling: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

Charter Operations: Defined by the FAA as being a type of Air Taxi operation typically above 60 seats non-scheduled to include vacation tour groups and non-scheduled air freight operations.

Circling Approach: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

Commercial Operator: A person for compensation or hire engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier.

Common Traffic Advisory Frequency (CTAF): A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

Compass Locator: A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

Compatibility Plan: As used herein, a plan, usually adopted by an Airport Land Use Commission, which sets forth policies for promoting compatibility between airports and the land uses which surround them. Often referred to as a Comprehensive Land Use Plan (CLUP).

Compound Annual Growth Rate: The Compound Annual Growth Rate (CAGR) is the average growth rate of a data series over multiple periods of time (usually years). It is a measure of the constant growth of that data series and is the metric of choice to use when comparing the growth of several data series over different periods of time, as opposed to the Average Annual Growth Rate (AAGR) that represents the arithmetic average of annual growth of a data series over several periods of time (usually a period of years) or the Average Growth Rate (AGR)

that represents the average increase of a data series over a single period of time (usually a period of years). The CAGR is the only metric that allows airport operators to track and compare actual growth of aviation activity levels to a forecast. The formula is as follows:

$$CAGR_{[i;f]} = \left(\frac{V_f}{V_i}\right)^{\frac{1}{Y_f - Y_i}} - 1$$

Where:
- Y_i is the first year of the data series
- Y_f is the last year of the data series
- V_i is the value of the data series during the first year
- V_f is the value of the data series during the last year

As an example, if the number of based aircraft at a hypothetical airport increase from 65 in 2020 to 67 in 2021, decrease to 63 in 2022, increase again to 75 in 2023 and to 82 in 2024, the results are as follows:

- 2020 - 2024 CAGR: 6.0 percent ("*on average, based aircraft have been growing at a rate of 6.0 percent a year over the past four years*")
- 2020 - 2024 AAGR: 6.4 percent ("*the average annual growth rate of based aircraft was 6.4 percent over the past four years*")
- 2020 - 2024 AGR: 26.2 percent ("*based aircraft grew 26.2 percent over the past four years*")

Conical Surface: Please see Part 77 Surfaces for further reference.

Control Zone: Controlled airspace surrounding one or more airports, normally a circular area having a radius of five statute miles plus extensions to include instrument arrival and departure paths. Most control zones surround airports with air traffic control towers and are in effect only for the hours when the tower is operational.

Controlled Airport: An airport that has an operating airport traffic control tower.

Crosswind: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

Crosswind Component: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

Crosswind Leg: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

Day-Night Average Sound Level (DNL): The noise metric adopted by the U.S. Environmental Protection Agency for measurement of environmental noise. It represents the average daytime noise level during a 24-hour day, measured in decibels and adjusted to account for the lower tolerance of people to noise during nighttime periods. The mathematical symbol is Ldn.

Decision Height: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

Decibel (dB): A unit measuring the magnitude of a sound, equal to the logarithm of the ratio of the intensity of the sound to the intensity of an arbitrarily chosen standard sound, specifically a sound just barely audible to

an unimpaired human ear. For environmental noise from aircraft and other transportation sources, an A-weighted sound level (sometimes abbreviated dBA) is normally used. The A-weighting scale adjusts the values of different sound frequencies to approximate the auditory sensitivity of the human ear.

Declared Distances: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- *Takeoff Runway Available (TORA)*: The runway length declared available and suitable for the ground run of an airplane taking off.
- *Takeoff Distance Available (TODA)*: The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.
- *Accelerate-Stop Distance Available (ASDA)*: The runway plus stop way length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.
- *Landing Distance Available (LDA)*: The runway length declared available and suitable for landing.

Department of Transportation (DOT): A state of federal level government organization consisting of modal operating agencies established to promote the coordination of state and federal transportation programs and to act as a focal point for research and development efforts in transportation.

Discretionary Funds: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

Displaced Threshold: A threshold that is located at a point on the runway other than the designated beginning of the runway.

Distance Measuring Equipment (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in weighted decibel, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

Downwind Leg: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

Easement: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

Elevation: The vertical distance measured in feet above mean sea level.

Entitlement: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

Environmental Audit: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

Environmental Assessment (EA): An environmental analysis prepared pursuant to the National Environmental Policy Act (NEPA) to determine whether an action would significantly affect the environment and thus require a more detailed Environmental Impact Statement (EIS). The certified release of an Environmental Assessment results in either a Finding of No Significant Impact (FONSI) or an EIS.

Environmental Impact Statement (EIS): A document required by the National Environmental Policy Act (NEPA) for certain actions significantly affecting the quality of the human environment.

Environmental Overview (EO): A minor environmental analysis performed to present overall characteristics of the Airport's environment and determine if any of the proposed planning improvements will impact National Environmental Policy Act's (NEPA) environmental categories. Usually a component of an AMP or ALP Update.

Experimental Aircraft Association: A not-for-profit organization operated exclusively for educational, recreational, and charitable purposes drawing upon the surrounding community for its membership and activities which include youth programs and public services.

F

Federal Aviation Administration (FAA): The U.S. government agency which is responsible for ensuring the safe and efficient use of the nation's airports and airspace.

Federal Aviation Regulations (FAR): The rules prescribed by the FAA governing all aviation activities in the United States. The FARs are part of *Title 14 - Aeronautics and Space* of the *Code of Federal Regulations (CFR)*. To avoid confusion with other acronyms, the FAA now refers to specific regulation by the term "14 CFR Part XX". Those regulation include, but are not limited to:

- 14 CFR Part 61 - Certification: Pilots, Flight Instructors, and Ground Instructors
- 14 CFR Part 77 - Safe, Efficient Use, And Preservation of the Navigable Airspace
- 14 CFR Part 91 - General Operating and Flight Rules
- 14 CFR Part 121 - Operating Requirements: Domestic, Flag, and Supplemental Operations
- 14 CFR Part 135 - Operating Requirements: Commuter and On Demand Operations
- 14 CFR Part 139 - Certification of Airports
- 14 CFR Part 141 - Flight Schools

Final Approach Fix: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

Final Approach: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

Fixed Base Operator (FBO): A provider of services to users of an airport. Such services include, but are not limited to, aircraft storage, fueling, flight training, repair, and maintenance.

Flight Level: An aircraft's altitude at standard air pressure, expressed in hundreds of feet. The air pressure is computed assuming an International Standard Atmosphere (ISA) pressure of 1013.25 hPa (29.92 inHg) at sea level, and therefore is not necessarily the same as the aircraft's actual altitude, either above sea level or above ground level. Flight levels are used to ensure safe vertical separation between aircraft, despite natural local variations in atmospheric air pressure. Aircraft are required to transition to Flight Levels within Class A airspace.

Flight Service Station: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

Fractional Aircraft Ownership: An aircraft ownership system that is based on a user paying an annual fee to an aircraft leasing company for access to a varied selection of corporate aircraft types. Aircraft operating fees are also paid for the specific type of aircraft and the number of hours flown.

Frangible NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

Fuel Flowage Fees: Fees levied by the airport operator per gallon of aviation gasoline and jet fuel sold at the airport.

G

General Aviation (GA): That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

General Aviation Airport: Please see National Plan of Integrated Airport Systems (NPIAS) for further reference.

Glideslope (GS): Component of an ILS approach that emits electronic signals which provide glide (vertical) guidance to airborne aircraft during ILS instrument approaches and landings.

Global Navigation Satellite System (GNSS): A satellite navigation system that uses satellites to provide autonomous geo-spatial positioning with global coverage. It allows small electronic receivers to determine their location (longitude, latitude, and altitude/elevation) to high precision (within a few centimeters to meters) using time signals transmitted along a line of sight by radio from satellites. The system can be used for providing position, navigation or for tracking the position of something fitted with a receiver (satellite tracking). The signals also allow the electronic receiver to calculate the current local time to high precision, which allows time synchronization. These uses are collectively known as Positioning, Navigation and Timing (PNT).

GNSS Augmentation: Augmentation of a global navigation satellite system (GNSS) is a method of improving the navigation system's attributes, such as accuracy, reliability, and availability, through the integration of external information into the calculation process. Such augmentation enables and supports the transition to Performance-Based Navigation (PBN) that, among others, is anticipated to fully allow for a sustainable and cost-effective alternative to ILS approaches in the near future. There are two different types of augmentation systems:

- *Satellite-Based Augmentation Systems (SBAS):* A SBAS supports wide-area or regional augmentation through the use of ground reference stations that evaluate the variations of GNSS signals from GNSS satellites, transmit correction messages to a separate fleet of SBAS satellites who then broadcast the correction messages back to Earth to SBAS-enabled GNSS receivers within the coverage area, usually every five (5) seconds. In the U.S. the FAA has implemented the Wide Area Augmentation System (WAAS) that is a SBAS that enables aircraft to rely on GNSS (specifically, the GPS) for all phases of flight, including precision approaches to any airport within its coverage area that includes Canada, the United States, and Mexico. More particularly, WAAS-capable approach procedures include Localizer Performance with Vertical Guidance (LPV) which is a type of Approach with Vertical Guidance (APV) that offer approach visibility minimums equal to those of CAT I ILS approaches, but without meeting ICAO Annex 10 precision approaches standards. As of March 26th, 2020, there are over 4,052 LPV approach procedures in the U.S. serving 1,955 airports, 1,187 of which are non-ILS airports.
- *Ground-Based Augmentation Systems (GBAS)*: A GBAS is a system that provides differential corrections and integrity monitoring of GNSS on a real-time basis. GBAS provides navigation and precision approach service in the vicinity of the host airport, broadcasting its differential correction message via a VHF radio data link from a ground-based transmitter. GBAS yields the extremely high accuracy, availability, and integrity necessary for Category I, and eventually Category II and III Precision Approach (PA). GBAS demonstrated accuracy is less than one meter in both the horizontal and vertical axis. In the US, the FAA is developing the Local Area Augmentation System (LAAS) that is a GBAS bringing CAT I precision approach capabilities to airports in the U.S. and that meets ICAO Annex 10 precision approaches standards. A LAAS system supports navigation and precision approach operations within 23 nautical miles from the LAAS reference point. The FAA is currently focused on validating standards for a CAT III service. While the FAA has indefinitely delayed plans for federal LAAS acquisition, the system can be purchased by airports and installed as a Non-Federal NAVAID. The FAA has recently stopped using the term LAAS and has transitioned to the ICAO terminology of GBAS. As of March 26th, 2020 there are only three airports that have implemented a public-use CAT I LAAS in the US, using the FAA-approved Honeywell SLS-4000 Block II system: Newark Liberty International Airport (EWR), George Bush Intercontinental Airport (IAH) and Atlantic City International Airport (ACY) (no published GLS IAPs). A handful of other U.S. airports have expressed interest in the FAA-approved LAAS: John F. Kennedy International Airport (JFK), LaGuardia Airport (LGA), San Francisco International Airport (SFO), Seattle-Tacoma International Airport (SEA) and Hartsfield-Jackson Atlanta International Airport (ATL). Two others private Boeing sites are using systems that are not approved by the FAA for use by certified air carriers and that do not have associated GLS IAPs published: Grant County International Airport (MWH) and Charleston International Airport (CHS) (not commissioned).

Global Positioning System (GPS): A fully operational GNSS system owned by the U.S. and operated by the United States Air Force (USAF) that employs 32 satellites (as of 2020). Please see Global Navigation Satellite System (GNSS) for further reference.

Ground Access: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

High Intensity Runway Edge Lights (HIRL): The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

Horizontal Surface: Please see Part 77 Surfaces for further reference.

I

Infill: Development which takes place on vacant property largely surrounded by existing development especially development which is similar in character.

Initial Approach Fix: The designated point at which the initial approach segment begins for an instrument approach to a runway.

Instrument Approach Procedure (IAP): A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

Instrument Flight Rules (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

Instrument Landing System (ILS): A precision instrument approach system which normally consists of the following electronic components:

- Localizer (LOC)
- Glide Slope (GS)
- Approach Lighting System (ALS)
- Outer Marker (OM, Optional)
- Middle Marker (MM, Optional)
- Inner Marker (IM, Optional)
- Distance measuring Equipment (DME), replacing marker beacons in modern ILS installations

Instrument Meteorological Conditions (IMC): Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

Instrument Runway: A runway equipped with electronic and visual navigation aids for which a precision or non-precision approach procedure having straight-in landing minimums has been approved. (AIM)

Itinerant Operations: Operations performed by aircraft that land at an airport arriving from outside the airport area, or depart an airport and leave the airport area.

K

Knots: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

Landside: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

Large Aircraft: An airplane that has a MTOW in excess of 12,500 pounds (14 CFR Part I).

Load Factor: The ratio of enplaned passengers on a flight to the number of available seats.

Local Area Augmentation System (LAAS): The FAA now refers to LAAS as GBAS. Please see GNSS Augmentation for further reference.

Local Operations: Operations performed by aircraft that remain in the local traffic pattern, execute simulated instrument approaches or low passes at the airport, and the operations to or from the airport and a designated practice area within a 20–mile radius of the tower.

Local Traffic: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch and-go training operations.

Localizer (LOC): Component of an ILS approach that emits electronic signals which provide course (horizontal) guidance to airborne aircraft during ILS instrument approaches and landings.

Localizer Type Directional Aid (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

Low Intensity Runway Lights (LIRL): The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

Maximum Landing Weight (MLW): The MLW is the maximum aircraft weight limit approved for an aircraft to land. Landing above this weight can cause structural damage. MLW < MTOW

Maximum Payload (MP): The maximum carrying capacity of an aircraft.

Maximum Ramp Weight (MRW): The MRW is the maximum aircraft weight for maneuvering on the ground. MRW includes the weight of fuel used for start, taxi, and aircraft run-up procedures. MRW > MTOW.

Maximum Takeoff Weight (MTOW): The MTOW is the maximum weight for takeoff as limited by aircraft strength and airworthiness requirements. The MTOW is the maximum weight at start of the take-off run. MTOW = MZFW + TF = OEW + MP + TF.

Maximum Zero Fuel Weight (MZFW): The MZFW is the maximum permissible weight of the aircraft without usable fuel. MZFW = OEW + MP.

Medium Intensity Runway Lights (MIRL): The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

Microwave Landing System (MLS): A precision instrument approach system similar but superior to an ILS, that would still require physical equipment to be installed at airports. Due to costs and increasing interest of GPS/WAAS approaches around the US, very few were installed, and the last two were eliminated in 2008.

Military Operations: Aircraft operations that are performed in military aircraft.

Minimum Descent Altitude (MDA): The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide slope is provided. (FAR 1)

Missed Approach Course (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

- When the aircraft has descended to the decision height and has not established visual contact; or
- When directed by air traffic control to pull up or to go around again.

Movement Area: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

National Airspace System (NAS): The network of air traffic control facilities, air traffic control areas, air routes and navigational facilities through the U.S.

National Plan of Integrated Airport Systems (NPIAS): The national airport system plan developed by the FAA on a biannual basis for the development of public use airports to meet national air transportation needs. It identifies existing and proposed airports that are significant to national air transportation in the U.S., and thus eligible to receive federal grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports. The FAA is required to provide Congress with a five-year estimate of AIP-eligible development every two years. The NPIAS includes about 3,300 public-use airports out of the nearly 20,000 public- and private-use landing facilities in the United States. About 65 percent of the public-use airports are included in the NPIAS. Approximately 98 percent of the NPIAS airports are owned by public entities (generally city, county, or State) and 2 percent are privately owned airports. The NPIAS includes all commercial service airports and selected general aviation airports that meet requirements. They are classified as follows (figures from the 2021-2025 NPIAS, published September 30th, 2020):

- *Primary* (396) Publicly owned, public-use airports with at least 10,000 annual enplanements and scheduled air carrier service:
  - *Large Hub* (30) Receives 1 percent or more of the annual U.S. commercial enplanements.
  - *Medium Hub* (31) Receives 0.25 to 1.0 percent of the annual U.S. commercial enplanements.
  - *Small Hub* (69) Receives 0.05 to 0.25 percent of the annual U.S. commercial enplanements.
  - *Nonhub* (266) Receives less than 0.05 percent but more than 10,000 of the annual U.S. commercial enplanements.
- *Nonprimary* (2,908) Airports that primarily support general aviation aircraft. These airports are further grouped into five categories based on existing activity (e.g., the number and types of based

aircraft and volume and types of flights), geographic factors, and public interest functions: National (92), Regional (482), Local (1,213), Basic (893), and Unclassified (228):

- *Commercial Service* (123) A public-use airport having scheduled passenger service and receiving between 2,500 and 10,000 annual enplanements.
- *Reliever* (250) A public-use airport designated to relieve congestion at a commercial service airport and to provide more general aviation access to the overall community.
- *General Aviation* (2,535) A public-use airport that does not have scheduled service or has scheduled service with less than 2,500 passenger boardings each year.

Nautical Mile: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

Navigational Aid (NAVAID): A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

Noise Contour: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

Non-Directional Beacon (NDB): A beacon transmitting non-directional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

Non-Precision Approach (NPA): A straight-in instrument approach procedure that provides course guidance, usually without vertical path guidance, with usual visibility minimums not lower than 3/4 mile (4000 RVR).

Non-Precision Instrument Runway: A runway with at least one end having an approved or planned straight-in instrument approach procedure which has no existing or planned precision instrument approach procedure.

Nonprimary Airport: Please see National Plan of Integrated Airport Systems (NPIAS) for further reference.

Notice To Airmen (NOTAM): A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

O

Object Free Area (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Obstacle Free Zone (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

Obstruction: Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used therein, the height of which exceeds the standards established in Subpart C of Federal Aviation Regulations Part 77, Objects Affecting Navigable Airspace.

Operating Empty Weight (OEW): The standard basic weight for any particular series or any particular configuration of an aircraft, including all structural component, all fluids necessary for operation such as engine oil, engine coolant, water, hydraulic fluid and the unusable fuel, as well as standard items and additional operator items, but excluding fuel loaded and payload.

Operation: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

Outer Marker (LOM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

Overflight: Any distinctly visible and audible passage of an aircraft in flight, not necessarily directly overhead.

P

Part 77 Surfaces: Imaginary airspace surfaces established with relation to each runway of an airport. Those surfaces are established as part of 14 CFR Part 77, hence the colloquial name. Those imaginary surfaces include the following types of surfaces:

- *Primary Surface* - A surface that is longitudinally centered on the runway, extending 200 feet beyond the threshold in each direction for runway with a prepared hard surface. The width of the primary surface varies and is depending upon the most precise approach for either end of that runway. For runways larger than utility, the width of the primary surface is 500 feet for visual runways having only visual approaches and for non-precision instrument runways having visibility minimums greater than three-fourths statute mile, and 1,000 feet for non-precision instrument runways having a non-precision instrument approach with visibility minimums as low as three-fourths of a statute mile, as well as for precision instrument runways.
- *Approach Surface* - An inclined slope or plane going outward and upward from the ends of the primary surface, centered on the extended runway centerline. The innermost portion of the approach slope overlaps with the Runway Protection Zone (RPZ). Non-precision, precision and visual approaches have different approach slopes, widths, and length. The inner edge of the approach surface always is the same width as the primary surface.
- *Horizontal Surface* - A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of a specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is 5,000 feet for all runways designated as utility or visual, and 10,000 feet for all other runways.
- *Transitional Surface* - An inclined plane with a slope of 7:1 extending outward and upward at right angles from the primary and approach surfaces, terminating at the point where they intersect with the horizontal surface or any other surface under more critical restrictions. Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

- *Conical Surface* - An inclined plane at a slope of 20:1 extending outward and upward from the periphery of the horizontal surface for a distance of 4,000 feet.

Peaking Operation: Peak hour aircraft operational projections are required to determine the peak period capacity of a runway system, as well as for determining the size of the various functional areas of a passenger terminal.

Performance-Based Navigation (PBN): An advanced form of air navigation that creates precise 3D flight paths and enables approaches that allow for similar visibility minimums that those of precision approaches but without the requirement for costly ground equipment such as ILS systems. There are two types of PBN:

- *Area Navigation (RNAV):* A type of PBN that allows an aircraft to fly a specific path between two 3D-defined points in space having no requirements for on-board navigation performance monitoring and alerting.
- *Required Navigation Performance (RNP):* A type of PBN that allows an aircraft to fly a specific path between two 3D-defined points in space having requirements for on-board navigation performance monitoring and alerting.

In the U.S. PBN is mainly used for the following types of En-Route and Terminal Procedures (TP):

- *RNAV Q- and T-Routes:* The FAA is replacing high- and low-altitude routes that rely on ground-based navigation aids (NAVAIDs) with routes that use RNAV specifications for use by aircraft with RNAV capability. T-Routes can be flown only with GNSS and are replacing many Victor routes in airspace from 1,200 to 18,000 feet. Q-Routes can be flown using positioning from either satellite signals or distance measuring equipment (DME) in case of a GPS outage. Q-Routes are replacing many Jet routes from 18,000 to 45,000 feet.
- *RNAV Standard Instrument Departures (SID):* RNAV SIDs provide fixed, precise repeatable paths for aircraft from takeoff to en-route airspace with a minimum of level offs to reduce fuel consumption and noise.
- *RNAV Standard Terminal Arrivals (STAR):* RNAV STAR procedures can provide a continuous descent from cruise altitude using Optimized Profile Descents (OPD) to save fuel and reduce emissions and noise.
- *RNP Instrument Approach Procedures (IAP):* RNP IAPs were previously identified by the FAA as RNAV (GPS) until the International Civil Aviation Organization (ICAO) changed this nomenclature. RNP approaches are for aircraft equipped primarily with GNSS or GNSS enhanced by WAAS. RNP approaches permit aircraft with the required navigation performance to operate on any desired course within the coverage of the navigation signals in use.
- *RNP with Authorization Required (AR) Instrument Approach Procedures (IAP):* Formerly identified as RNAV (RNP) by the FAA prior to ICAO's nomenclature change, these highly accurate approach procedures enable qualified operators with equipped aircraft to fly with great precision on the same flight path every time near high terrain or in congested airspace. RNP AR can use several different position sensor inputs, including GPS, VOR, DME/DME, inertial systems, baro-VNav and other sources. To fly these procedures, aircrews must be trained and authorized by the FAA to fly RNP AR, and aircraft must be certified. Some RNP AR approaches enable aircraft to fly a curved path to a runway even when other aircraft are approaching to land simultaneously on parallel runways.

Pilot Controlled Lighting: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency (usually CTAF).

Precision Approach (PA): A standard instrument approach procedure which provide course (runway alignment) and glide slope (descent) information, such as an ILS approach, ILS approach with Precision Runway Monitor (PRM), MLS approach or a PAR approach, with visibility lower than 3/4 mile (4000 RVR). Precision approaches are categorized as follows:

- *Category I (CAT I)*: A precision approach which provides for approaches with a Decision Height (DH) of no less than 200 feet and visibility no less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800 with operative touchdown zone and runway centerline lights).
- *Category II (CAT II)*: A precision approach which provides for approaches with a DH of no less than 100 feet and visibility no less than 1200 feet RVR.
- *Category III (CAT III)*: A precision approach which provides for approaches with minima less than Category II as follows:
    - *Category IIIa:* A precision approach which provides for approaches with a DH below 100 feet but visibility no less than 700 feet RVR.
    - *Category IIIb:* A precision approach which provides for approaches with a DH below 50 feet but visibility no less than 150 feet RVR.
    - *Category IIIc:* A precision approach which provides for approaches with no limits on either DH or RVR. Effectively allows for zero-visibility landings.

4-Box Precision Approach Path Indicator (PAPI-4): A lighting system providing visual approach slope guidance to aircraft during a VFR approach, or IFR approach at and below minimums when transitioning to visual cues for landing. It is similar to a VASI but provides a sharper transition between the colored indicator lights. Conventionally located on the left-hand side (PAPI-4L) of the approach, sometimes located on the right-hand side (PAPI-4R) of the approach when inconvenient.

Precision Approach Radar (PAR): A type of precision approach that rely on a controller to give verbal instructions to the pilot that keep the aircraft on course and glidepath during final approach. This type of system is mostly in use in the military.

Precision Instrument Runway: A runway with at least one end having an approved or planned straight-in precision instrument approach procedure.

Precision Obstacle Free Zone (POFZ): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFZ is a clearing standard which requires the POFZ to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

Precision Runway Monitor (PRM): A high-speed, high-precision radar system developed to monitor simultaneous close parallel instrument approaches to those parallel runways that are spaced less than 4,300 ft apart. In the US, PRM systems are installed at ORD, SFO, DTW and ATL.

Primary Airport: Please see National Plan of Integrated Airport Systems (NPIAS) for further reference.

Primary Surface: Please see Part 77 Surfaces for further reference.

R

Radial: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

Regression Analysis: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

Reliever Airport: Please see National Plan of Integrated Airport Systems (NPIAS) for further reference.

Remote Communications Outlet (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

Required Navigation Performance (RNP): Please see Performance-Based Navigation (PBN) for further reference.

Runway (RWY): A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

Runway Alignment Indicator Light (RAIL): A series of high intensity sequentially flashing lights installed on the extended centerline of the runway, usually in conjunction with an Approach Lighting System (ALS).

Runway End Identifier Lights (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

Runway Gradient: The average slope measured in percent, between the two ends of a runway.

Runway Object Free Area (ROFA): An area centered on the ground on a runway centerline provided to enhance the safety of aircraft operations by remaining clear of objects, except for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes.

Runway Protection Zone (RPZ): An area off of the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

Runway Safety Area (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

S

Scope: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

Segmented Circle (SGC): A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

Shoulder: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

Small Aircraft: An airplane that has a MTOW of 12,500 pounds or less (14 CFR Part I).

Special-Use Airspace: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities.

Standard Instrument Departure (SID): An IFR air traffic control route identified in an instrument departure procedure by which aircraft should transition from take-off phase to the en-route phase.

Standard Terminal Arrival Route (STAR): An IFR air traffic control route identified in an approach procedure by which aircraft should proceed from the en-route phase to an initial approach fix.

Straight-In Landing/Approach: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

T

Tactical Air Navigation (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably equipped aircraft a continuous indication of hearing and distance to the TACAN station.

Taxilane: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

Taxiway Safety Area (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

Taxiway (TWY): A defined path established for the taxiing of aircraft from one part of an airport to another.

Terminal Instrument Procedures (TERPS): A standard for the formulation, review, approval and the publishing of procedures for STARS, SIDs and IAPs to and from civil and military airports.

Threshold Lights: Fixed green lights arranged symmetrically left and right of the runway centerline, identifying the runway end.

Threshold: The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.

Touch-And-Go: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and go is recorded as two operations: one operation for the landing and one operation for the takeoff.

Touchdown Zone (TDZ): The first 3,000 feet of the runway beginning at the threshold.

Touchdown Zone Elevation (TDZE): The highest elevation in the touchdown zone.

Touchdown Zone Lighting (TDZL): Two rows of transverse light bars located symmetrically about the runway centerline normally at 100- foot intervals. The basic system extends 3,000 feet along the runway.

Touchdown: The point at which a landing aircraft makes contact with the runway surface.

Traffic Pattern: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.

Transitional Surface: Please see Part 77 Surfaces for further reference.

Trip Fuel (TF): Fuel required to complete a trip to destination from the origin airport. For those planning purposes, Trip Fuel as defined here includes continency fuel, alternate fuel, final reserve fuel, additional fuel and any extra fuel carried by aircraft.

U

Uncontrolled Airport: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

Universal Communication (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

Upwind Leg: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

Utility Runway: A runway designed for use by aircraft with MTOW of 12,500 lbs. or less.

V

Vector: A heading issued to an aircraft to provide navigational guidance by radar.

Very High Frequency Omnidirectional Range (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

Very High Frequency Omnidirectional Range / Tactical Air Navigation (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

Victor Airway: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

Visual Approach Slope Indicator (VASI): System of lights on the side of an airport runway threshold that provides visual descent guidance information during approach. Those systems are similar but older than PAPI systems, consequently new VASIs are not installed by FAA.

Visual Approach: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

Visual Flight Rules (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

Visual Meteorological Conditions (VMC): Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

Visual Runway: A runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA-approved airport layout plan or by any planning document submitted to the FAA by competent authority.

W

Wide Area Augmentation System (WAAS): Please see GNSS Augmentation for further reference.

Z

Zoning: A police power measure, enacted primarily by units of local government, in which the community is divided into districts or zones within which permitted and special uses are established, as are regulations governing lot size, building bulk, placement, and other development standards. Requirements vary from district to district, but they must be uniform within districts. A zoning ordinance consists of two parts: the text and a map.

Appendix C - External References

Federal Aviation Administration (FAA)

- AC 150/5000-17, *Critical Aircraft and Regular Use Determination*
- AC 150/5060-5, *Airport Capacity and Delay*
- AC 150/5070-6B (Change 1 & 2), *Airport Master Plans*
- AC 150/5300-13B (Change 1), *Airport Design*
- AC 150/5320-6G, *Airport Pavement Design and Evaluation*
- AC 150/5325-4B, *Runway Length Requirements for Airport Design*
- AC 150/5340-1M (Change 1), *Standards for Airport Markings*
- AC 150/5340-30J, *Design and Installation Details for Airport Visual Aids*
- Order 1050.1G, *FAA National Environmental Policy Act Implementing Procedures*
- Order JO 6850.2C, *Visual Guidance Lighting Systems*
- EB 95, *Additional Siting and Survey Considerations for PAPI and Other VGSI*

Colorado Department of Transportation - Division of Aeronautics (CDOA)

- 2020 Colorado Aviation System Plan
- 2024 System Update, Colorado Airport Pavement Management System
- 2025 Colorado Aviation Economic Impact Study
- Programs & Procedures Manual (Version 2024-A, August 2024)

Transportation Research Board (TRB), Airport Cooperative Research Program (ACRP)

- National Academies of Sciences, Engineering, and Medicine (2014). *ACRP Report 113: The Guidebook on General Aviation Facility Planning*. Washington D.C.: Transportation Research Board
- National Academies of Sciences, Engineering, and Medicine (2012). *ACRP Report 79: Evaluating Airfield Capacity*. Washington D.C.: Transportation Research Board
- National Academies of Sciences, Engineering, and Medicine (2022). *Development of a Small Aircraft Runway Length Analysis Tool*. Washington, DC: The National Academies Press.

Appendix D - 2020 Colorado Aviation System Plan

The 2020 Colorado Aviation System Plan can be found at the link below:

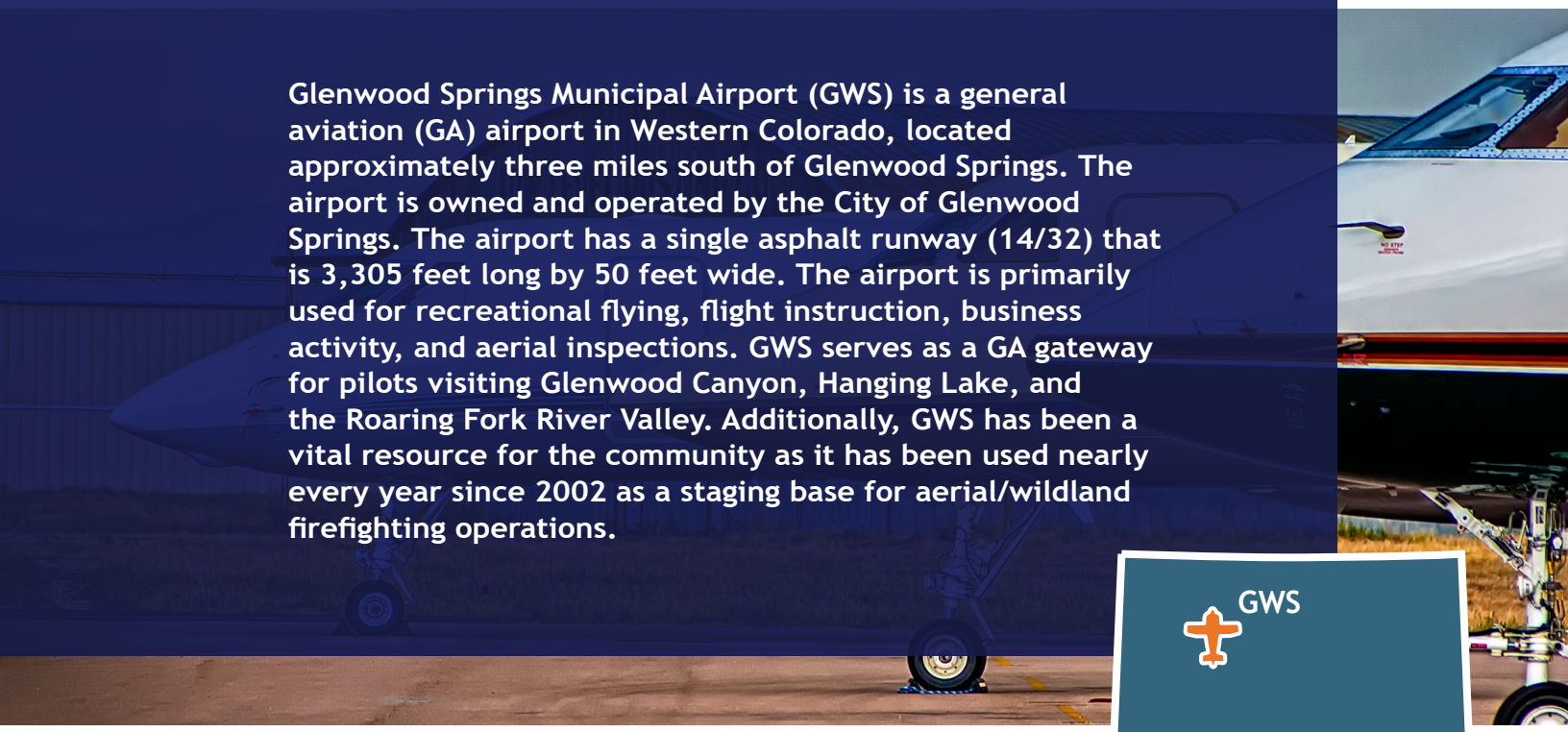
https://www.coloradoaviationsystem.com/2020-casp/

The individual airport brochure for GWS is provided on the following pages.

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GLENWOOD SPRINGS MUNICIPAL

Glenwood Springs Municipal Airport (GWS) is a general aviation (GA) airport in Western Colorado, located approximately three miles south of Glenwood Springs. The airport is owned and operated by the City of Glenwood Springs. The airport has a single asphalt runway (14/32) that is 3,305 feet long by 50 feet wide. The airport is primarily used for recreational flying, flight instruction, business activity, and aerial inspections. GWS serves as a GA gateway for pilots visiting Glenwood Canyon, Hanging Lake, and the Roaring Fork River Valley. Additionally, GWS has been a vital resource for the community as it has been used nearly every year since 2002 as a staging base for aerial/wildland firefighting operations.





Airport Classification

The 2020 Colorado Aviation System Plan (CASP) has identified six functional classifications for Colorado's 65 publicly-owned, public-use airports and one privately-owned, public-use airport. The six classifications were newly developed for the 2020 CASP and replace the roles previously developed in the 2011 study. These classifications follow the Federal Aviation Administration's (FAA) role categories as defined by the National Plan of Integrated Airport Systems (NPIAS) and the ASSET study. However, the CASP expands upon these roles to create more specific classifications for airports that are not included in the NPIAS. Airports that are included in the NPIAS are eligible for federal funding. As of the 2019 NPIAS publication, 48 publicly-owned airports and one privately-owned airport in the Colorado airport system are included in the NPIAS, while 17 publicly-owned airports are not.

Glenwood Springs Municipal Airport is one of 19 airports in Colorado classified as a GA-Local airport. GA-Local airports are classified as having on-site weather reporting and occasionally supporting IFR flight operations. GA-Local airports are the most common classification of airport and link smaller population centers to the national airport system. Airports in this role are primarily used by piston aircraft for personal and business purposes and frequently accommodate flight training, emergency medical services, and/or charter passenger services.

Commercial Service | GA-National | GA-Regional | **GA-Local** | GA-Community | GA-Rural

Frequent Airport Activities

- Recreational Visitors
- Corporate/Business Activities
- Search and Rescue
- Environmental Patrol
- Aerial Photography/ Surveys

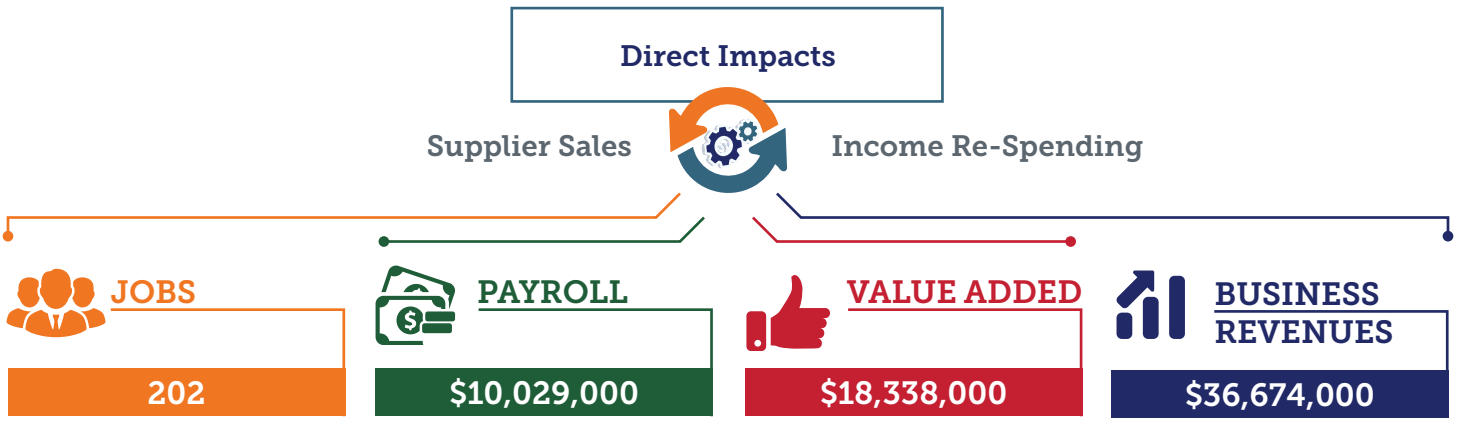
Glenwood Springs Municipal Features

Associated City/County	Glenwood Springs/ Garfield
Associated OEDIT Region	11 - Northwest Colorado Region
FAA GA ASSET Classification	Non-NPIAS
Annual Operations (2018)	22,020
Number of Based Aircraft (2018)	69
Runway(s)	1
Air Traffic Control Tower	No

GWS

Economic Impacts of GWS

The 2020 Colorado Aviation Economic Impact Study (CEIS) measured the economic impacts of all airports in the state. Glenwood Springs Municipal is one of 56 general aviation airports contributing to the state's aviation economic impacts. The components that comprise the total economic impacts for GWS are summarized below. Visit the project website to learn more about the methodology used to determine the economic impacts of GWS and all other Colorado airports.



Airport Needs and Recommendations

The 2020 CASP identified several performance measures (PMs) and facility and service objectives (FSOs) to provide a baseline for the infrastructure, facilities, and service capabilities required to best support the type and volume of aviation activity typified by each classification. The CASP identified gaps between the airport's existing condition and the needs to satisfy PMs, FSOs, and/or future facility needs driven by aviation demand forecasts. It is important to note that the PMs and FSOs are not requirements or mandates for airports to meet, rather, they serve as guidelines for airports and CDOT Division of Aeronautics to use during the airport planning process. Airports considered to be deficient in meeting the PMs and/or FSOs were reviewed to determine the recommended projects needed to satisfy those components.

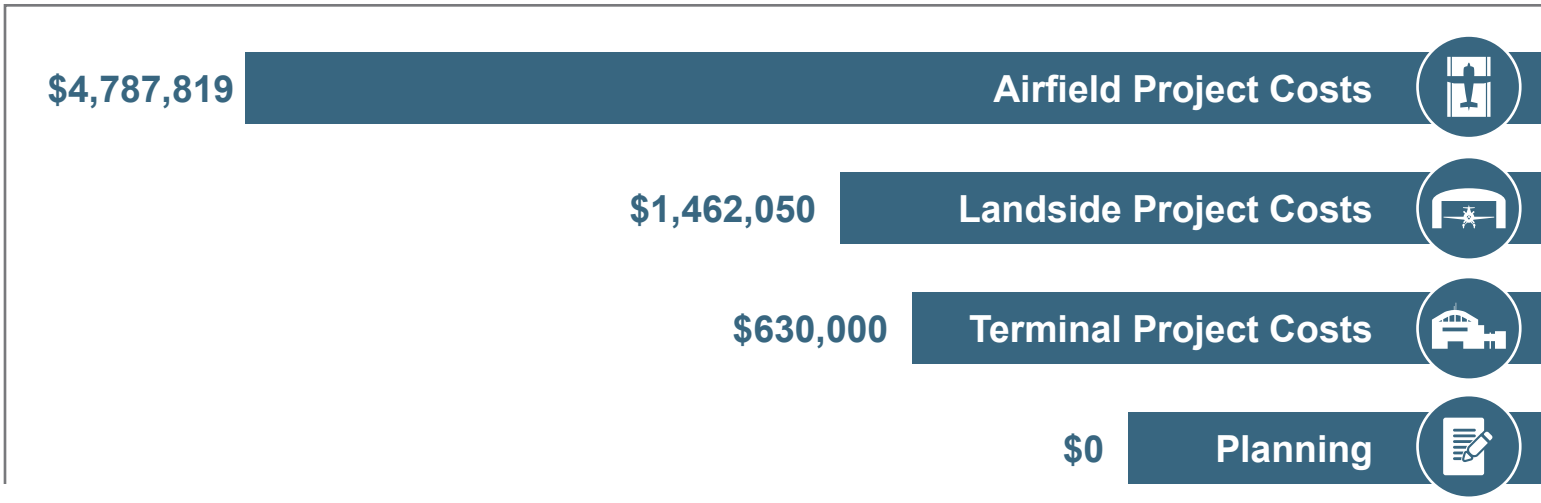
Planning level costs were developed for recommended projects and were associated with the appropriate goal category, PM, or FSO. These costs were developed based on 2019 Colorado material costs and industry knowledge and were adjusted to reflect cost differentials between types, sizes, and locations of airports. Projects and associated costs from available airport master plans and the CDOT 20-year Capital Improvement Program (CIP) were also incorporated into the CASP to provide an estimate of the airport's needs based on meeting PMs and FSOs as well as forecasted future demand. The project cost estimates for Glenwood Springs Municipal to meet appropriate goals, PMs, and FSOs, and projects identified by the airport from other planning efforts, are categorized by project type in the following chart.



Did You Know?

Each August, GWS hosts an Aviation Expo that highlights the value of all aspects of aviation and the airport. The Expo is free to the public and several businesses, flight schools, and aviation organizations set up booths and static aircraft displays. Additionally, local pilots donate their time, fuel, and aircraft to give flights to Expo attendees. Money raised during the event supports the "Friends of GWS" scholarship fund, which provides tuition assistance for local graduates pursuing a career in aviation.

Airport Project Costs by Type



Airport Report Card

Facility and service objectives (FSOs) were developed for each of the six airport classifications in the 2020 CASP. The following table details the FSOs and corresponding performance of Glenwood Springs Municipal. These objectives were analyzed in conjunction with the other performance measures (PMs) to determine the airport's project needs and associated costs.

Objective Category	GA-Local Objective	Current Condition	Meets 2020 Objective?
Airfield			
ARC	B-II	B-II	Yes
Runway Length	Accommodate 100% of small aircraft adjusted for elevation and mean maximum daily temp during hottest month	3,305 feet (7,200 feet)	No
Runway Width	75 feet	50 feet	No
Runway Strength	30,000 pounds	15,000 lbs SW	No
Taxiway	Partial parallel	Full parallel	Yes
Runway Markings	Non-precision	Visual	No
Lighting/NAVAIDS			
Approach	Non-precision	Visual	No
Visual Aids	Rotating beacon, lighted wind cone, REILs, VGSIs	VGSIs, wind cone	No
Runway Lighting	MIRL	None	No
Weather Reporting	On-site ASOS, AWOS, or Automated Unicom	Automated UNICOM	Yes
Airport Facilities			
Terminal (CS and/or GA)	Facility with restrooms, pilot-lounge, and Wi-Fi	None	No
Apron Tie-Downs	Tie-downs for 50% of based aircraft fleet plus 25% of weekly average overnight transient storage during peak season	50% of based aircraft fleet plus 25% transient aircraft fleet: 35 — Total tie-down spaces: 30	No
Hangars	Hangars for 50% of based aircraft fleet and 25% of weekly average overnight transient storage	50% of based aircraft fleet: 35 — Number of based aircraft hangar spaces: 64 25% of transient aircraft fleet: 1 — Number of transient aircraft hangar spaces: 0	No
Dedicated Maintenance/SRE Storage Building	Yes	No	No
Electric Vehicle Charging Stations	Yes	No	No
Perimeter Security	AOA 3-wire fencing with appropriate signage	AOA 3-wire fencing with appropriate signage	Yes
Services/Other			
Jet A Fuel	24/7 (Self-Serve or Call Out)	24/7 (Self-Serve or Call Out)	Yes
AvGas Fuel	24/7 (Self-Serve or Call-Out)	24/7 (Self-Serve or Call Out)	Yes
Aircraft De-icing	Based on community need	None	Based on community need
Courtesy Car	Yes	Yes	Yes
Sustainability Plan	Based on community need	No	Based on community need
Minimums for All Airports			
Restroom (24-hr accessible) ✓	Cell Phone Service ✓	Airport Layout Plan (ALP) ✓	Wi-Fi Service ✗

Appendix E - 2025 Colorado Economic Impact Study

The 2025 Colorado Aviation Economic Impact Study can be found at the link below:

https://www.coloradoaviationsystem.com/2025-ceis/

The individual airport brochure for GWS is provided on the following pages.

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2025 Colorado Aviation ECONOMIC IMPACT STUDY

Individual Airport Economic Impact Report

KGWS Sumers Airpark (GWS)

KGWS Sumers Airpark (GWS) is a general aviation airport in western Colorado, located approximately three miles south of Glenwood Springs. The airport is owned by the City of Glenwood Springs and operated by a local non-profit. The airport has a single asphalt runway (14/32) that is 3,305 feet long by 50 feet wide. The airport is primarily used for recreational flying, flight instruction, business activity, and aerial inspection. GWS serves as a gateway for general aviation pilots and passengers visiting Glenwood Canyon, Hanging Lake, and the Roaring Fork River Valley. Additionally, GWS is a vital resource for the community as it has been used nearly every year since 2002 as a staging base for aerial/wildland firefighting operations.

Top Activities

- Recreational Activities
- Corporate/ Business Activity
- Search and Rescue
- Environmental Patrol
- Aerial Photography/ Survey



Economic Impacts of

KGWS Sumers Airpark (GWS)

KGWS Sumers Airpark is one of 66 public use airports that contribute to the State's aviation economic impact. To understand how GWS and other airports support economic activity, the Colorado Department of Transportation (CDOT) Division of Aeronautics undertook the 2025 Colorado Aviation Economic Impact Study (CEIS). The study determined that GWS generated the below total economic activity in 2023. Of the $34.2 million of total business revenues generated by GWS, $32.8 million were generated by on-airport activities and $1.4 million generated by visitor spending.[1]

126 total jobs

$8.5M total payroll

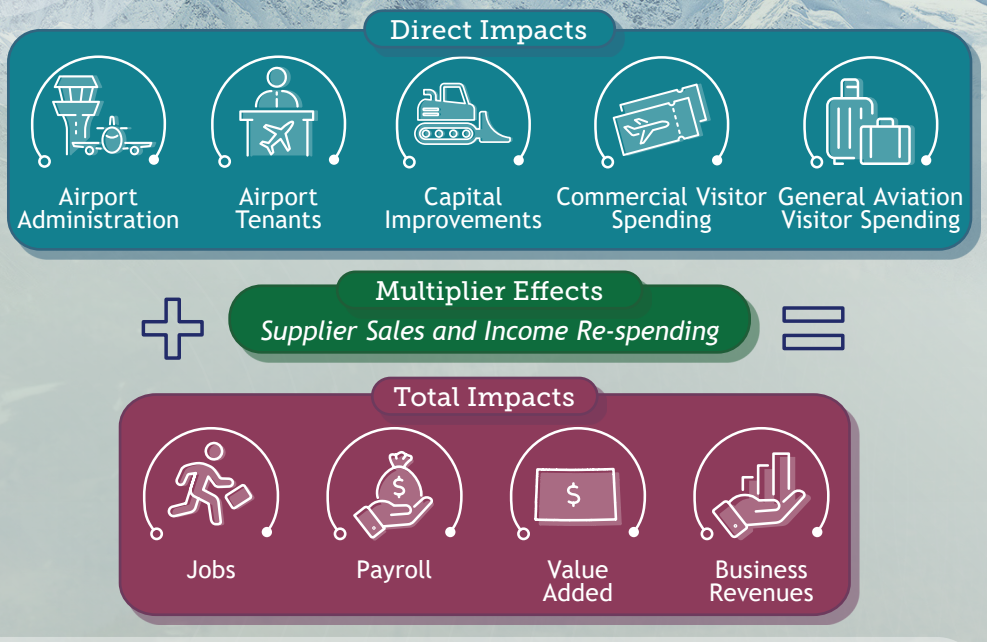
$16.4M total value added

$34.2M total business revenues

[1] *Totals may not sum due to rounding*

2025 Colorado Aviation Economic Impact Study

2025 Colorado Aviation ECONOMIC IMPACT STUDY



What is Economic Impact?

Two types of economic impacts are generated as a result of airport activity: Direct Impacts and Multiplier Effects (supplier sales and income re-spending). Direct impacts come from the activities of the airport administration, on-airport tenants, capital improvement spending, and spending by visitors arriving on commercial and general aviation aircraft. Multiplier effects are generated when portions of direct revenues are used to purchase goods and services from Colorado businesses (supplier sales), and when income earned by workers in airport-supported jobs is spent at Colorado businesses (income re-spending). Total Impacts represent the summation of the direct impacts, supplier sales, and income re-spending effects for the state.

Economic Impact Measures

Economic Impacts are communicated by the total jobs, payroll, value added, and business revenues generated by each airport. These are defined as:

Jobs
Total number of people employed, both full-time and part-time.

Payroll
Total employment compensation, including wages, benefits, and taxes paid on behalf of employees.

Value Added
Total contribution to the Gross State Product. It includes all payroll, profits, and business taxes paid.

Business Revenues
Total expenditures for airport administration, capital projects and tenant sales of goods and services, as well as visitor spending in Colorado's hospitality-related sectors. Also referred to as "output," "sales," or "economic activity/impact."

Statewide Aviation Economic Impacts

Colorado's 66 public use airports range from small GA airports to a major international airline hub, all of which contribute to the state's economy. The impacts of on-airport activities and visitor spending associated with each airport, combined with the statewide impacts of off-airport air cargo operations, helped Colorado's aviation system generate $68.9 billion in total economic activity (business revenues) in 2023.

348,466 total jobs

$23.5B total payroll

$40.3B total value added

$68.9B total business revenues

For more information on the Colorado Aviation Economic Impact Study, please visit our webpage at *https://www.coloradoaviationsystem.com/*

2025 Colorado Aviation Economic Impact Study

Appendix F - Current Based Aircraft

Table F.1 presents a detailed list of aircraft currently based at GWS as of May 2025.

Table F.1 - GWS Current Validated Based Aircraft

Registration	Aircraft Make	Aircraft Model	Type[1]	AAC	ADG	TDG
N496MG	Aviat	A-1 Husky	SE Piston	A	I	1A
N5755V	Beechcraft	A23-24 Musketeer Super III	SE Piston	A	I	1A
N20HM	Beechcraft	A36 Bonanza	SE Piston	A	I	1A
N7683M	Cessna	175	SE Piston	A	I	1A
N180C	Cessna	180	SE Piston	A	I	1B
N6698T	Cessna	150A	SE Piston	A	I	1A
N170MW	Cessna	170B	SE Piston	A	I	1A
N2545D	Cessna	170B	SE Piston	A	I	1A
N8291L	Cessna	172H Skyhawk	SE Piston	A	I	1A
N4362Q	Cessna	172L Skyhawk	SE Piston	A	I	1A
N7922T	Cessna	175A	SE Piston	A	I	1A
N8340T	Cessna	175C Skylark	SE Piston	A	I	1A
N67WW	Cessna	180H	SE Piston	A	I	1B
N7914V	Cessna	180H	SE Piston	A	I	1B
N2203G	Cessna	182A	SE Piston	A	I	1A
N6198B	Cessna	182A	SE Piston	A	I	1A
N7145E	Cessna	182B	SE Piston	A	I	1A
N9308X	Cessna	182E	SE Piston	A	I	1A
N2602R	Cessna	182K	SE Piston	A	I	1A
N42349	Cessna	182L	SE Piston	A	I	1A
N71518	Cessna	182M	SE Piston	A	I	1A
N9161G	Cessna	182N	SE Piston	A	I	1A
N759CY	Cessna	182Q Skylane	SE Piston	A	I	1A
N3783Y	Cessna	210D Centurion	SE Piston	A	I	1A
N5546H	Cessna	T182 Skylane	SE Piston	A	I	1A
N569DV	Cessna	T182T Skylane	SE Piston	A	I	1A
N448TW	Cessna	T206H Turbo Stationair	SE Piston	A	I	1A
N6910R	Cessna	T210H Turbo Centurion	SE Piston	A	I	1A
N123DD	Cessna	T210L Turbo Centurion	SE Piston	A	I	1A
N6850B	Cessna	T210M Turbo Centurion	SE Piston	A	I	1A

Registration	Aircraft Make	Aircraft Model	Type[1]	AAC	ADG	TDG
N732MY	Cessna	T210M Turbo Centurion	SE Piston	A	I	1A
N3939G	Cessna	TU206C Turbo Super Skywagon	SE Piston	A	I	1A
N889TM	Cirrus	SR22	SE Piston	A	I	1A
N4407B	De Havilland Canada	DHC-1B-2-S3 Chipmunk T2	SE Piston	A	I	1A
N242DF	Force Dave	Colorado Condor	SE Piston	A	I	1A
N7542C	Forney	F-1	SE Piston	A	I	1A
N58064	Mooney	M20K	SE Piston	A	I	1A
N8569C	Piper	PA-18-135 Super Cub	SE Piston	A	I	1A
N474GE	Piper	PA-18-150 Super Cub	SE Piston	A	I	1A
N7887P	Piper	PA-24-250 Comanche	SE Piston	A	I	1A
N8414P	Piper	PA-24-400 Comanche	SE Piston	A	I	1A
N8786P	Piper	PA-24-400 Comanche	SE Piston	A	I	1A
N9277W	Piper	PA-28-235 Cherokee	SE Piston	A	I	1A
N9127W	Piper	PA-28-235 Cherokee	SE Piston	A	I	1A
N1964G	Piper	PA-28R-201T Turbo Arrow III	SE Piston	A	I	1A
N2538B	Stinson	L-13	SE Piston	A	I	1B
N27782	Stinson	SR-10E Reliant	SE Piston	A	I	1B
N46RE	Van's	RV-6	SE Piston	A	I	1A
N787TR	Van's	RV-7A	SE Piston	A	I	1A
N94VV	Zenair	Zenith Stol CH 701	SE Piston	A	I	1A
N221HR	Beechcraft	56TC Baron	ME Piston	B	I	1A
N36724	Beechcraft	95-B55 Baron	ME Piston	B	I	1A
N5497G	Cessna	421C Golden Eagle	ME Piston	B	I	2A
N232AS	Cessna	T310R	ME Piston	A	I	1A
N1532X	Piper	PA-34-200T Seneca II	ME Piston	A	I	1A
N429CH	Bell	429 GlobalRanger	Rotorcraft	-	-	-
N90783	Robinson	R22	Rotorcraft	-	-	-
N442SH	Robinson	R44 Raven II	Rotorcraft	-	-	-
N7033G	Robinson	R66	Rotorcraft	-	-	-

Source: KGWS Sumers Airpark, May 2025. FAA Aircraft Characteristics Database, October 2024
Notes: [1]: SE: Single-Engine ME: Multi-Engine

Appendix G - Runway Length Analysis

G.1 FAA Advisory Circular Methodology

According to FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design,* there are three distinct design approaches for determining runway length requirements depending on an airplane's Maximum Takeoff Weight (MTOW):

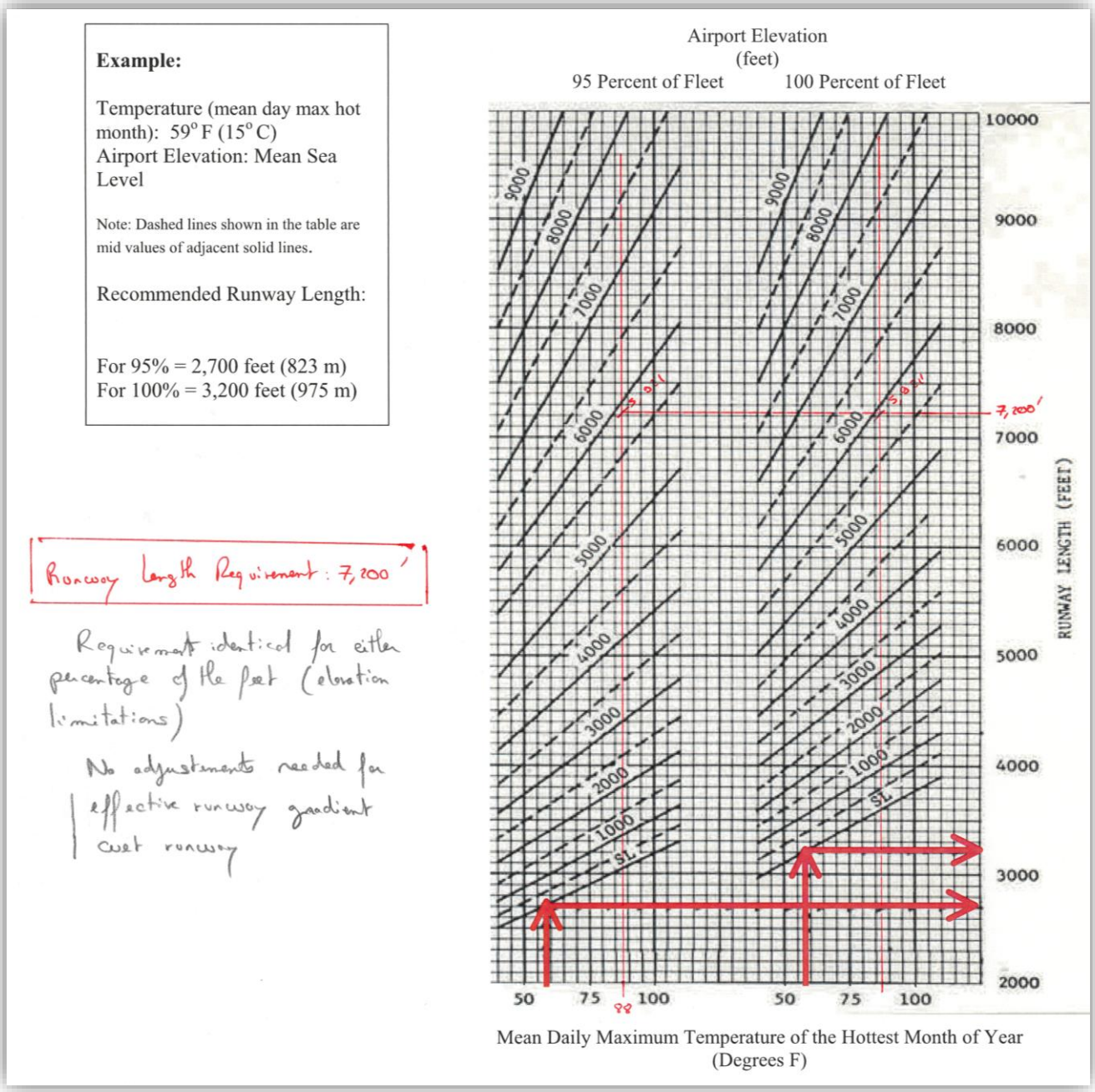
- 12,500 pounds or less: Family grouping of small airplanes (Chapter 2 of AC)
- Over 12,500 pounds but less than and including 60,000 pounds: Family grouping of large airplanes (Chapter 3 of AC)
- Over 60,000 pounds, and Regional Jets: Individual large airplanes (Chapter 4 of AC)

As listed in **Section 3.3.3, *Critical Design Aircraft*** Runway 14-32 is a utility runway intended to be used by propeller driven aircraft of 12,500 pounds or lower that currently account for over 99.9 percent of annual operations. Consequently, only Chapter 2 of the AC was used for runway length calculations.

The following **Figure G.1** presents runway length calculations for Small Airplanes with MTOW of 12,500 pounds or Less and Approach Speeds of 50 Knots or More and Having Fewer than 10 Passenger Seats. Chapter 2 curves for Small Airplanes with MTOW of 12,500 pounds or Less and Approach Speeds of 50 Knots or More and Having 10 or More Passenger Seats could not be used above 3,000 feet MSL elevation. Runway length requirements were calculated for the mean maximum temperature of the hottest month at GWS (88°F) and local pressure altitude (5,921 feet), and for two different percentage of the fleet.

Table 4.6 in **Section 4.3.3.2, *Runway Length*** presents the results of the runway length analysis according to the methodology contained in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*.

Figure G.1 - Grouping of Small Airplanes, App. Speed >=50 Kts, Seats <10



Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. Dibble, July 2025 analysis

G.2 SARLAT Program

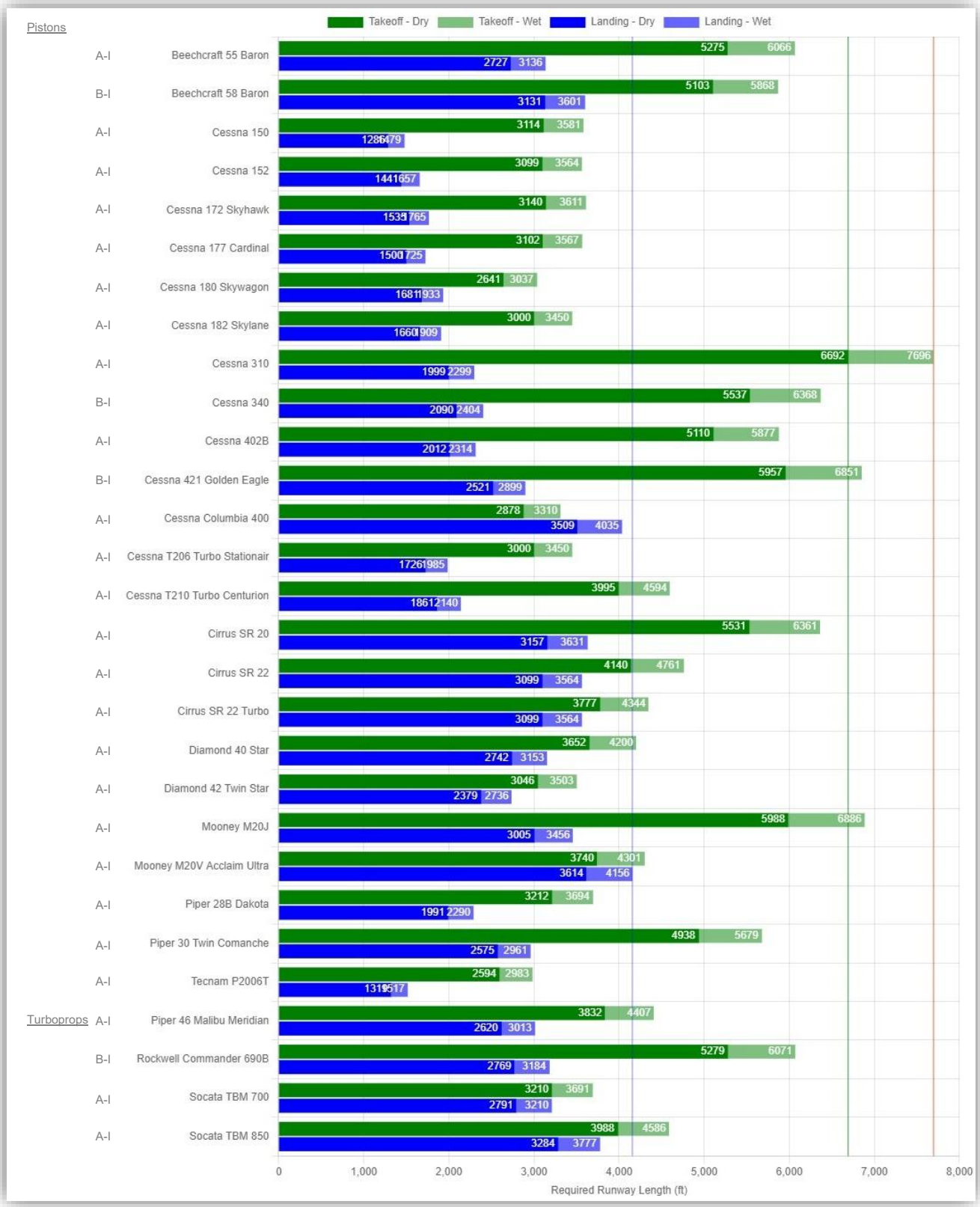
As a secondary calculation methodology, the Small Aircraft Runway Length Analysis Tool (SARLAT) from the Transportation Research Board (TRB) Airport Cooperative Research Program (ACRP) Web-Only Document 54: *Development of a Small Aircraft Runway Length Analysis Tool* was used to correlate results obtained from the FAA AC Methodology. According to recent FAA guidance, the SARLAT program is now the official tool to use for runway length analyses involving small aircraft.

Runway length requirements were calculated for the mean maximum temperature of the hottest month at GWS (88°F), local pressure altitude (5,921 feet), effective runway gradient (0.4 percent), wind speed (0 kts), and surface type (paved), and for two different aircraft loads. Only A/B-I Small Aircraft were included in the calculations. SARLAT results are presented below on **Figure G.2** and **Figure G.3**:

- Runway Length Required at 100 Percent Load for Small Aircraft Fleet Mix (SARLAT Output).
- Runway Length Required at 50 Percent Load for Small Aircraft Fleet Mix (SARLAT Output).

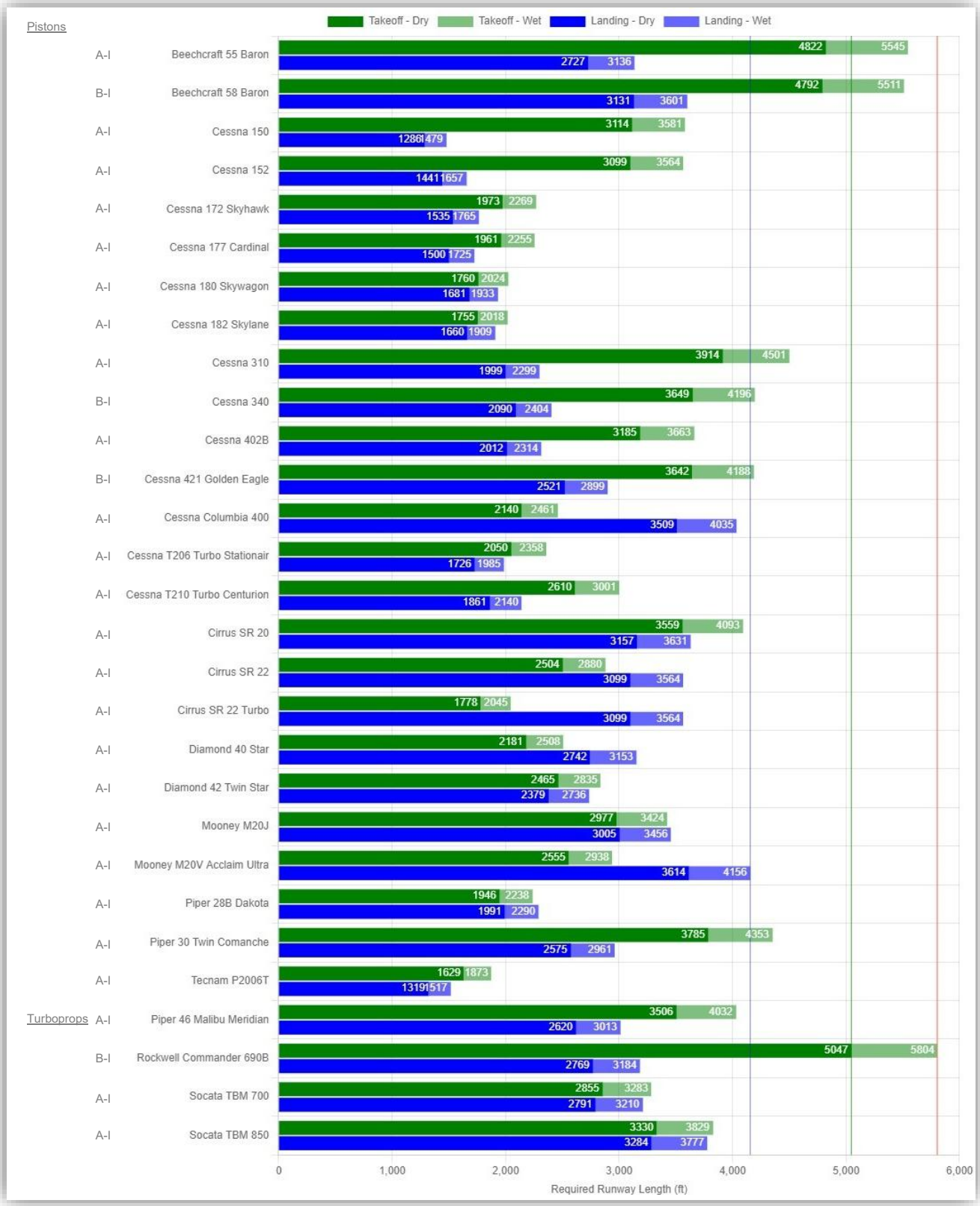
Table 4.6 in **Section 4.3.3.2, *Runway Length*** summarizes the results of the runway length analysis using SARLAT along with results obtained using the methodology contained in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*.

Figure G.2 - Runway Length at 100 Percent Load for Small Aircraft Fleet Mix



Source: Small Aircraft Runway Length Analysis Tool, July 2025
Note: Useful load for piston aircraft programmed at 100%. Useful load for turboprops programmed at 75%.

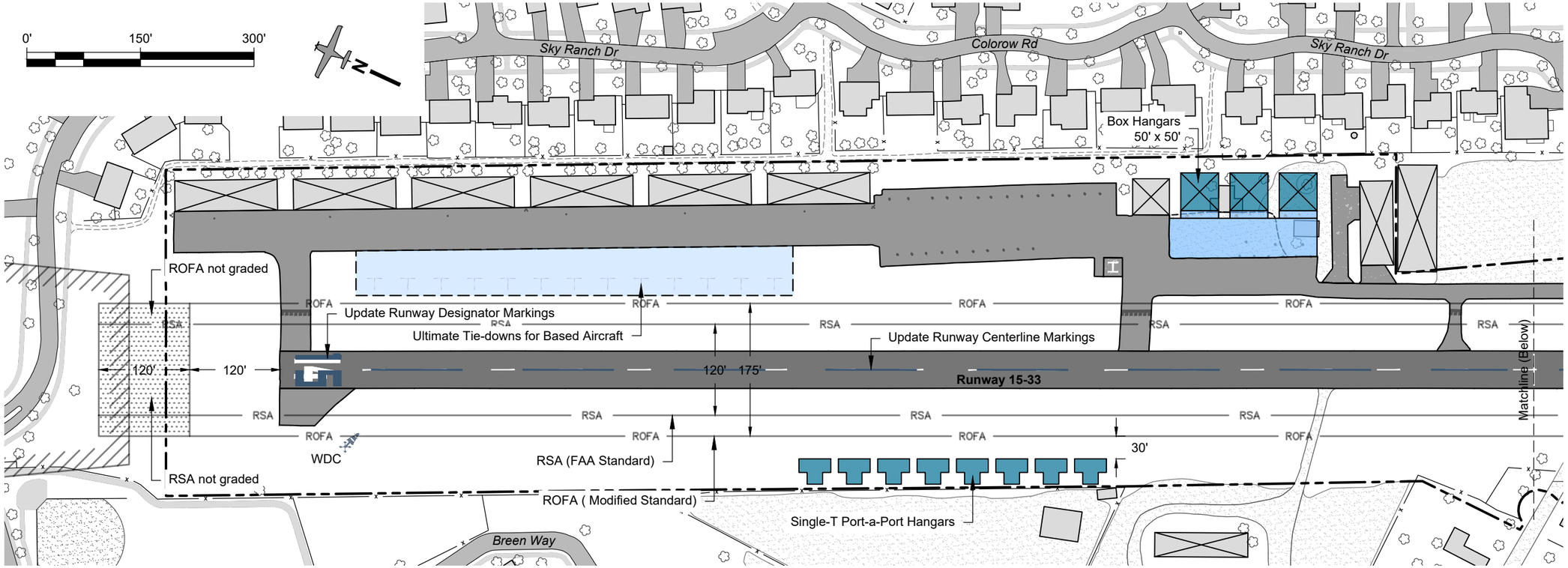
Figure G.3 - Runway Length at 50 Percent Load for Small Aircraft Fleet Mix

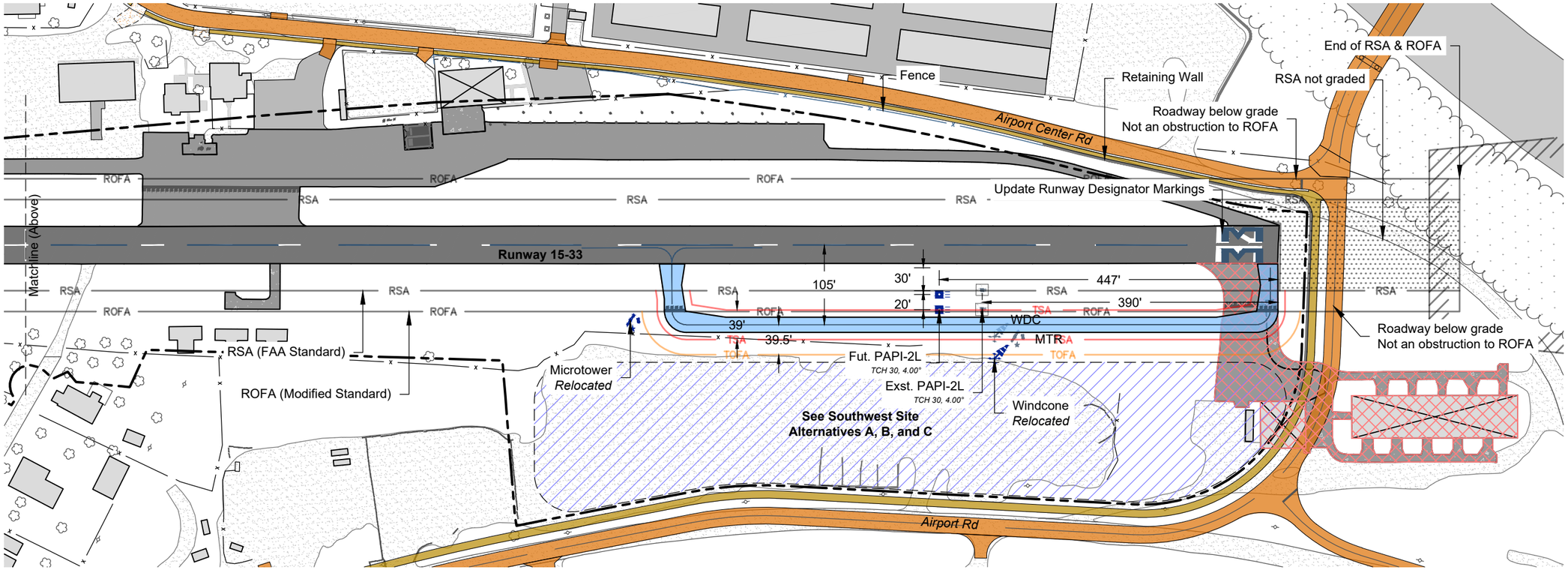


Source: Small Aircraft Runway Length Analysis Tool, July 2025
Note: Useful load for piston and turboprop aircraft programmed at 50%.

Appendix H - Initial Development Alternatives

Initial development alternatives are included on the following pages.





DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

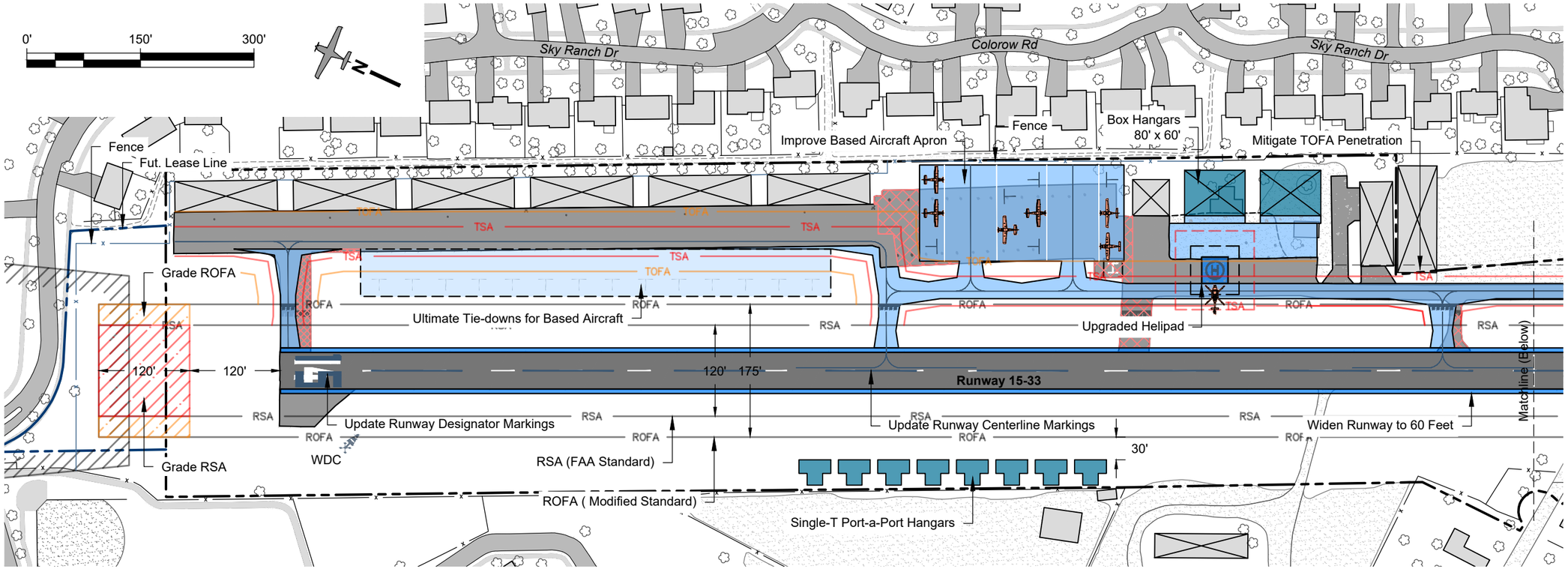
Notes:

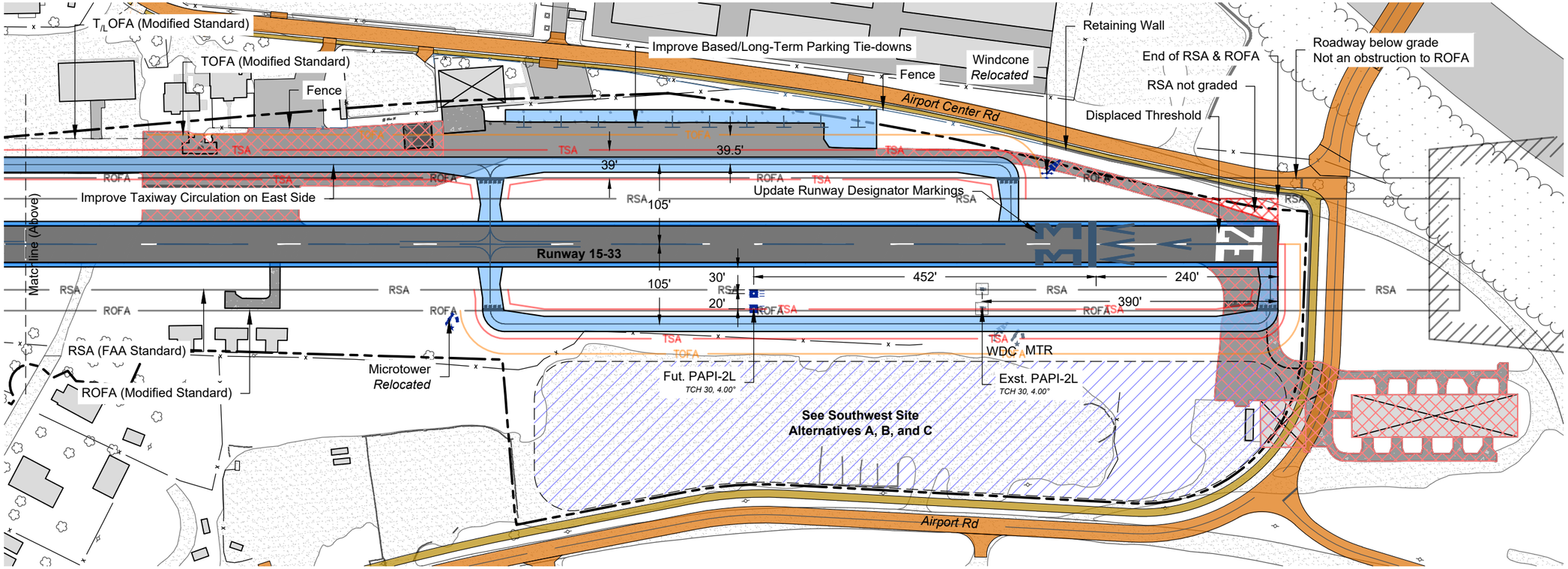
- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
- ADG: Airplane Design Group
- BRL: Building Restrict. Line
- ROFA: Run. Obj. Free Area
- RSA: Runway Safety Area
- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.1
Alternative 1 - No Improvements

K:\2025\1325662.GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 5.1 - Alternative 1.dwg





DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Future Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

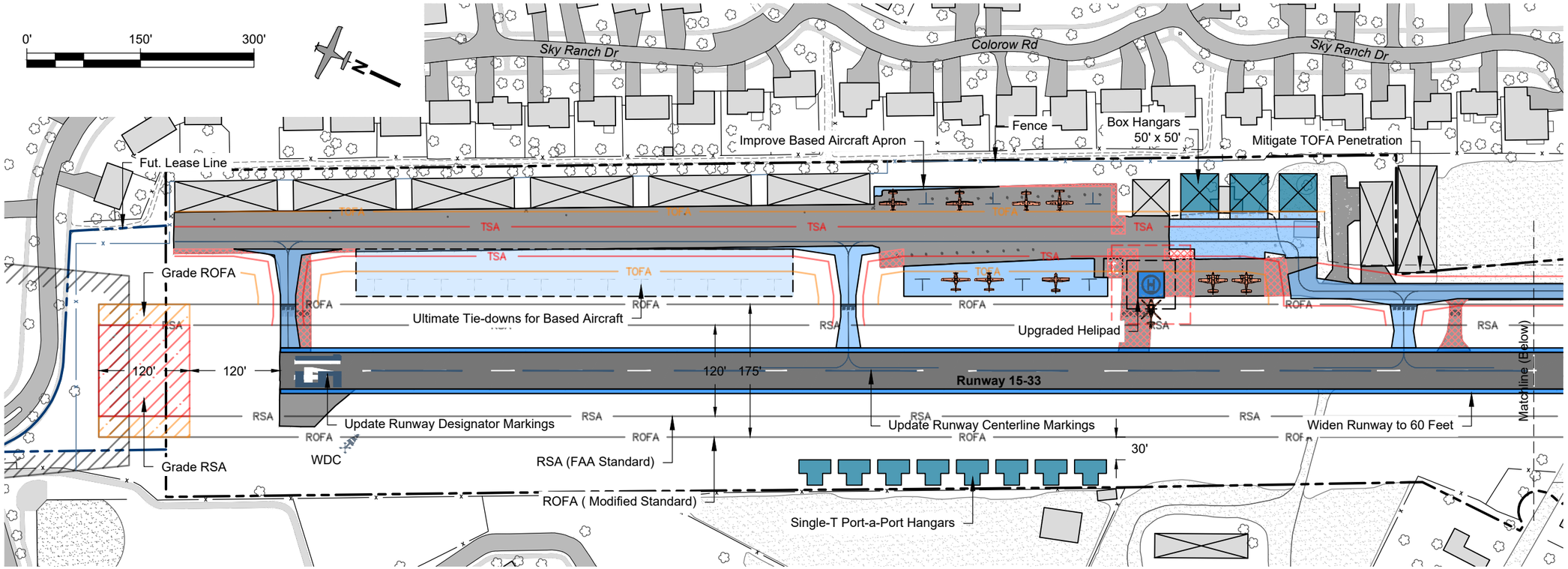
Notes:

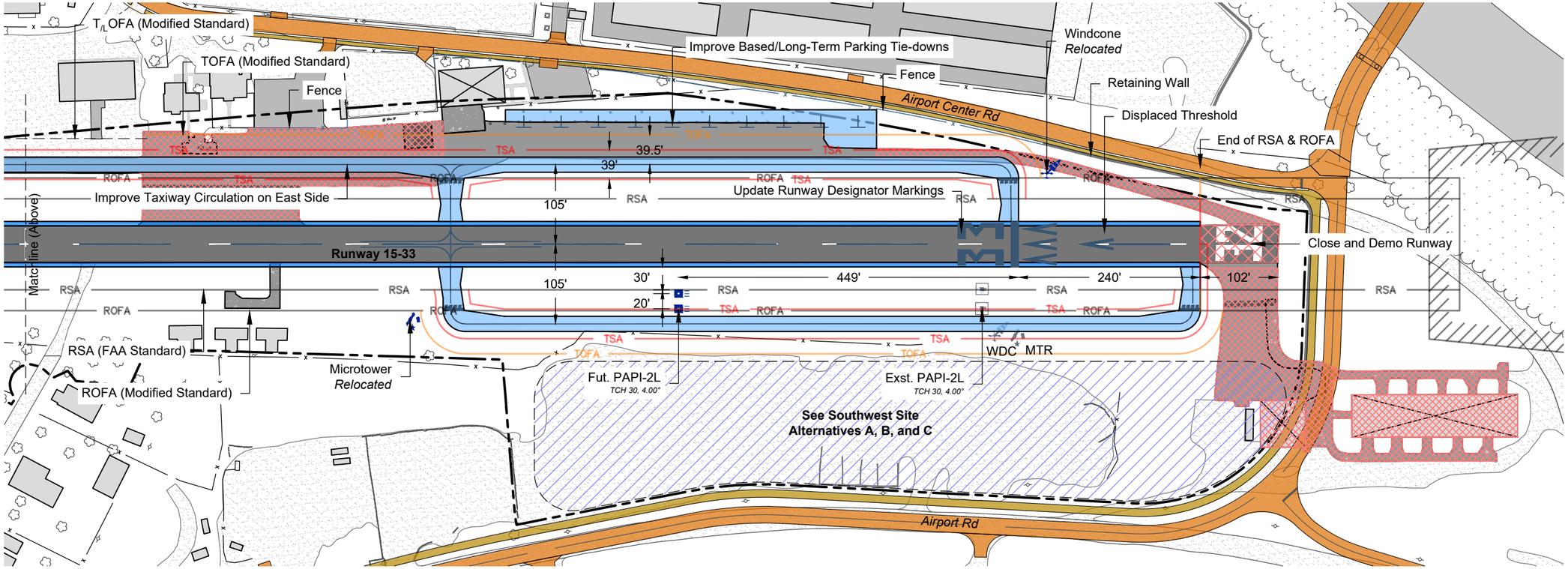
- Tie-down Design Aircraft
  (Based Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
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- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.2
Alternative 2 - Disp. Threshold

K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 5.2 - Alternative 2.dwg





DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Future Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo

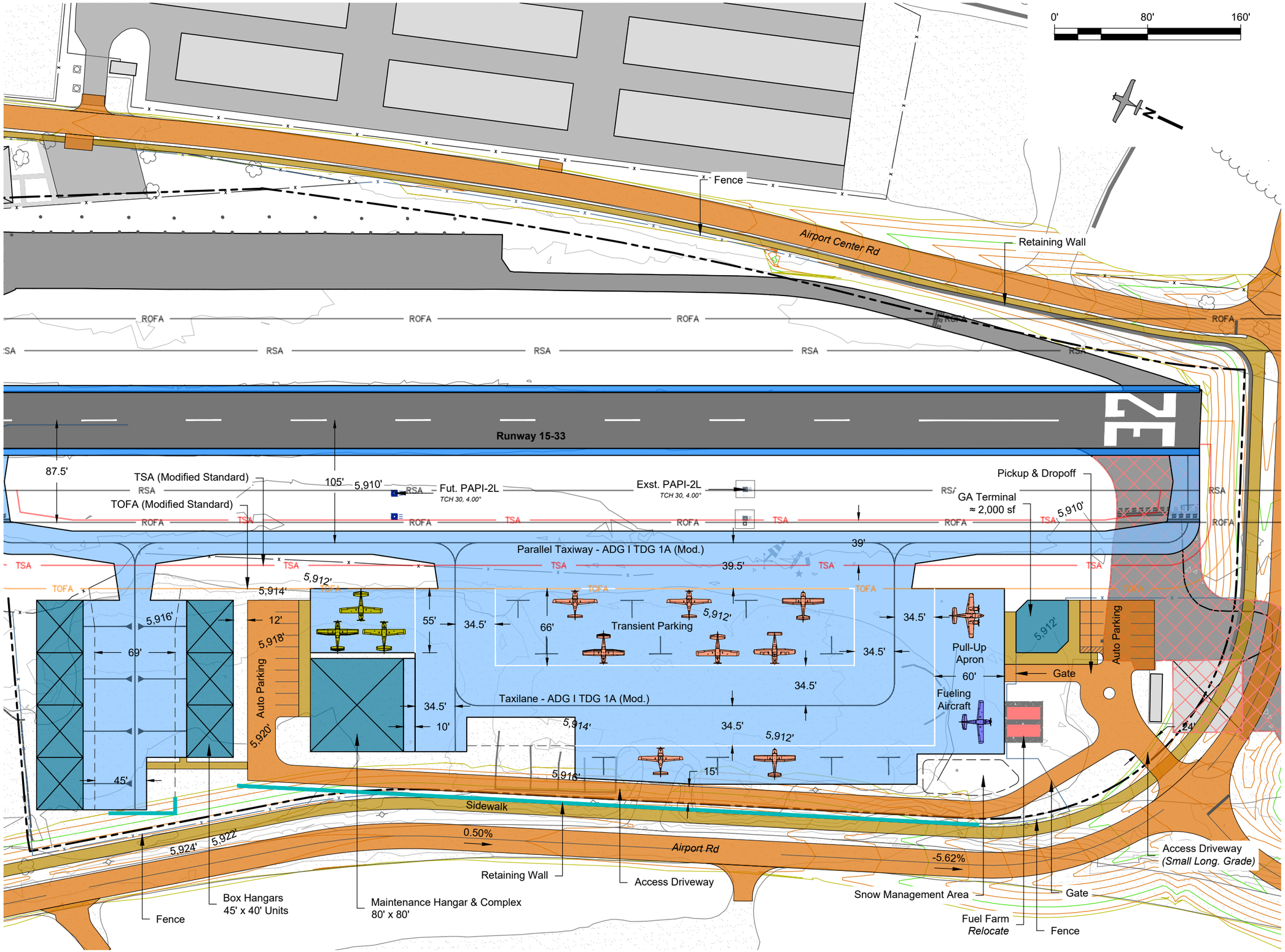
Notes:

- Tie-down Design Aircraft
  (Based Aircraft)
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  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 5'
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- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.3
Alternative 3 - Shorten Runway

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DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

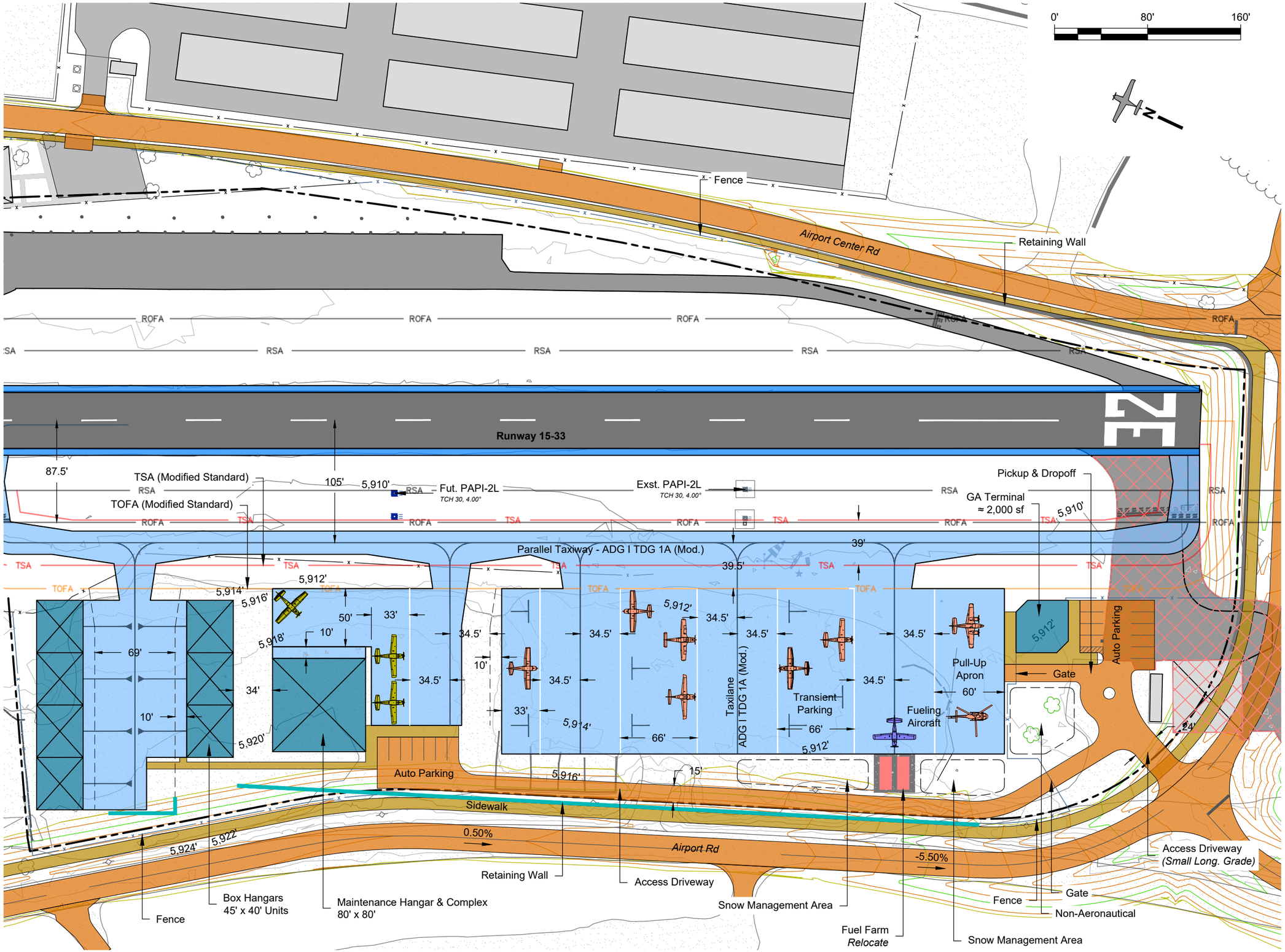
Notes:

- Tie-down Design Aircraft
  (Transient Aircraft)
  Max. Wingspan: 39'
  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 10'
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- TDG: Taxiway Design Group
- TOFA: Taxi. Obj. Free Area
- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.4
Southwest Site Concept A1

K:\2025\1325662 GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 5.4 - Southwest Site Concept A1.dwg



DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

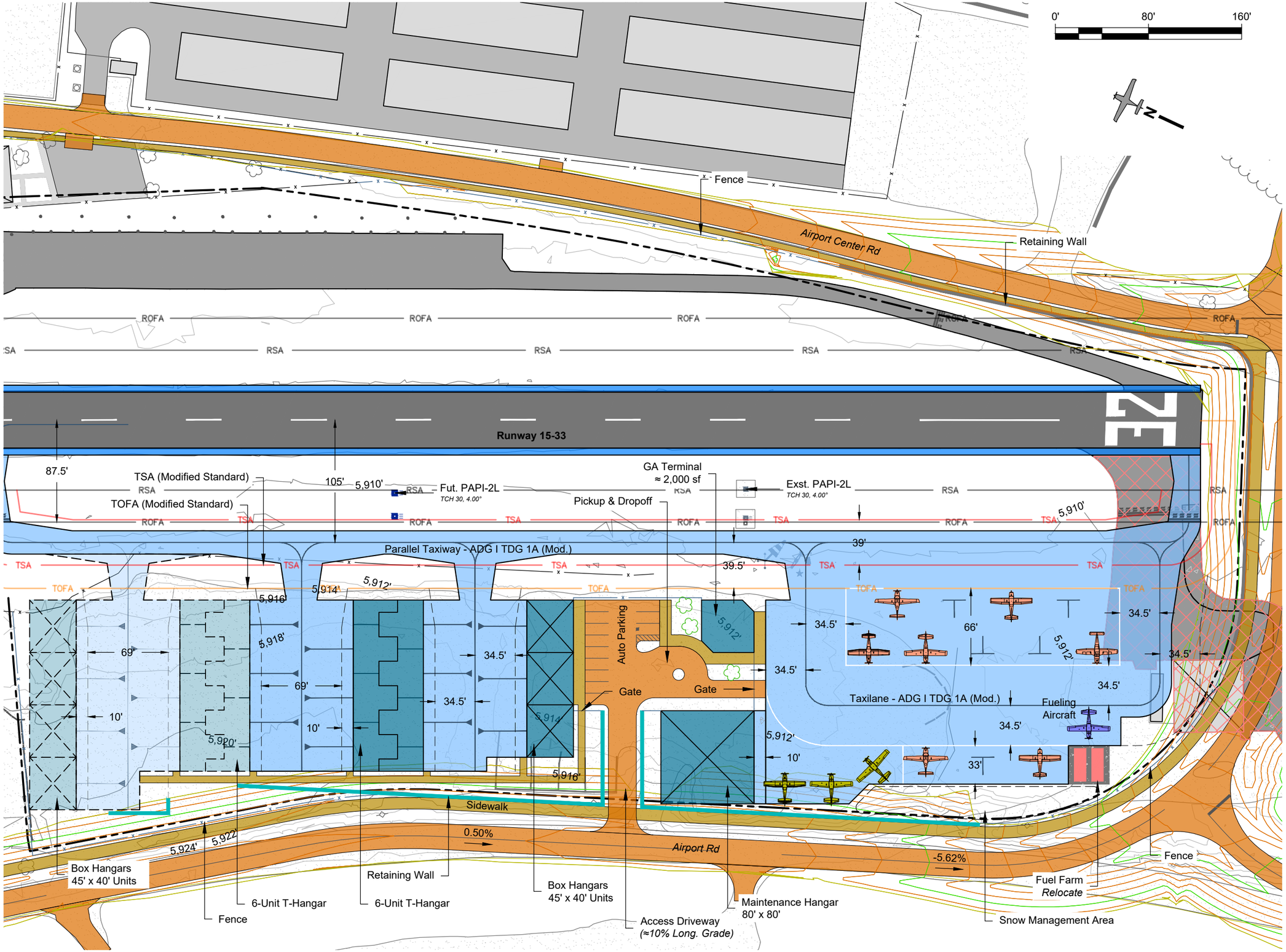
Notes:

- Tie-down Design Aircraft
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  Max. Length: 30'
  Generic SE Piston
  Wingtip Clearance: 10'
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- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.5
Southwest Site Concept A2

K:\2025\1325662 GWS ALP Update & Narrative Report\6 - AutoCAD\3 - Exhibits\Figure 5.5 - Southwest Site Concept A2.dwg



K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.6 - Soutwest Site Concept B1.dwg

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Legend:

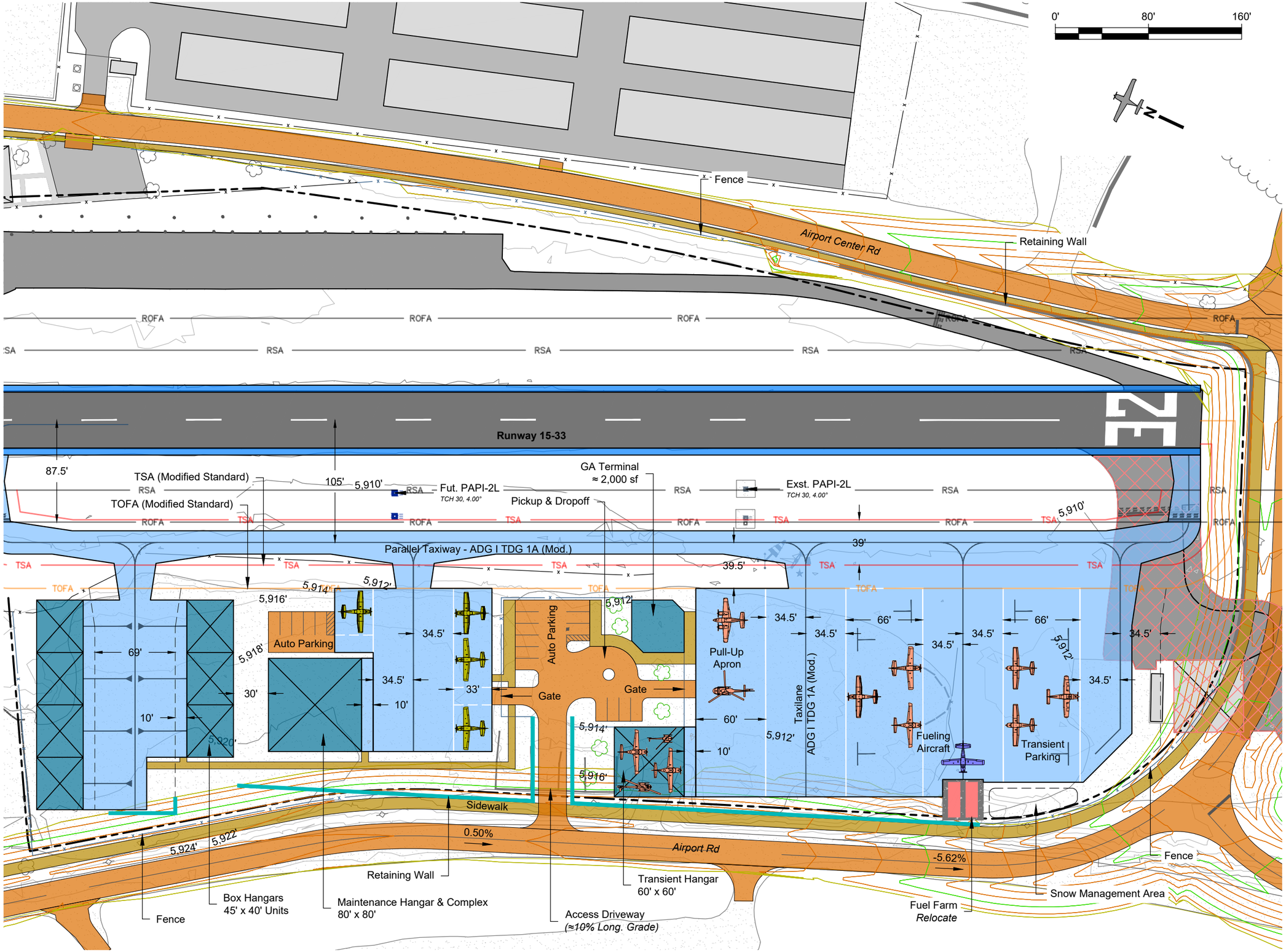
- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
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- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

Notes:

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- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.6
Southwest Site Concept B1



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Legend:

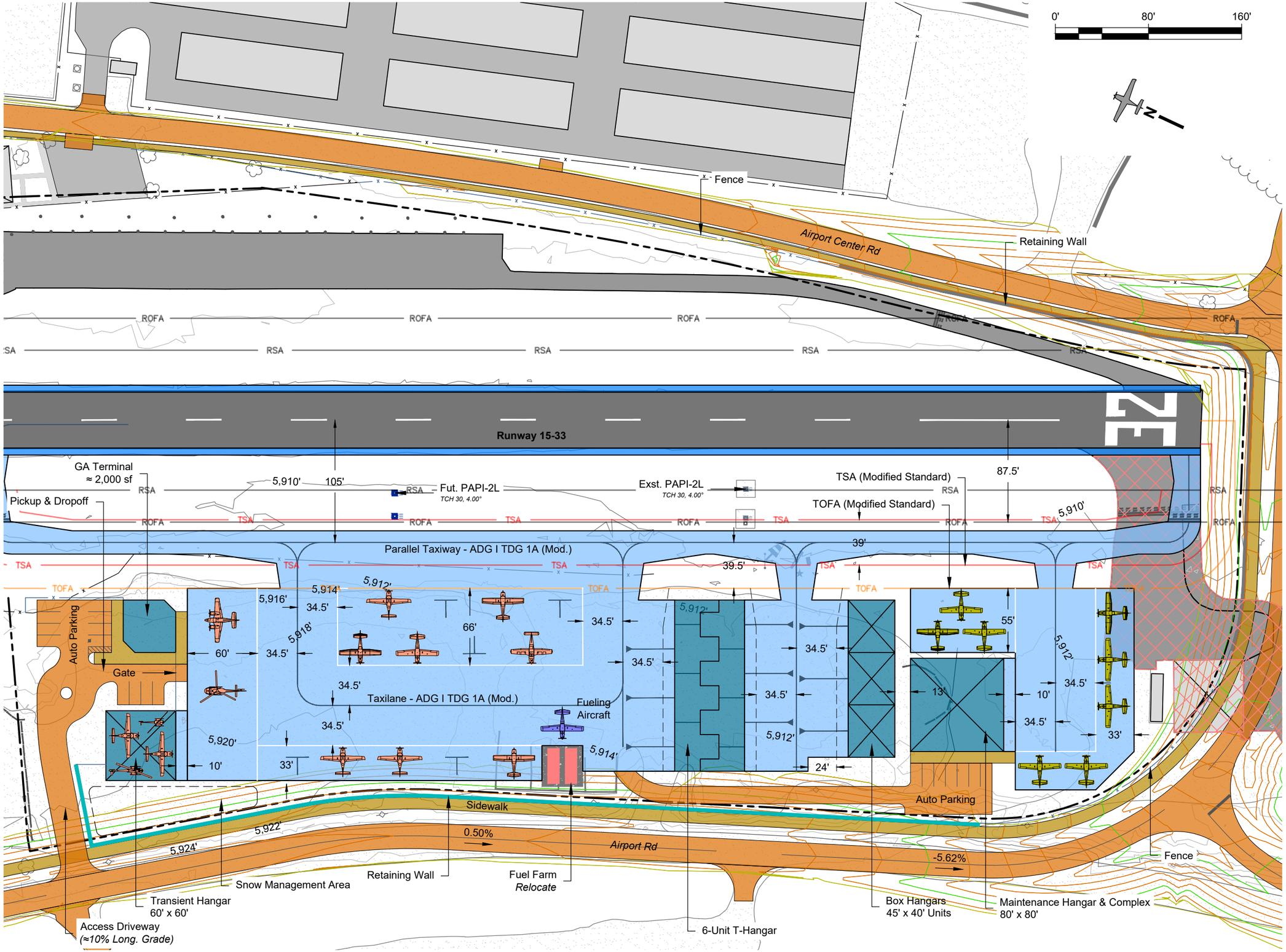
- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

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- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.7
Southwest Site Concept B2



K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.8 - Southwest Site Concept C1.dwg

DIBBLE

Legend:

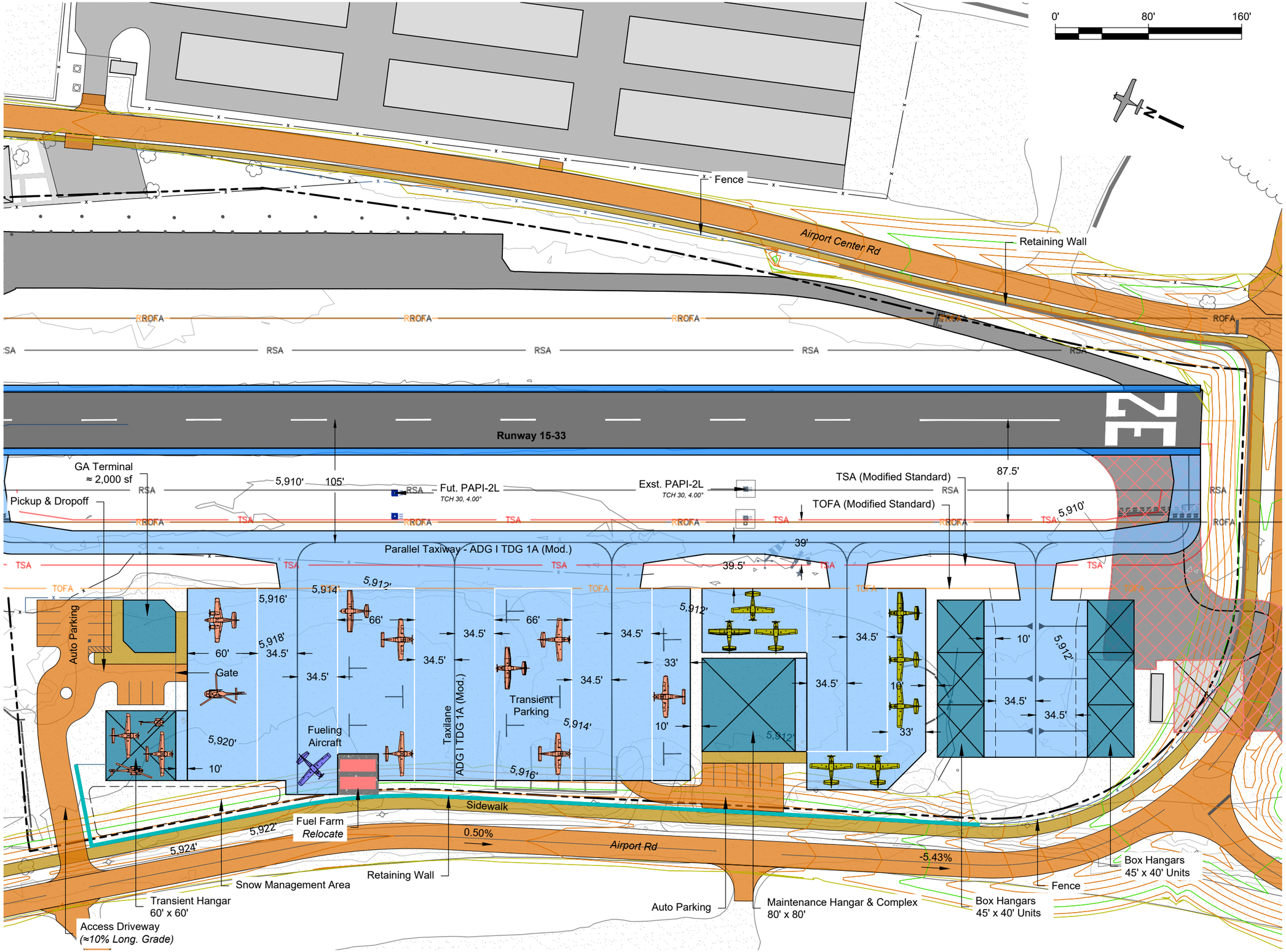
- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
- Pavement/Facility Demo
- Existing Ground (10' Cont.)
- Existing Ground (2' Cont.)
- South Bridge (10' Cont.)
- South Bridge (2' Cont.)

Notes:

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  Generic SE Piston
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- $T_{/L}$OFA: $T_{/L}$ Obj. Free Area
- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.8
Southwest Site Concept C1



K:\2025\1325062 GWS ALP Update & Narrative Report\6 - AutoCAD\5 - Exhibits\Figure 5.9 - Soutwest Site Concept C2.dwg

DIBBLE

Legend:

- Existing Facilities
- Future Development
- Ultimate Development
- Existing Lease Line
- Existing RSA (Strd)
- Existing ROFA (Mod.)
- Future TSA (Mod.)
- Future TOFA (Mod.)
- Future $T_{/L}$OFA (Mod.)
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- Existing Ground (10' Cont.)
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- South Bridge (2' Cont.)

Notes:

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- TSA: Taxiway Safety Area
- $T_{/L}$: Taxilane

Scale based on a 11"x17" sheet.

KGWS Sumers Airpark
Airport Layout Plan Update
Figure 5.9
Southwest Site Concept C2

Appendix I - CIP Cost Estimates

Breakdowns of estimated costs for each project are provided on the following pages. All costs in 2026 Dollars.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Runway 15-33 Rehabilitation & Widening

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$128,000.00	1	$128,000.00
	Contractor Quality Control Program	LS	$13,000.00	1	$13,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	9	$46,091.03
	Pavement Demolition	SY	$5.00	179	$894.80
	Unclassified Excavation	CY	$15.00	13,236	$198,545.25
	Erosion Control	LS	$20,000.00	1	$20,000.00
Paving					
	Runway 17-35 Rehab - Asphalt Mill 2"	SY	$5.00	17,648	$88,242.33
	Runway 17-35 Rehab - Asphalt Fill 2"	Ton	$160.00	2,234	$357,381.45
	Runway 17-35 Rehab - Tack & Seal Coats	SY	$5.00	17,648	$88,242.33
	Runway 17-35 Widen - Compacted Subgrade	SY	$5.00	4,412	$22,060.58
	Runway 17-35 Widen - Asphalt	Ton	$160.00	1,055	$168,763.46
	Runway 17-35 Widen - Crushed ABC	CY	$70.00	735	$51,474.69
	Runway 17-35 Widen - Geo Fabric	SY	$5.00	4,412	$22,060.58
Markings					
	All Markings	LS	$40,000.00	1	$40,000.00
Visual Aids					
	Relocate L-881 PAPI-2L	EA	$5,000.00	1	$5,000.00
Drainage					
	Runway 17-35	LS	$120,000.00	1	$120,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	9	$36,872.82
	Subtotal				$1,500,000
	Contingencies	20%			$300,000
	Construction Total				**$1,800,000**
	Professional Services*				$400,000
	Project Total				**$2,200,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
RSA Improvements Runway 15

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$20,000.00	1	$20,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	0.5	$2,410.47
	Unclassified Excavation	CY	$15.00	1,333	$20,000.00
	Excess Excavation (Haul Offsite)	CY	$45.00	1,000	$45,000.00
	Erosion Control	LS	$10,000.00	1	$10,000.00
Drainage					
	Runway 15 RSA	LS	$12,000.00	1	$12,000.00
Fencing					
	Wildlife Fence	SF	$50.00	512	$25,599.87
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.5	$1,928.37
	Subtotal				$150,000
	Contingencies	20%			$30,000
	Construction Total				**$180,000**
	Professional Services*				$40,000
	Project Total				**$220,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Taxiway Improvements Ph. I

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$20,000.00	1	$20,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	1.0	$5,000.00
	Unclassified Excavation	CY	$15.00	3,527	$52,900.94
	Erosion Control	LS	$10,000.00	1	$10,000.00
Paving					
	Taxiway A - Compacted Subgrade	SY	$5.00	1,763	$8,816.82
	Taxiway A - Asphalt	Ton	$160.00	422	$67,448.70
	Taxiway A - Crushed ABC	CY	$70.00	294	$20,572.59
Markings					
	All Markings	LS	$5,000.00	1	$5,000.00
Drainage					
	Taxiway A	LS	$15,000.00	1	$15,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	1.0	$4,000.00
	Subtotal				$300,000
	Contingencies	20%			$100,000
	Construction Total				**$400,000**
	Professional Services*				$100,000
	Project Total				**$500,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Taxiway Improvements Ph. II

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$20,000.00	1	$20,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	0.5	$2,500.00
	Pavement Demolition	SY	$5.00	973	$4,865.36
	Unclassified Excavation	CY	$15.00	1,363	$20,441.62
	Erosion Control	LS	$10,000.00	1	$10,000.00
Paving					
	Taxiway A5 & A5 - Compacted Subgrade	SY	$5.00	681	$3,406.94
	Taxiway A5 & A5 - Asphalt	Ton	$160.00	163	$26,063.06
	Taxiway A5 & A5 - Crushed ABC	CY	$70.00	114	$7,949.52
Markings					
	All Markings	LS	$2,000.00	1	$2,000.00
Drainage					
	Taxiway A	LS	$6,000.00	1	$6,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.5	$2,000.00
	Subtotal				$200,000
	Contingencies	20%			$100,000
	Construction Total				**$300,000**
	Professional Services*				$100,000
	Project Total				**$400,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
NAVAID & VISAIDs Relocation

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$20,000.00	1	$20,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	0.5	$2,500.00
	Unclassified Excavation	CY	$15.00	1,000	$15,000.00
	Concrete Foundations	LS	$10,000.00	1	$10,000.00
	Trenching for Circuit	LF	$8.00	1,000	$8,000.00
Navigational Aids					
	Relocate Microtower	EA	$5,000.00	1	$5,000.00
Visual Aids					
	New L-881 PAPI-2 LED	EA	$25,000.00	1	$25,000.00
	New Primary Wind Cone L-807(L) LED	LS	$25,000.00	1	$25,000.00
Electrical					
	New Circuit & Duct, Counterpoise, etc..	LF	$25.00	1,000	$25,000.00
Turfing					
	Seeding & Mulching, Top Soiling	LS	$5,000.00	0.5	$2,500.00
	Subtotal				$150,000
	Contingencies	20%			$30,000
	Construction Total				**$180,000**
	Professional Services*				$40,000
	Project Total				**$220,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
North Ramp Improvements

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$80,000.00	1	$80,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	2.0	$10,000.00
	Pavement Demolition	SY	$5.00	52	$260.18
	Unclassified Excavation	CY	$15.00	13,094	$196,415.87
	Erosion Control	LS	$20,000.00	1	$20,000.00
Paving					
	N Ramp Rehab - Crack Seal and Seal Coat	SY	$5.00	8,316	$41,579.32
	N Ramp Expand - Compacted Subgrade	SY	$5.00	6,547	$32,735.98
	N Ramp Expand - Asphalt	Ton	$160.00	1,565	$250,430.24
	N Ramp Expand - Crushed ABC	CY	$70.00	1,091	$76,383.95
	N Ramp Expand - New Tiedown Anchors	EA	$1,000.00	63	$63,000.00
Markings					
	All Markings	LS	$21,000.00	1	$21,000.00
Drainage					
	N Ramp	LS	$61,000.00	1	$61,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	2.0	$8,000.00
	Subtotal				$900,000
	Contingencies	20%			$200,000
	Construction Total				**$1,100,000**
	Professional Services*				$300,000
	Project Total				**$1,400,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Southeast Ramp Improvements

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$20,000.00	1	$20,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	0.5	$2,500.00
	Unclassified Excavation	CY	$15.00	1,993	$29,896.01
	Erosion Control	LS	$10,000.00	1	$10,000.00
Paving					
	SE Ramp Rehab - Crack Seal and Seal Coat	SY	$5.00	2,423	$12,114.07
	SE Ramp Expand - Compacted Subgrade	SY	$5.00	997	$4,982.67
	SE Ramp Expand - Asphalt	Ton	$160.00	238	$38,117.41
	SE Ramp Expand - Crushed ABC	CY	$70.00	166	$11,626.22
	SE Ramp Expand - New Tiedown Anchors	EA	$1,000.00	29	$29,000.00
Markings					
	All Markings	LS	$4,000.00	1	$4,000.00
Drainage					
	SE Ramp	LS	$11,000.00	1	$11,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.5	$2,000.00
	Subtotal				$200,000
	Contingencies	20%			$100,000
	Construction Total				**$300,000**
	Professional Services*				$100,000
	Project Total				**$400,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
New Southwest Ramp

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$309,000.00	1	$309,000.00
	Contractor Quality Control Program	LS	$31,000.00	1	$31,000.00
Site Work					
	Pavement Demolition	SY	$5.00	1,915	$9,576.23
	Unclassified Excavation	CY	$15.00	17,419	$261,278.14
	Erosion Control	LS	$30,000.00	1	$30,000.00
	Retaining Wall	LF	$1,500.00	492	$738,000.00
Paving					
	Apron & Taxilane - Compacted Subgrade	SY	$5.00	8,756	$43,781.13
	Apron & Taxilane - Asphalt	Ton	$160.00	2,093	$334,925.68
	Apron & Taxilane - Crushed ABC	CY	$70.00	1,946	$136,207.97
	Hangar Apron Tie - PCC	SY	$250.00	56	$13,888.89
	Auto Parking - Compacted Subgrade	SY	$5.00	1,047	$5,233.45
	Auto Parking - Asphalt	Ton	$160.00	132	$21,195.48
	Auto Parking - Crushed ABC	CY	$70.00	116	$8,140.93
	Walkway - PCC	SF	$10.00	1,886	$18,862.84
	New Tiedown Anchors	EA	$1,000.00	27	$27,000.00
	Helipad - PCC	SY	$250.00	178	$44,444.44
Structures					
	New GA Terminal Building	SF	$250.00	1,925	$481,250.00
	60' x 50' Hangar (x1)	SF	$100.00	3,000	$300,000.00
Markings					
	Apron & Taxilane Markings	LS	$26,000.00	1	$26,000.00
	Auto Parking Markings	LS	$2,000.00	1	$2,000.00
	Helipad Markings	LS	$3,000.00	1	$3,000.00
Fuel Storage					
	Tank Foundation & Containement - PCC	EA	$40,000.00	2	$80,000.00
	Relocate 12,000 gal Fuel Tank (Jet A)	EA	$20,000.00	1	$20,000.00
	Relocate 12,000 gal Fuel Tank (AVGAS)	EA	$20,000.00	1	$20,000.00
	Relocate Modules & Systems	LS	$20,000.00	1	$20,000.00
Drainage					
	Apron & Taxilane	LS	$103,000.00	1	$103,000.00
	Access Drive & Parking	LS	$18,000.00	1	$18,000.00
	Fuel Farm	LS	$42,000.00	1	$42,000.00
Fencing					
	Wildlife Fence	SF	$50.00	999	$49,950.00
	Pedestrian Gate, Manual	EA	$5,000.00	1	$5,000.00
	Vehicle Gate, Automatic	EA	$20,000.00	1	$20,000.00
Utilities					
	Utilities Connections	LS	$10,000.00	2	$20,000.00
	Storm Drainage	LS	$50,000.00	2	$100,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	1.1	$4,231.83
	Landscaping	LS	$50,000.00	1.0	$50,000.00
	Subtotal				$3,400,000
	Contingencies	20%			$700,000
	Construction Total				**$4,100,000**
	Professional Services*				$900,000
	Project Total				**$5,000,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Rodeo Grounds Grading & Drainage (Construction)

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$300,000.00	1	$300,000.00
	Contractor Quality Control Program	LS	$30,000.00	1	$30,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	6.3	$31,564.95
	Excess Excavation (Haul Offsite)	CY	$45.00	50,925	$2,291,615.54
	Erosion Control	LS	$230,000.00	1	$230,000.00
Drainage					
	Rodeo Grounds	LS	$383,000.00	1	$383,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	6.3	$25,251.96
	Subtotal				$3,300,000
	Contingencies	20%			$660,000
	Construction Total				**$3,960,000**
	Professional Services*				$400,000
	Project Total				**$4,360,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Hangars Ph. I

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$356,000.00	1	$356,000.00
	Contractor Quality Control Program	LS	$36,000.00	1	$36,000.00
Site Work					
	Unclassified Excavation	CY	$15.00	19,291	$289,369.97
	Pavement (SW Ramp & Taxilane) Demolition	SY	$5.00	34,876	$174,378.22
	Existing Hangars Demolition	SF	$10.00	16,006	$160,058.94
	Erosion Control	LS	$30,000.00	1	$30,000.00
	Rock Wall	LF	$250.00	537	$134,280.30
Paving					
	Apron & Taxilane - Compacted Subgrade	SY	$5.00	10,284	$51,419.21
	Apron & Taxilane - Asphalt	Ton	$160.00	2,458	$393,356.95
	Apron & Taxilane - Crushed ABC	CY	$70.00	2,285	$159,970.87
	Hangar Apron Tie - PCC	SY	$250.00	89	$22,222.22
	Auto Parking - Compacted Subgrade	SY	$5.00	237	$1,185.23
	Auto Parking - Asphalt	Ton	$160.00	30	$4,800.17
	Auto Parking - Crushed ABC	CY	$70.00	26	$1,843.69
Structures					
	80' x 80' Hangar (x1)	SF	$125.00	6,400	$800,000.00
	10-Unit T-Hangar	LS	$1,000,000.00	1	$1,000,000.00
Markings					
	All Markings	LS	$32,000.00	1	$32,000.00
Drainage					
	Apron & Taxilane	LS	$121,000.00	1	$121,000.00
	Access Drive & Parking	LS	$4,000.00	1	$4,000.00
Fencing					
	Wildlife Fence	SF	$50.00	229	$11,433.27
Utilities					
	Utilities Connections	LS	$10,000.00	2	$20,000.00
	Storm Drainage	LS	$50,000.00	2	$100,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.8	$3,199.99
	Subtotal				$4,000,000
	Contingencies	20%			$800,000
	Construction Total				**$4,800,000**
	Professional Services*				$1,000,000
	Project Total				**$5,800,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Hangars Ph. II

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$228,000.00	1	$228,000.00
	Contractor Quality Control Program	LS	$23,000.00	1	$23,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	0.5	$2,497.82
	Unclassified Excavation	CY	$15.00	5,411	$81,163.62
	Existing Hangars Demolition	SF	$10.00	1,822	$18,221.46
	Erosion Control	LS	$10,000.00	1	$10,000.00
Paving					
	Apron - Compacted Subgrade	SY	$5.00	1,607	$8,036.36
	Apron - Asphalt	Ton	$160.00	384	$61,478.15
	Apron - Crushed ABC	CY	$70.00	357	$25,002.01
Structures					
	3-Unit 40' x 45' Box Hangars (x2)	SF	$100.00	10,800	$1,080,000.00
	4-Unit 40' x 45' Box Hangars (x1)	SF	$100.00	7,200	$720,000.00
Markings					
	All Markings	LS	$5,000.00	1	$5,000.00
Drainage					
	Apron	LS	$19,000.00	1	$19,000.00
Fencing					
	Wildlife Fence	LF	$50.00	170	$8,500.00
Utilities					
	Utilities Connections	LS	$10,000.00	3	$30,000.00
	Storm Drainage	LS	$50,000.00	3	$150,000.00
	Relocate Hydrant Water Line	LF	$75.00	400	$30,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.5	$2,000.00
	Subtotal				$2,600,000
	Contingencies	20%			$600,000
	Construction Total				**$3,200,000**
	Professional Services*				$700,000
	Project Total				**$3,900,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Hangars Ph. III

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$127,000.00	1	$127,000.00
	Contractor Quality Control Program	LS	$13,000.00	1	$13,000.00
Site Work					
	Unclassified Excavation	CY	$15.00	2,575	$38,621.76
	Erosion Control	LS	$10,000.00	1	$10,000.00
Paving					
	Apron & Taxilane - Compacted Subgrade	SY	$5.00	440	$2,200.00
	Apron & Taxilane - Asphalt	Ton	$160.00	105	$16,830.00
	Apron & Taxilane - Crushed ABC	CY	$70.00	98	$6,844.44
	Hangar Apron Tie - PCC	SY	$250.00	156	$38,888.89
	Access Drive - Compacted Subgrade	SY	$5.00	188	$938.17
	Access Drive - Asphalt	Ton	$160.00	24	$3,799.59
	Access Drive - Crushed ABC	CY	$70.00	21	$1,459.38
	Walkway - PCC	SF	$10.00	1,034	$10,342.70
Structures					
	60' x 60' Hangar & 30' Side Lean-To (x1)	SF	$125.00	4,800	$600,000.00
	60' x 60' Hangar (x1)	SF	$100.00	3,600	$360,000.00
Markings					
	All Markings	LS	$4,000.00	1	$4,000.00
Drainage					
	Apron	LS	$6,000.00	1	$6,000.00
	Access Drive & Parking	LS	$4,000.00	1	$4,000.00
Fencing					
	Wildlife Fence	SF	$50.00	25	$1,250.00
	Vehicle Gate, Automatic	EA	$20,000.00	1	$20,000.00
Utilities					
	Utilities Connections	LS	$10,000.00	2	$20,000.00
	Storm Drainage	LS	$50,000.00	2	$100,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.5	$2,000.00
	Subtotal				$1,400,000
	Contingencies	20%			$300,000
	Construction Total				**$1,700,000**
	Professional Services*				$400,000
	Project Total				**$2,100,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Hangars Ph. IV

DIBBLE

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$21,000.00	1	$21,000.00
	Contractor Quality Control Program	LS	$10,000.00	1	$10,000.00
Site Work					
	Clearing & Grubbing	Ac	$5,000.00	0.5	$2,500.00
	Pavement Demolition	SY	$5.00	183	$916.48
	Unclassified Excavation	CY	$15.00	1,092	$16,378.27
	Erosion Control	LS	$10,000.00	1	$10,000.00
Paving					
	Taxilane - Compacted Subgrade	SY	$5.00	728	$3,639.62
	Taxilane - Asphalt	Ton	$160.00	174	$27,843.07
	Taxilane - Crushed ABC	CY	$70.00	162	$11,323.25
Structures					
	Single-T Port-a-Port Hangars (x3)	EA	$25,000.00	3	$75,000.00
Markings					
	All Markings	LS	$3,000.00	1	$3,000.00
Drainage					
	Apron	LS	$9,000.00	1	$9,000.00
Utilities					
	Utilities Connections	LS	$10,000.00	3	$30,000.00
Turfing					
	Seeding & Mulching, Top Soiling	Ac	$4,000.00	0.5	$2,000.00
	Subtotal				$300,000
	Contingencies	20%			$100,000
	Construction Total				**$400,000**
	Professional Services*				$100,000
	Project Total				**$500,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Fuel Tank Removal

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
General					
	Mobilization	LS	$11,000.00	1	$11,000.00
	Contractor Quality Control Program	LS	$2,000.00	1	$2,000.00
Site Work					
	Remove Tanks	LS	$20,000.00	0.5	$10,000.00
	Backfill with Dirt	CY	$15.00	5,000	$75,000.00
	Disposal of Tank	LS	$5,000.00	0.5	$2,500.00
Environmental					
	Cleaning & Mitigation	LS	$20,000.00	0.5	$10,000.00
Paving					
	Apron - Asphalt	Ton	$160.00	26	$4,153.28
	Apron - Crushed ABC	CY	$70.00	18	$1,266.79
	Subtotal				$120,000
	Contingencies	20%			$30,000
	Construction Total				**$150,000**
	Professional Services*				$30,000
	Project Total				**$180,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs are not an engineer's opinion of probable costs.

KGWS Sumers Airpark (GWS)
ALPU - CIP Cost Estimates
Land Acquisition Runway 15 RSA

	Description	Unit	Unit Price	Estimated Quantity	Extended Total
Property Acquisition					
	Acquisition Reference #1 (0.97 Ac)	LS	$145,000.00	1	$145,000.00
	Subtotal				$150,000
	Contingencies	20%			$30,000
	Construction Total				**$180,000**
	Professional Services*				$40,000
	Project Total				**$220,000**

Notes *: Professional Services is inclusive of Planning, Environmental, Design, and Construction Administration Services.
Costs in 2026 Dollars. All costs are rounded to the next $100,000 when summed.
Costs per acre according to recent appraisals for parcels surrounding the Airport.

Mark Fadick
Utility Construction Planner
mark.fadick@blackhillscorp.com

96 County Road 160
Glenwood Springs, CO 81601
P: 970.914.8326

May 27, 2026

Re: 786 Airport Road, Glenwood Springs, CO 81601 – Airport Maintenance Building

To: Ryan Gordon,

Black Hills Energy has existing natural gas facilities located on or near the above-mentioned project. At this time, it appears that these existing facilities have adequate capacity to provide natural gas service to your project, subject to the tariffs, rules and regulations on file. Any upgrading of our facilities necessary to deliver adequate service to and within the development will be undertaken by Black Hills Energy upon completion of appropriate contractual agreements and subject to necessary governmental approvals.

Please contact us with any questions regarding this project, and with a timeline of when you would like to proceed with your project.

Sincerely,

Mark Fadick

Mark Fadick
Utility Construction Planner
Black Hills Energy

Matthew Langhorst, DPW
(970) 384-6438 (o)

CITY OF GLENWOOD SPRINGS
WATER/WASTE WATER

101 West 8th Street
Glenwood Springs, CO 81601

June 2, 2026

City of Glenwood Springs
C/O Ryan Gordon
101 West 8th Street
Glenwood Springs, CO 81601

RE: Can and Will Serve letter for proposed relocation of the 6,000 square foot mechanics shop at Glenwood Springs Airport, Parcel #218527100050, also known as 786 Airport Road, Glenwood Springs, CO 81601.

The purpose of this letter is to provide confirmation that the City of Glenwood Springs can and will serve your parcel of land located at 786 Airport Road with domestic water, electrical power and broadband internet for the relocation of the 6,000 square foot existing building, to be relocated and expanded to 8,000 square feet in size.

It is anticipated that the development will not increase the water and electric usage at the parcel from its existing amount. The city's water system can provide CDPHE certified domestic water for your expansion. Electrical capacity will be worked out with Load Calculation forms during the building plan submittal process, but additional load is not anticipated.

Any change to the foregoing proposal deemed material by the City in its' sole discretion will void this can and will serve letter. The cost of any necessary extensions, taps or improvement fees to provide these services is the sole responsibility of the applicant.

Prior to final approval of the water service and associated tap, the following conditions must be met:

1. The applicant must submit a plan for the City's review and approval, indicating the proposed tap locations, tap sizes, and any other water infrastructure to be constructed on the site to provide domestic flow.

2. All applicable tap and system improvements fees, as calculated by the City's Community Development Department and Electric Department, shall become due and payable prior to any taps being made on the City's system.

3. All water and electrical uses must be metered, with the meters being inspected by the appropriate department after installation. Accounts must be set up with the Finance Department prior to the services being energized.

4. Prior to final permitting on the property an electrical load calculation form will be filled out and approved by the City of Glenwood Springs Electrical Department.

5. The city can and will provide broadband internet to the site if the applicant would like that

service. This service can be reviewed with the Community Broadband Network (CBN) staff during the permitting process but generally requires a 2" conduit to be run to each building from a CBN provided main pedestal location on the site.

6. Water and electrical services must meet all applicable Municipal Code, CDPHE requirements, Water Department and Engineering Department Rules and Standards.

7. Following completion of project, an as-built drawing preferably in an AutoCAD drawing file format (.dwg) and PDF format of the designed system and associated appurtenances shall be submitted for review and approval by the City.

If you have any questions regarding this matter, please contact me.

Matthew Langhorst
Director of Public Works
970-384-6438

cc:
Steve Boyd, Chief Organizational Officer and Acting City Manager
Karl Hanlon, Esq, Karp Neu and Hanlon Law Offices
Jeremy Everding, Water and Wastewater Field Superintendent
Mike Siomiak, Electric Department Contact

City of Glenwood Springs
101 West 8th Street, Glenwood Springs, CO 81601

Ryan Gordon, PE, City Engineer
970-384-6413 (o)
ryan.gordon@cogs.us

June 18, 2026

RE: Location & Extent Review – Drainage Letter

Dear Planning and Zoning Commission,

The City of Glenwood Springs (City) submits this Location and Extent Review application for the construction of a new airport maintenance building the relocation of the existing airplane hanger. These activities are required as part of the South Bridge Project.

The following is our proposed plan to address stormwater and drainage at the site.

DRAINAGE

The airport has an established stormwater management plan which consists of dry wells in the northern reach and vegetated swales on either side of the runway sloping from the north to the south to an outfall that discharges to the Roaring Fork River. Stormwater has historically infiltrated and it's rare that water makes it to the outfall.

The construction and relocation of the buildings – including new pavement, will result in a net increase in impervious area of 600 sf. Table 1 shows the change in impervious areas due to the work.

Table 1 - Stormwater Areas

	Existing Area (SF)	Proposed Area (SF)
Hanger	12,650	12,650
Maintenance Building	4,400	6,400
Paved Area/Impervious Area	39,200	37,800
TOTAL	56,250	56,850

The site is graded to direct stormwater to north of the maintenance shop to a new dry well through a vegetated swale and also to the east to a new dry well that will be located between the runway and the hanger. The amount of additional impervious area that is added due to the new elements is insubstantial and the dry wells will adequately accommodate the additional stormwater. The geotechnical report developed for the South Bridge project conducted

numerous infiltration analyses and is included to validate the applicant of dry wells for stormwater management.

Sincerely,

Ryan Gordon, PE, City Engineer
City of Glenwood Springs
970-384-6413 (o)
ryan.gordon@cogs.us

DRAFT PRELIMINARY REPORT
GEOTECHNICAL INVESTIGATION
AIRPORT ROAD, SOUTH BRIDGE AND STATE HIGHWAY 82 IMPROVEMENTS
GLENWOOD SPRINGS, COLORADO

April 26, 2018



Prepared For:

Jacobs Engineering Group, Inc.
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Denver, CO 80202-5131

Prepared By:

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Project No. 216-417

Draft Preliminary Report
Geotechnical Investigation
Airport Road, South Bridge and State Highway 82 Improvements
Glenwood Springs, Colorado

Project No. 216-417

April 26, 2018

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1.0 PROJECT INFORMATION

1.1 Purpose and Scope

This report presents the results of the preliminary geotechnical investigation by Yeh and Associates, Inc. (YA) for the South Bridge Project preliminary design in south Glenwood Springs, Garfield County, Colorado. A scope of services and cost estimate was first provided in a document dated November 9, 2012, YA Proposal No. 2012P-G051. A revised scope of service based on design changes was provided on September 23, 2016, YA Project No. 216-417. The actual number of test holes and test hole locations for specific structure types were adjusted during the investigation due to restrictions on accessibility, logistics and subsurface conditions encountered during the investigation. The project area is located in south Glenwood Springs west of the Roaring Fork River in the area of the Glenwood Springs Airport, east of the Roaring Fork River in the area of Holy Cross Energy, and between approximately mile markers 3.5 and 4.0 on State Highway 82 (SH 82). The general project location is shown on Figure 1. Proposed improvements related to the South Bridge Project include:

- Roadway improvements to Airport Road from its intersection with Four Mile Road southeast to Airport Center Road;
- Roadway improvements to Airport Center Road at the intersection with the proposed South Bridge connector road west of the Roaring Fork River;
- A new connector road constructed at the east end of the bridge crossing Holy Cross Energy and Roaring Fork Transportation Authority (RFTA) properties and connecting Airport Road to the new bridge;
- A proposed tunnel below the existing airport runway for the connector road;
- The proposed South Bridge crossing the Roaring Fork River;
- And a new grade separated interchange with underpass, on/off ramps and retaining walls connecting the new road at the east end of the South Bridge connector road to SH 82.

The purpose of this study was to evaluate the geotechnical characteristics of the on-site soils and provide preliminary geotechnical recommendations for the proposed improvements. We understand subsequent investigations will be performed for final recommendations based on these findings and the preliminary design. This investigation consisted of geologic reconnaissance and exploratory test hole drilling to investigate subsurface conditions. The test hole drilling was observed by a representative of Yeh & Associates. Samples obtained during

the field explorations were examined by the project personnel and representative samples were subjected to laboratory testing to determine the engineering characteristics of materials encountered. This report summarizes our field investigations, the results of our analysis, and provides preliminary recommendations for bridge foundations, roadway improvements, including pavement design, and retaining wall design, based on the results of the subsurface investigation and laboratory testing.

1.2 Proposed Improvements

Based on existing conceptual plans and communication with the City of Glenwood Springs and Jacobs Engineering, we understand a connector road with a new bridge across the Roaring Fork River is proposed in the south Glenwood Springs area to provide access between SH 82 and Airport Road. As shown on conceptual plan sets provided by Jacobs Engineering, the additional improvements also include a new interchange with underpass and access ramps for the connection of the proposed road with SH 82. Conceptual plans show that access across the Glenwood Springs Airport property may require a tunnel below the runway. The proposed connector road will cross private property of Holy Cross Energy and the RFTA Rio Grande Trail. In addition, retaining walls are planned along the proposed roadway and SH 82, at intersections, and at bridge, tunnel, and underpass structures. Based on our understanding of the conceptual design, the proposed runway tunnel may require excavations of up to 25 feet.

At the time of this draft report, an estimated 16 retaining walls with heights of 4 feet or greater are planned. Retaining walls will be constructed to provide stabilization for cuts required for bridge, tunnel, and underpass construction and grade separation for the surrounding intersection and road improvements. In addition, walls or barriers of less than 4 feet high are planned for both sides of SH 82 north and south of the intersection with Garfield County Road (CR) 154. Table 1 summarizes proposed preliminary retaining wall type, approximate location, and approximate dimensions. Limited information regarding retaining wall locations and design was available to us at the time of this report and we anticipate further study will be required once wall type and locations are determined.

The conceptual plans provided show the proposed South Bridge over the Roaring Fork River connecting SH 82 and Airport Road approximately 472 feet long and 50 feet wide. We understand the proposed bridge to be a three span structure with two piers. Bridge structures will be required for the underpass or and the tunnel. The planned SH 82 underpass appears to

be approximately 100 feet long and 60 feet wide, and the proposed airport runway tunnel appears to be approximately 200 feet long and 66 feet wide. No information regarding possible utility realignment was provided to us at the time of this report.

Roadway improvements are proposed for Airport Road from its intersection with Four Mile Road southeast to Airport Center Road, on Airport Center Road at its intersection with a new connector road, and along SH 82, including new road construction for on and off ramps. A pavement design for these sites was performed and design parameters for all sites can be found in Section 5 of this report.

The project area has been divided into three separate sites for purposes of discussion in this report.

- The Airport Road Site begins at the intersection of Airport Road (CR 116) and Four Mile Road (CR 117) and extends approximately 0.7 mile southeast to where Airport Road will intersect with the proposed connector road. Improvements in this area consist of upgrading the existing Airport Road and grade changes approximately 0.7 mile southeast of Four Mile Road to connect to the proposed new road construction.
- The Airport Tunnel and South Bridge Site encompasses an area approximately 500 feet north of the south airport hangars/maintenance building between Airport Road and the Roaring Fork River. This site includes the proposed airport runway tunnel, the west and east abutments of the proposed South Bridge, and the Holy Cross Energy property between the Roaring Fork River and SH 82.
- The State Highway 82 Site includes the SH 82 corridor between approximately mile marker 3.5 to mile marker 4.0, and the Old SH 82/Frontage Road/CR 154 from the intersection with Red Canyon Road (CR 115) south for 0.3 mile. This site includes the proposed SH 82 underpass and associated access ways.

Table 1 – Preliminary Retaining Wall Locations, Type and Estimated Size

Project Site	Wall Designation	Type	Estimated Maximum Height (feet)	Estimated Wall Length (feet)
Airport Tunnel and South Bridge Site	Airport Tunnel-West	Cut Wall	22	72
	Airport Tunnel-East	Cut Wall	22	72
	South Bridge West Abutment, north	Fill Wall	10	30
	South Bridge West Abutment, south	Fill Wall	10	30
	South Bridge East Abutment, north	Fill Wall	10	30
	South Bridge East Abutment, south	Fill Wall	10	30
	Holy Cross Energy and connector road	Fill Wall	15	250
	Access Holy Cross Energy and SH 82 west Underpass entrance	Cut Wall	15	300
SH 82 Site	Northwest Interchange SH 82 Underpass	Cut Wall	22	500
	Southwest Interchange SH 82 Underpass	Cut Wall	22	700
	Northeast Interchange SH 82 Underpass	Cut Wall	22	700
	Southeast Interchange SH 82 Underpass	Cut Wall	22	400
	SH 82 Underpass North Wall	Cut Wall	22	100
	SH 82 Underpass South Wall	Cut Wall	22	100
	Old SH 82 Access north side	Cut Wall	15	350
	Southeast Interchange Ramp SH 82	Cut Wall	12	600

1.3 General Site Conditions

The project area is located in the Roaring Fork River Valley approximately 3.5 miles south of downtown Glenwood Springs, Garfield County, Colorado and the confluence of the Roaring Fork and Colorado Rivers. The northwest trending valley is approximately one mile wide in the project area and is bounded by steep mountainous terrain to the east and west. The Roaring Fork River flows generally south to north. A topographic survey of the project area was performed by the client and is included in Figures 2 through 4 to show the proposed roadway alignments and the approximate test hole locations.

1.4 General Area Geology

The project area is located in south Glenwood Springs, Garfield County, Colorado on the western edge of the Southern Rocky Mountains Region, west of the Continental Divide and east of the Colorado Plateau in an area of complex geology. The geologic description of the project area is based on the Geologic Map of the Glenwood Springs quadrangle by Kirkham and others. The project site is located in the north end of the Carbondale Collapse Center, an area recognized for significant evaporite bedrock dissolution. The southern flanks of the White River

Uplift, a topographic and geologic dome, are situated northeast of the site. The north/south trending Cattle Creek Anticline roughly parallels the Roaring Fork River in Glenwood Springs and the axis, or top of the fold, in the project area roughly coincides with the runway at the Glenwood Springs Airport. Rock formations west of the project area consequently dip, or tilt approximately 50 degrees to the west and rock formations east of the project area dip approximately 20 to 30 degrees to the east. Evaporite diapirism, or salt intrusion and deformation of overlying rock, and dissolution of evaporite salts has complicated the geologic structure in the area. Several faults, which have displaced rock layers, have been mapped by Kirkham and others in the Glenwood Springs area east of the project site.

Based on the Geologic Map of Glenwood Springs, the Roaring Fork River in the project area appears to be underlain by Quaternary age alluvium of stream channel and flood plain deposits consisting of silt, sand, cobbles and boulders over the light-colored mudstone, sandstone and evaporites, including gypsum, halite and anhydrite, of the Pennsylvanian age Eagle Valley Evaporite/Eagle Valley Formation. These formations are exposed in outcrops in the lower slopes and cliffs west of the project area. Steep slopes and cliffs of red beds of sandstone, conglomerate, and mudstone above the site to the west and east are part of the Pennsylvanian-Permian age Maroon Formation, as shown in Photo 1. Bedrock contacts in the project area are buried under a variety of Quaternary age deposits.



Photo 1 – Maroon Formation cliffs above the Roaring Fork Valley, south of the project area looking NE.

1.5 General Investigation Summary

Thirty-eight test holes were drilled during the period of October 31, 2017 to January 26, 2018. The location of test holes and sequence of drilling operations were based on drill rig availability, site conditions, and subsurface material encountered. Test hole locations were identified on the conceptual plans received from the client. Test holes were drilled to depths ranging from 2 to 103 feet below existing grades. Table 2 below provides the test hole number with respect to the proposed structure or roadway improvement locations. Table 3 provides test hole elevations, and northing and easting coordinates as surveyed by Jacobs Engineering. Test hole locations and the corresponding proposed improvements are discussed below for each of the three sites.

1.5.1 Airport Road Test Hole Locations

Nine (9) test holes were drilled for the proposed Airport Road improvements and for pavement design as shown in Figure 2 of with examples in Photos 2 and 3 below. We understand no alignment or major grade changes will be made north of the intersection with the proposed connector road, approximately 0.2 mile north of the intersection with Airport Center Road, which is at the approximate location of test hole P-9.



Photo 2 – Drilling test hole P-3 for proposed roundabout, Airport Road and Morgan Street, looking north.



Photo 3 – Drilling test hole P-8 on Airport Road, looking northwest. Abandoned historic coke ovens can be seen on hillside to the east.

1.5.2 Airport Tunnel and South Bridge Site

Ten (10) test holes were drilled at this site for:

- a proposed tunnel below the existing airport runway as shown in Photo 4;
- foundations for the proposed South Bridge across the Roaring Fork River, as shown in Photo 5;
- and the proposed connector road located between Airport Road approximately 0.2 mile north of the intersection with Airport Center Road, to approximately mile 3.85 on SH 82 as shown on Photo 6.

The test hole locations for this site are shown on Figure 3 with examples in Photos 4, 5, and 6 below.



Photo 4 – Drilling test hole PW-14 at east end of proposed tunnel below existing airport Runway 32, looking east.



Photo 5 – Completed test hole PW-14 on Airport Road and drilling test hole A-1 for west bridge abutment, looking ENE (panorama photo).



Photo 6 – Drilling test hole PW-17 for proposed connector roadway and retaining wall looking east toward proposed intersection with SH 82.

1.5.3 State Highway 82

Nineteen (19) test holes were drilled along State Highway 82 and the adjacent frontage road also known as Old State Highway 82 for:

- construction of a new intersection with an underpass (see Photo 7);
- roadway grade changes and entrance and exit ramps;
- retaining walls (see Photo 8);
- and pavement subgrade evaluation.

The test hole locations for this site are shown on Figure 4 with examples in Photos 7 and 8 below.



Photo 7 – Drilling test hole A-4 for the proposed underpass on Highway 82 looking southeast.



Photo 8 – Drilling test holes W-33 and W-34 for proposed retaining walls at new intersection on Highway 82, looking northwest.

Table 2 – Proposed Structure or Roadway Locations with Corresponding Test Hole(s)

Project Site	Proposed Structure	Test Hole(s)
Airport Road	Improvements Airport Road Pavement	P-1 through P-9
Airport Tunnel and South Bridge	New Roadway Pavement for South Bridge Access	P-10, PW-11, PW-12, PW-14 and A-1
	Pavement Improvement Airport Center Drive	P-13, PW-14
	Possible Airport Tunnel-Walls	PW-11, PW-12
	West Abutment and Walls, South Bridge	A-1
	East Abutment and Walls, South Bridge	A-2
	New Roadway Pavement, Holy Cross Energy Access and west Underpass Access	PW-15, P-16, PW-17
	Walls, Holy Cross Energy Access and west SH 82 Underpass Access	PW-15, PW-17
State Highway 82	SH 82 Underpass south Abutment/Wall	A-3
	SH 82 Underpass north Abutment/Wall	A-4
	SH 82 access ramps/interchange pavement	PW-18 through PW-26, P-27, PW-28, P-29 through P-30, W-32 through W-34
	SH 82 southbound on ramp Wall	PW-18, A-3
	SH 82 northbound off ramp Walls	PW-19, PW-20, W-32, W-33, W-34
	SH 82 southbound off ramp Walls	PW-21, PW-23, PW-25, PW-26, PW-28
	SH-82 northbound on ramp Wall	A-4, PW-22, PW-24
	SH 82 improvements CR 154 access Wall	PW-31
	Old SH 82 access Wall	W-32, W-33, W-34

The locations of the test holes are presented on Figures 2 through 4 at the end of this report. Test hole coordinates and elevations were surveyed by the client and are presented below in Table 3.

Table 3 – Test Hole Coordinates

Site	Test Hole Number	Northing	Easting	Elevation
Airport Road	P-1	615418.017	488375.220	5916.6
	P-2	615190.567	488757.002	5919.0
	P-3	615059.536	489054.600	5921.3
	P-4	614990.010	489115.131	5922.8
	P-5	614952.478	489338.492	5925.9
	P-6	614745.950	489484.463	5925.1
	P-7	614469.873	489869.107	5925.5
	P-8	614055.789	490220.040	5924.3
	P-9	613734.312	490454.646	5924.0
Airport Tunnel and South Bridge	P-10	613549.684	490699.927	5911.0
	PW-11	613408.213	490873.440	5909.6
	PW-12	613474.229	491023.028	5908.4
	P-13	613572.327	491069.606	5907.1
	PW-14	613328.602	491124.286	5908.0
	A-1	613398.482	491266.806	5883.3
	A-2	613305.925	491705.993	5879.3
	PW-15	613365.646	491890.992	5885.8
	P-16	613257.318	491807.156	5886.4
	PW-17	613215.846	491978.890	5892.3
State Highway 82	PW-18	612646.515	492323.949	5937.1
	PW-19	612771.519	492399.829	5931.4
	PW-20	612979.013	492412.825	5927.8
	A-3	613120.183	492368.113	5927.0
	A-4	613176.251	492433.742	5924.4
	PW-21	613322.234	492399.864	5921.7
	PW-22	613370.561	492464.543	5920.4
	PW-23	613527.049	492434.431	5917.6
	PW-24	613564.753	492498.632	5916.7
	PW-25	613723.943	492458.458	5913.4
	PW-26	613866.714	492463.544	5910.5
	P-27	613931.503	492526.517	5914.6
	PW-28	614104.138	492423.664	5907.3
	P-29	614459.146	492302.960	5905.0
	P-30	615018.240	491899.955	5900.7
	PW-31	614949.387	491846.989	5904.7
	W-32	612870.149	492443.463	5946.0
	W-33	612824.010	492458.784	5945.3
	W-34	612623.393	492446.391	5942.9

Test holes, P-1 through P-10, P-13, PW-15, P-16, PW-18, PW-19, PW-20, PW-24, P-27, P-29, P-30, PW-31, and W-34 were advanced with a CME 45 truck–mounted drill rig using 4-inch outside diameter continuous flight solid stem auger. Test holes PW-21, PW-23, PW-25, PW-26, and PW-28 were advanced with an Acker Renegade rubber-track drill rig using 8-inch outside diameter continuous flight hollow stem auger. Test holes A-3, PW-11, PW-12, PW-14, and PW-17 were advanced with the Acker Renegade rubber-track drill rig using an ODEX drilling system. Test holes A-1, A-4, PW-22, W-32, and W-33 were advanced with a CME 55 track-mounted drill rig using an ODEX drilling system. Due to difficult drilling conditions and to reach

the desired depth, test hole A-2 was initially drilled with a Simco 1900 truck-mounted drill rig and drilled again with a CME 750X Buggy all-terrain rig using an ODEX drilling system.

At selected intervals, a modified California sampler with a 2-inch interior diameter (ID) and 2.5 inch outside diameter (OD), or a standard split spoon sampler with a 1⅜-inch ID and 2 inch OD were used to record blow counts and obtain samples. The sampler was seated at the bottom of the test hole, then advanced by a 140 pound hydraulic automatic, or "auto," hammer falling a distance of 30 inches. Based on energy measurements by GRL Engineers, Inc. on July 16, 2017, the hammer energy transfer ratio was 97 percent at 55 blows per minute (bpm) for the CME 750X Buggy rig and was 96 percent at 52 bpm for the Acker Renegade Rubber Track Rig. The number of blows required to drive the sampler two 6-inch intervals or a fraction thereof, constitutes the N-value. Bulk samples were also obtained at selected depth intervals. Samples were subjected to laboratory testing to determine the engineering characteristics of materials encountered, including swell/compression testing under wetting and an applied load based on the proposed construction. The test hole logs and legend are presented in Appendix A and preliminary engineering geology sheets are presented in Appendix C.

2.0 AIRPORT ROAD SITE

2.1 Airport Road Site Conditions

The Airport Road Site is located along 0.3 miles of Airport Road, also known as CR 163, south of the intersection with Four Mile Road (CR 117) and includes a short segment of Darrow Street (CR 160) from the intersection with Airport Road and approximately 250 feet to the east. In this area, Airport Road is a two lane asphalt paved road with little to no shoulder width. Darrow Street is a two lane, unimproved gravel road. Airport Road and Darrow Street provide access to residential, commercial, and industrial areas in south Glenwood Springs, including the Glenwood Springs Airport. The historic Cardiff Coke Ovens are adjacent to and southwest of the Airport Road Site, as shown in Photo 9. Condominium construction activity was observed adjacent to the southwest side of the roadway and included apparent coverage of exposed rock with shotcrete. In the project area, Airport Road is nearly level to gently sloping at grades of approximately 2 percent up to the southeast in the northern half of the site and 2 percent down to the southeast in the south end of the site. Darrow Street is gently sloping down to the west at a grade of approximately 2 percent. Elevations at the Airport Road Site ranged between approximately 5915 feet and 5930 feet. The Roaring Fork River is approximately 800 to 2,800

feet east of Airport Road at the project site. The confluence of Three Mile Creek and the Roaring Fork River is approximately 0.5 to 1.0 mile north of the site.



Photo 9 - Drilling test hole P-8 with Cardiff Coke Ovens on hillside, looking west.

2.2 Airport Road Site Geology

Based on the Geologic Map of the Glenwood Springs quadrangle by Kirkham and others, surficial deposits at the Airport Road Site have been mapped as artificial fill including construction fill of silt, sand and rock fragments, construction debris and remnant debris from the historic Cardiff Coke Ovens west of Airport Road. The fill was placed over Quaternary age alluvial/colluvial deposits including clay, silt, sand and gravel with cobbles and boulders deposited in stream channels, flood plains, terraces and debris fans. Quaternary age glacial outwash deposits of silt, clay, sand, gravel, cobbles and boulders underlie the alluvial/colluvial deposits. Poorly compacted fill may be subject to settlement when loaded. Bedrock underlying the surficial deposits has been mapped as the Pennsylvanian age Eagle Valley Evaporite/Eagle Valley Formation. Outcrops of the Eagle Valley Formation occur in slopes southwest of the road. Based on a 2002 collapsible soils map/report from the Colorado Geological Survey, historic occurrence of soil settlement was mapped just west of the intersection of Airport Road and Four Mile Road.

According to the Garfield County Slope Hazards Map, the lower slopes adjacent to the southwest side of Airport Road at the project site are located in a major hazard zone for rapid deposition debris fan deposits and rockfall activity, while the upper slopes are shown as a moderate hazard. A part of the steep lower slopes of exposed rock southwest of the road was recently covered with shotcrete. Additionally, based on the Garfield County Soil Hazards Map, the adjacent area southwest of the road is in a major hazard zone for soils prone to subsidence, known as hydrocompressible soils. These hydro-compressible soils include hillside gravity deposited colluvium, and rapid depositional deposits, such as mudflow, debris flow or slopewash.

2.3 Airport Road Subsurface Conditions

Nine test holes were drilled in the Airport Road Site using 4 inch solid stem auger. Test holes were drilled to depths ranging from 2 feet to 12 feet. In general, the subsurface conditions at the Airport Road Site consisted of asphalt and/or road base over 0.5 to 4 feet of clay, sand and gravel fill, over native clay, sand and gravels, with occasional cobbles and boulders. Auger refusal was encountered in test holes P-3, P-4, P-5, P-6, and P-9 at depths of 4.4 feet, 5.0 feet, 2.0 feet, 3.0 feet, and 12.0 feet, respectively. Bedrock was not encountered in the test holes at this site. The test hole logs and legend are presented in Appendix A, laboratory test results are presented in Appendix B, and preliminary engineering geology sheets are presented in Appendix C.

2.3.1 Asphalt and Road Base, Airport Road

Paved areas had 2 to 7 inches of asphalt over 0 to 20 inches of road base. The shoulder area of Airport Road at test hole P-7 had no asphalt and 10 inches of road base. The unimproved roadway on Darrow Street had no asphalt and 8 inches of gravel road base at test hole P-5. Asphalt and road base thicknesses for the Airport Road Site can be found in Table 4 below. Two road base sand samples tested had 14 percent fines (material passing the No. 200 sieve). Atterberg limits testing on these samples exhibited liquid limits of no value to 20 percent and plasticity indices of non-plastic to 3 percent. Road base samples classified as SM according to the Unified Soil Classification System (USCS), and as A-1-a and A-1-b according to the American Association of State Highway and Transportation Officials (AASHTO).

Table 4 – Airport Road Site Existing Asphalt and Base Thicknesses

Road Name	Test Hole Number, Airport Road	Pavement Thickness (inches)	Base Thickness (inches)
Airport Road	P-1	2.0	4.0
	P-2	4.0	20.0
	P-3	4.0	11.0
	P-4	5.0	7.0
	P-6	7.0	5.0
	P-8	6.0	8.0
	P-9	5.0	None
	Average. Thickness	4.7	7.9
	P-7 (shoulder)	None	10.0
Darrow Street	P-5	None	8.0

2.3.2 Existing Fill, Airport Road

Existing fill was encountered in all test holes as artificial fill, or modified land surface deposits. Fill soils depths above native soils varied between 0.5 and 7.5 feet and consisted of sand or gravel with silt and/or clay. Test hole P-1 had 4 feet of clay fill with construction debris and black gravel. All other test holes, with the exception of test holes P-3 and P-7 encountered black fill and debris that appeared to be coke oven waste rock.

Five samples of black sand and gravel fill material, believed to be coke oven waste, tested had 18 to 36 percent fines. Four of these samples tested for Atterberg limits had liquid limits of no value to 27 percent and plasticity indices of non-plastic to 7 percent. One sample from test hole P-8 at a depth of 2 feet exhibited a collapse of 0.2 percent when wetted under an applied pressure of 200 pounds per square foot (psf). Two bulk samples of the black material, one from test hole P-2 and a combined sample from test holes P-8 and P-9 subjected to Hveem (R-value) testing (ASTM 2844) resulted in R-values of 72 and 64, respectively, at an exudation pressure of 300 pounds per square inch (psi). The black material classified as SC-SM, SM, and GM (USCS) and as A-4, A-2-4, and A-1-b (AASHTO).

Two samples of clay fill tested had 78 to 79 percent fines, a liquid limit of 27 percent and a plasticity index of 11 percent. One of the samples from test hole P-1 at a depth of 4 feet exhibited collapse of 0.3 percent when wetted under an applied pressure of 500 psf. The clay fill classified as CL (USCS) and A-6 with groups 6 and 7 (AASHTO).

Two gravel fill samples tested had 21 to 31 percent fines, liquid limits of no value to 35 percent and plasticity indices of non-plastic to 21 percent. The gravel fill classified as GC and GM (USCS) and as A-2-4 and A-2-6 (AASHTO).

2.3.3 Native Clay and Gravel, Airport Road

Five native clay samples tested had 57 to 84 percent fines, liquid limits 24 to 31 percent and plasticity indices of 8 to 17 percent. Three of these samples were tested for swell/collapse. One of the samples from test hole P-9 at a depth of 7.5 feet exhibited collapse of 0.1 percent when wetted under an applied pressure of 500 psf. The other two samples from test holes P-2 at a depth of 4 feet and P-8 at a depth of 2.5 feet showed no movement when wetted under applied pressures of 500 psf and 200 psf, respectively. Two native gravel samples tested had 14 and 47 percent fines, liquid limits of no value and 26 percent, and plasticity indices of non-plastic and 10 percent. One of these samples collected from test hole P-9 at a depth of 10.5 feet exhibited collapse of 0.2 percent when wetted under an applied pressure of 1,000 psf. The native clay classified as CL (USCS) and A-4 (3), A-6 with groups 5, 7, 11, and 12 (AASHTO) and the native gravel classified as GC and GM (USCS) and as A-4(2) and A-1-a.

2.3.4 Water Soluble Sulfate and Corrosion Testing, Airport Road

For the Airport Road Site, concentrations of water-soluble sulfates were measured in the laboratory on one bulk and four retrieved samples taken in test holes P-2, P-5, P-8, and P-9 from depths of 2-3, 1.0, 2.0, 4.0 and 7.5 feet, respectively (two samples were tested from test hole P-9). Testing on these samples indicated water-soluble sulfate contents ranging from 0.004 percent to 0.133 percent, which represents a susceptibility to sulfate attack to concrete of Class 0 to Class 1 based on Table 601-2 of the 2017 CDOT Standard Specifications for Road and Bridge Construction. We understand no structures are currently planned for this section.

The pH, electrical resistivity and percent of water-soluble chloride were also determined for the above samples. Test results measured pH values of 7.1 to 7.5, resistivity measurements of 410 to 887 ohm-centimeters, and water-soluble chlorides ranged between 0.002 to 0.085 percent. We recommend a corrosion specialist be consulted regarding utilities and/or materials which may be susceptible to corrosion under these conditions

3.0 AIRPORT TUNNEL AND SOUTH BRIDGE SITE

3.1 Airport Tunnel and South Bridge Site Conditions

The Airport Tunnel and South Bridge Site is located in an area that includes the Roaring Fork River crossing between Airport Road and SH 82. The west side of the site is approximately 500 feet north of the south airport maintenance building and hangars, between Airport Road to the west and the Roaring Fork River to the east, and includes the area of the west abutment of the proposed South Bridge. This site includes the old Glenwood Springs Rodeo grounds west of the airport, the area adjacent to the south end of the runway, a small segment of Airport Center Road approximately 900 feet northeast of the intersection with Airport Road, and the area east of Airport Center Road near the river bank. The old rodeo grounds are now used as open space storage area for the City of Glenwood Springs. Airport Center Road is a two lane, asphalt paved road with little to no shoulder width, and provides access to the airport, industrial areas and connects to residential areas to the north. In the project site area, the old rodeo grounds, the airport runway and Airport Center Road are nearly level with a grade change of less than one percent. Between Airport Center Road and the river bank, the unimproved area is strongly sloping to the east at a grade of approximately 14 percent. Elevations at the west side of the site in the area of the proposed airport tunnel, ranged between approximately 5875 feet and 5920 feet. The Roaring Fork River is adjacent to the east edge of the site, approximately 50 feet below the steeply sloping west river bank. The confluence of Three-mile Creek and the Roaring Fork River is approximately one mile north or the site.

The east side of the site is on the Holy Cross Energy property and encompasses the south area of the Holy Cross Energy facilities between SH 82 on the east and the Roaring Fork River to the west, and the east abutment of the proposed South Bridge. The site also includes a segment of the RFTA Rio Grande Trail that parallels the highway. Moderate slopes down to the west exist on the west side of SH 82, where they grade into open fields at the Holy Cross Energy property with gently sloping grades of approximately 5 percent down to the west to the steeply sloping river bank. The Roaring Fork River at the site was approximately 40 feet below the existing top of the east river bank. The Roaring Fork River is adjacent to the west edge of this site. East of SH 82, Red Canyon discharges water into a culvert and under SH 82 south of the intersection of SH 82 and Red Canyon Road (CR 115). The culvert appears to discharge into a system of drains under the Holy Cross Energy parking areas and into the Roaring Fork River north of the proposed South Bridge location. East of and above SH 82, hillsides that are moderately to very steeply sloping to the west are dominated by bedrock outcrops and talus/rockfall debris.

Vegetation at the site includes landscaped areas of the airport and Holy Cross Energy facilities, native grasses, shrubs and trees.

3.2 Airport Tunnel and South Bridge Site Geology

Based on the Geologic Map of the Glenwood Springs quadrangle by Kirkham and others, surficial deposits at the Airport Tunnel and South Bridge Site have been mapped as Quaternary age glacial outwash deposits of silt, clay, sand, gravel, cobbles and boulders, with a change shown at the east edge of the site to Quaternary age alluvial and colluvial deposits including clay, silt, sand and gravel with cobbles and boulders deposited in stream channels, flood plains, terraces, debris fans and debris flows. In this area, several levels of terrace outwash gravels have been mapped. Occasionally these gravels are separated by loess, alluvium or colluvium and may include overbank deposits. Colluvial deposits are typically susceptible to active deposition and are frequently subject to sheet wash, rockfall, small debris flows, and minor landsliding. Fine-grained colluvium may be prone to hydrocompaction, piping, and settlement, particularly when derived from Maroon Formation or evaporitic rocks. Outcrops of the red beds of siltstone, sandstone and conglomerates of the Maroon Formation occur in steep slopes east of SH 82 as shown in Photos 1, 5, 6 and 8. Underlying these surficial deposits and the Maroon Formation is the Pennsylvanian age Eagle Valley Evaporite/Eagle Valley Formation bedrock of evaporites including gypsum, halite and anhydrite interbedded with gray to black shale. The evaporite bedrock is prone to development of solution cavities into which overlying fine-grained sediments may be piped and may be subject to compaction, settlement, hydrocompaction and possible sinkhole development. Soils derived from evaporites may be corrosive.

During our subsurface investigation, changes in overall color of granular material encountered in the borings, especially the matrix, seemed to mark a boundary between gravel layers. One explanation may be that alluvial deposits blanketed terrace outwash gravels. These changes have been marked in the test hole logs found in Appendix A.

The Garfield County Slope and Soils Hazards Maps show hazards exist in areas adjacent to the Airport Tunnel and South Bridge Site, but do not show mapped hazards on the site. Based on a 2002 collapsible soils map/report from the Colorado Geological Survey, unconsolidated soils prone to soil collapse were mapped in the project area. See section 4.2 for hazards mapped east of SH 82.

3.3 Airport Tunnel and South Bridge Subsurface Conditions

Ten (10) test holes were drilled in the Airport Tunnel and South Bridge Site using 4-inch solid stem auger or an ODEX system. Test holes were drilled to depths ranging from 2.5 feet to 103 feet. In general, the subsurface conditions at the Airport Tunnel and South Bridge Site consisted of 0 to 12.8 feet of clay, sand and gravel fill, over native clay, sand and gravels, with occasional cobbles and boulders. Due to the pneumatic hammer pulverizing materials from test holes using ODEX drilling, drill cutting sizes ranged from dust to approximately ¾-inch in diameter. Determination of actual size (diameter) of gravels, cobbles and boulders was difficult and variation in the composition of the sand and gravel layers is likely. Subsurface boulder occurrences were estimated from field observations during drilling as shown in Photo 10. Bedrock was encountered in test holes A-1, PW-11, and PW-14 at depths of 46 feet, 42 feet and 68 feet, respectively. Auger refusal in gravels, cobbles and boulders was encountered in test holes P-10, PW-15, and P-16 at depths of 6.5 feet, 5 feet, and 2.5 feet, respectively. ODEX refusal was encountered in test hole PW-14 at a depth of 74.1 feet. Two test holes, P-13 and PW-14, drilled in Airport Center Road pavement encountered 2 inches of asphalt and no discernible road base. The test hole logs and legend are presented in Appendix A, laboratory test results are included in Appendix B, and preliminary engineering geology sheets are presented in Appendix C.



**Photo 10 – Surface drilling conditions at test hole A-1.
Note basalt boulders in drilling area, looking SSE.**

3.3.1 Asphalt, Airport Tunnel and South Bridge

Paved areas drilled in Airport Center Road had 2 inches of asphalt over no discernible road base. Asphalt thicknesses for Airport Center Road in the Airport Tunnel and South Bridge Site can be found in Table 5 below.

Table 5 – Airport Center Road Existing Asphalt and Base Thicknesses

Test Hole Number, Airport Center Road	Pavement Thickness (inches)	Base Thickness (inches)
P-13	2.0	None
PW-14	2.0	None
Average Thickness	2.0	None

3.3.2 Existing Fill, Airport Tunnel and South Bridge

Existing fill was encountered in test holes P-10, PW-11, PW-12, PW-13, PW-14, and PW-15 in the Airport Tunnel and South Bridge Site as artificial fill or modified land surface deposits. Fill soil depths above native soils varied between 1.0 and 13.0 feet and consisted of sand or gravel with silt and/or clay. Test hole P-10 encountered 4 feet of clay fill that included black material and potential debris from the old rodeo grounds. One clay fill sample tested had 76 percent fines (material passing the No. 200 sieve). Atterberg limits testing on this sample resulted in liquid limits of 25 percent and a plasticity index of 11 percent. Two sand and gravel fill samples tested had 21 and 38 percent fines, liquid limits of no value and plasticity indices of non-plastic. Fill samples classified as CL, SM, and GM according to the Unified Soil Classification System (USCS), and A-6(6), A-4, and A-1-b according to the American Association of State Highway and Transportation Officials (AASHTO).

3.3.3 Native Clay, Sand and Gravel, Airport Tunnel and South Bridge

Three native clay samples tested had 56 to 83 percent fines, liquid limits of 29 to 31 percent, and plasticity indices of 10 to 15 percent. Twenty five sand and gravel samples were subjected to laboratory testing for fines and Atterberg limits. Five sand samples tested had between 10 to 49 percent fines, liquid limits of no value to 25 percent and plasticity indices of non-plastic to 10 percent. Twenty gravel samples tested had 4 to 31 percent fines, liquid limits of no value to 28 percent and plasticity indices of non-plastic to 13 percent. The sand and gravel classified as SC, SM, SP-SM, GC, GM, GC-GM, GP-GM, GW-GM, GP, and GW (USCS), and A-4 (2), A-2-4, A-2-6, A-1-a, and A-1-b (AASHTO).

3.3.4 Native Bedrock, Airport Tunnel and South Bridge

Three native shale bedrock samples retrieved from test hole A-1, at depths between 52 and 72 feet, tested had liquid limits of 22 to 24 percent, and plasticity indices of 4 to 5 percent. One bulk sample of gypsum was submitted for corrosion testing. Bedrock encountered at the Airport Tunnel and South Bridge Site appeared to consist of variable black to gray shale and light grey to white gypsum deposits. See photo 11.



Photo 11 – Bedrock gypsum material ODEX cuttings at test hole PW-14.

3.3.5 Water Soluble Sulfate and Corrosion Testing, Airport Tunnel and South Bridge

Samples from the Airport Tunnel and South Bridge site at depths corresponding to estimated conceptual foundation locations and estimated foundation design were tested to evaluate corrosively and deteriorating effect on concrete. Concentrations of water-soluble sulfates were measured in the laboratory on ten samples taken from test holes P-10, P-13, P-16, P-17, A-1, and A-2 at depths ranging from 1 to 74 feet. Testing on these samples indicated water-soluble sulfate contents ranging from 0.003 percent to 1.301 percent, which represents a susceptibility to sulfate attack to concrete of Class 0 to Class 2 based on Table 601-2 of the 2017 CDOT Standard Specifications for Road and Bridge Construction. Sulfate-resistant cement is

recommended for use with soils of moderate to severe risk of sulfate attack. Further information concerning sulfate resistant cement can be provided if requested.

The pH, electrical resistivity and percent of water-soluble chloride were also determined for the above samples. Test results measured pH values of 7.5 to 8.7, resistivity measurements of 913 to 9398 ohm-centimeters, and water-soluble chlorides ranged between 0.0003 to 0.0166 percent. We recommend a corrosion specialist be consulted regarding utilities and/or materials which may be susceptible to corrosion under these conditions

4.0 STATE HIGHWAY 82 INTERSECTION AND IMPROVEMENTS

4.1 State Highway 82 Site Conditions

The State Highway 82 (SH 82) Site is located along the SH 82 alignment right-of-way from approximately mile 3.5 to mile marker 4.0. SH 82 intersects with CR 154 in the north end of the site, with Red Canyon Road (CR 115) in the middle section of the site, and with a private driveway at the south end of the site. The SH 82 Site also includes a short segment of Old State Highway 82/south CR 154 approximately 0.25 mile south of the intersection with Red Canyon Road (CR 115). SH 82 provides access at intersections to commercial, industrial, agricultural, and some residential areas. SH 82 is a four lane asphalt road with a center turn lane to the north and grassy median to the south. Shoulder widths vary and some segments have guard rails on the west side. Old SH 82/south CR 154 is a narrow, less than two lane wide, unimproved gravel road. SH 82 and Old SH 82 are generally nearly level to gently sloping to the north at grades of approximately 1 to 2 percent. Moderately steep to steep slopes down to the west toward the road exist on the east side of SH 82 and moderate slopes down to the west from the road exist on the west side of SH 82, where they grade into open fields at the Holy Cross Energy property. Elevations at the SH 82 Site ranged between approximately 5900 feet and 5950 feet. East of SH 82, Red Canyon discharges water into a culvert and under SH 82 south of the intersection of SH 82 and Red Canyon Road (CR 115). The culvert appears to discharge into a system of drains under the Holy Cross Energy parking areas and into the Roaring Fork River north of the proposed South Bridge location. East of and above SH 82, hillsides that are moderately to very steeply sloping to the west are dominated by bedrock outcrops and talus/rockfall debris. Vegetation at the site includes landscaped areas of the airport and Holy Cross Energy facilities, native grasses, shrubs and trees.

Drilling along SH 82 occurred during daytime and nighttime hours with lane closures permitted during low traffic hours. See photo 12. At times, two drill crews were utilized for efficiency during lane closures as shown in photo 13. The investigation included test holes for the proposed intersection and underpass, general pavement conditions, and proposed retaining walls. Test holes for walls were also drilled along the frontage road/Old State Highway 82. See photo 14.



Photo 12 – Night drilling along SH 82 at test hole PW-18 looking north.



Photo 13 – Two drill crews along SH 82 drilling at test holes PW-20 and A-4, looking NNW.



Photo 14 – Drilling for proposed retaining walls at W-32 along Old State Highway 82 for future HWY 82 intersection, looking north.

4.2 State Highway 82 Site Geology

Based on the Geologic Map of the Glenwood Springs quadrangle by Kirkham and others, surficial deposits at the SH 82 Site have been mapped as Quaternary age alluvial and colluvial deposits including clay, silt, sand and gravel with cobbles and boulders deposited in stream channels, flood plains, terraces, debris fans, sheet wash and debris flows. In this area, several levels of terrace outwash gravels have been mapped. Occasionally these gravels are separated by loess, alluvium or colluvium and may include overbank deposits. Colluvial deposits are typically susceptible to active deposition and are frequently subject to sheet wash, rockfall, small debris flows, and minor landslides. Fine-grained colluvium may be prone to hydrocompaction, piping, and settlement, particularly when derived from Maroon Formation or evaporitic rocks. Underlying these deposits are Quaternary age glacial outwash deposits of silt, clay, sand, gravel, cobbles and boulders. Artificial, or manmade fill should be expected in areas of highway construction. Poorly compacted fill may be subject to settlement when loaded. Bedrock underlying the surficial deposits has been mapped as the Pennsylvanian age Eagle Valley Evaporite/Eagle Valley Formation and the Pennsylvanian-Permian age Maroon Formation. Outcrops of the red beds of siltstone, sandstone and conglomerates of the Maroon Formation occur in steep slopes east of SH 82.

According to the Garfield County Slope Hazards Map and the Garfield County Soil Hazards Map, the areas adjacent to SH 82, including areas to the east, at the project site are located in a moderate hazard zone for rapid deposition debris fan deposits and rockfall activity and in a moderate hazard zone for soils prone to subsidence, known as hydrocompressible soils. These hydro-compressible soils include hillside gravity deposited colluvium, and rapid depositional deposits, such as mudflow, debris flow or slopewash. Based on a 2002 collapsible soils map/report from the Colorado Geological Survey, unconsolidated soils prone to soil collapse and piping, especially when wetted, were mapped adjacent to the west side of SH 82 in the project area,

4.3 State Highway 82 Subsurface Conditions

In general, the subsurface conditions at the SH 82 Site consisted of asphalt and/or road base over native clay, sand and gravels, with occasional cobbles and boulders. Test hole PW-28 encountered sand and gravel fill below road base to a depth of 4 feet. In apparent cut and fill areas, native materials used as fill were generally not distinguishable from in-situ native materials. Due to the pneumatic hammer pulverizing materials for test holes using ODEX

drilling, drill cutting sizes ranged from dust to approximately ¾-inch in diameter. Determination of actual size (diameter) of gravels, cobbles and boulders was difficult and variation in the composition of the sand and gravel layers would be likely. Subsurface boulder occurrences were estimated from field observations of the bit advance rate and cuttings during drilling. Auger refusal was encountered in test holes PW-21, PW-24, P-28, and W-34 at depths of 6.0 feet, 8.3 feet, 9.0 feet, and 15.5 feet, respectively. ODEX refusal was encountered in test hole A-3 at a depth of 64 feet. Bedrock was not encountered in the test holes at this site. The test hole logs and legend are presented in Appendix A, laboratory test results are presented in Appendix B, and preliminary engineering geology sheets are presented in Appendix C.

4.3.1 Asphalt and Road Base, State Highway 82 Site

Paved areas on SH 82 had 6 to 10 inches of asphalt over 5 to 18 inches of road base. Test hole PW-31, drilled off the west edge of the shoulder of SH 82, had no asphalt and 6 inches of road base. The unimproved roadway on Old SH 82/CR 154 had no asphalt and 12 inches and 6 inches of gravel road base at test holes W-32 and W-34, respectively. Test hole W-33 was drilled off the east edge of Old SH 82/CR 154. Asphalt and road base thicknesses for the SH 82 Site can be found in Table 6 below. Four road base sand and gravel samples tested had 3 to 35 percent fines (material passing the No. 200 sieve). Atterberg limits testing on these samples exhibited liquid limits of no value to 22 percent and plasticity indices of non-plastic to 2 percent. Road base samples classified as SM, SP-SM, GW-GM, and GW according to the Unified Soil Classification System (USCS), and as A-1-a, A-2-4 and A-2-7 according to the American Association of State Highway and Transportation Officials (AASHTO).

Table 6 – SH 82 Site Existing Asphalt and Base Thicknesses

Road Name	Test Hole Number	Pavement Thickness (inches)	Base Thickness (inches)
State Highway 82	PW-18	9.0	15.0
	PW-19	9.0	9.0
	PW-20	9.0	9.0
	PW-21	10.0	8.0
	A-3	7.0	17.0
	A-4	7.0	7.0
	PW-22	8.0	10.0
	PW-23	9.0	7.0
	PW-24	7.5	10.5
	PW-25	10.0	6.0
	PW-26	9.0	9.0
	P-27	9.0	5.0
	PW-28	9.0	6.0
	P-29	9.0	15.0
	P-30	6.0	18.0
	Average Thickness	8.5	10.1
	PW-31 (off edge of shoulder)	None	6.0
Old State Highway 82/ CR 154	**Test Hole Number**	**Pavement Thickness (inches)**	**Base Thickness (inches)**
	W-32	None	12.0
	W-34	None	6.0
	Average Thickness	None	9.0

4.3.2 Existing Fill, State Highway 82 Site

Existing fill encountered in test hole PW-28 at a depth of 1.3 to 4.0 feet was artificial fill or and/or modified land surface deposits and consisted of sand or gravel with silt and/or clay. One sand fill sample tested had 34 percent fines, a liquid limit of no value and a plasticity index of non-plastic. One gravel fill sample tested had 38 percent fines, a liquid limit of 21 percent and a plasticity index of 4 percent. Fill samples classified as SM and GC-GM (USCS), and as A-2-4 and A-4 (AASHTO). A bulk sample of sand fill from test hole PW-28 taken at depths between 2 and 4 feet was subjected to Hveem (R-value) testing (ASTM 2844) and resulted in an R-value of 60 at an exudation pressure of 300 psi.

4.3.3 Native Clay, Sand and Gravel, State Highway 82 Site

Tests on three native clay samples showed results of 52 to 94 percent fines, liquid limits of 21 to 33 percent, and plasticity indices of 4 to 13 percent. These samples from depths of 9 feet, 34

feet and 57 feet were tested for swell/collapse potential and exhibited collapse of 0.1 and 0.2 percent when wetted under an applied pressure of 1,000 psf.

Twenty-seven (27) native sand samples tested had 26 to 48 percent fines, liquid limits of no value to 23 percent and plasticity indices of non-plastic to 8 percent. Three of the sand samples from depths between 2.0 and 2.5 feet were tested for swell/collapse when wetted at an applied pressure of 300 psf and exhibited collapse of 0.2 to 3.2 percent. Four of the sand samples from depths of 1.5 to 5 feet were tested for swell/collapse when wetted at an applied pressure of 500 psf and exhibited collapse of 0.1 to 0.8 percent. Six of the sand samples from depths between 7 and 24 feet were tested for swell/collapse when wetted at an applied pressure of 1,000 psf and exhibited collapse of 0.2 to 1.0 percent. Two bulk native sand samples were tested for R-value. A bulk sand sample from test hole P-30 taken at depths between 2 and 6 feet was subjected to Hveem (R-value) testing (ASTM 2844) and resulted in an R-value of 34 at an exudation pressure of 300 psi. A combined bulk sand sample from test holes PW-19 and PW-20 taken at depths between 5 and 15 feet was subjected to Hveem (R-value) testing (ASTM 2844) and resulted in an R-value of 59 at an exudation pressure of 300 psi.

Thirty five native gravel samples were tested and had results that showed 9 to 40 percent fines, liquid limits of no value to 27 percent, and plasticity indices of non-plastic to 11 percent. Four of the gravel samples from depths between 4 and 7 feet were tested for swell/collapse when wetted at an applied pressure of 500 psf and exhibited collapse of 0.1 to 2.9 percent. Ten of the gravel samples from depths between 4 and 37 feet were tested for swell/collapse when wetted at an applied pressure of 1,000 psf and exhibited collapse of 0.2 to 4.4 percent. A bulk sand sample from test hole PW-18 taken at depths between 2 and 6 feet was subjected to Hveem (R-value) testing (ASTM 2844) and resulted in an R-value of 72 at an exudation pressure of 300 psi.

The native clay, samples classified as CL and CL-ML (USCS) and A-4(0), A-4(2), and A-6(12) (AASHTO). The native sand samples classified as SC, SM, and SC-SM (USCS) and A-4(0), A-4(1), and A-2-4 (AASHTO). The native gravel samples classified as GC, GM, GC-GM, GP-GM, and GW-GM (USCS), and A-6 (1), A-4, A-2-4, A-1-a, and A-1-b (AASHTO).

4.3.4 Water Soluble Sulfate and Corrosion Testing, State Highway 82 Site

For the State Highway 82 Site improvements, samples were taken for chemical testing at depths corresponding to proposed pavement areas as well as potential retaining walls and deep foundation elements for structures. Concentrations of water-soluble sulfates were measured in

the laboratory on eight samples taken in test holes P-18, P-23, P-27, W-32, A-3, and A-4 at depths ranging from 4 to 44 feet, with three of the samples taken from test hole A-3. Testing on these samples indicated water-soluble sulfate contents ranging from 0.003 percent to 0.068 percent, which represents a susceptibility to sulfate attack to concrete of Class 0 based on Table 601-2 of the 2017 CDOT Standard Specifications for Road and Bridge Construction. It should be noted that these values indicate a low risk of sulfate attack on concrete exposed to these materials.

The pH, electrical resistivity and percent of water-soluble chloride were also determined for the above samples. Test results measured pH values of 7.7 to 8.7, resistivity measurements of 969 to 6046 ohm-centimeters, and water-soluble chlorides ranged between 0.0004 to 0.0237 percent. We recommend a corrosion specialist be consulted regarding utilities and/or materials which may be susceptible to corrosion under these conditions.

5.0 PAVEMENT SECTION RECOMMENDATIONS

Three pavement section sites have been identified in the project area and include improvements to Airport Road, and construction of a new connector road between Airport Road and State Highway 82 (SH 82), which includes a new intersection with access ramps at SH 82.

5.1 Traffic Counts

5.1.1 Traffic Counts

Traffic information for this project was calculated from the traffic study conducted by IDAX Data Solutions for Airport Road. For the State Highway 82 portion of the project, the Colorado Department of Transportation (CDOT) OTIS web page was used to provide present traffic loading and future growth information. Traffic count information can be found in Appendix D.

5.1.2 Traffic Growth Projections

For the SH 82 portion of the project, the CDOT OTIS web page was used to provide present traffic loading and future growth information. Current traffic counts for Airport Road were provided by IDAX Data Solutions. No traffic growth projections were provided for Airport Road, and the design is based on the same annual growth factor and same percent trucks as was used for SH 82. Traffic growth for the proposed connector road for this design is assumed to be the same as Airport Road.

5.1.3 Design Traffic Loading

The pavement design requirements were determined using the AASHTOWare Mechanistic – Empirical (M-E) Pavement Design program. Table 7 presents a summary of inputs used for the pavement designs. This is the program adopted by CDOT and uses truck volumes and growth factors to predict pavement performance. Calculations of truck loading for pavement designs are presented in Appendix D.

Table 7 – Airport Road Design Traffic Loading

Roadway Segment	SH 82	Airport Road/Proposed Connector Road
2019 Truck Volume	1,262	70
Truck Cluster*	1	1
Weather Data	Glenwood Springs, Colorado	Glenwood Springs, Colorado
Annual Growth Factor	1.37	1.37
HMA Top Lift	SX(100) PG 64-28**	SX(100) PG 64-28**
Lower Lifts	SX(75) PG 58-28**	SX(75) PG 58-28**
ABC R-value, minimum	78	78
Pit Run R-value, minimum	60	60
Imported subgrade R-value, minimum	35	35

*Predominantly Class 5 Trucks (Single Units)
**See section 5.1.4 for Hot Mix Asphalt Type selection

5.2 Subgrade Strength Evaluation

5.2.1 Airport Road and Proposed Connector Road

Based on the subsurface investigation for this report, the subgrade for Airport Road and the area of the proposed connector road was quite variable with different soil types and layer thicknesses and includes imported fill and probable reworked native soils. The predominant subgrade soil AASHTO classification below the pavement on Airport Road is A-6 and Table 4 in Section 2.3.1 above presents the range of pavement and base thicknesses encountered. The subgrade soil AASHTO classifications in the area of the proposed connector road varies and includes A-6 east and west of the Roaring Fork River with additional pavement section information found in Table 5 in Section 3.3.1 above. The intersection of the proposed connector road and Airport Center Road east of the runway will be new construction.

5.2.2 State Highway 82

SH 82 has hot mix asphalt (HMA) pavement thickness averaging 8.5 inches. The aggregate base course (ABC) thickness below the pavement on SH 82 is quite variable ranging from 6

inches to 30 inches with pit run subbase in some locations. The predominant subgrade soil AASHTO classification below the pavement section of SH 82 is A-4. Pavement section information for SH 82 can be found in Table 6 in section 4.3.1 above.

5.2.3 R-Values

In order to determine the subgrade strength to be used as an input to the pavement design program, soil samples from the project area were tested for R-value in accordance with AASHTO T190. The resulting R-values for the base and pit run subbase ranged from 59 to 72 and the subgrade soil R-value was measured as 34. Because we anticipate that many of the fill soils currently in place will be reused for the approaches to the new structures, a subgrade R-value of 34 was used to calculate a resilient modulus (M_R) of 9,000 psi for the subgrade and an R-value of 60 was used to determine the resilient modulus of 10,615 psi for input of the subbase materials. The resilient modulus of Class 6 aggregate base course (ABC) is 25,000 with a minimum R-value of 78.

To assure adequate subgrade strength below the pavement, we recommend that any embankment fill material placed within the two feet immediately below the aggregate subbase (pit run) meet a minimum R-value of 35.

5.2.4 Base, Subbase and Subgrade Materials

Pavements at all three sites were designed using the same base, subbase and subgrade properties. We anticipate that at the Airport Road Site, the on-site materials will be reused. We anticipate that at the Airport Tunnel and South Bridge Site, the tunnel, the new approaches for the proposed connector road on either side of the river and the approach to the interchange at SH 82 will consist of imported materials or that materials generated on site will be used. For the access ramps on SH82, we anticipate imported materials for embankment subgrade, subbase and base.

5.3 Design Assumptions

Table 88 presents the design parameter inputs for the AASHTOWare M-E program. The base, subbase and subgrade is the same for both HMA and Portland Cement Concrete Pavement (PCCP). HMA designs are based on 20-Year truck loading and PCCP designs are based on 30-Year truck loading.

Table 8 – Pavement Design Parameters

Design Input Categories	SH 82	Airport Road/ Proposed Connector Road
2019 Truck Volume	1,262	70
20-Year Truck Volume	4,735,520	350,223
30-Year Truck Volume	7,632,700	564,489
ABC, Class 6 M_R, psi	25,000	25,000
Pit Run M_R, psi	10,615	10,615
Subgrade M_R, psi	9,000	9,000

5.4 Pavement Thickness Recommendations

A pavement section is a layered structure designed to disperse dynamic traffic loads to the subgrade. The performance of the pavement structure depends on the traffic loadings and physical properties of the subgrade materials. Recommended pavement design thickness sections are summarized Table 9 below. All of the pavement sections, both HMA and PCCP, were designed using the same recommended base, subbase and subgrade treatment.

Table 9 – Recommended Pavement, Base and Subbase Thickness

Roadway Segment	HMA Thickness (inches)	PCCP* Thickness (inches)
Airport Road	6.0	7.0
Proposed Connector Road	6.0	7.0
SH 82	8.0	8.0
For HMA and PCCP-All Roadway Segments		
ABC, Class 6 (inches)	6.0	6.0
Subbase, Pit Run R-60 (inches)	12.0	12.0
Imported Subgrade Type	R-35	R-35

***All PCCP shall contain load transfer devices, dowels and tie bars, in conformance with CDOT Standard M-412.**

Approach roads should be constructed with a minimum 6 inches of HMA over 6 inches of ABC. New construction should match existing conditions if thicknesses are greater than those described above.

5.5 Hot Mix Asphalt Type

5.5.1 Asphalt Binder

The Long Term Pavement Performance program LTPPBind was used to help select the binder grade for use on this project. Based on the output from the LTPPBind program referencing the Glenwood Springs weather station, PG 64-28 is the 98 percent reliability binder for the top mat in the project area and PG 58-28 is a 98 percent reliability binder for lower lifts.

Based on past performance of binders in this area, we recommend that the lower lifts be constructed using PG 58-28. Mixes using this binder are readily available from local contractors and this binder meets the low temperature requirements and exceeds the high temperature requirements.

For the top lift, we recommend that the mix be made with PG 64-28. This binder meets the 98 percent or better reliability for low temperature cracking in the project area and exceeds the high temperature properties needed for the top lift. Both of these binders have been used on CDOT projects in this area and performed well.

5.5.2 Mix Type

For this project we recommend that the mix used for all lifts meet the requirements for SX(75). The SX(75) mix has a standard gradation used by CDOT and has shown good performance in this area. The 75 gyration mix was chosen because the anticipated traffic loading.

Aggregates for HMA pavement should be of uniform quality, and composed of clean, hard, durable particles of crushed stone, gravel, or slag. Excess fine material should be wasted before crushing. The specified gradations for the above mixes are published in Tables 703-4 of the 2017 CDOT Standard Specifications for Road and Bridge Construction.

5.6 Pavement Subgrade Preparation

5.6.1 Subgrade Preparation

In areas of pavement removal or new alignment, it is recommended that the top 6 inches of the subgrade for the entire roadway width be scarified and recompacted in compliance with CDOT Standard Specifications. A minimum of 6 inches of Class 6 aggregate base course (ABC) should be placed and compacted prior to constructing the new pavement. On new fills, as

mentioned above, we recommend that the top two feet below the ABC meet the requirement for an R-value of 35.

5.6.2 Geotextile

We recommend that a separator geotextile Class 1 conforming to the requirements listed in Section 712.08 of the 2017 CDOT Standard Specifications for Road and Bridge Construction be placed between the subgrade and the ABC Class 6 in conformance with Section 420.07. The subgrade and ABC should be compacted in accordance with the requirements shown in Section 203.07 of the 2017 CDOT Standard Specifications for Road and Bridge Construction.

5.6.3 Proof Roll

The pavement subgrade should be proof rolled with a heavily loaded pneumatic-tire vehicle. Areas that deform more than 0.5 inch under heavy wheel loads should be removed, replaced if necessary, and reworked to achieve a stable subgrade prior to paving. We recommend that proof rolling and compaction tests be observed and documented by a representative of a registered Professional Engineer.

5.6.4 Corrosion Susceptibility

The concentration of soluble sulfate in the soils on this project ranged from 0.003 percent to 0.133 percent at depths between 1 and 19 feet, which represents a susceptibility to sulfate attack to concrete of CR 0 to CR 1 based on Table 601-2 of the 2017 CDOT Standard Specifications for Road and Bridge Construction. Concrete mixes in contact with soils on this project should meet the requirements for CR 1 in conformance with Section 601.04 of the CDOT Standard Specifications.

6.0 GROUNDWATER

Groundwater was encountered in three test holes during our investigation. Groundwater was indicated during drilling of test hole PW-11, west of the airport runway, at a depth of approximately 39 feet, or an elevation estimated at 5,871 feet. Measurements at time of drilling at A-1, on the west South Bridge abutment, and A-2, on the east South Bridge abutment side of the bridge, indicated groundwater at depths of approximately 57.0 feet and 34.2 feet below ground surface, respectively. Estimated elevations for these depths are between 5,826.3 and 5,845.1 feet, based on surface elevations provided by client. Slotted PVC standpipe piezometers were installed at these two locations. Subsequent measurements of the depth to groundwater were made on January 29, 2018 and April 9, 2018. Water levels were 56.9 feet and 57.3 feet for test hole A-1 on January 29 and April 9, 2018, respectively. Water levels were

34.2 feet and 36.4 feet for Test hole A-2 on January 29 and April 9, 2018, respectively. Water was not encountered in any other abutment, retaining wall, or pavement test holes.

Variations in groundwater conditions may occur seasonally. The magnitude of the variation will be largely dependent upon fluctuations in the adjacent Roaring Fork River water levels, the amount of spring snowmelt, duration and intensity of precipitation, site grading changes, and the surface and subsurface drainage characteristics of the surrounding area.

7.0 SITE GRADING

Based on conceptual plans provided by the client, the proposed roadway improvements, tunnel, bridge, underpass, and intersection construction will utilize existing right-of-way limits where feasible for new embankment fills. We understand that construction slopes are not known at this time. Typically fill slopes should be graded at 3:1 or flatter and cut slopes at 2:1 or flatter. Cut and fill slopes should be seeded soon after construction to reduce the potential for long term erosion. Establishing vegetation on slopes steeper than 3:1 may require temporary stabilization for erosion control. Existing slopes should be benched prior to placing new fill per Section 203.06.

Based on our investigation, we don't anticipate groundwater to be encountered during grading for the proposed construction. Groundwater may be encountered in deep foundation excavations such as at the South Bridge.

All areas requiring fill should be stripped of vegetation, organic soils, debris, asphalt and existing road base. Topsoil is not recommended for fill material. We recommend that imported fill material consist of Colorado Department of Transportation (CDOT) Class 1 structural fill, or equivalent. On-site granular soils of an R-value of 35 or greater appear suitable for construction of embankments. If onsite soils are used in fills, we recommend the material be screened to a maximum particle size of 6 inches. Fill should be placed in thin, loose lifts of 8 inches thick or less. We recommend fill materials be placed in accordance with the CDOT Standard Specifications for Road and Bridge Construction, 2017 edition. Placement and compaction of fill should be observed and tested by a representative of the geotechnical engineer. Surface water should be directed away from the crest of slopes. The slopes should be protected from erosion by revegetation or other means.

8.0 PRELIMINARY FOUNDATION RECOMMENDATIONS

The conceptual plans for the South Bridge Project include three major structures, their associated retaining walls, and several minor structures. Major structures are the proposed tunnel under the Glenwood Springs Airport runway, the proposed South Bridge over the Roaring Fork River and the proposed underpass for the connector road at SH 82. Retaining wall design was still conceptual at the time of this report. Minor anticipated structures consist of drainage structures such as concrete box culverts, culvert headwalls, and street lights or stoplights. The preliminary foundation recommendations contained herein generally comply with AASHTO LRFD (Load Resistance Factor Design) 8th Edition (2017).

In general, subsurface conditions for the airport tunnel and South Bridge foundation elements consisted of a thick layer of very dense alluvial gravels, cobbles and boulders overlying evaporite bedrock. Spread footing foundations bearing on native, very dense granular material may be appropriate for the airport tunnel and South Bridge abutment foundations. Nominal bearing resistance in the gravel is expected to exceed 20 kips per square foot (ksf) and can be determined after the preliminary bridge foundation design has been provided. Suitability of shallow foundations for bridge abutments is dependent on the anticipated depth of scour for design which was not incorporated in our study at this time. Deep foundation systems may be required to mitigate scour potential. Deep foundation types may include driven piles in pre-drilled holes or micropiles that are supported primarily by side friction in the dense gravels. Drilled shafts will be difficult to construct at abutment locations because of the presence of large cobbles and boulders in the alluvial gravel deposits. Recommendations for deep foundation systems can be provided upon request following additional subsurface exploration at the proposed bridge abutment and pier locations. Estimated elevations to native dense gravels in the area of proposed major structures can be found in Table 10. Eagle Valley Evaporite bedrock was encountered in test holes PW-11, PW-14 and A-1, located west of the Roaring Fork River. The depth to bedrock in the borings was highly variable with an overall trend for increased depth as test hole locations progressed toward the east as shown in Table 10 and in Appendix C. Based on the subsurface data, proposed pier foundations may encounter bedrock which may not be suitable for shallow foundations due to the potential for dissolution and the occurrence of solution cavities in the evaporites at depth. The potential for dissolution and the location of solution cavities is difficult to predict from widely scattered exploratory borings. We highly

recommend that an additional geotechnical investigation that follows AASHTO guidelines be performed for pier locations prior to finalizing foundation recommendations.

Subgrade soils along the State Highway 82 corridor consisted of colluvial soils prone to settlement. We recommend retaining wall and underpass structures bear on a deep foundation system penetrating colluvial material and bearing a minimum of 10 feet into the deeper dense gravel layer. Deep foundation systems may consist of driven piles, drilled shafts or micropiles. Boulders or large cobbles were encountered in the overburden materials and predrilling at pile locations may be necessary. If a driven pile foundation is selected, a larger section such as an HP 12X74 should be used in order to facilitate installation. Additional test holes will be required depending on final wall locations. Recommendations for deep foundation systems will be provided after our final geotechnical investigation.

Prior to any additional subsurface investigation, the preliminary designs for the proposed roadway, tunnel, bridge, and underpass should be provided. For bridge, tunnel, or underpass widths greater than 100 feet, additional test holes may be required at each abutment to meet AASHTO requirements.

Table 10 – Approximate Elevation to Native Dense Gravel and Bedrock at Major Structure Areas

Location	Test Hole Number	Approximate Elevation to Native Dense Gravel (feet)	Approximate Elevation to Bedrock (feet)
Airport Tunnel West Abutment	PW-11	5,896	5,868
Airport Tunnel East Abutment	PW-14	5,895	5,840
South Bridge West Abutment	A-1	5,883	5,837
South Bridge East Abutment	A-2	5,879	Not encountered
State Highway 82 West Abutment	A-3	5,888	Not encountered
State Highway 82 East Abutment	A-4	5,884	Not encountered

8.1 Lateral Earth Pressure

Bridge retaining/wing walls should be designed to resist lateral earth pressure. We recommend all retaining/wing walls be backfilled with CDOT Class 1 Structure Backfill. Walls can be designed using an equivalent fluid density of 38 pounds per cubic foot (pcf) for active or 60 pcf for at rest conditions for Class 1 Structure Backfill. This equivalent fluid density assumes a horizontal slope above the wall and without any surcharge loads. This value also assumes that

the backfill materials are not saturated. Wall designs should consider the influence of surcharge loading such as: bridge shallow foundations, traffic, construction equipment, and/or sloping backfill.

Retaining walls should be constructed with a drainage system to drain away any excess water immediately behind the wall. Drainage systems such as free-draining gravel, pipes, drain board and/or weep holes are commonly used for the wall drainage.

9.0 PRELIMINARY RETAINING WALL OPTIONS

Based on our preliminary study, it appears the following retaining wall types are feasible:

- Mechanically stabilized earth (MSE)
- Cast-in-place (CIP)
- Caisson wall
- Soil Nail
- Anchored (i.e. ground anchor or tieback)

All retaining walls should be checked for global stability once the design is final. Additional test holes will likely be required to meet AASHTO requirements for subsurface investigation at wall locations. Prior to additional geotechnical investigation, final retaining wall locations should be provided. Design recommendations for retaining walls will be provided in our final geotechnical report after our subsequent study.

10.0 SEISMIC CONSIDERATIONS

No current active faults are known to exist in the immediate vicinity of the proposed structures that include South Bridge, airport tunnel, State Highway 82 underpass and retaining walls. Minor earthquakes of magnitude 3.8, 4.0 and 3.8 were reported in the Glenwood Springs area in January 1971, August 2001, and February 2006, respectively. Based on information from the US Geological Survey and the Colorado Geological Survey, these were not considered to be damaging earthquakes. The three sites in the project area can be classified as Site Class C, based on the recommendations in Table 3.10.3.1-1 of AASHTO (2017). Based on the recommendations in Table 3.10.6-1 of AASHTO (2017), the project area can be classified as a Seismic Zone 1.

The peak ground acceleration (PGA) and the short- and long- period spectral acceleration coefficients (Ss and S1, respectively) for a Site Class B (reference site class) were determined using the seismic design maps from the USGS website. The seismic design parameters for a Site Class B, and Site Class C are shown in Tables 11 and 12 below. Bridge and tunnel structures in the project area are within a 1,000 foot radius of latitude 39.50213° and longitude -107.30514°.

Table 11 – Seismic Design Parameters for Site Class B

PGA (0.0 sec)	S_S (0.2 sec)	S_1 (1.0 sec)
0.107 g	0.203 g	0.044 g

Table 12 – Seismic Design Parameters for Site Class C

A_S (0.0 sec)	S_{DS} (0.2 sec)	S_{D1} (1.0 sec)
0.129 g	0.243 g	0.075 g

11.0 RECOMMENDATIONS FOR ADDITIONAL STUDY

As previously stated, we recommend additional test holes be performed based on further design of structures and roadways. Bridge, tunnel, and underpass widths may require additional test holes at each abutment. A valley profile of subsurface conditions and preliminary engineering geology sheets can be found in Appendix C. At the project site, bedrock encountered west of the Roaring Fork River appears to deepen from west to east, and was not encountered east of the river to the depth drilled in this investigation. We recommend that bridge pier locations for the proposed South Bridge be drilled to evaluate bearing conditions, and the depth to and quality of the bedrock.

Additional investigation will likely be required when retaining wall locations are finalized. Our preliminary investigation encountered hydrocompressive soils with settlement potential of up to 4.4 percent in the State Highway 82 proposed intersection/underpass area. We recommend additional test holes be drilled when retaining wall locations are identified to further evaluate potential settlement from hydrocompressive soils.

12.0 LIMITATIONS

This study was conducted in accordance with generally accepted geotechnical engineering practices in this area for use by the client for preliminary design purposes. We understand a final investigation will be required prior to final recommendations and construction. The

preliminary conclusions and recommendations submitted in this report are based upon the data obtained from widely spaced exploratory test holes, field reconnaissance and anticipated construction. The nature and extent of subsurface variations across the site may not become evident until excavation is performed. If during construction, conditions appear to be different from those described herein; this office should be advised at once so re-evaluation of the recommendations may be made. We recommend final cut and fill slope designs be reviewed by Yeh and Associates prior to construction. We recommend on-site observation of excavations by a representative of the geotechnical engineer.

The scope of services for this project did not include, specifically or by implication, any design, environmental or biological (e.g., mold, fungi, and bacteria) assessment of the site or identification or prevention of pollutants, or conditions or biological conditions. If the owner is concerned about the potential for such contamination, conditions or pollution, other studies should be undertaken.

The report was prepared in substantial accordance with the generally accepted standards of practice for geotechnical engineering as exist in the site area at the time of our investigation. No warranties, express or implied, are intended or made.

13.0 REFERENCES

AASHTO, 2017. AASHTO Load-Resistance Factor Design (LRFD) Bridge Design Specifications, Eighth Edition. Washington, DC: American Association of State Highway and Transportation Officials, 2017.

Colorado Department of Transportation, 2017. CDOT Standard Specifications for Road and Bridge Construction, 8th Edition.

Colorado Geological Survey, Earthquake and Late Cenozoic Fault and Fold Map Server accessed on March 21, 2018 at http://dnrwebmapgdev.state.co.us/CGSOnline/

Denver Channel 7 News, August 10, 2001, Earthquake hits Glenwood Springs area, accessed on March 21, 2018 at https://www.thedenverchannel.com/news/earthquake-hits-glenwood-springs-area

Garfield County Geographic Information Systems, Soil Hazard Profile, Study Areas 1,2, & 3,Garfield County, Colorado, revised 2002

Garfield County Geographic Information Systems, Slope Hazard Profile, Study Areas 1,2, & 3,Garfield County, Colorado, revised 2002

Kirkham, R.M., Streufert, R.K., and Cappa, J.A., et al, 2009. Geologic Map of the Glenwood Springs Quadrangle, Garfield County, Colorado, Colorado Geological Survey, CGS MS 38.

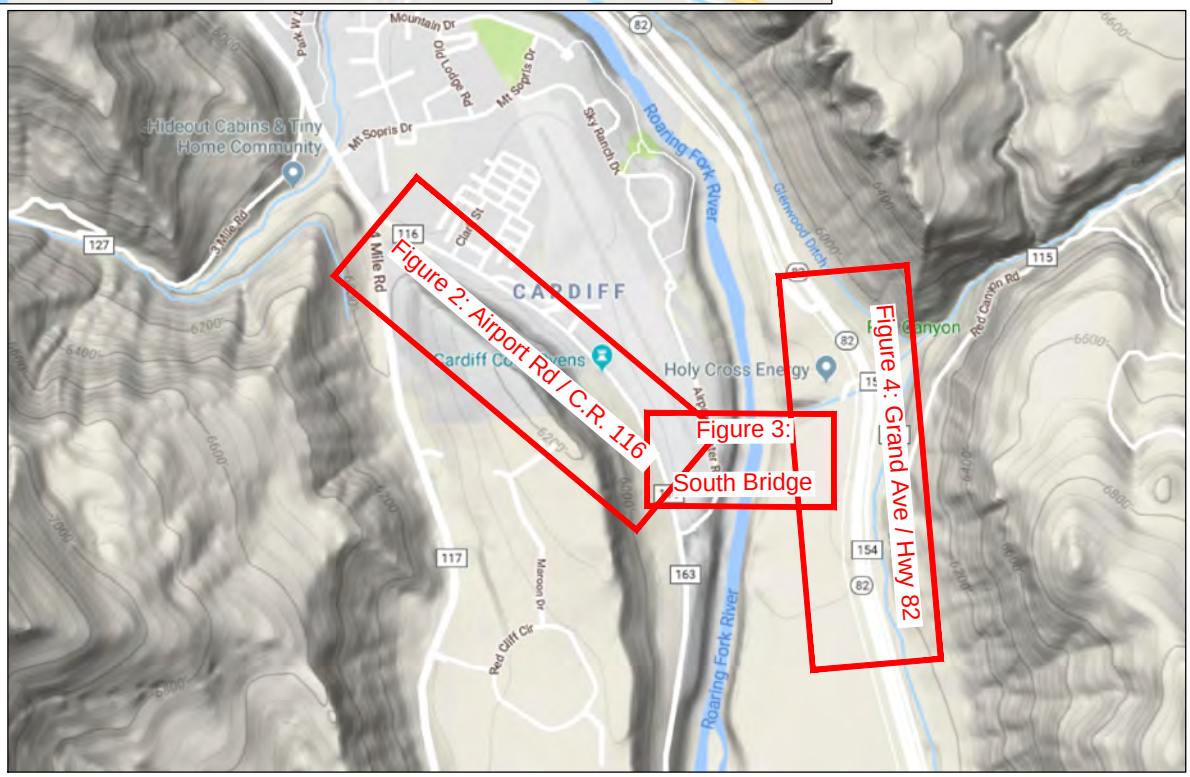
Kirkham, R.M., Scott, R.B., and Judkins, T.W. 2002. Late Cenozoic Evaporite Tectonism and Volcanism in West Central Colorado, Geological Society of America, Special Paper 366.

Lincoln-Devore. 1978. Geologic Hazards of the Glenwood Springs Metropolitan Area-Garfield County, Colorado. Colorado Geological Survey, Department of Natural Resources Open File Report 78-10.

Post Independent, February 10, 2006 Minor quake shakes things up in Garfield County, accessed on March 21, 2018 at https://www.postindependent.com/news/minor-quake-shakes-things-up-in-garfield-county/

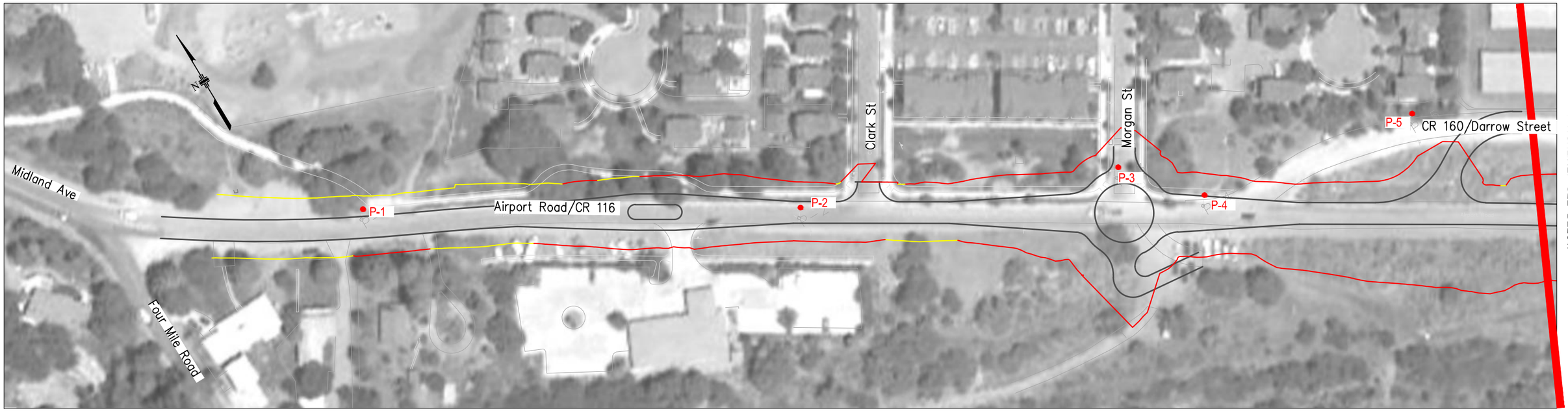
White, J.L., 2002, Collapsible Soils and Evaporite Karst Hazards of the Roaring Fork River Corridor, Garfield, Eagle, and Pitkin Counties, Colorado. Colorado Geological Survey, Department of Natural Resources MS-34.

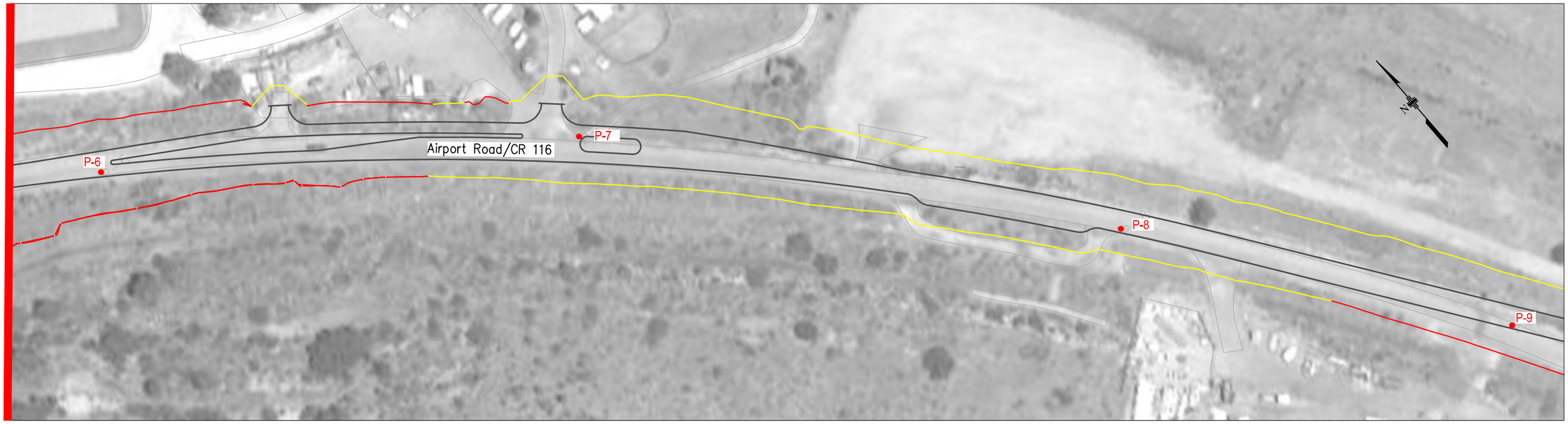




N

Yeh and Associates, Inc. Consulting Engineers & Scientists	DRAWN BY: JRM DATE: 03/05/2018 CHECKED BY: SWR DATE: 03/05/2018 DESIGNED FOR: City of Glenwood Springs PROJECT NUMBER: 216-417 NOT TO SCALE Base maps acquired from maps.google.com and USGS Maps at ngmdb.usgs.gov/img4/ht_icons/Browse/CO/CO_Glenwood_Springs_1963_250000.jpg	PROJECT: South Bridge Glenwood Springs, Colorado **Site Location Map**	FIGURE 1





NOTES:

Base map topography and test hole locations were surveyed and provided by Jacobs Engineering Group.

Base image captured from Google Earth 03/05/2018.

LEGEND

- P-1 — Indicates approximate location of pavement test hole
- Indicates edge of proposed roadway
- Indicates top of cut
- Indicates toe of fill

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Consulting Engineers & Scientists

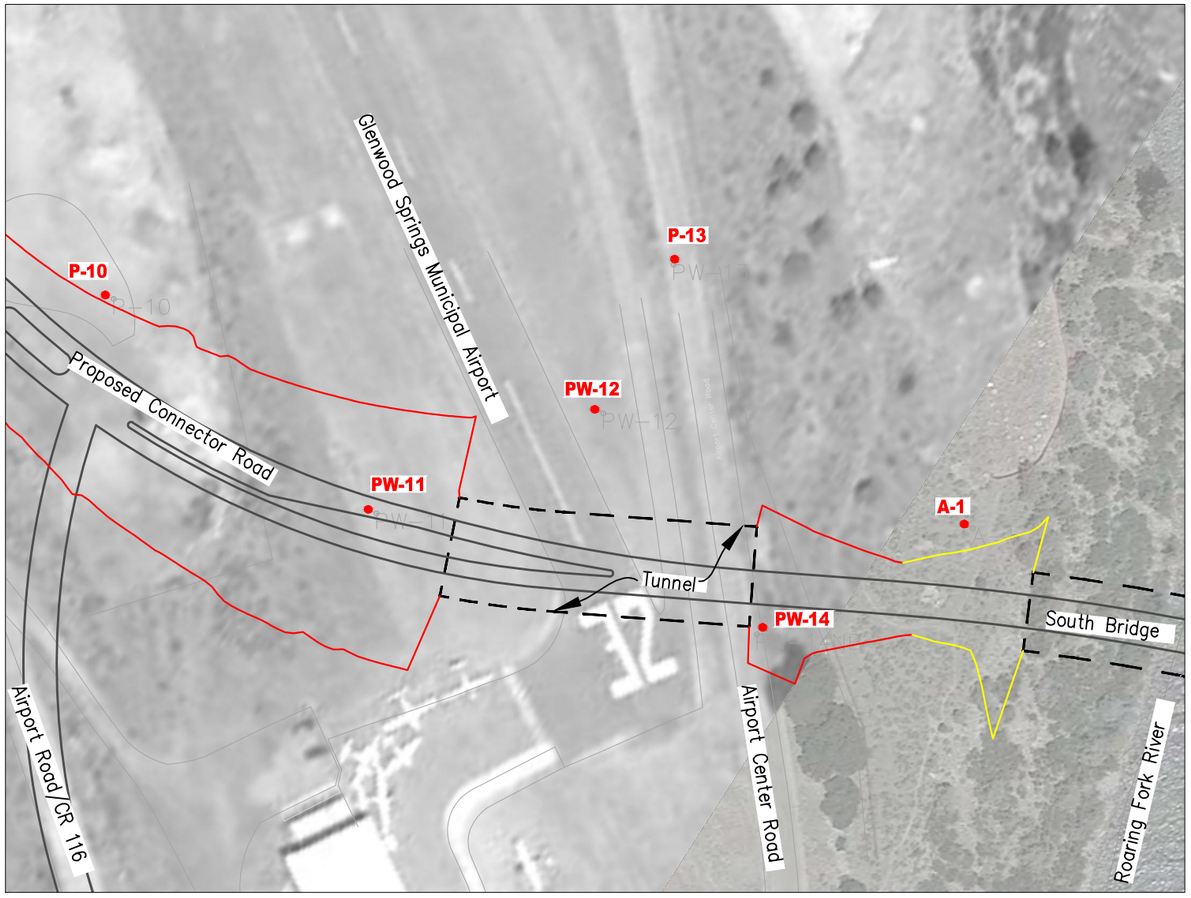
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CHECKED BY: SWR	DATE: 03/14/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
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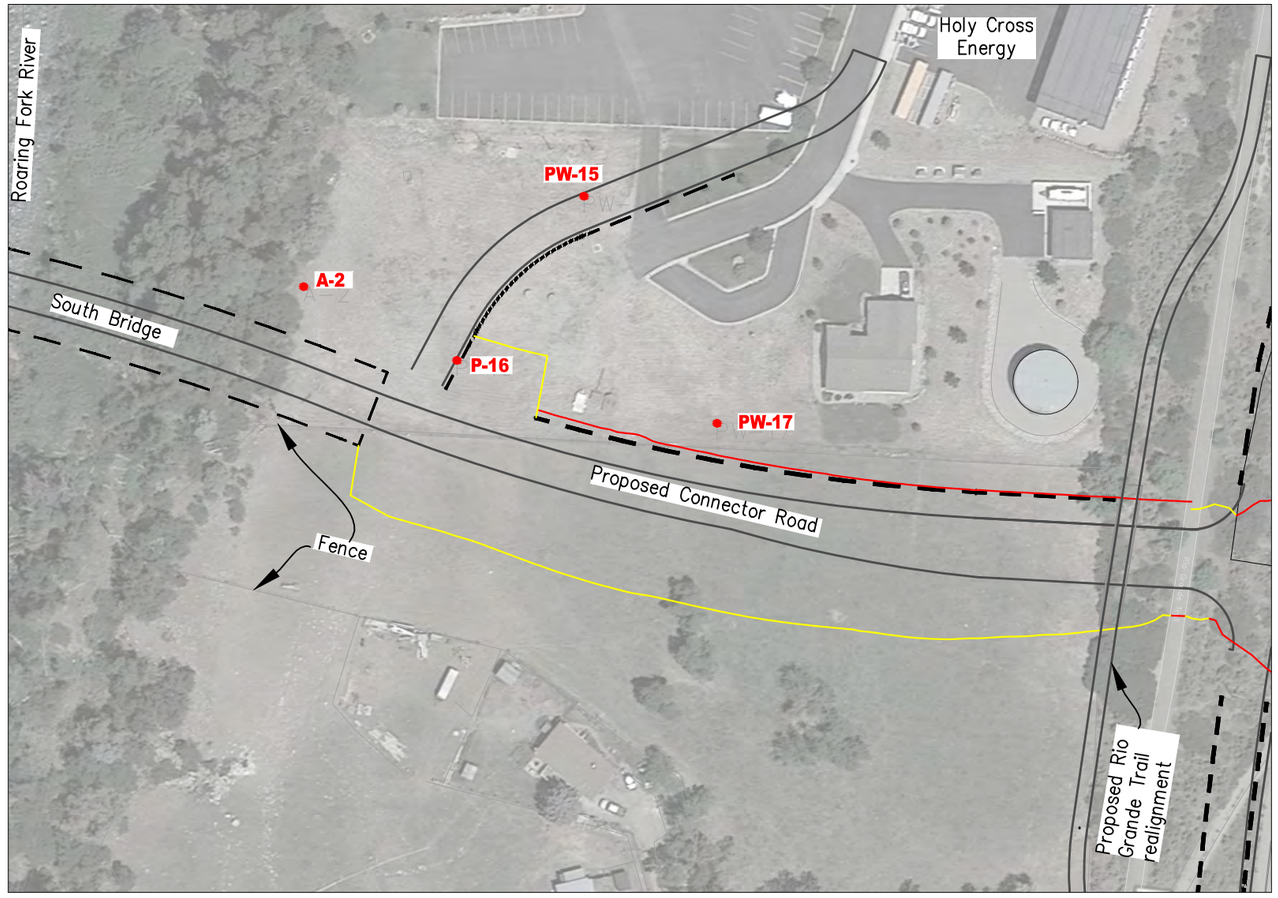
0 50 100 200

PROJECT: Draft South Bridge
Glenwood Springs, Colorado

Approximate Test Hole Location Map
Airport Road / C.R. 116

FIGURE 2





LEGEND

P-10	Indicates approximate location of pavement test hole
PW-11	Indicates approximate location of pavement/wall test hole
A-1	Indicates approximate location of abutment test hole
	Indicates edge of proposed roadway
	Indicates top of cut
	Indicates toe of fill
	Proposed structure

N

NOTES:

Base map topography and test hole locations were surveyed and provided by Jacobs Engineering Group.

Base image captured from Google Earth 03/05/2018.

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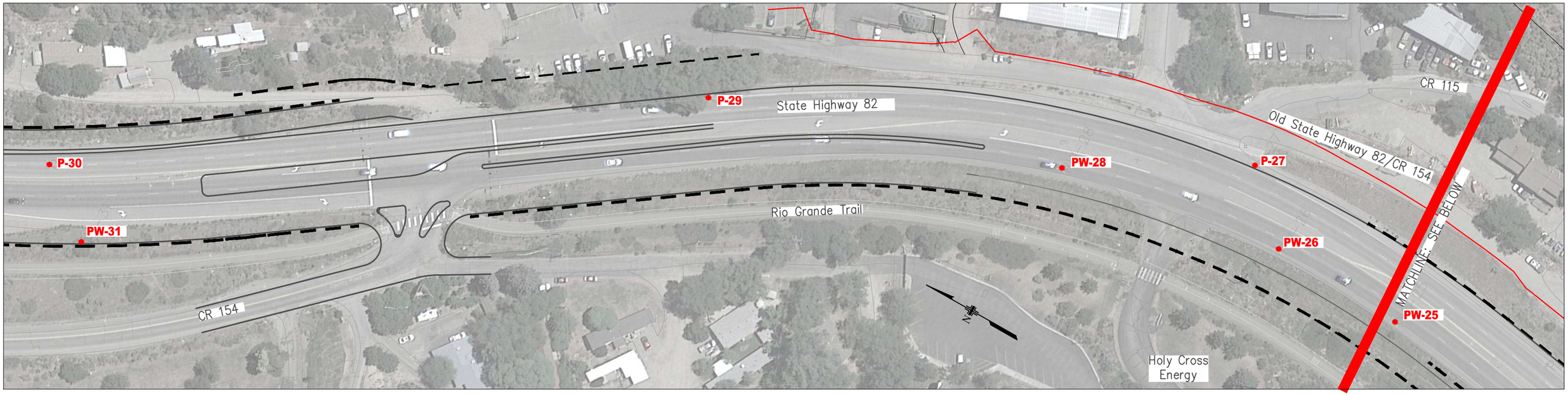
DRAWN BY: JRM/SW	DATE: 04/09/2018
CHECKED BY: SWR	DATE: 04/09/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
SCALE: 1"=100'	

0 50 100 200

PROJECT: Draft South Bridge
Glenwood Springs, Colorado

Approximate Test Hole Location Map
Airport Tunnel & South Bridge Site

FIGURE 3





NOTES:

Base map topography and test hole locations were surveyed and provided by Jacobs Engineering Group.

Base image captured from Google Earth 03/05/2018.

LEGEND

● P-27	Indicates approximate location of pavement test hole
● PW-18	Indicates approximate location of pavement/wall test hole
● W-32	Indicates approximate location of wall test hole
● A-3	Indicates approximate location of abutment test hole

	Indicates edge of proposed roadway
	Indicates top of cut
	Indicates toe of fill
– – –	Proposed structure

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DRAWN BY: JRM/SW	DATE: 04/17/2018
CHECKED BY: SWR	DATE: 04/17/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
SCALE: 1"=100'	

0 50 100 200

PROJECT: Draft South Bridge
Glenwood Springs, Colorado

Approximate Test Hole Location Map State Highway 82

FIGURE 4

APPENDIX A

Test Hole Logs and Legend

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **A-1**

Boring Began: 11/13/2017
Boring Completed: 11/13/2017
Drilling Method(s): ODEX
Driller: HRL Compliance Solutions
Drill Rig: CME 55 Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 83.0 ft
Ground Elevation: 5883.3 ft
Coordinates: N: 1.0 E: 35.0
Location: ~200 ft NE of SE end runway
Logged By: K. Dye
Final By: S. White

Weather Notes: Clear
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels:			
Symbol	▽	▼	▼
Depth	57.0 ft	56.9 ft	57.3 ft
Date	11/13/17	1/29/18	4/9/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.3 ft. (topsoil).									
						0.3 - 46.0 ft. GRAVEL with silt to silty, occasionally clayey, with sand and cobbles, gray to tan, no to low plasticity, damp, very dense, possible boulders.									
5880			50 for 3 in.	50 for 3 in.											
	5														
5875			32-29-29	58			0.6		59	31	10	NV	NP	A-1-a (0) GP-GM	
	10														
5870			44/48/50 for 4 in.	44/48/50 for 4 in.											**12.0 ft** - Split spoon bent during sampling in very dense gravels.
	15														
5865			35-28-29	57											
	20														
5860															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5855	30		27/50 for 5 in.	27/50 for 5 in.		**0.3 - 46.0 ft. GRAVEL** with silt to silty, occasionally clayey, with sand and cobbles, gray to tan, no to low plasticity, damp, very dense, possible boulders.									pH=8.7 S=0.006% Chl=0.0005% Re=9200ohm·cm
5850			16-41-50	91											
5845	35		25 for 3 in.-bounce	25 for 3 in.-bounce											
5840	40		25 for 3 in.-bounce	25 for 3 in.-bounce											
5835	45					**46.0 - 62.5 ft. WEATHERED EVAPORITE/SHALE**, white to light gray, decomposed, residuum.									
5830	50		3-1	4			18.4	105.0				24	5		pH=7.7 S=1.301% Chl=0.0056% Re=913ohm·cm **52.0 ft** - At depths of 52 to 57 feet, no rotation on drill.
	55														

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5825	60														**56.0 ft** - At depths of 56 to 59 feet, very loose drilling and no return on cuttings. **57.0 ft** - Water noted at 57 feet during drilling.
			31/50 for 3 in.	31/50 for 3 in.			14.5					22	4		**62.0 ft** - PVC standpipe piezometer installed from 62 feet deep to surface. Grout cement and locking cap at surface.
5820	65					**62.5 - 83.0 ft. EVAPORITE/SHALE**, white and dark gray, very hard.									
5815	70														
			100 for 5 in.	100 for 5 in.			8.4	115.0				23	4		
5810	75														
5805	80														
			50 for 1 in.	50 for 1 in.											
5800						Bottom of Hole at 83.0 ft.									**83.0 ft** - Test hole backfilled with ODEX cuttings between depths of 62 to 83 feet.

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **A-2**

Boring Began: 1/8/2018
Boring Completed: 1/26/2018
Drilling Method(s): ODEX
Driller: DA Smith and Authentic
Drill Rig: Simco 9100 and CME 750X Buggy
Hammer Type: Automatic (hydraulic)

Total Depth: 103.0 ft
Ground Elevation: 5879.3 ft
Coordinates: N: 1.0 E: 36.0
Location: ~300 ft SW of Holy Cross Energy maintenance bldg
Logged By: K. Dye
Final By: S. White

Weather Notes: P. cloudy
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels:			
Symbol	▽	▼	▼
Depth	34.2 ft	34.2 ft	36.4 ft
Date	1/26/18	1/29/18	4/9/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.5 ft. (topsoil).									**0.0 ft** - Driller DA Smith injecting water into air system in attempt to reduce friction in very dense gravels.
						0.5 - 52.0 ft. GRAVEL with silt, sand, cobbles and boulders, brown, damp to moist, dense to very dense.									
5875	5		50 for 6 in.	50 for 6 in.			3.9		70	26	4	NV	NP	A-1-a (0) GW	
5870	10		25 for 2 in.-bounce	25 for 2 in.-bounce											
5865	15		25 for 4 in.-bounce	25 for 4 in.-bounce											
5860	20		42/30 for 2 in.-bounce	42/30 for 2 in.-bounce											pH=7.5 S=0.003% Chl=0.0003% Re=7812ohm·cm
			50 for 6 in.	50 for 6 in.			2.8		75	21	4	NV	NP	A-1-a (0) GP	
5855															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5850	30		50 for 4 in.	50 for 4 in.		**0.5 - 52.0 ft. GRAVEL** with silt, sand, cobbles and boulders, brown, damp to moist, dense to very dense.									
5845	35		19-20-14	34			4.5		51	41	8	NV	NP	A-1-a (0) GP-GM	
5840	40														
5835	45														
5830	50		50 for 5 in.	50 for 5 in.											
5825	55					**52.0 - 68.0 ft. clayey SAND** with gravel, cobbles and boulders, light brown to red-brown, wet.									**52.0 ft** - Dense sand upwelling into casing. Difficult drilling conditions. **53.0 ft** - PVC standpipe piezometer installed from 53 feet deep to

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
						52.0 - 68.0 ft. clayey SAND with gravel, cobbles and boulders, light brown to red-brown, wet.									surface. Grout cement and locking cap at surface.
5820	60														
5815	65														
5810	70		30/25 for 1 in.-bounce 37/49/50 for 4 in.	30/25 for 1 in.-bounce 37/49/50 for 4 in.		**68.0 - 95.0 ft. GRAVEL** with silt, sand, cobbles and boulders, red-brown to dark red-brown, moist to wet, very dense, micaceous; occasional sand lenses.	23.7		16	35	49	25	10	A-4 (2) SC	pH=7.7 S=0.003% Chl=0.0004% Re=4769ohm·cm **70.0 ft** - ODEX refusal during first drilling attempt with DA Smith Drilling using ODEX and added water.
5805	75														
5800	80		58 for 6 in.	58 for 6 in.			10.5		41	42	17	NV	NP	A-1-b (0) SM	
5795	85														

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5790	90		60 for 5 in.	60 for 5 in.		**68.0 - 95.0 ft. GRAVEL** with silt, sand, cobbles and boulders, red-brown to dark red-brown, moist to wet, very dense, micaceous; occasional sand lenses.	12.8		37	52	11	NV	NP	A-1-b (0) SP-SM	
5785	95					**95.0 - 103.0 ft. GRAVEL** with silt, sand to sandy and with cobbles and boulders, tan to light brown, wet, very dense, occasional sand lenses.									
5780	100		50/50 for 2 in.	50/50 for 2 in.			11.8		23	59	18	NV	NP	A-2-4 (0) SM	
5775						Bottom of Hole at 103.0 ft.									**103.0 ft** - Bottom of hole with second drilling attempt with Authentic Drilling using ODEX and no added water. Test hole backfilled with ODEX cuttings to 53 feet.
5770															
5765															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **A-3**

Boring Began: 11/2/2017
Boring Completed: 11/2/2017
Drilling Method(s): ODEX
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 64.0 ft
Ground Elevation: 5927.0 ft
Coordinates: N: 1.0 E: 37.0
Location: West side SH82 ~870 ft south CR 115
Logged By: S. White/K. Dye
Final By: S. White

Weather Notes: Clear, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.6 ft. 7 inches, (asphalt).									
						0.6 - 2.0 ft. brown, 17 inches, (road base).									
5925						**2.0 - 39.5 ft. clayey GRAVEL** silty with sand, red-brown, low plasticity, damp, medium dense to dense, micaceous.									
	5		12-10-8	18											
5920															
			11-9	20			4.1	111.0	45	25	30	23	6	A-2-4 (0) GC-GM	pH=8 S=0.007% Chl=0.0033% S/C=-1.3% Re=2651ohm·cm
	10														
5915															
	15		7-7-8	15											**14.0 ft** - No recovery in sampler.
5910															
	20		8-8-7	15											
5905															
			11-15	26			6.1	106.0	36	26	38	20	4	A-4 (0) GC-GM	pH=8.3 S=0.007%

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5900						**2.0 - 39.5 ft. clayey GRAVEL** silty with sand, red-brown, low plasticity, damp, medium dense to dense, micaceous.									Chl=0.0008% S/C=-4.4% Re=2959ohm·cm
	30		10-10-6	16											
5895															
	35														
5890															
			12-38	50			10.6 4.2	110.0	42 56	18 28	40 16	27 NV	11 NP	A-6 (1) GC A-1-b (0) GM	
	40		50 for 5 in.	50 for 5 in.		**39.5 - 64.0 ft. silty GRAVEL** with sand, cobbles and boulders, light brown, no plasticity, damp, very dense.									pH=8.7 S=0.003% Chl=0.0008% Re=6046ohm·cm **42.0 ft** - Harder drilling.
5885															
	45														
5880															
			25/50 for 2 in.	25/50 for 2 in.											
	50														
5875															
	55														

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5870						**39.5 - 64.0 ft. silty GRAVEL** with sand, cobbles and boulders, light brown, no plasticity, damp, very dense.									
	60		13/50 for 6 in.	13/50 for 6 in.											**59.0 ft** - No recovery in sampler.
5865															
						Bottom of Hole at 64.0 ft.									**64.0 ft** - ODEX refusal. Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5860															
5855															
5850															
5845															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **A-4**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): ODEX
Driller: HRL Compliance Solutions
Drill Rig: CME 55 Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 72.5 ft
Ground Elevation: 5924.4 ft
Coordinates: N: 1.0 E: 38.0
Location: East side SH82 ~860 ft south CR 115
Logged By: K. Dye
Final By: S. White

Weather Notes: Clear, calm
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels:			
Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.6 ft. 7 inches, (asphalt).									
						0.6 - 1.2 ft. 7 inches, (road base).									
			14-11-9	20		**1.2 - 7.0 ft. clayey GRAVEL** with silt, sand, and occasional cobbles and boulders, red-brown, low plasticity, damp, medium dense, occasional sand lenses.									
5920	5														**5.5 ft** - to 7.0 ft-more dense drilling
			5-4-5	9		**7.0 - 14.0 ft. clayey SAND** silty with gravel, red-brown, low plasticity, damp, loose.	7.4		19	38	43	21	4	A-4 (0) SC-SM	pH=7.8 S=0.017% Chl=0.0066% Re=1986ohm·cm
5915	10														
			4-4-8	12											
5910	15					**14.0 - 40.0 ft. clayey GRAVEL** with silt, sand, and occasional cobbles and boulders, red-brown, low plasticity, damp, loose to medium dense, occasional sand lenses.									**14.0 ft** - to 17 ft-more dense drilling
			15-14-10	24											
5905	20														
			8-7	15			4.0	116.0	50	29	21	22	4	A-1-b (0) GC-GM	
5900															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						14.0 - 40.0 ft. clayey GRAVEL with silt, sand, and occasional cobbles and boulders, red-brown, low plasticity, damp, loose to medium dense, occasional sand lenses.									
			7-11	18			9.7	118.0	39	25	36	24	8	A-4 (0) GC	
5895	30														
			8-4-4	8											
5890	35														
5885	40					**40.0 - 72.5 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown, no plasticity, damp to wet, very dense.									
			45-37-17	54			1.8		60	30	10	NV	NP	A-1-a (0) GW-GM	
5880	45														
5875	50														
			40 for 3 in.-bounce	40 for 3 in.-bounce											
5870	55														

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5865	60					**40.0 - 72.5 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown, no plasticity, damp to wet, very dense.									
			43 for 4 in.-bounce	43 for 4 in.-bounce											
5860	65														
5855	70														
			50 for 6 in.	50 for 6 in.			8.2		53	36	11	NV	NP	A-1-a (0) GP-GM	**72.0 ft** - Moist to wet granular soils noted.
						Bottom of Hole at 72.5 ft.									**72.5 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5850															
5845															
5840															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-01**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 8.5 ft
Ground Elevation: 5916.6 ft
Coordinates: N: 1.0 E: 1.0
Location: CR 116 SE of CR 117
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5915						**0.0 - 0.2 ft.** 2 inches, (asphalt).									
						0.2 - 0.5 ft. 4 inches, (road base).									
			7-5-4	9		**0.5 - 4.5 ft. CLAY** with sand, brown to black, low plasticity, damp to moist, stiff, porcelain fragments, black gravel, debris, (fill).	13.8		2	19	79	27	11	A-6 (7) CL	
	5		5-5	10		**4.5 - 8.5 ft. sandy CLAY**, brown, moist, stiff.	12.9	101.0	0	22	78	27	11	A-6 (6) CL	S/C=-0.3%
5910			4-3-3	6											
5905						Bottom of Hole at 8.5 ft.									**8.5 ft** - Test hole backfilled with auger cuttings; asphalt patch at surface approximately 6 inches thick.
5900															
5895															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-02**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 8.0 ft
Ground Elevation: 5919.0 ft
Coordinates: N: 1.0 E: 2.0
Location: CR 116 NW of Clark St
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.3 ft. 4 inches, (asphalt).									
			28-21-9	30		**0.3 - 2.0 ft. silty SAND** with gravel, brown, no plasticity, damp, medium dense to dense, 20 inches, (road base).	6.8		40	46	14	NV	NP	A-1-b (0) SM	
						2.0 - 3.0 ft. silty SAND with gravel, black, no plasticity, damp, medium dense to dense, possible coke oven waste rock, (fill).	2.5		40	42	18	NV	NP	A-1-b (0) SM	R-Value=72 pH=7.5 S=0.005% Chl=0.0216% Re=887ohm·cm S/C=0%
			2-1-3	4											
5915			2-3	5		**3.0 - 8.0 ft. CLAY** with sand, brown to red-brown, low to medium plasticity, damp to moist, medium stiff.	21.7	100.0	0	16	84	31	15	A-6 (11) CL	
	5														
			3-4	7											
						Bottom of Hole at 8.0 ft.									**8.0 ft** - Test hole backfilled with auger cuttings; asphalt patch at surface to match existing.
5910															
5905															
5900															
5895															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-03**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 4.4 ft
Ground Elevation: 5921.3 ft
Coordinates: N: 1.0 E: 3.0
Location: Morgan St NE of CR 116
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5920	0					**0.0 - 0.3 ft.** 4 inches, (asphalt).									
			29-39-25	64		**0.3 - 1.3 ft. silty SAND** with gravel, no plasticity, damp, dense to very dense, 11 inches, (road base).	5.1		32	49	19	NV	NP	A-1-b (0) SM	
			11-21	32		**1.3 - 3.5 ft. clayey GRAVEL** with sand, medium plasticity, damp, medium dense, debris in fill, (fill).	7.1	118.0	56	27	17	35	21	A-2-6 (0) GC	
			50 for 5 in.	50 for 5 in.		**3.5 - 4.4 ft. silty GRAVEL** with sand, occasional cobbles and boulders, no plasticity, damp, very dense.	4.1		44	42	14	NV	NP	A-1-a (0) GM	**4.4 ft** - Auger refusal. Test hole backfilled with auger cuttings; asphalt patch at surface to match existing.
5915						Bottom of Hole at 4.4 ft.									
5910															
5905															
5900															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-04**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 5.0 ft
Ground Elevation: 5922.8 ft
Coordinates: N: 1.0 E: 4.0
Location: CR 116 ~85 ft ESE of Morgan St
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.4 ft. 5 inches, (asphalt).									
						0.4 - 1.0 ft. 7 inches, (road base).									
			8-6-7	13		**1.0 - 1.5 ft. clayey SAND** silty with gravel, black, low plasticity, damp to moist, medium dense, possible coke oven waste rock, (fill).	11.2 15.7		16 1	48 17	36 82	27 31	7 17	A-4 (0) SC-SM A-6 (12) CL	
5920						**1.5 - 3.0 ft. CLAY** with sand, medium plasticity, moist, stiff.									
						3.0 - 5.0 ft. silty GRAVEL with sand, cobbles and boulders, no plasticity, damp to moist, very dense.									
	5					Bottom of Hole at 5.0 ft.									**5.0 ft** - Auger refusal. Test hole backfilled with auger cuttings; asphalt patch at surface to match existing.
5915															
5910															
5905															
5900															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-05**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 2.0 ft
Ground Elevation: 5925.4 ft
Coordinates: N: 1.0 E: 5.0
Location: Darrow St ~200 ft ENE of CR 116
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5925	0					**0.0 - 0.7 ft.** 8 inches, (road base).									
			28/12 for 1 inch/bounce	28/12 for 1 inch/bounce		**0.7 - 1.5 ft. silty GRAVEL** with sand, black, no plasticity, damp, dense, possible coke oven waste rock, (fill).	5.0		51	30	19	NV	NP	A-1-b (0) GM	pH=7.3 S=0.01% Chl=0.0849% Re=587ohm·cm
						1.5 - 2.0 ft. silty GRAVEL with sand, occasional cobbles and boulders, no plasticity, damp, very dense.									
						Bottom of Hole at 2.0 ft.									**2.0 ft** - Auger refusal. Test hole backfilled with auger cuttings.
5920															
5915															
5910															
5905															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-06**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 3.0 ft
Ground Elevation: 5925.1 ft
Coordinates: N: 1.0 E: 6.0
Location: CR 116 ~500 ft SE P-4
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.6 ft. 7 inches, (asphalt).									
						0.6 - 1.0 ft. silty SAND with gravel, no to low plasticity, damp, 5 inches, (road base).	3.0		38	48	14	20	3	A-1-a (0) SM	
			50 for 5 in.	50 for 5 in.		**1.0 - 2.0 ft. silty SAND** with gravel, black, damp, possible coke oven waste rock, (fill).	14.1		13	30	57	28	14	A-6 (5) CL	
						2.0 - 2.4 ft. sandy CLAY, brown, low plasticity, moist.									
						2.4 - 3.0 ft. silty GRAVEL with sand, occasional cobbles and boulders, brown, no plasticity, damp.									
5920						Bottom of Hole at 3.0 ft.									**3.0 ft** - Auger refusal. Test hole backfilled with auger cuttings; asphalt patch at surface to match existing.
5915															
5910															
5905															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-07**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 5.5 ft
Ground Elevation: 5925.5 ft
Coordinates: N: 1.0 E: 7.0
Location: NE edge CR 116 at Darrow St intersector
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5925						**0.0 - 0.8 ft.** 10 inches, (road base).									
						0.8 - 2.0 ft. silty GRAVEL with sand, light brown to dark brown, no plasticity, damp, dense, (fill).									
			25-22-21	43			7.2		39	30	31	NV	NP	A-2-4 (0) GM	
						2.0 - 5.5 ft. silty SAND with gravel, gray to red, no plasticity, damp, dense to very dense.									
	5		42-30-26	56			1.8		26	61	13	NV	NP	A-1-b (0) SM	
5920						Bottom of Hole at 5.5 ft.									**5.5 ft** - Test hole backfilled with auger cuttings.
5915															
5910															
5905															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-08**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 8.5 ft
Ground Elevation: 5924.3 ft
Coordinates: N: 1.0 E: 8.0
Location: CR 116 ~1,500 ft NNW of Airport Center Rd
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.5 ft. 6 inches, (asphalt).									
			24-15-7	22		**0.5 - 1.2 ft.** 8 inches, (road base).									
						1.2 - 2.5 ft. clayey SAND silty with gravel, black, no plasticity, damp, possible coke oven waste rock with voids, (fill).	7.6 7.1	 104.0	15	56	29	NV	NP	A-2-4 (0) SM	R-Value=64
			6-4	10		**2.5 - 8.5 ft. CLAY** with sand, brown, low plasticity, moist, stiff.	16.7	109.0	1	20	79	26	12	A-6 (7) CL	**2.0 ft** - S/C= -0.2 pH=7.1 S=0.004% Chl=0.0398% Re=682 ohm-cm **2.5 ft** - S/C= 0.0
5920	5		4-5-6	11											
						Bottom of Hole at 8.5 ft.									**8.5 ft** - Test hole backfilled with auger cuttings; asphalt patch at surface to match existing.
5915															
5910															
5905															
5900															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-09**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 12.0 ft
Ground Elevation: 5924.0 ft
Coordinates: N: 1.0 E: 9.0
Location: CR 116 ~1,100 ft NNW of Airport Center Rd
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.4 ft. 5 inches, (asphalt).									
			8-8-7	15		**0.4 - 7.5 ft. clayey SAND** silty with gravel, black, damp to moist, loose to medium dense, possible coke oven waste rock; with voids, (fill).	7.6		15	56	29	NV	NP	A-2-4 (0) SM	R-Value=64
5920															
	5		5-4	9			11.1	59.0	38	49	13				pH=7.3 S=0.133% Chl=0.0096% Re=410ohm·cm
			3-2	5		**7.5 - 10.5 ft. sandy CLAY**, brown, low plasticity, damp to moist, medium stiff to stiff.	12.6	111.0	5	30	65	24	8	A-4 (3) CL	pH=7.4 S=0.112% Chl=0.0021% S/C=-0.1% Re=860ohm·cm
5915	10		3/50 for 4 in.	3/50 for 4 in.		**10.5 - 12.0 ft. clayey GRAVEL** with sand, occasional cobbles and boulders, brown, low plasticity, damp to moist, loose to very dense.	11.0	122.0	27	26	47	26	10	A-4 (2) GC	S/C=-0.2%
						Bottom of Hole at 12.0 ft.									**12.0 ft** - Auger refusal. Test hole backfilled with auger cuttings; asphalt patch at surface to match existing.
5910															
5905															
5900															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-10**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Colorado Drilling and Sampling
Drill Rig: Simco 2800
Hammer Type: Automatic (hydraulic)

Total Depth: 6.5 ft
Ground Elevation: 5911.0 ft
Coordinates: N: 1.0 E: 10.0
Location: East edge City leaf collection site/old rodeo grounds
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5910						**0.0 - 4.0 ft. CLAY** with sand, red-brown with dark brown and black, low plasticity, moist, medium stiff, with possible coke oven waste rock, (fill).									
			1-2-3	5			16.9		1	23	76	25	11	A-6 (6) CL	pH=7.7 S=0.007% Chl=0.0008% Re=2041ohm·cm
	5		21/bounce	21/bounce		**4.0 - 6.5 ft. clayey GRAVEL** with sand, possible cobbles and boulders, brown, low plasticity, damp, very dense.	7.9		44	25	31	27	13	A-2-6 (0) GC	
5905							8.0	105.0	41	34	25	28	13	A-2-6 (0) GC	
						Bottom of Hole at 6.5 ft.									**6.5 ft** - Auger refusal. Test hole backfilled with auger cuttings.
5900															
5895															
5890															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-11**

Boring Began: 10/31/2017
Boring Completed: 10/31/2017
Drilling Method(s): ODEX
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 59.1 ft
Ground Elevation: 5909.6 ft
Coordinates: N: 1.0 E: 11.0
Location: ~80 ft WSW south Runway,~190 ft NNW Taxiway
Logged By: K. Dye
Final By: S. White

Weather Notes: Cloudy, breezy
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels:			
Symbol	▽		
Depth	39.0 ft	-	-
Date	10/31/17	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 1.5 ft. SAND with clay, silt, dark brown, (fill).									
						1.5 - 14.0 ft. GRAVEL with silt and sand, scattered cobbles, brown, no plasticity, damp, dense to very dense.									
5905	5		21-32-30	62			1.8		66	27	7	NV	NP	A-1-a (0) GP-GM	
5900	10		23-20-19	39			1.6		53	35	12	NV	NP	A-1-a (0) GP-GM	
5895	15		13-18-24	42		**14.0 - 42.0 ft. GRAVEL** with silt, sand, cobbles and boulders, gray with pink, no plasticity, damp to wet, dense to very dense.	1.2		54	38	8	NV	NP	A-1-a (0) GP-GM	
5890	20		50 for 6 in.	50 for 6 in.			1.7		55	34	11	NV	NP	A-1-a (0) GP-GM	
5885			25-39-48	87											

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Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5880	30		9-16-22	38		**14.0 - 42.0 ft. GRAVEL** with silt, sand, cobbles and boulders, gray with pink, no plasticity, damp to wet, dense to very dense.									
5875	35		50 for 6 in.	50 for 6 in.											
5870	40		31/20 for 2 in.	31/20 for 2 in.											
5865	45		50 for 5 in.	50 for 5 in.		**42.0 - 59.1 ft. EVAPORITE/SHALE**, white and gray, black, hard to very hard.									**42.0 ft** - Sulfurous odor noted at intervals between 42 and 54 foot depths.
5860	50		50 for 5 in.	50 for 5 in.											
5855	55														

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-11**

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5850	0		50 for 1 in.	50 for 1 in.		Bottom of Hole at 59.1 ft.									**59.1 ft** - Test hole backfilled with ODEX cuttings.
5845															
5840															
5835															
5830															
5825															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-12**

Boring Began: 11/1/2017
Boring Completed: 11/1/2017
Drilling Method(s): ODEX
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 50.5 ft
Ground Elevation: 5908.4 ft
Coordinates: N: 1.0 E: 12.0
Location: ~20 ft ENE of south Runway and ~140 ft NNW of south edge of Runway
Logged By: K. Dye
Final By: S. White

Weather Notes: P. cloudy, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 1.0 ft. (fill).									
5905						**1.0 - 14.0 ft. GRAVEL** with silt sand and cobbles, brown, no plasticity, dry to damp, very dense.									
	5		13-25-28	53			0.4		56	33	11	NV	NP	A-1-a (0) GP-GM	
5900															
	10														
5895															
	15		28-38-30	68		**14.0 - 50.5 ft. silty GRAVEL** with sand, cobbles and boulders, gray to pink, no plasticity, dry to damp, very dense.	0.9		48	39	13	NV	NP	A-1-a (0) GM	
5890															
	20		50 for 6 in.	50 for 6 in.			1.6		50	37	13	NV	NP	A-1-a (0) GM	
5885															
			15/30/27	15/30/27											

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Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
			for 3 in.	for 3 in.		**14.0 - 50.5 ft. silty GRAVEL** with sand, cobbles and boulders, gray to pink, no plasticity, dry to damp, very dense.									
5880	30														
5875	35														
5870	40														
5865	45														
5860	50		35-39-28	67											**49.0 ft** - Tighter drilling
						Bottom of Hole at 50.5 ft.									**50.5 ft** - Test hole backfilled with ODEX cuttings.
5855															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-13**

Boring Began: 10/31/2017
Boring Completed: 10/31/2017
Drilling Method(s): Solid-Stem Auger (4" OD)
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 7.5 ft
Ground Elevation: 5907.1 ft
Coordinates: N: 1.0 E: 13.0
Location: Airport Center Rd ~1,050 ft NE of CR 116
Logged By: K. Dye
Final By: S. White

Weather Notes: P. cloudy, breezy
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5905						**0.0 - 0.2 ft.** 2 inches, (asphalt). **0.2 - 3.5 ft. silty SAND** with gravel, light brown and red, no plasticity, damp to moist, medium dense, (fill).									
			34 for 4 in./bounce	34 for 4 in./bounce			12.1		27	35	38	NV	NP	A-4 (0) SM	
	5					**3.5 - 7.5 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown and gray, no plasticity, damp, very dense.									
5900			50 for 6 in.	50 for 6 in.			1.0		60	30	10	NV	NP	A-1-a (0) GP-GM	
						Bottom of Hole at 7.5 ft.									**7.5 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5895															
5890															
5885															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-14**

Boring Began: 11/1/2017
Boring Completed: 11/1/2017
Drilling Method(s): ODEX
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 74.1 ft
Ground Elevation: 5908.0 ft
Coordinates: N: 1.0 E: 14.0
Location: Airport Center Rd ~850 ft NE of CR 116
Logged By: K. Dye
Final By: S. White

Weather Notes: Cloudy,breezy,warm
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.2 ft. 2 inches, (asphalt).									
5905						**0.2 - 13.0 ft. silty GRAVEL** with sand, brown, no plasticity, damp, loose to medium dense, (fill).									
	5		6-5-7	12											pH=7.8 S=0.007% Chl=0.0166% Re=1782ohm·cm
5900															
	10		3-4-6	10			3.6		45	34	21	NV	NP	A-1-b (0) GM	
5895						**13.0 - 68.0 ft. GRAVEL** with silt to silty, with sand, cobbles and boulders, gray to pink, no plasticity, damp, very dense.									
	15		31/50 for 6 in.	31/50 for 6 in.			0.7		60	31	9	NV	NP	A-1-a (0) GP-GM	
5890															
	20		16/45 for 5 in.	16/45 for 5 in.											
5885															
			16-41-50	91			2.0		48	36	16	NV	NP	A-1-b (0) GM	

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Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5880	30					**13.0 - 68.0 ft. GRAVEL** with silt to silty, with sand, cobbles and boulders, gray to pink, no plasticity, damp, very dense.									
5875															
	35		28/50 for 5 in.	28/50 for 5 in.											
5870															
	40														
5865															
	45														
5860															
	50		26/50 for 4 in.	26/50 for 4 in.											
5855															
	55														

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5850	60					**13.0 - 68.0 ft. GRAVEL** with silt to silty, with sand, cobbles and boulders, gray to pink, no plasticity, damp, very dense.									
5845	65														
5840	70					**68.0 - 74.1 ft. EVAPORITE/SHALE**, white and dark gray.									pH=8 S=1.112% Chl=0.0007% Re=1978ohm·cm
5835			200 for 1 in.	200 for 1 in.		Bottom of Hole at 74.1 ft.									**74.1 ft** - ODEX refusal. Casing stuck. Test hole backfilled with ODEX cuttings. Cold patch asphalt at surface to match existing.
5830															
5825															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-15**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 5.0 ft
Ground Elevation: 5885.8 ft
Coordinates: N: 1.0 E: 15.0
Location: ~130 ft south of Holy Cross Energy maintenance bldg
Logged By: S. Richards & K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5885	0					**0.0 - 1.0 ft. SAND** with silt and gravel, (fill).									
						1.0 - 5.0 ft. silty GRAVEL with sand and cobbles, red-brown, damp, medium dense to very dense.									
			9-10-20	30											
			19/12 for 1 in. bounce	19/12 for 1 in. bounce			3.1		51	33	16				
	5					Bottom of Hole at 5.0 ft.									**5.0 ft** - Auger refusal. Test hole backfilled with auger cuttings.
5880															
5875															
5870															
5865															

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Yeh and Associates, Inc.
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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-16**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 2.5 ft
Ground Elevation: 5886.4 ft
Coordinates: N: 1.0 E: 16.0
Location: ~220 ft south of Holy Cross Energy maintenance bldg
Logged By: S. Richards & K. Dye
Final By: S. White

Weather Notes: Sunny, warm
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.5 ft. (topsoil).									
5885			10/27 for 5 in. bounce	10/27 for 5 in. bounce		**0.5 - 1.5 ft. sandy CLAY** with cobbles, low plasticity, damp to moist, very stiff to hard.	9.3		5	32	63	31	14	A-6 (6) CL	pH=7.9 S=0.01% Chl=0.0015% Re=2179ohm·cm
						1.5 - 2.5 ft. silty GRAVEL with sand, cobbles and possible boulders, red-brown, very dense.									**2.5 ft** - Auger refusal. Test hole backfilled with auger cuttings.
						Bottom of Hole at 2.5 ft.									
5880															
5875															
5870															
5865															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-17**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): ODEX
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 37.8 ft
Ground Elevation: 5892.3 ft
Coordinates: N: 1.0 E: 17.0
Location: ~220 ft SSW Holy Cross Energy water tank
Logged By: S. White/K. Dye
Final By: S. White

Weather Notes: Sunny, warm
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.5 ft. (topsoil).									
5890						**0.5 - 10.0 ft. CLAY** with sand, gravel and cobbles, red-brown, low to medium plasticity, damp, stiff, occasionally calcareous.									
			7-7-6	13			7.2		0	17	83	29	10	A-4 (7) CL	
	5														
5885			32-48	80			5.6		17	27	56	29	15	A-6 (5) CL	pH=8 S=0.03% Chl=0.0003% Re=1796ohm·cm
	10					**10.0 - 38.0 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown, no plasticity, damp, very dense, occasional sand lens.									
5880			24/29/50 for 4 in.	24/29/50 for 4 in.			1.1		62	30	8	NV	NP	A-1-a (0) GW-GM	pH=8.5 S=0.003% Chl=0.0004% Re=9398ohm·cm
	15														
5875			50 for 6 in./bounce	50 for 6 in./bounce			3.8		68	23	9	NV	NP	A-1-a (0) GP-GM	
	20														
5870			50 for 1 in./bounce	50 for 1 in./bounce											

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Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5865						**10.0 - 38.0 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown, no plasticity, damp, very dense, occasional sand lens.									
			27/34/50 for 5 in.	27/34/50 for 5 in.			3.2		39	51	10	NV	NP	A-1-b (0) SP-SM	
	30														
5860															
	35														
5855			40 for 4 in./bounce	40 for 4 in./bounce			5.4		64	26	10				**37.8 ft** - Test hole backfilled with odex cuttings.
						Bottom of Hole at 37.8 ft.									
5850															
5845															
5840															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-18**

Boring Began: 11/2/2017
Boring Completed: 11/2/2017
Drilling Method(s): Solid-Stem Auger
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 40.5 ft
Ground Elevation: 5937.1 ft
Coordinates: N: 1.0 E: 18.0
Location: West side SH82 ~1,300 ft south CR 115
Logged By: K. Dye
Final By: S. White

Weather Notes: Clear, mild
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 9 inches, (asphalt).									
5935			14-15-31	46		**0.8 - 2.0 ft. silty SAND** with gravel, no plasticity, damp, medium dense, 15 inches, (road base).	4.3		32	33	35	22	2	A-2-4 (0) SM	
						2.0 - 15.0 ft. silty GRAVEL with sand, occasionally with clay, red-brown, no to low plasticity, damp, medium dense to dense, with sand lenses.	1.7		44	33	23	NV	NP	A-1-b (0) GM	R-Value=72
	5		8-19-17	36											
5930															
	10		7-16-10	26			5.2		26	35	39	23	6	A-4 (0) SC-SM	
5925							5.7		33	31	36	21	3	A-4 (0) GM	
	15		6-9-8	17		**15.0 - 40.5 ft. clayey SAND** silty with gravel, red-brown, no to low plasticity, damp, loose to medium dense, with occasional cobbles.									pH=7.7 S=0.068% Chl=0.0056% Re=969ohm·cm
5920															
	20		6-4	10			3.8	104.0	25	47	28	22	4	A-2-4 (0) SC-SM	
5915															
			4-2-3	5											

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5910						**15.0 - 40.5 ft. clayey SAND** silty with gravel, red-brown, no to low plasticity, damp, loose to medium dense, with occasional cobbles.									
	30		6-8-10	18											
5905															
	35														
5900															
	40		4-3-5	8											
5895						Bottom of Hole at 40.5 ft.									**40.5 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5890															
5885															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-19**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 20.5 ft
Ground Elevation: 5931.4 ft
Coordinates: N: 1.0 E: 19.0
Location: East side SH82 ~1,300 ft south CR 115
Logged By: S. White
Final By: S. White

Weather Notes: Clear, cold
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5930	0					**0.0 - 0.8 ft.** 9 inches, (asphalt).									
						0.8 - 1.5 ft. 9 inches, (road base).									
						1.5 - 20.5 ft. clayey SAND with gravel, occasionally silty, red-brown, no to low plasticity, damp to moist, loose to medium dense, occasional dense gravel layers; micaceous.									
			13-22	35			3.4	116.0	60	21	19	21	5	A-1-b (0) GC-GM	S/C=-2.9%
	5						5.0		32	38	30	19	3	A-2-4 (0) SM	R-Value=59
5925															
			5-8	13			6.7	120.0	20	42	38	21	8	A-4 (0) SC	S/C=-0.3%
	10														
5920															
			3-5	8			9.6	116.0	16	39	45	21	5	A-4 (0) SC-SM	S/C=-0.2%
	15														
5915															
			8-16-14	30			2.9		67	19	14	22	5	A-1-a (0) GC-GM	
	20					Bottom of Hole at 20.5 ft.									
5910															

20.5 ft - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-20**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 42.2 ft
Ground Elevation: 5927.8 ft
Coordinates: N: 1.0 E: 20.0
Location: East side SH82 ~1,050 ft south CR 115
Logged By: S. White
Final By: S. White

Weather Notes: Clear,cool,breezy
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 9 inches, (asphalt).									
						0.8 - 1.5 ft. 9 inches, (road base).									
5925						**1.5 - 42.0 ft. silty SAND** with gravel, red-brown, no to low plasticity, damp to moist, medium dense to dense, occasionally clayey; with occasional cobbles; micaceous.									
	5		7-12-6	18			5.5 5.0		26 32	38 38	36 30	19 NV	3 NP	A-4 (0) SM A-2-4 (0) SM	R-Value=59
5920															
	10		14-23	37			2.8	123.0	23	33	44	NV	NP	A-4 (0) SM	
5915															
	15		8-10-18	28											
5910															
	20		20-31	51			5.5	127.0	24	37	39	21	4	A-4 (0) SC-SM	S/C=-0.2%
5905															
			11-17	28			8.0	120.0	27	34	39	21	3	A-4 (0) SM	S/C=-0.5%

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Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5900	30					**1.5 - 42.0 ft. silty SAND** with gravel, red-brown, no to low plasticity, damp to moist, medium dense to dense, occasionally clayey; with occasional cobbles; micaceous.									
5895			8-11	19			11.6	124.0	6	40	54	21	4	A-4 (0) CL-ML	S/C=-0.1%
5890	35		14-14	28											
			19-10	29											
			5-8	13											
			6-8	14											
	40		20-15	35											
			14-9	23											
			9-11	20											
5885			50 for 2 in.	50 for 2 in.		**42.0 - 42.2 ft. GRAVEL** with sand, gray to pink, no plasticity, damp, very dense. Bottom of Hole at 42.2 ft.									**42.2 ft** - Sampler refusal. Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5880															
5875															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-21**

Boring Began: 11/3/2017
Boring Completed: 11/3/2017
Drilling Method(s): Hollow-Stem Auger
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 6.0 ft
Ground Elevation: 5921.7 ft
Coordinates: N: 1.0 E: 21.0
Location: West side SH82 ~700 ft south CR 115
Logged By: S. Richards & K. Dye
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5920						**0.0 - 0.8 ft.** 10 inches, (asphalt).									
						0.8 - 1.5 ft. 8 inches, (road base).									
			15-18-12	30		**1.5 - 6.0 ft. clayey GRAVEL** silty with sand, cobbles and boulders, red-brown, low plasticity, damp, medium dense to very dense, with clay, sand lenses.	6.1		36	29	35	23	6	A-2-4 (0) GC-GM	
	5		19-17-11	28			5.2		31	35	34	22	8	A-2-4 (0) SC	
5915						Bottom of Hole at 6.0 ft.									**6.0 ft** - Auger refusal. Dense gravel destroyed auger teeth. Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5910															
5905															
5900															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-22**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): ODEX
Driller: HRL Compliance Solutions
Drill Rig: CME 55
Hammer Type: Automatic (hydraulic)

Total Depth: 52.3 ft
Ground Elevation: 5920.4 ft
Coordinates: N: 1.0 E: 22.0
Location: East side SH82 ~650 ft south CR 115
Logged By: K. Dye
Final By: S. White

Weather Notes: Clear, breeze
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5920						**0.0 - 0.7 ft.** 8 inches, (asphalt).									
						0.7 - 1.5 ft. 10 inches, (road base).									
			15-13-7	20		**1.5 - 6.0 ft. clayey SAND** silty with gravel, red-brown, low plasticity, damp, medium dense.	6.3		28	33	39	22	5	A-4 (0) SC-SM	
5915	5					**6.0 - 46.5 ft. silty GRAVEL** with sand and cobbles, occasionally clayey, red-brown, no to low plasticity, damp, medium dense, with occasional sand lenses; micaceous.									
			9-7	16			5.5	106.0	34	30	36	21	4	A-4 (0) GC-GM	
5910	10														
			4-2-9	11											
5905	15														
			11-14	25			5.2	123.0	43	31	26	NV	NP	A-2-4 (0) GM	S/C=-0.9%
5900	20														

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Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5895						**6.0 - 46.5 ft. silty GRAVEL** with sand and cobbles, occasionally clayey, red-brown, no to low plasticity, damp, medium dense, with occasional sand lenses; micaceous.									
5890	30														
5885	35														
5880	40														
5875	45					**46.5 - 48.5 ft. SAND**, brown, damp.									
5870	50					**48.5 - 52.3 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown, no plasticity, damp, very dense.									
			50 for 3 in.	50 for 3 in.		Bottom of Hole at 52.3 ft.	0.9		59	32	9	NV	NP	A-1-a (0) GP-GM	**52.3 ft** - Test hole backfilled with ODEX cuttings. Cold patch asphalt at surface to match existing.

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-23**

Boring Began: 11/3/2017
Boring Completed: 11/3/2017
Drilling Method(s): Hollow-Stem Auger
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 15.5 ft
Ground Elevation: 5917.6 ft
Coordinates: N: 1.0 E: 23.0
Location: West side SH82 ~500 ft south CR 115
Logged By: K. Dye
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 9 inches, (asphalt).									
						0.8 - 1.3 ft. 7 inches, (road base).									
5915			8/6/50 for 5 in.	8/6/50 for 5 in.		**1.3 - 15.5 ft. clayey GRAVEL** with sand, occasionally silty, red-brown, no to low plasticity, damp, medium dense to very dense, occasional sand lenses; micaceous.	8.5		20	39	41	22	3	A-4 (0) SM	
	5		8-13-16	29			4.7		36	32	32	22	6	A-2-4 (0) GC-GM	
5910															
			6-10	16			9.0	124.0	30	34	36	23	7	A-4 (0) SC-SM	pH=8 S=0.004% Chl=0.0237% S/C=-0.2% Re=1265ohm·cm
	10														
5905															
	15		6-10-6	16			7.1		37	30	33	22	2	A-2-4 (0) GM	
5900						Bottom of Hole at 15.5 ft.									**15.5 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5895															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-24**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 9.0 ft
Ground Elevation: 5916.7 ft
Coordinates: N: 1.0 E: 24.0
Location: East side SH82 ~450 ft south CR 115
Logged By: S. Richards
Final By: S. White

Weather Notes: Clear, breeze
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5915						**0.0 - 0.6 ft.** 7.5 inches, (asphalt).									
						0.6 - 1.5 ft. 10.5 inches, (road base).									
						1.5 - 9.0 ft. clayey GRAVEL silty with sand, scattered cobbles and boulders, red-brown, no to low plasticity, damp, medium dense to very dense, occasional sand lenses;.									
			8-11	19			8.9	116.0	32	34	34	22	2	A-2-4 (0) SM	S/C=-0.2%
	5		9-8	17			8.2	122.0	37	30	33	23	4	A-2-4 (0) GC-GM	S/C=-0.1%
5910			8-12	20			5.8	119.0	37	30	33	22	5	A-2-4 (0) GC-GM	S/C=-0.3%
						Bottom of Hole at 9.0 ft.									**9.0 ft** - Auger refusal. Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5905															
5900															
5895															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-25**

Boring Began: 11/3/2017
Boring Completed: 11/3/2017
Drilling Method(s): Hollow-Stem Auger
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 14.9 ft
Ground Elevation: 5913.4 ft
Coordinates: N: 1.0 E: 25.0
Location: West side SH82 ~300 ft south CR 115
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 10 inches, (asphalt).									
						0.8 - 1.3 ft. 6 inches, (road base).									
			9-12	21		**1.3 - 14.9 ft. clayey GRAVEL** silty with sand, occasional cobbles, red-brown, low plasticity, damp to moist, loose to very dense, occasional sand lenses.	9.4	117.0	22	36	42	21	5	A-4 (0) SC-SM	S/C=-0.3%
5910															
	5		9-12-10	22			7.1		36	33	31	22	6	A-2-4 (0) GC-GM	
			3-3-4	7											
5905															
			3-3	6			9.9	120.0	41	32	27				S/C=-0.2%
	10														
5900															
			3/50 for 5 in.	3/50 for 5 in.		Bottom of Hole at 14.9 ft.									**14.9 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5895															
5890															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-26**

Boring Began: 11/3/2017
Boring Completed: 11/3/2017
Drilling Method(s): Hollow-Stem Auger
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 10.5 ft
Ground Elevation: 5910.5 ft
Coordinates: N: 1.0 E: 26.0
Location: West side SH82 ~150 ft south CR 115
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5910						**0.0 - 0.8 ft.** 9 inches, (asphalt).									
						0.8 - 1.5 ft. GRAVEL with sand, no plasticity, damp, 9 inches, (road base).	1.1		48	49	3	NV	NP	A-2-7 (0) GW	
			6-6-7	13		**1.5 - 10.5 ft. clayey GRAVEL** silty with sand, red-brown, low plasticity, damp to moist, loose to dense.									
			5-6	11			8.5	114.0	40	28	32	22	6	A-2-4 (0) GC-GM	S/C=-0.7%
	5														
5905															
	10		6-13-34	47			9.5		41	28	31	25	5	A-2-4 (0) GC-GM	
5900						Bottom of Hole at 10.5 ft.									**10.5 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5895															
5890															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-27**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 10.0 ft
Ground Elevation: 5914.6 ft
Coordinates: N: 1.0 E: 27.0
Location: East side SH82 ~50 ft south CR 115
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 9 inches, (asphalt).									
						0.8 - 1.2 ft. 5 inches, (road base).									
			20-18-18	36		**1.2 - 4.0 ft. clayey GRAVEL** with sand, red-brown with light brown, low plasticity, damp, dense.	5.8		36	34	30	21	8	A-2-4 (0) GC	
5910	5		4-12-16	28		**4.0 - 10.0 ft. clayey SAND** with gravel, red-brown, low plasticity, damp, loose to medium dense, occasional clay lenses.	5.9		30	34	36	21	8	A-4 (0) SC	pH=7.8 S=0.006% Chl=0.0159% Re=1469ohm·cm
			2-2-2	4			8.4		15	37	48	22	8	A-4 (1) SC	
5905	10		4-8	12			9.2	116.0	12	36	52	26	10	A-4 (2) CL	S/C=-0.2%
						Bottom of Hole at 10.0 ft.									

10.0 ft - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.

5900
5895
5890

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-28**

Boring Began: 11/3/2017
Boring Completed: 11/3/2017
Drilling Method(s): Hollow-Stem Auger
Driller: Authentic Drilling
Drill Rig: Acker Renegade Rubber Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 8.3 ft
Ground Elevation: 5907.3 ft
Coordinates: N: 1.0 E: 28.0
Location: West side SH82 ~130 ft north CR 115
Logged By: S. Richards & K. Dye
Final By: S. White

Weather Notes: Sunny, cool
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 9 inches, (asphalt).									
						0.8 - 1.3 ft. 6 inches, (road base).									
5905			16-10-20	30		**1.3 - 4.0 ft. silty SAND** with gravel and occasional gravel layer, dark red-brown, no to low plasticity, damp, medium dense, (fill).	2.9 9.2		26 34	40 28	34 38	NV 21	NP 4	A-2-4 (0) SM A-4 (0) GC-GM	R-Value=60
	5		15-22-20	42		**4.0 - 8.3 ft. silty GRAVEL** with sand, cobbles and boulders; occasionally clayey, red-brown, low plasticity, damp, dense to very dense.	3.3		42	38	20	21	5	A-1-b (0) GC-GM	
5900			10/15/50 for 4 in.	10/15/50 for 4 in.			3.1		40	39	21	19	3	A-1-b (0) GM	
						Bottom of Hole at 8.3 ft.									**8.3 ft** - Auger refusal. Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5895															
5890															
5885															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-29**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 6.5 ft
Ground Elevation: 5905.0 ft
Coordinates: N: 1.0 E: 29.0
Location: East side SH82 ~280 ft north CR 154
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.8 ft. 9 inches, (asphalt).									
			22-24-24	48		**0.8 - 2.0 ft. GRAVEL** with silt and sand, no plasticity, damp, dense, 15 inches, (road base).	1.3		46	43	11	NV	NP	A-1-a (0) GW-GM	
			14-10	24		**2.0 - 6.5 ft. clayey SAND** silty with gravel, red-brown with light brown, low plasticity, damp, loose to medium dense.	4.3	113.0	25	38	37	22	5	A-4 (0) SC-SM	S/C=-1.1%
5900	5		4-3-3	6											
5895															
5890															
5885															

Bottom of Hole at 6.5 ft.

6.5 ft - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **P-30**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 8.5 ft
Ground Elevation: 5900.7 ft
Coordinates: N: 1.0 E: 30.0
Location: East side SH82 ~600 ft north CR 154
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5900						**0.0 - 0.5 ft.** 6 inches, (asphalt).									
			23-12-20	32		**0.5 - 2.0 ft. SAND** with silt and gravel, no plasticity, damp, dense, 18 inches, (road base).	1.8		38	51	11	NV	NP	A-1-a (0) SP-SM	
						2.0 - 5.0 ft. silty SAND with gravel, occasionally clayey, red-brown, no to low plasticity, damp, medium dense.	3.7		24	40	36	NV	NP	A-4 (0) SM	R-Value=34
			10-10-13	23			5.8		31	36	33	22	5	A-2-4 (0) SC-SM	
	5														
5895			12-20	32		**5.0 - 8.5 ft. silty GRAVEL** with sand and cobbles, occasonally clayey, red-brown, low plasticity, damp, medium dense to dense, possible boulders.	6.1	128.0	45	24	31	21	5	A-2-4 (0) GC-GM	S/C=-0.1%
			12-16-15	31			4.1		53	23	24	21	3	A-1-b (0) GM	
						Bottom of Hole at 8.5 ft.									**8.5 ft** - Test hole backfilled with auger cuttings. Cold patch asphalt at surface to match existing.
5890															
5885															
5880															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **PW-31**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 8.0 ft
Ground Elevation: 5904.7 ft
Coordinates: N: 1.0 E: 31.0
Location: West side SH82 ~350 ft north CR 154
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny, warm
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.5 ft. 6 inches, (road base).									
						0.5 - 8.0 ft. clayey SAND silty with gravel and cobbles, red-brown, low plasticity, damp, medium dense to dense, occasional gravel layer; possible boulders.									
			13-18	31			3.1	103.0	12	40	48	22	5	A-4 (0) SC-SM	S/C=-3.2%
5900	5		28-28	56			2.2	112.0	36	36	28	22	4	A-2-4 (0) SC-SM	S/C=-0.5%
			10-20	30			2.3	118.0	29	32	39	22	6	A-4 (0) SC-SM	S/C=-1%
5895						Bottom of Hole at 8.0 ft.									**8.0 ft** - Test hole backfilled with auger cuttings.
5890															
5885															
5880															

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Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **W-32**

Boring Began: 11/15/2017
Boring Completed: 11/15/2017
Drilling Method(s): ODEX
Driller: HRL Compliance Solutions
Drill Rig: CME 55 Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 77.8 ft
Ground Elevation: 5946.0 ft
Coordinates: N: 1.0 E: 32.0
Location: West side Old SH82 ~1130 ft south CR 115
Logged By: S. White
Final By: S. White

Weather Notes: P.cloudy, cold
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5945						**0.0 - 1.0 ft.** 12 inches, (road base).									
						1.0 - 51.0 ft. clayey GRAVEL silty with sand, cobbles and boulders, red-brown, low plasticity, damp to moist, medium dense to very dense, occasional sand lenses; micaceous.									**2.0 ft** - Boulders noted at 2 to 4 foot depths
5940	5														
5935	10		10-10	20			2.2	118.0	34	40	26	22	4	A-2-4 (0) SC-SM	S/C=-2.8% pH=8.3 S=0.008% Chl=0.0004% Re=5147ohm·cm
5930	15														
5925	20		49-32-46	78											

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5920						**1.0 - 51.0 ft. clayey GRAVEL** silty with sand, cobbles and boulders, red-brown, low plasticity, damp to moist, medium dense to very dense, occasional sand lenses; micaceous.									
			32-24	56			2.5	121.0	53	24	23	21	4	A-1-b (0) GC-GM	S/C=-1.6%
	30														
5915			22-19-15	34											
	35														
5910			10-7	17			5.9	128.0	54	19	27	23	5	A-2-4 (0) GC-GM	S/C=-0.7%
	40														
5905															
	45														
5900															
	50														
5895						**51.0 - 60.0 ft. CLAY**, red-brown, low plasticity, moist, very stiff.									
	55														

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5890						**51.0 - 60.0 ft. CLAY**, red-brown, low plasticity, moist, very stiff.									
			5-12	17			25.6	99.0	0	6	94	33	13	A-6 (12) CL	S/C=-0.1%
	60					**60.0 - 77.8 ft. GRAVEL** with silt, sand, cobbles and boulders, light brown, no plasticity, damp, dense to very dense.									
5885															
	65														
5880															
	70														
5875															
	75														
5870															
			50/50 for 3 in.	50/50 for 3 in.			0.3		63	27	10	NV	NP	A-1-a (0) GP-GM	
						Bottom of Hole at 77.8 ft.									**77.8 ft** - Test hole backfilled with ODEX cuttings.
5865															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **W-33**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): ODEX
Driller: HRL Compliance Solutions
Drill Rig: CME 55 Track Rig
Hammer Type: Automatic (hydraulic)

Total Depth: 33.5 ft
Ground Elevation: 5945.3 ft
Coordinates: N: 1.0 E: 33.0
Location: East side Old SH82 ~1150 ft south CR 115
Logged By: K. Dye
Final By: S. White

Weather Notes: Clear, calm
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
5945						**0.0 - 6.0 ft. clayey GRAVEL** silty with sand and cobbles, red-brown, low plasticity, damp, medium dense, occasional sand lens.									
5940	5														
			8-9-9	18		**6.0 - 14.0 ft. clayey SAND** silty with gravel, red-brown, low plasticity, damp, medium dense.	3.5		30	33	37	22	6	A-4 (0) SC-SM	
5935	10														
5930	15					**14.0 - 33.5 ft. clayey GRAVEL** silty with sand and cobbles, red-brown, low plasticity, damp, medium dense.									
			14-20	34			2.0	135.0	75	12	13				
5925	20														

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifi-cations	Field Notes and Other Lab Tests
5920						**14.0 - 33.5 ft. clayey GRAVEL** silty with sand and cobbles, red-brown, low plasticity, damp, medium dense.									
			10-19	29			3.6	122.0	67	15	18	22	5	A-1-b (0) GC-GM	S/C=-0.4%
5915	30														
			42-19-9	28											
5910						Bottom of Hole at 33.5 ft.									**33.5 ft** - Test hole backfilled with ODEX cuttings.
5905															
5900															
5895															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Yeh and Associates, Inc.
Consulting Engineers & Scientists

Project Name: South Bridge, Glenwood Springs, Colorado

Project Number: 216-417 *Boring No.:* **W-34**

Boring Began: 11/14/2017
Boring Completed: 11/14/2017
Drilling Method(s): Solid-Stem Auger
Driller: Colorado Drilling and Sampling
Drill Rig: CME 45
Hammer Type: Automatic (hydraulic)

Total Depth: 15.5 ft
Ground Elevation: 5942.9 ft
Coordinates: N: 1.0 E: 34.0
Location: West side Old SH82 ~1350 ft south CR 115
Logged By: S. Richards
Final By: S. White

Weather Notes: Sunny
Inclination from Horiz.: Vertical
Night Work: ☐

Groundwater Levels: Not Observed

Symbol			
Depth	-	-	-
Date	-	-	-

Elevation (feet)	Depth (feet)	Sample Type/ Advancement Method	Soil Samples: Blows per 6 in	Soil Samples: Penetration Resistance	Lithology	Material Description	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plasticity Index	AASHTO & USCS Classifications	Field Notes and Other Lab Tests
						0.0 - 0.5 ft. 6 inches, (road base).									
5940						**0.5 - 6.0 ft. clayey SAND** silty with gravel, red-brown, low plasticity, damp, medium dense.									
	5		10-15	25			4.9	114.0	23	37	40	22	5	A-4 (0) SC-SM	S/C=-0.8%
5935			13-15	28		**6.0 - 15.5 ft. clayey GRAVEL** silty with sand, occasional cobbles, boulders, red-brown, low plasticity, damp, medium dense to very dense, occasional sand lenses.	2.8	127.0	50	23	27	22	4	A-2-4 (0) GC-GM	S/C=-0.8%
	10														
5930															
	15		20/25 for 3 in.-bounce	20/25 for 3 in.-bounce			1.4	133.0	48	26	26	21	4	A-2-4 (0) GC-GM	S/C=-1.7%
5925						Bottom of Hole at 15.5 ft.									**15.5 ft** - Auger refusal. Test hole backfilled with auger cuttings.
5920															

BORING LOG 2015 216-417 GINT LOGS 4-24-18.GPJ 2015 YEH ASSOCIATES TEMPLATE.GDT 2015 LIBRARY (4).GLB 4/25/18

Legend for Symbols Used on Borehole Logs

Sample Types


Auger Cuttings


ODEX/Downhole Hammer


Modified California Sampler (2.5 inch OD, 2.0 inch ID)


Standard Penetration Test (ASTM D1586)

Lithology Symbols (see Boring Logs for complete descriptions)


Asphalt


Road Base


Fill Sand to Fill Gravel, black, possible coke oven waste material


Fill with Clay as major soil


Fill with Sand as major soil


Fill with Gravel as major soil


Topsoil


Clay


Clayey Sand with gravel, occasional cobbles, boulders


Silty Sand, with gravel, cobbles


Sand


Clayey Gravel with cobbles and boulders


Silty Gravel with cobbles and boulders


Gravel, tan, gray, pink, light brown, brown, with cobbles and boulders


Gravel, tan, light brown, brown, gray, with cobbles and boulders


Weathered Evaporite/Shale Bedrock


Evaporite/Shale Bedrock

Lab Test Standards

Moisture Content	ASTM D2216
Dry Density	ASTM D7263
Sand/Fines Content	ASTM D421, ASTM C136, ASTM D1140
Atterberg Limits	ASTM D4318
AASHTO Class.	AASHTO M145, ASTM D3282
USCS Class.	ASTM D2487

(Fines = % Passing #200 Sieve
Sand = % Passing #4 Sieve, but not passing #200 Sieve)

Other Lab Test Abbreviations

pH	Soil pH (AASHTO T289-91)
S	Water-Soluble Sulfate Content (AASHTO T290-91, ASTM D4327)
Chl	Water-Soluble Chloride Content (AASHTO T291-91, ASTM D4327)
S/C	Swell/Consolidation (ASTM D4546)
R-Value	Resistance R-Value (ASTM D2844)
Re	Electrical Resistivity (AASHTO T288-91)

Notes

1. "Penetration Resistance" on the Boring Logs refers to the N value for SPT samples only, as per ASTM D1586. For samples obtained with a Modified California sampler, drive depth was 12 inches, and "Penetration Resistance" refers to the sum of all blows. For all sample types, where blow counts were more than 50 for the last increment, the blows and length for the last increment are reported under "Penetration Resistance."

2. The Modified California sampler used to obtain samples is a 2.5-inch OD, 2.0-inch ID (1.95-inch ID with liners), split-barrel sampler with internal liners, as per ASTM D3550. Sampler is driven with a 140-pound hammer, dropped 30 inches per blow.

APPENDIX B

Laboratory Test Results

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, Airport Road Site

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
P-1	1.5	SPT	13.8		2	19	79	27	16	11								A-6 (7)	CL	FILL CLAY with sand
	4.0	MC	12.9	101	0	22	78	27	16	11					-0.3	500		A-6 (6)	CL	FILL CLAY with sand
P-2	1.0	SPT	6.8		40	46	14	NV	NP	NP								A-1-b (0)	SM	FILL SAND, silty with gravel (BASE)
	2.0 to 3.0	BULK	2.5		40	42	18	NV	NP	NP							72	A-1-b (0)	SM	FILL SAND, silty with gravel (BLACK WASTE ROCK MATERIAL)
	2.5 to 3.0	BULK									0.005	0.0216	887	7.5						FILL SAND, silty with gravel (BLACK WASTE ROCK MATERIAL)
	4.0	MC	21.7	100	0	16	84	31	16	15					0.0	500		A-6 (11)	CL	CLAY with sand
P-3	0.5	SPT	5.1		32	49	19	NV	NP	NP								A-1-b (0)	SM	FILL SAND, silty with gravel (BASE)
	2.0	MC	7.1	118	56	27	17	35	14	21								A-2-6 (0)	GC	FILL GRAVEL, clayey with sand
	4.0	SPT	4.1		44	42	14	NV	NP	NP								A-1-a (0)	GM	GRAVEL, silty with sand
P-4	1.0	SPT	11.2		16	48	36	27	20	7								A-4 (0)	SC-SM	FILL SAND, clayey, silty, with gravel (BLACK WASTE ROCK MATERIAL)
	1.7	SPT	15.7		1	17	82	31	14	17								A-6 (12)	CL	CLAY with sand

BULK - Indicates auger cuttings
MC - Indicates modified California sampler
SPT - Indicates split spoon sampler/Standard Penetration Test
NV - Indicates no value
NP - Indicates non-plastic

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, Airport Road Site

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
P-5	1.0	SPT	5.0		51	30	19	NV	NP	NP	0.010	0.0849	587	7.3				A-1-b (0)	GM	FILL GRAVEL, silty with sand (BLACK WASTE ROCK MATERIAL)
P-6	0.6 to 1.0	BULK	3.0		38	48	14	20	17	3								A-1-a (0)	SM	FILL SAND, silty with gravel (BASE)
	2.0	SPT	14.1		13	30	57	28	14	14								A-6 (5)	CL	CLAY, sandy
P-7	1.5	SPT	7.2		39	30	31	NV	NP	NP								A-2-4 (0)	GM	FILL GRAVEL, silty with sand
	4.0	SPT	1.8		26	61	13	NV	NP	NP								A-1-b (0)	SM	SAND, silty with gravel
P-8	2.0	MC	7.1	104							0.004	0.0398	682	7.1	-0.2	200				FILL SAND, clayey to silty with gravel (BLACK WASTE ROCK MATERIAL)
	2.5	MC	16.7	109	1	20	79	26	14	12					0.0	200		A-6 (7)	CL	CLAY with sand
P-9	4.0	MC	11.1	59	38	49	13				0.133	0.0096	410	7.3						FILL SAND, clayey, silty with gravel (BLACK WASTE ROCK MATERIAL, voids)
	7.5	MC	12.6	111	5	30	65	24	16	8	0.112	0.0021	860	7.4	-0.1	500		A-4 (3)	CL	CLAY, sandy
	10.5	MC	11.0	122	27	26	47	26	16	10					-0.2	1,000		A-4 (2)	GC	GRAVEL, clayey with sand, cobbles and boulders
P-8 + P-9	1 to 4	BULK	7.6		15	56	29	NV	NP	NP							64	A-2-4 (0)	SM	FILL SAND, silty with gravel (BLACK WASTE ROCK MATERIAL)

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NV - Indicates no value
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YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, Airport Tunnel and South Bridge

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
P-10	2.0	SPT	16.9		1	23	76	25	14	11	0.007	0.0008	2041	7.7				A-6 (6)	CL	FILL CLAY with sand
	4 to 5	BULK	7.9		44	25	31	27	14	13								A-2-6 (0)	GC	GRAVEL, clayey with sand
	5.0	MC	8.0	105	41	34	25	28	15	13								A-2-6 (0)	GC	GRAVEL, clayey with sand, cobbles and boulders
PW-11	4.0	SPT	1.8		66	27	7	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt , sand and cobbles
	9.0	SPT	1.6		53	35	12	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL, with silt and sand
	14.0	SPT	1.2		54	38	8	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt and sand
	19 to 25	BULK	1.7		55	34	11	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL, with silt, sand, and cobbles

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NV - Indicates no value
NP - Indicates non-plastic

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, Airport Tunnel and South Bridge

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
PW-12	4.0	SPT	0.4		56	33	11	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL, with silt, sand, and cobbles
	14.0	SPT	0.9		48	39	13	NV	NP	NP								A-1-a (0)	GM	GRAVEL, silty with sand and cobbles
	19 to 25	BULK	1.6		50	37	13	NV	NP	NP								A-1-a (0)	GM	GRAVEL, silty with sand and cobbles
P-13	3.0 to 3.5	BULK	12.1		27	35	38	NV	NP	NP								A-4 (0)	SM	FILL SAND, silty with gravel
	7.0	SPT	1.0		60	30	10	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand, cobbles and boulders
PW-14	4 to 9	BULK									0.007	0.0166	1782	7.8						FILL GRAVEL, silty with sand
	9.0	SPT	3.6		45	34	21	NV	NP	NP								A-1-b (0)	GM	FILL GRAVEL, silty with sand
	14.0	SPT	0.7		60	31	9	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL, with silt, sand, cobbles, and boulders
	24.0	SPT	2.0		48	36	16	NV	NP	NP								A-1-b (0)	GM	GRAVEL, silty, with sand, cobbles, and boulders
	72 to 74	BULK									1.112	0.0007	1978	8.0						EVAPORITE/SHALE BEDROCK

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NP - Indicates non-plastic

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, Airport Tunnel and South Bridge

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
A-1	7.0	SPT	0.6		59	31	10	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand and cobbles
	27.0	SPT									0.006	0.0005	9200	8.7						GRAVEL with silt, sand and cobbles
	52.0	MC	18.4	105				24	19	5	1.301	0.0056	913	7.7						WEATHERED EVAPORITE/SHALE BEDROCK
	62.0	SPT	14.5					22	18	4										WEATHERED EVAPORITE/SHALE BEDROCK
	72.0	MC	8.4	115				23	19	4										EVAPORITE/SHALE BEDROCK
A-2	4.0	SPT	3.9		70	26	4	NV	NP	NP								A-1-a (0)	GW	GRAVEL with sand, cobbles and boulders
	19 to 25	BULK									0.003	0.0003	7812	7.5						GRAVEL with sand, cobbles and boulders
	22.0	SPT	2.8		75	21	4	NV	NP	NP								A-1-a (0)	GP	GRAVEL with sand, cobbles and boulders
	37.0	SPT	4.5		51	41	8	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand, cobbles and boulders
	68.0	SPT	23.7		16	35	49	25	15	10	0.003	0.0004	4769	7.7				A-4 (2)	SC	SAND, clayey with gravel, cobbles and boulders
	79.5	SPT	10.5		41	42	17	NV	NP	NP								A-1-b (0)	SM	SAND, silty with gravel, cobbles and boulders
	89.5	SPT	12.8		37	52	11	NV	NP	NP								A-1-b (0)	SP-SM	SAND with silt, gravel, cobbles and boulders
	99.5	SPT	11.8		23	59	18	NV	NP	NP								A-2-4 (0)	SM	SAND, silty with gravel, cobbles and boulders

BULK - Indicates auger cuttings
MC - Indicates modified California sampler
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NV - Indicates no value
NP - Indicates non-plastic

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, Airport Tunnel and South Bridge

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
PW-15	4.0	SPT	3.1		51	33	16													GRAVEL silty with sand and cobbles
P-16	1.0	SPT	9.3		5	32	63	31	17	14	0.010	0.0015	2179	7.9				A-6 (6)	CL	CLAY, sandy
PW-17	2.5	SPT	7.2		0	17	83	29	19	10								A-4 (7)	CL	CLAY with sand
	7.5	MC	5.6		17	27	56	29	14	15	0.030	0.0003	1796	8.0				A-6 (5)	CL	CLAY with sand, gravel and cobbles
	12.5	SPT	1.1		62	30	8	NV	NP	NP	0.003	0.0004	9398	8.5				A-1-a (0)	GW-GM	GRAVEL with silt, sand, cobbles and boulders
	17.5	SPT	3.8		68	23	9	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand, cobbles and boulders
	27.5	SPT	3.2		39	51	10	NV	NP	NP								A-1-b (0)	SP-SM	SAND, with silt, gravel and cobbles
	37.5	SPT	5.4		64	26	10													GRAVEL with silt, sand, cobbles and boulders

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YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
PW-18	1.0	SPT	4.3		32	33	35	22	20	2								A-2-4 (0)	SM	SAND, silty with gravel (BASE)
	2 to 6	BULK	1.7		44	33	23	NV	NP	NP							72	A-1-b (0)	GM	GRAVEL, silty with sand
	9.0	SPT	5.2		26	35	39	23	17	6								A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	14.0	SPT	5.7		33	31	36	21	18	3								A-4 (0)	GM	GRAVEL, silty with sand
	15 to 19	BULK									0.068	0.0056	969	7.7						SAND, clayey, silty, with gravel
	19.0	MC	3.8	104	25	47	28	22	18	4								A-2-4 (0)	SC-SM	SAND, clayey, silty with gravel
PW-19	4.0	MC	3.4	116	60	21	19	21	16	5					-2.9	500		A-1-b (0)	GC-GM	GRAVEL, clayey, silty, with sand
	9.0	MC	6.7	120	20	42	38	21	13	8					-0.3	1,000		A-4 (0)	SC	SAND, clayey with gravel
	14.0	MC	9.6	116	16	39	45	21	16	5					-0.2	1,000		A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	19.0	SPT	2.9		67	19	14	22	17	5								A-1-a (0)	GC-GM	GRAVEL, clayey, silty with sand

BULK - Indicates auger cuttings
MC - Indicates modified California sampler
SPT - Indicates split spoon sampler/Standard Penetration Test
NV - Indicates no value
NP - Indicates non-plastic

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Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
PW-19+ PW-20	5 to 15	BULK	5.0		32	38	30	NV	NP	NP							59	A-2-4 (0)	SM	SAND, silty with gravel
PW-20	4.0	SPT	5.5		26	38	36	19	16	3								A-4 (0)	SM	SAND, silty with gravel
	9.0	MC	2.8	123	23	33	44	NV	NP	NP								A-4 (0)	SM	SAND, silty with gravel
	19.0	MC	5.5	127	24	37	39	21	17	4					-0.2	1,000		A-4 (0)	SC-SM	SAND, clayey, silty with gravel and cobbles
	24.0	MC	8.0	120	27	34	39	21	18	3					-0.5	1,000		A-4 (0)	SM	SAND, silty with gravel
	34.0	MC	11.6	124	6	40	54	21	17	4					-0.1	1,000		A-4 (0)	CL-ML	CLAY, silty, sandy

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Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
A-3	9.0	MC	4.1	111	45	25	30	23	17	6					-1.3	1,000		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	9 to 14	BULK									0.007	0.0033	2651	8.0						GRAVEL, clayey, silty with sand
	24.0	MC	6.1	106	36	26	38	20	16	4					-4.4	1,000		A-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	24 to 29	BULK									0.007	0.0008	2959	8.3						GRAVEL, clayey, silty with sand
	39.0	MC	10.6	110	42	18	40	27	16	11								A-6 (1)	GC	GRAVEL, clayey with sand
	39.5	MC	4.2		56	28	16	NV	NP	NP								A-1-b (0)	GM	GRAVEL, silty with sand, cobbles and boulders
	40 to 44	BULK									0.003	0.0008	6046	8.7						GRAVEL, silty with sand, cobbles and boulders
A-4	7.0	SPT									0.017	0.0066	1986	7.8						SAND, clayey, silty, with gravel
	7.0 to 13.5	BULK	7.4		19	38	43	21	17	4								A-4 (0)	SC-SM	SAND, clayey, silty, with gravel
	22.0	MC	4.0	116	50	29	21	22	18	4								A-1-b (0)	GC-GM	GRAVEL, clayey, silty with sand and cobbles
	27.0	MC	9.7	118	39	25	36	24	16	8								A-4 (0)	GC	GRAVEL, clayey with sand
	42.0	SPT	1.8		60	30	10	NV	NP	NP								A-1-a (0)	GW-GM	GRAVEL with silt, sand, cobbles and boulders
	72.0	SPT	8.2		53	36	11	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand, cobbles and boulders

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Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
PW-21	2.0	SPT	6.1		36	29	35	23	17	6								A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	4.0	SPT	5.2		31	35	34	22	14	8								A-2-4 (0)	SC	SAND, clayey with gravel
PW-22	2.0	SPT	6.3		28	33	39	22	17	5								A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	7.0	MC	5.5	106	34	30	36	21	17	4								A-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	17.0	MC	5.2	123	43	31	26	NV	NP	NP					-0.9	1,000		A-2-4 (0)	GM	GRAVEL, silty with sand
	52.0	SPT	0.9		59	32	9	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand, cobbles and boulders
PW-23	1.3	SPT	8.5		20	39	41	22	19	3								A-4 (0)	SM	SAND, silty with gravel
	4.0	SPT	4.7		36	32	32	22	16	6								A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	9.0	MC	9.0	124	30	34	36	23	16	7	0.004	0.0237	1265	8.0	-0.2	1,000		A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	14.0	SPT	7.1		37	30	33	22	20	2								A-2-4 (0)	GM	GRAVEL, silty with sand

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Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
PW-24	2.0	MC	8.9	116	32	34	34	22	20	2					-0.2	300		A-2-4 (0)	SM	SAND, silty with gravel
	4.0	MC	8.2	122	37	30	33	23	19	4					-0.1	500		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	7.0	MC	5.8	119	37	30	33	22	17	5					-0.3	500		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
PW-25	1.5	MC	9.4	117	22	36	42	21	16	5					-0.3	500		A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	4.0	SPT	7.1		36	33	31	22	16	6								A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	9.0	MC	9.9	120	41	32	27								-0.2	1,000				GRAVEL, clayey, silty with sand
PW-26	0.8 to 1.5	BULK	1.1		48	49	3	NV	NP	NP								A-2-7 (0)	GW	FILL GRAVEL with sand (BASE)
	4.0	MC	8.5	114	40	28	32	22	16	6					-0.7	1,000		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	9.0	SPT	9.5		41	28	31	25	20	5								A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand

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Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
P-27	1.2	SPT	5.8		36	34	30	21	13	8								A-2-4 (0)	GC	GRAVEL, clayey with sand
	4.0	SPT	5.9		30	34	36	21	13	8	0.006	0.0159	1469	7.8				A-4 (0)	SC	SAND, clayey with gravel
	7.0	SPT	8.4		15	37	48	22	14	8								A-4 (1)	SC	SAND, clayey with gravel
	9.0	MC	9.2	116	12	36	52	26	16	10					-0.2	1,000		A-4 (2)	CL	CLAY, sandy
PW-28	2 to 4	BULK	2.9		26	40	34	NV	NP	NP							60	A-2-4 (0)	SM	FILL SAND, silty with gravel
	2.0	SPT	9.2		34	28	38	21	17	4								A-4 (0)	GC-GM	FILL GRAVEL, clayey, silty with sand
	4.0	SPT	3.3		42	38	20	21	16	5								A-1-b (0)	GC-GM	GRAVEL, clayey, silty with sand
	7.0	SPT	3.1		40	39	21	19	16	3								A-1-b (0)	GM	GRAVEL, silty with sand, cobbles and boulders
P-29	0.8	SPT	1.3		46	43	11	NV	NP	NP								A-1-a (0)	GW-GM	FILL GRAVEL with silt and sand (BASE)
	2.5	MC	4.3	113	25	38	37	22	17	5					-1.1	300		A-4 (0)	SC-SM	SAND, clayey, silty with gravel

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Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
P-30	0.5	SPT	1.8		38	51	11	NV	NP	NP								A-1-a (0)	SP-SM	FILL SAND with silt and gravel (BASE)
	2 to 5	BULK	3.7		24	40	36	NV	NP	NP							34	A-4 (0)	SM	SAND, silty with gravel
	3.0	SPT	5.8		31	36	33	22	17	5								A-2-4 (0)	SC-SM	SAND, clayey, silty with gravel
	5.0	MC	6.1	128	45	24	31	21	16	5					-0.1	500		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	7.0	SPT	4.1		53	23	24	21	18	3								A-1-b (0)	GM	GRAVEL, silty with sand
PW-31	2.0	MC	3.1	103	12	40	48	22	17	5					-3.2	300		A-4 (0)	SC-SM	SAND, clayey, silty
	4.0	MC	2.2	112	36	36	28	22	18	4					-0.5	500		A-2-4 (0)	SC-SM	SAND, clayey, silty with gravel and cobbles
	7.0	MC	2.3	118	29	32	39	22	16	6					-1.0	1,000		A-4 (0)	SC-SM	SAND, clayey, silty with gravel

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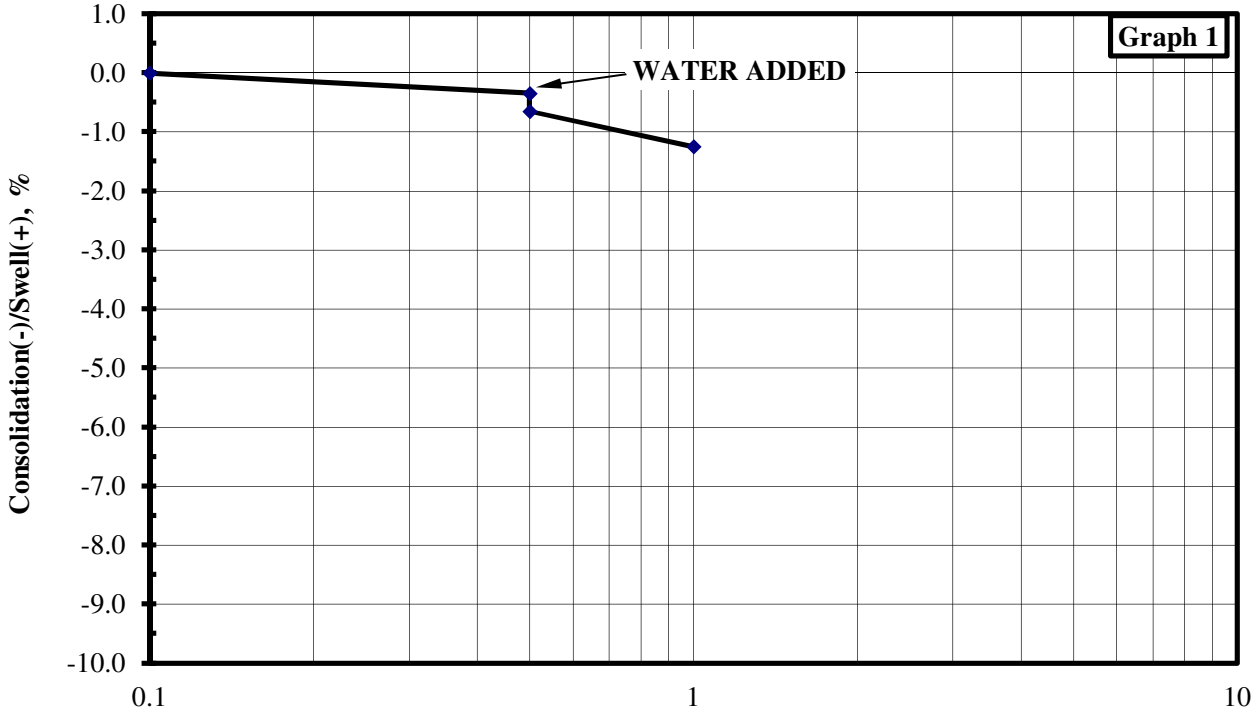
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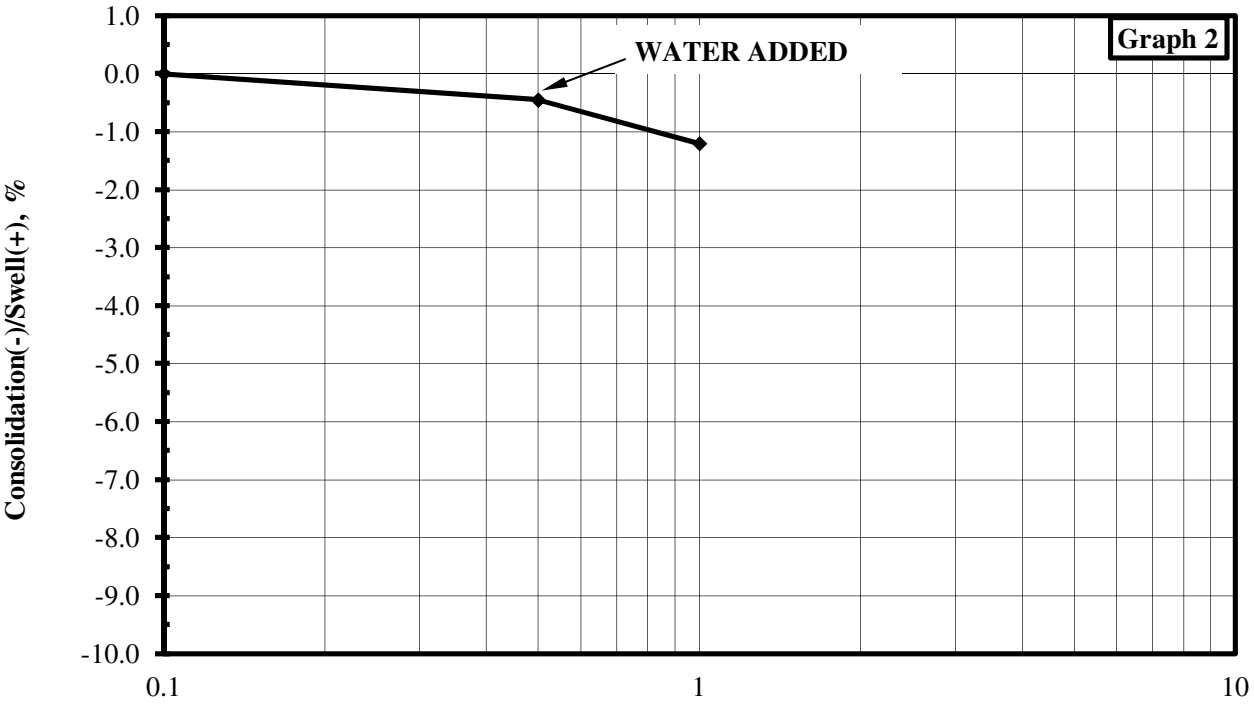
Summary of Laboratory Test Results

Project No: 216-417 Project Name: South Bridge, Glenwood Springs, State Highway 82 Site and SH 82 Underpass Abutments

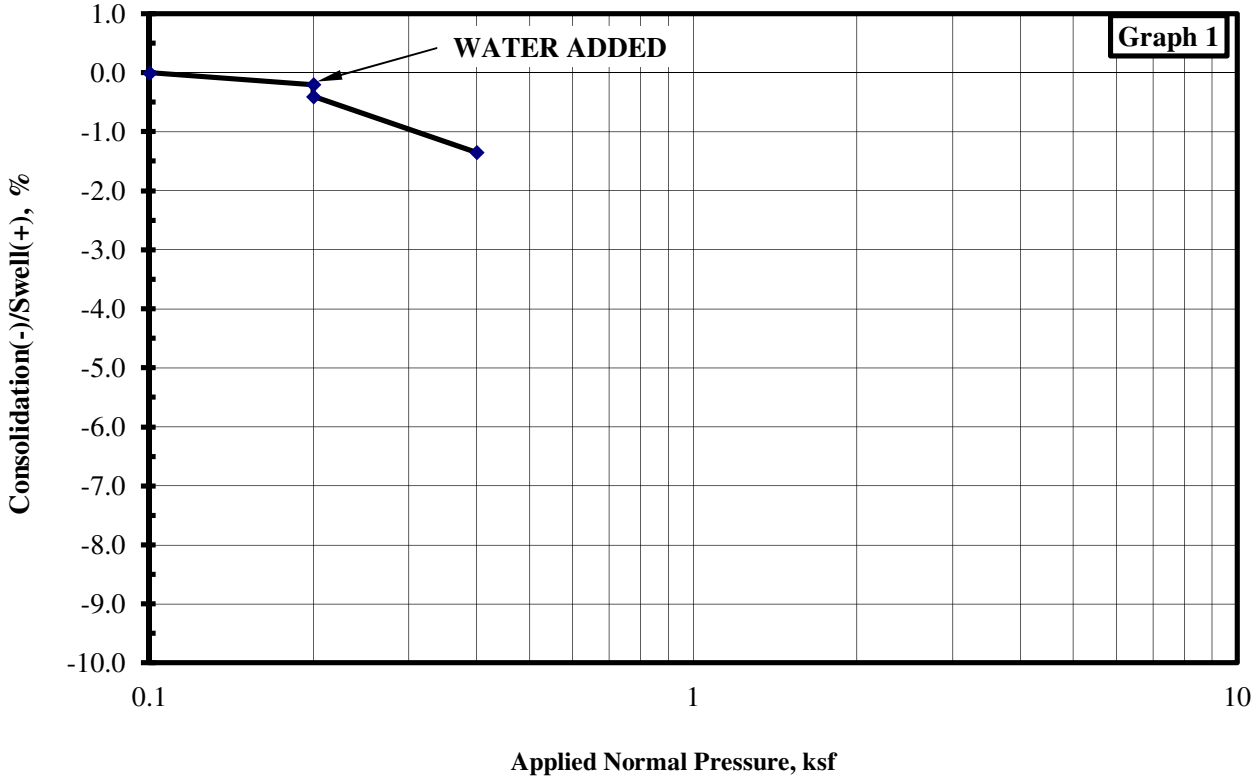
Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			Water Soluble Sulfate (%)	Water Soluble Chloride (%)	Resistivity (ohm-cm)	pH	Swell/Collapse		R-Value	AASHTO	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					%	psf				
W-32	12.0	MC	2.2	118	34	40	26	22	18	4					-2.8	1,000		A-2-4 (0)	SC-SM	SAND, clayey, silty with gravel
	13 to 22	BULK									0.008	0.0004	5147	8.3						GRAVEL, clayey, silty with sand and cobbles
	27.0	MC	2.5	121	53	24	23	21	17	4					-1.6	1,000		A-1-b (0)	GC-GM	GRAVEL, clayey, silty with sand and cobbles
	37.0	MC	5.9	128	54	19	27	23	18	5					-0.7	1,000		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand, cobbles and boulders
	57.0	MC	25.6	99	0	6	94	33	20	13					-0.1	1,000		A-6 (12)	CL	CLAY
	77.0	SPT	0.3		63	27	10	NV	NP	NP								A-1-a (0)	GP-GM	GRAVEL with silt, sand, cobbles and boulders
W-33	7.0	SPT	3.5		30	33	37	22	16	6								A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	17.0	MC	2.0	135	75	12	13													GRAVEL, clayey, silty with sand and cobbles
	27.0	MC	3.6	122	67	15	18	22	17	5					-0.4	1,000		A-1-b (0)	GC-GM	GRAVEL, clayey, silty with sand and cobbles
W-34	4.0	MC	4.9	114	23	37	40	22	17	5					-0.8	500		A-4 (0)	SC-SM	SAND, clayey, silty with gravel
	8.0	MC	2.8	127	50	23	27	22	18	4					-0.8	1,000		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand
	14.0	MC	1.4	133	48	26	26	21	17	4					-1.7	1,000		A-2-4 (0)	GC-GM	GRAVEL, clayey, silty with sand, cobbles and boulders

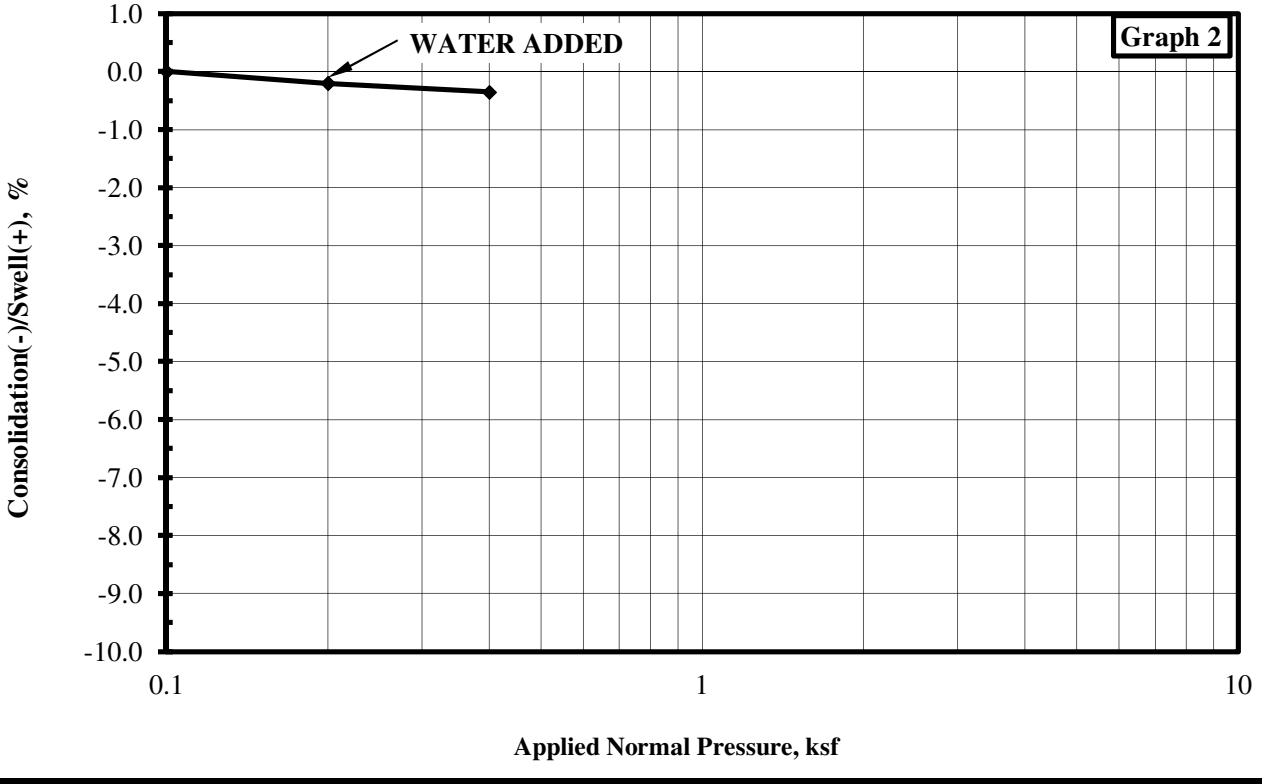
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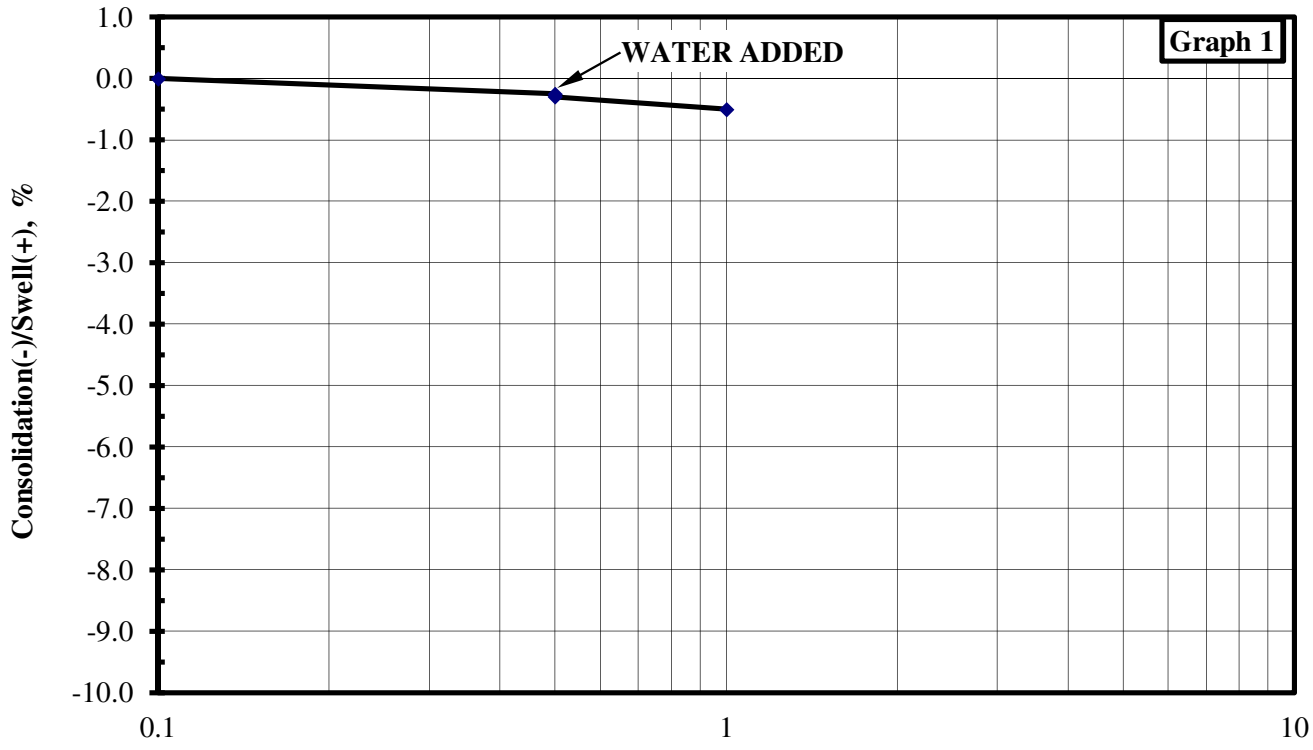


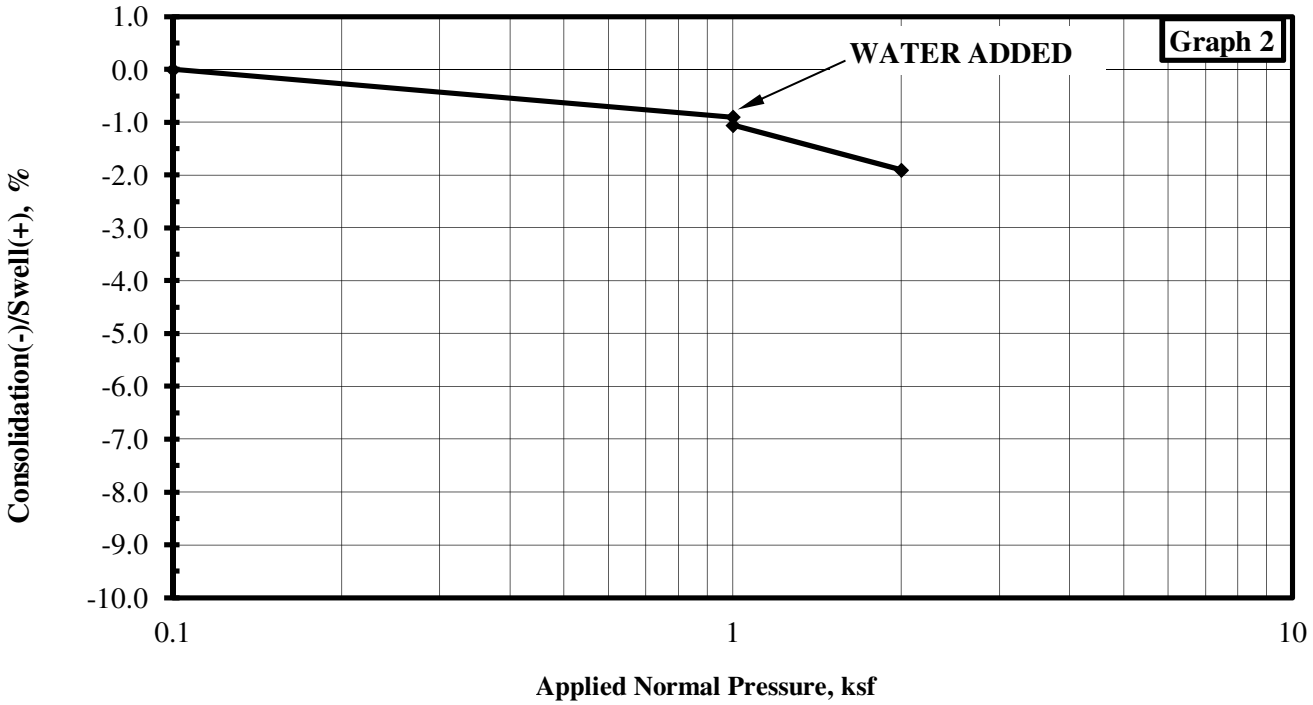
Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	P-1	4	101	12.9	-0.3	FILL CLAY with sand (CL)	Drawn By: KD/SW
2	P-2	4	100	21.7	0.0	CLAY with sand (CL)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs Airport Road Site			Figure B-1
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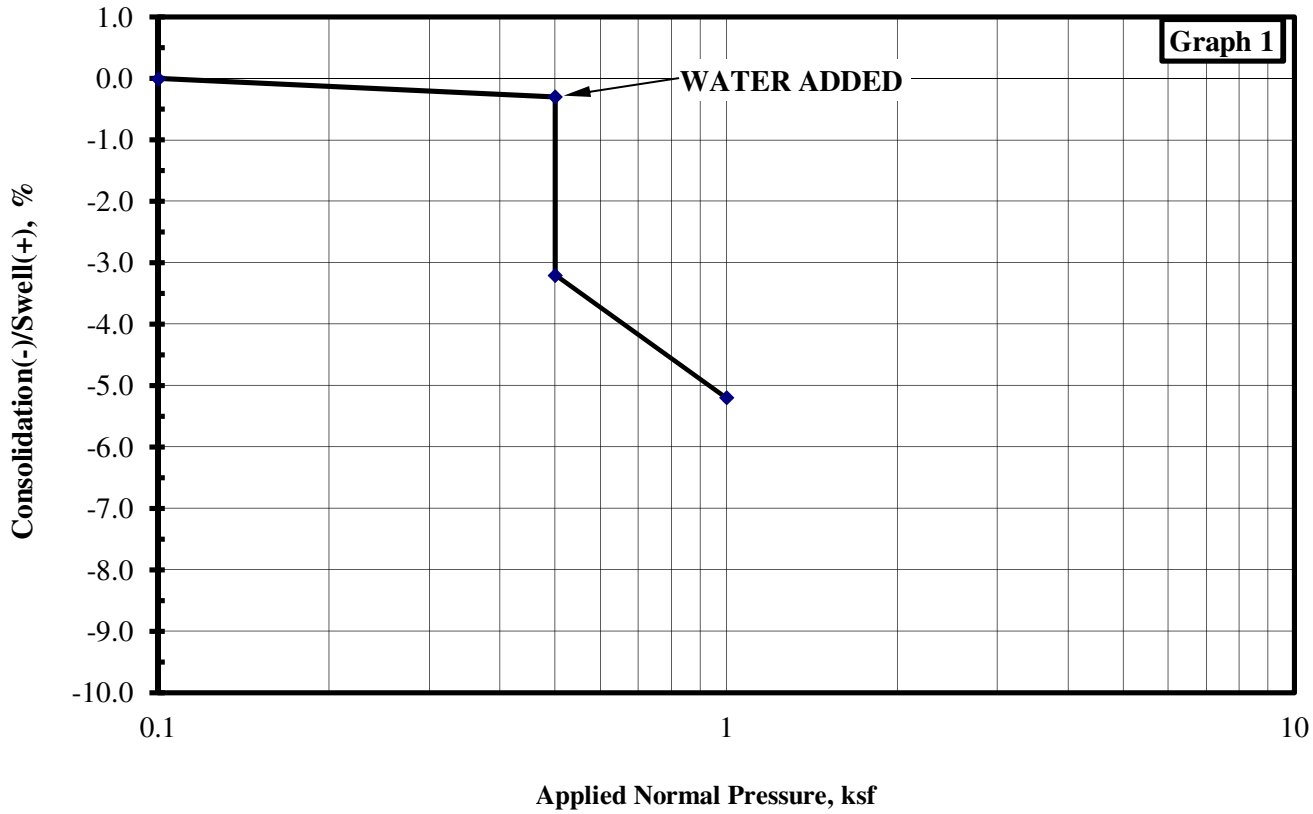
Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	P-8	2	104	7.1	-0.2	FILL SAND (black waste rock material)	Drawn By: KD/SW
2	P-8	2.5	109	16.7	0.0	CLAY with sand (CL)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs Airport Road Site			Figure B-2
YEH & ASSOCIATES, INC.							

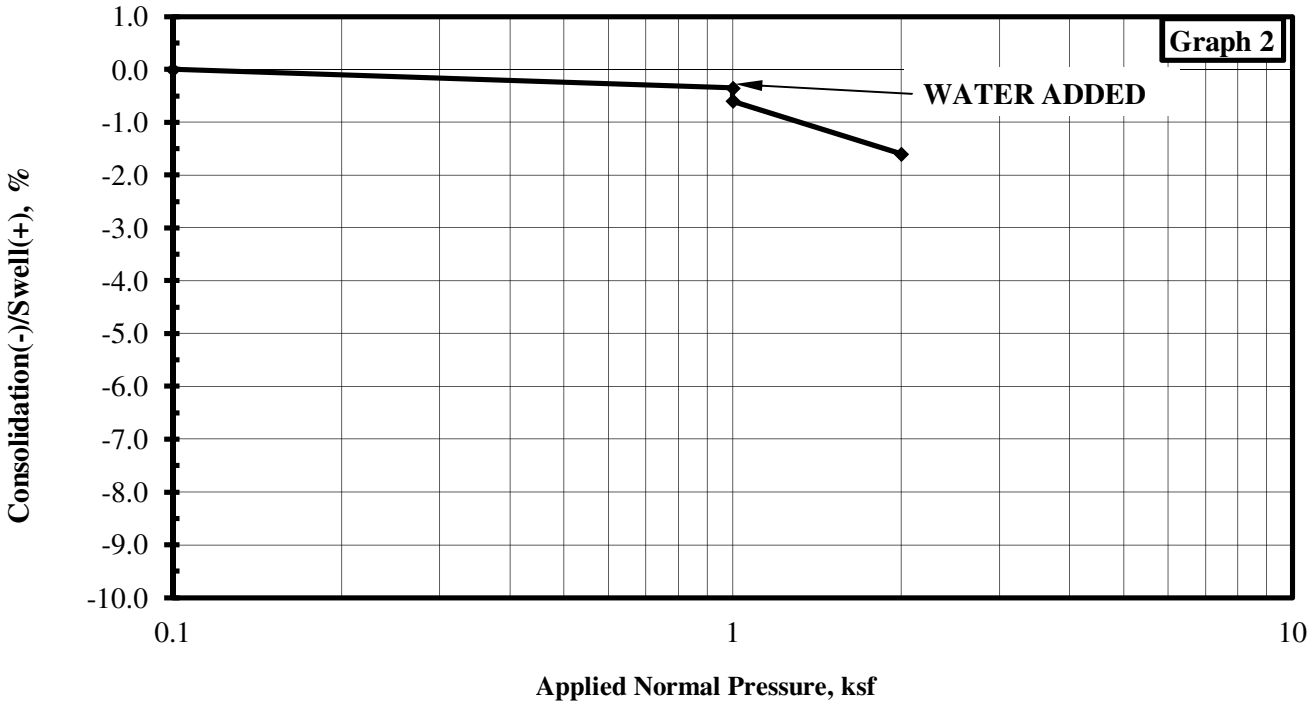




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	P-9	7.5	111	12.6	-0.1	CLAY, sandy (CL)	Drawn By: KD/SW
2	P-9	10.5	122	11.0	-0.2	GRAVEL, clayey (GC)	Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs Airport Road Site				Figure B-3

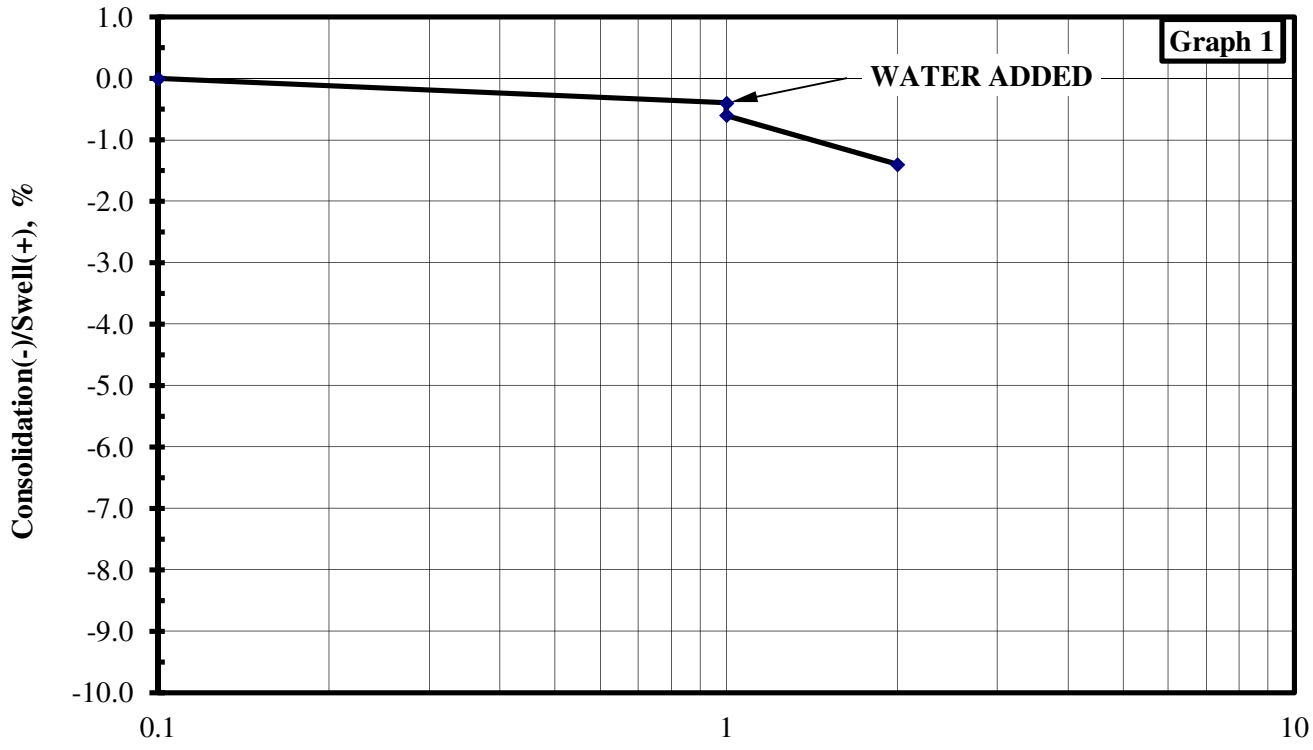
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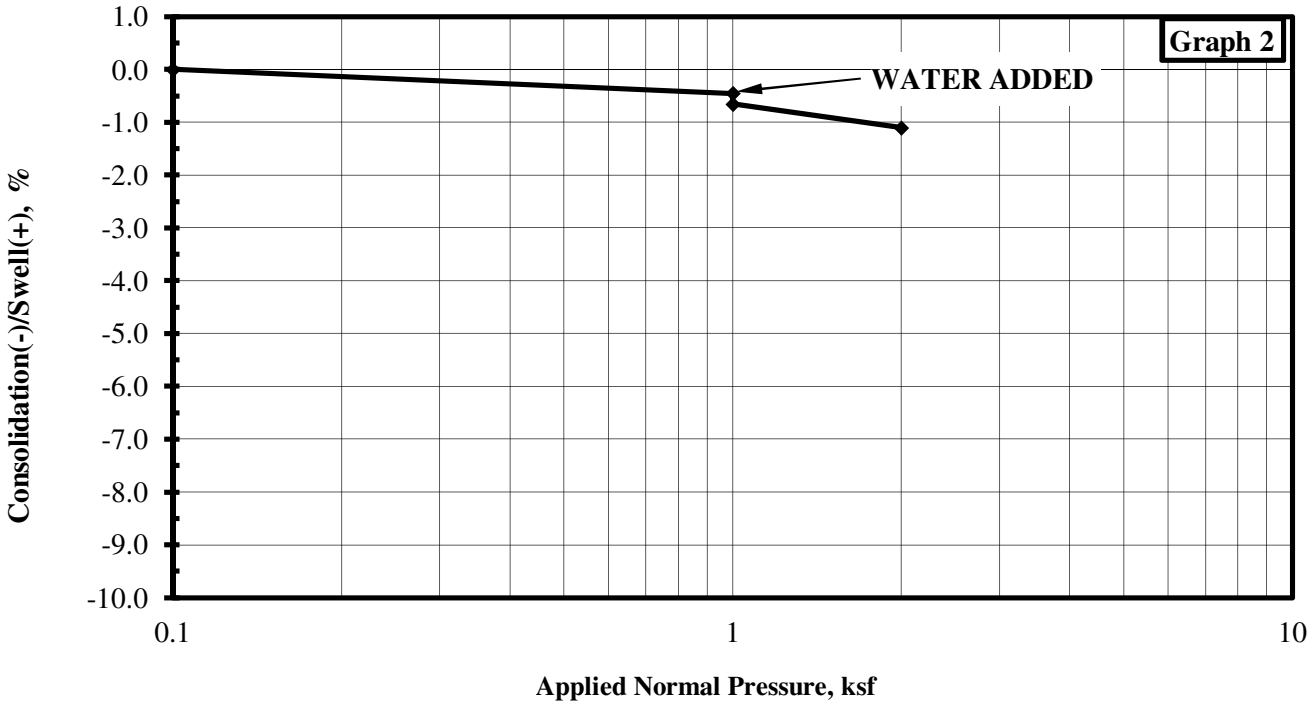




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-19	4	116	3.4	-2.9	GRAVEL, clayey, silty (GC-GM)	Drawn By: KD/SW
2	PW-19	9	120	6.7	-0.3	SAND, clayey (SC)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-4

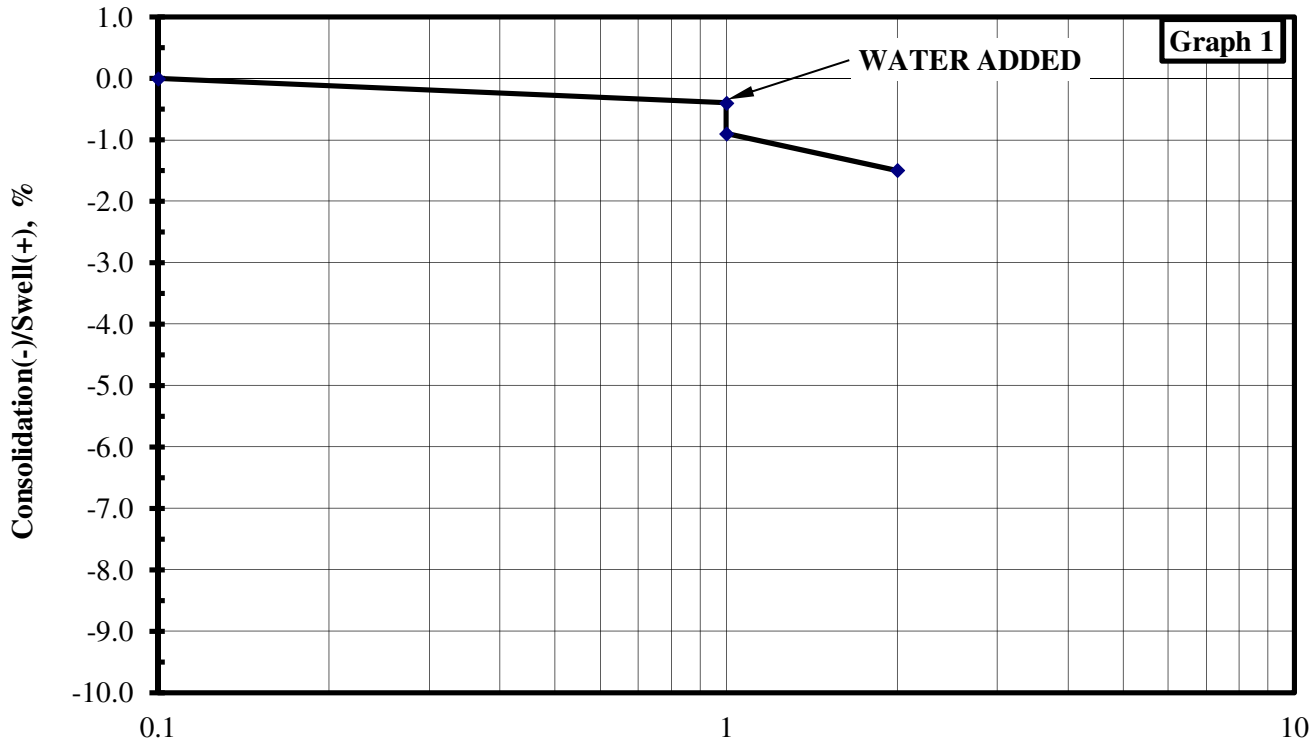
YEH & ASSOCIATES, INC.

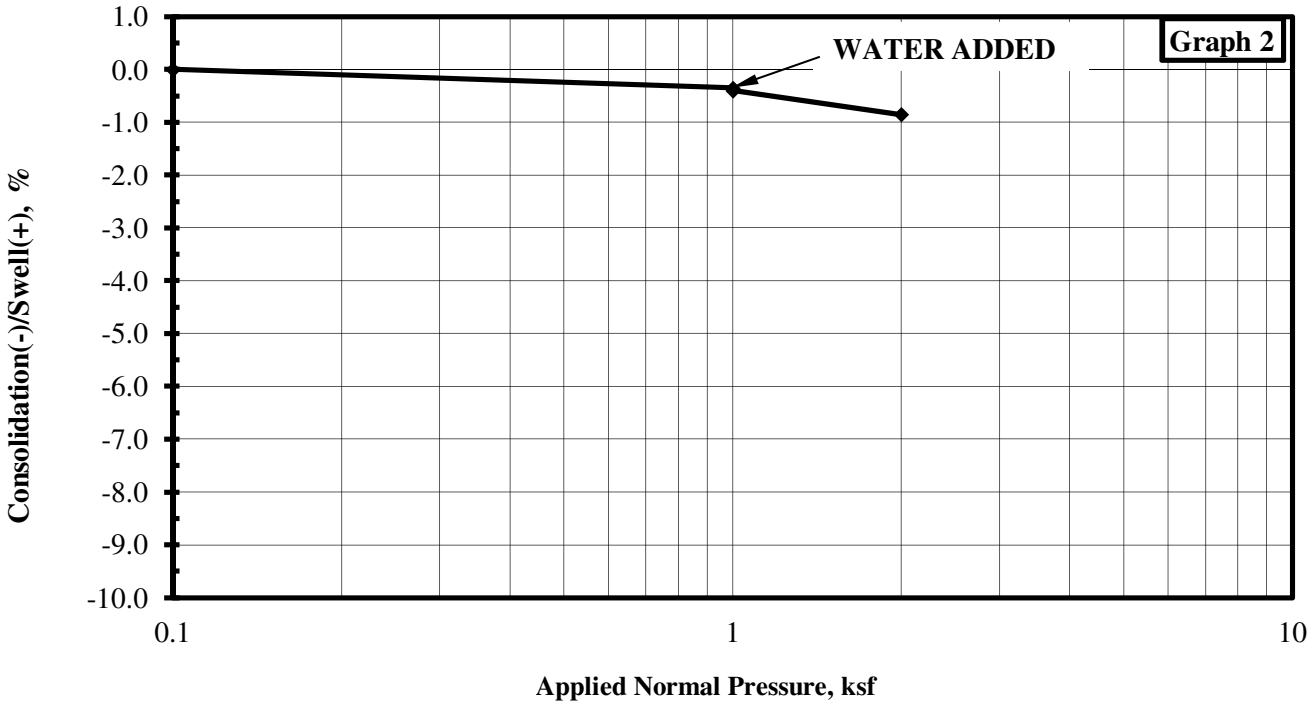




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-19	14	116	9.6	-0.2	SAND, clayey, silty (SC-SM)	Drawn By: KD/SW
2	PW-20	19	127	5.5	-0.2	SAND, clayey, silty (SC-SM)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-5

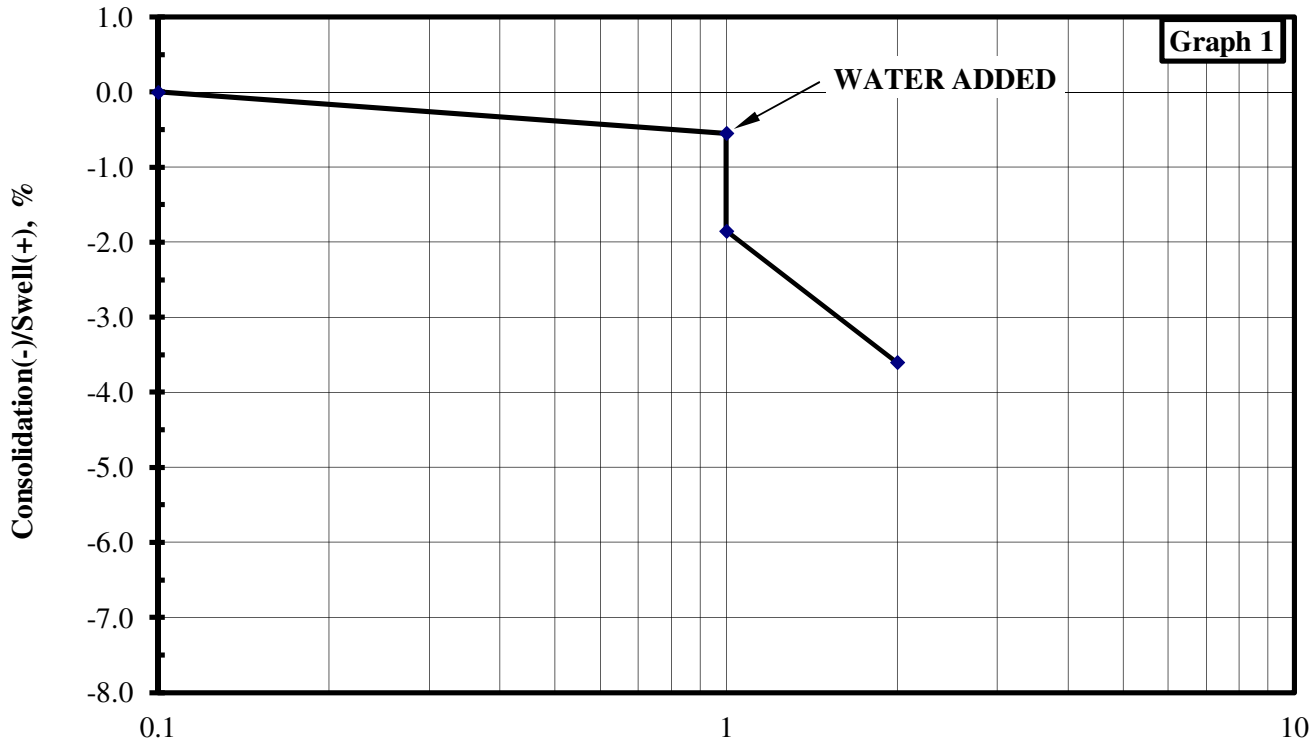
YEH & ASSOCIATES, INC.

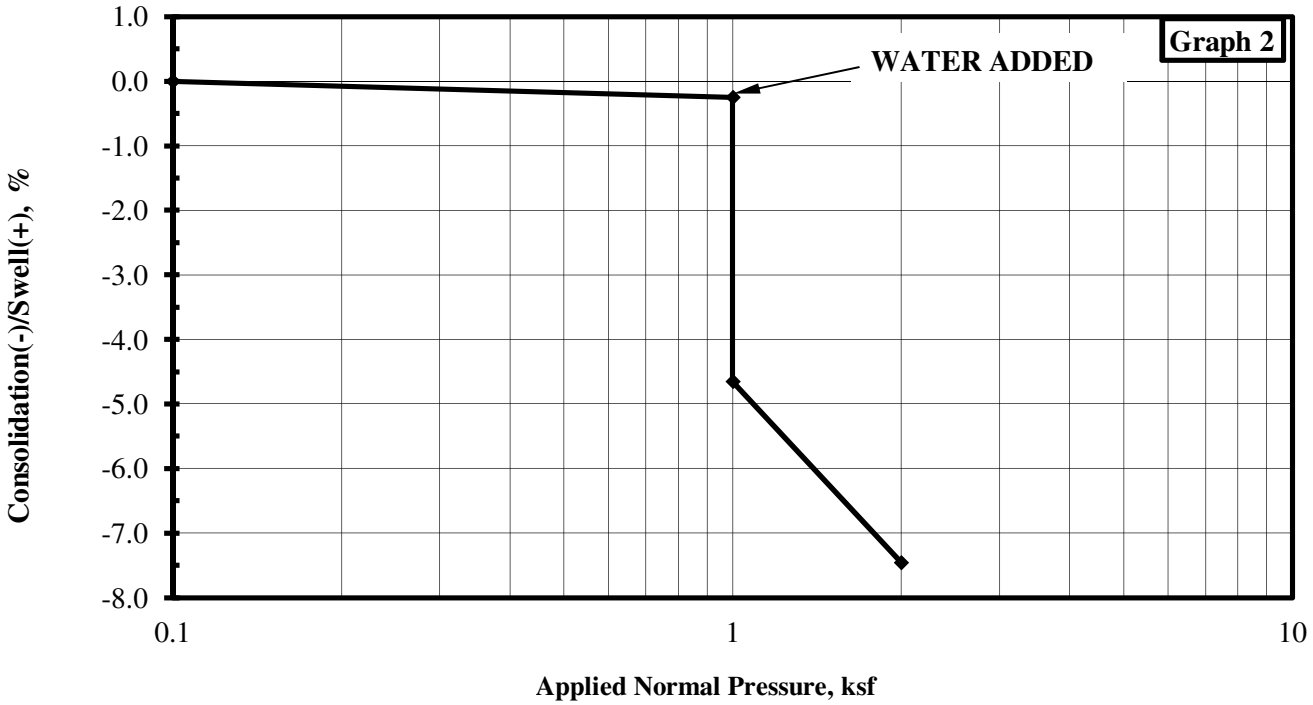




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-20	24	120	8.0	-0.5	SAND, silty (SM)	Drawn By: KD/SW
2	PW-20	34	124	11.6	-0.1	CLAY, silty, sandy (CL-ML)	Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82				Figure B-6

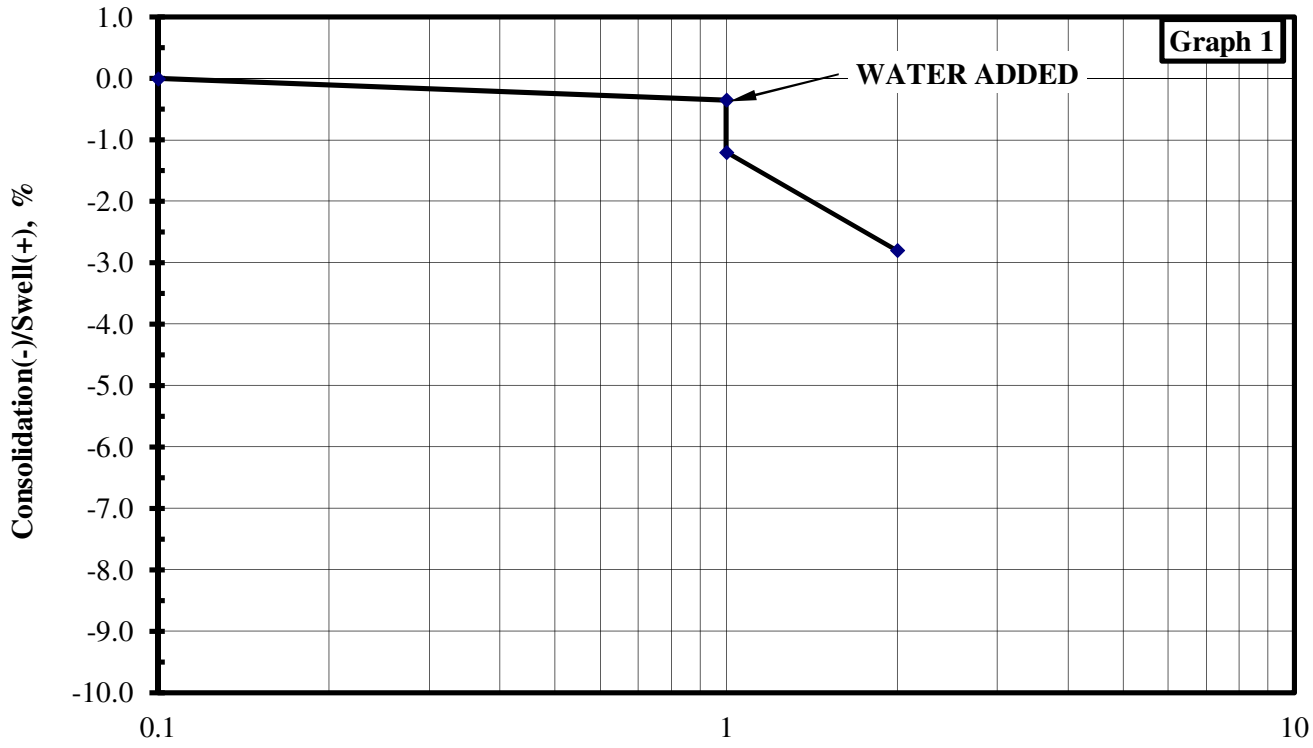
YEH & ASSOCIATES, INC.

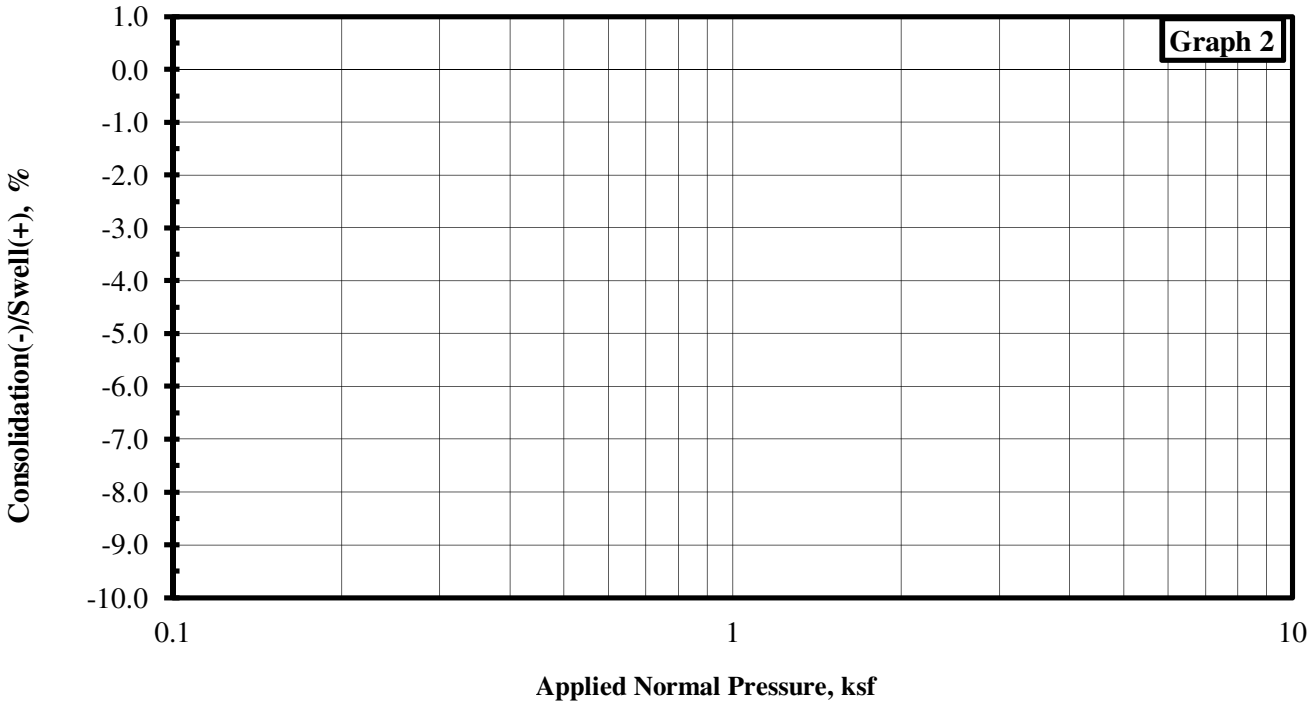




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	A-3	9	111	4.1	-1.3	GRAVEL, clayey, silty (GC-GM)	Drawn By: KD/SW
2	A-3	24	106	6.1	-4.4	GRAVEL, clayey, silty (GC-GM)	Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82 - SH 82 Abutments				Figure B-7

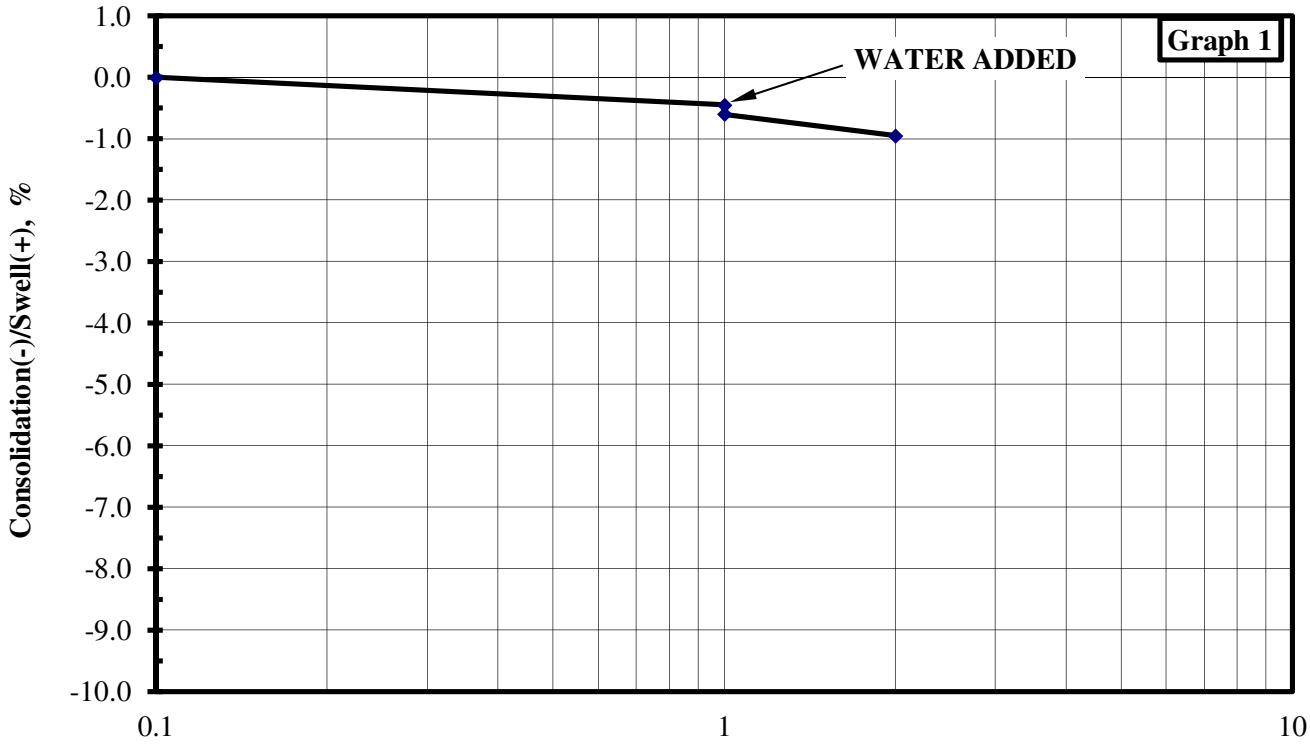
YEH & ASSOCIATES, INC.

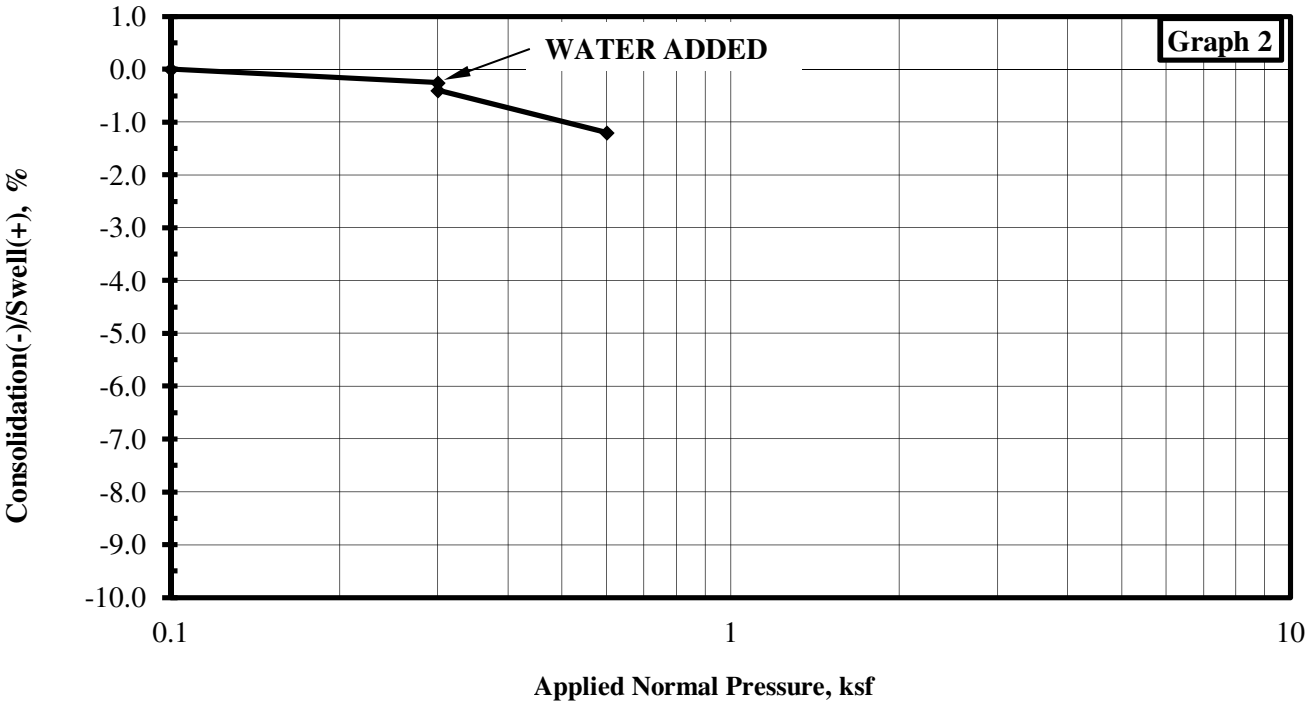




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-22	17	123	5.2	-0.9	GRAVEL, silty (GM)	Drawn By: KD/SW
2							Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82				Figure B-8

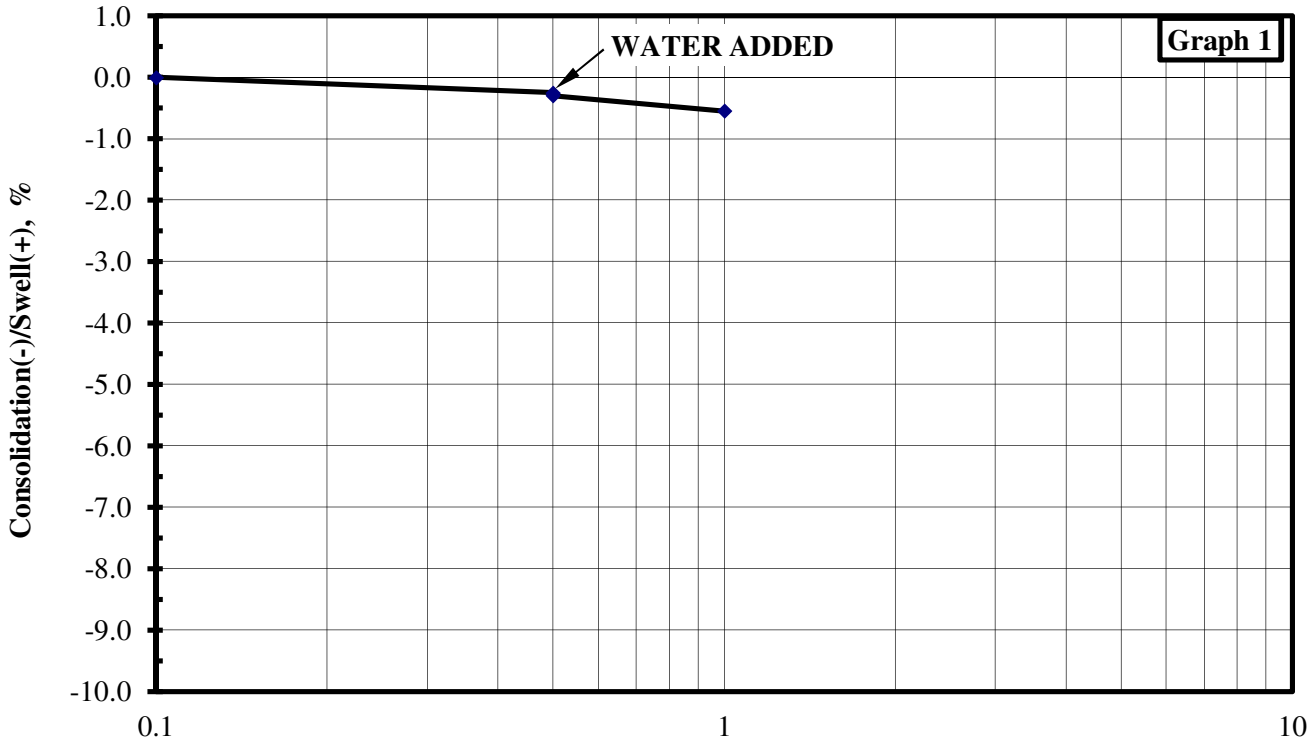
YEH & ASSOCIATES, INC.

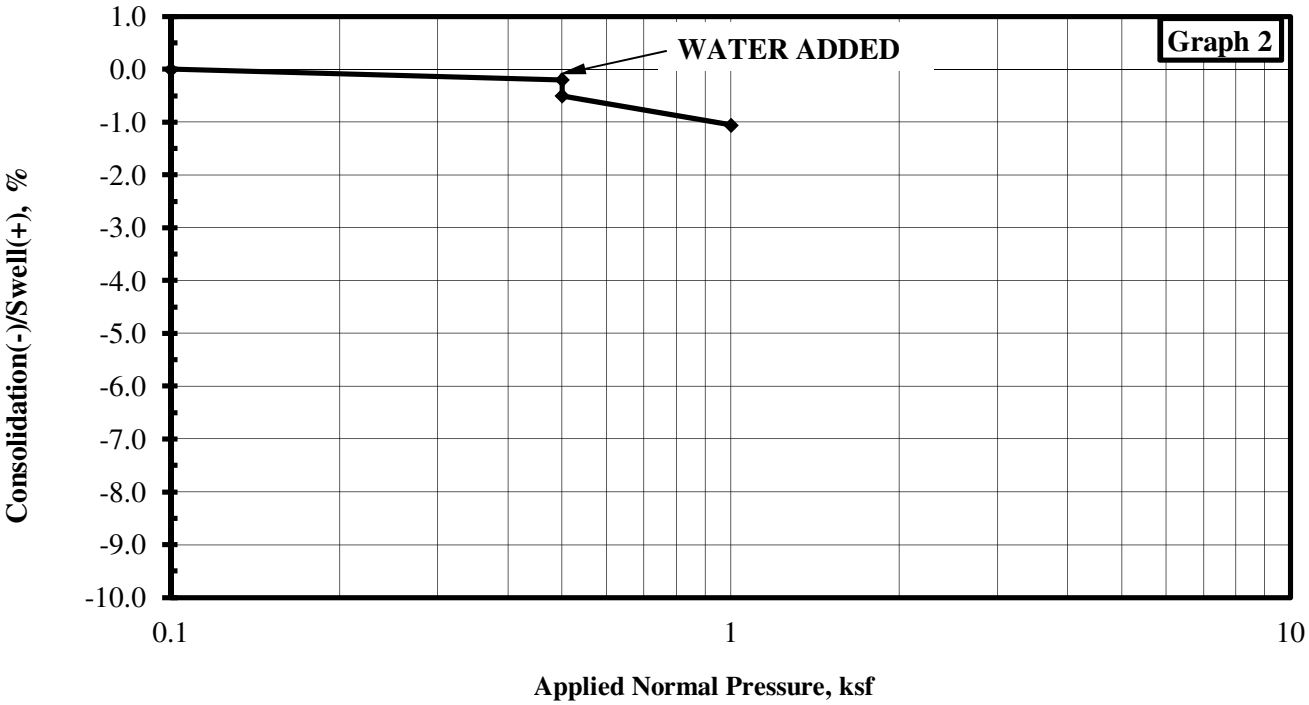




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-23	9	124	9.0	-0.2	SAND, clayey, silty (SC-SM)	Drawn By: KD/SW
2	PW-24	2	116	8.9	-0.2	SAND, silty (SM)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-9

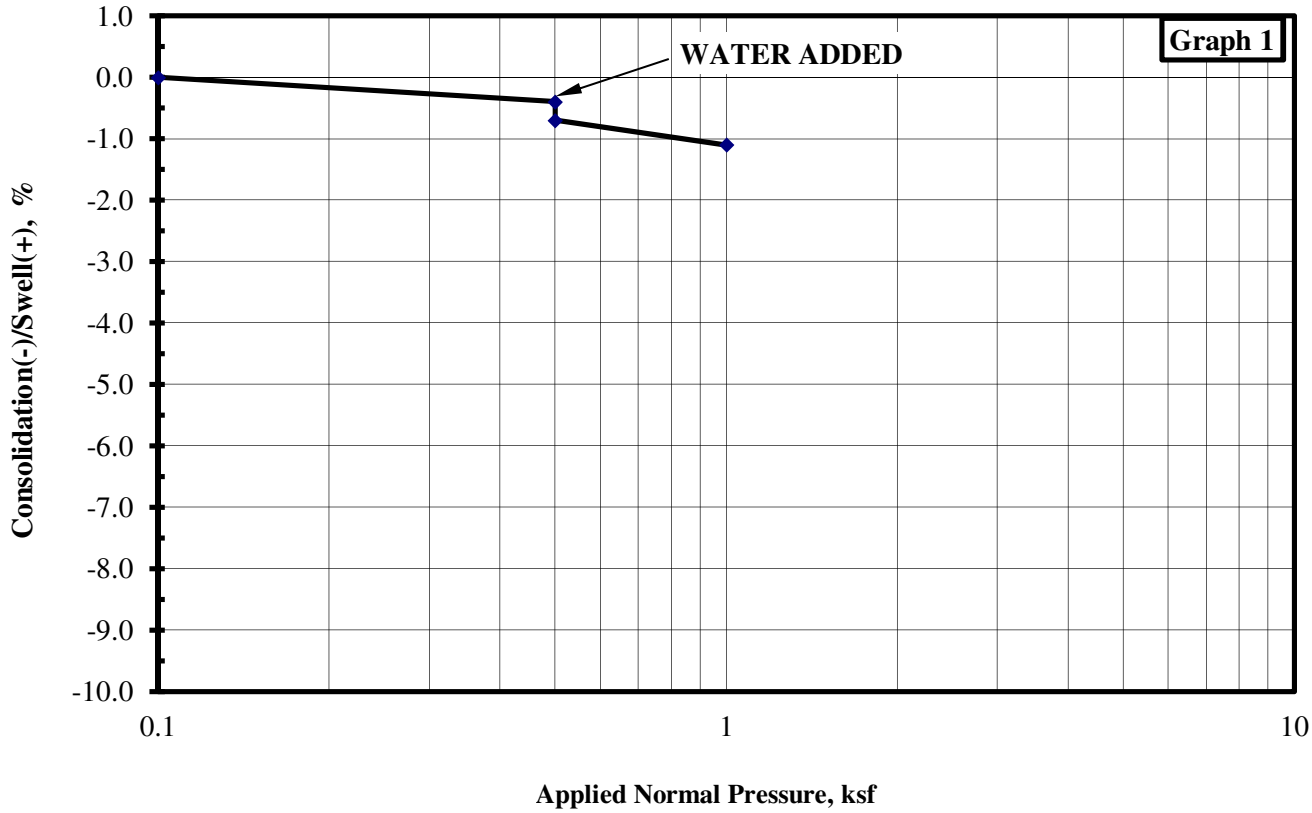
YEH & ASSOCIATES, INC.

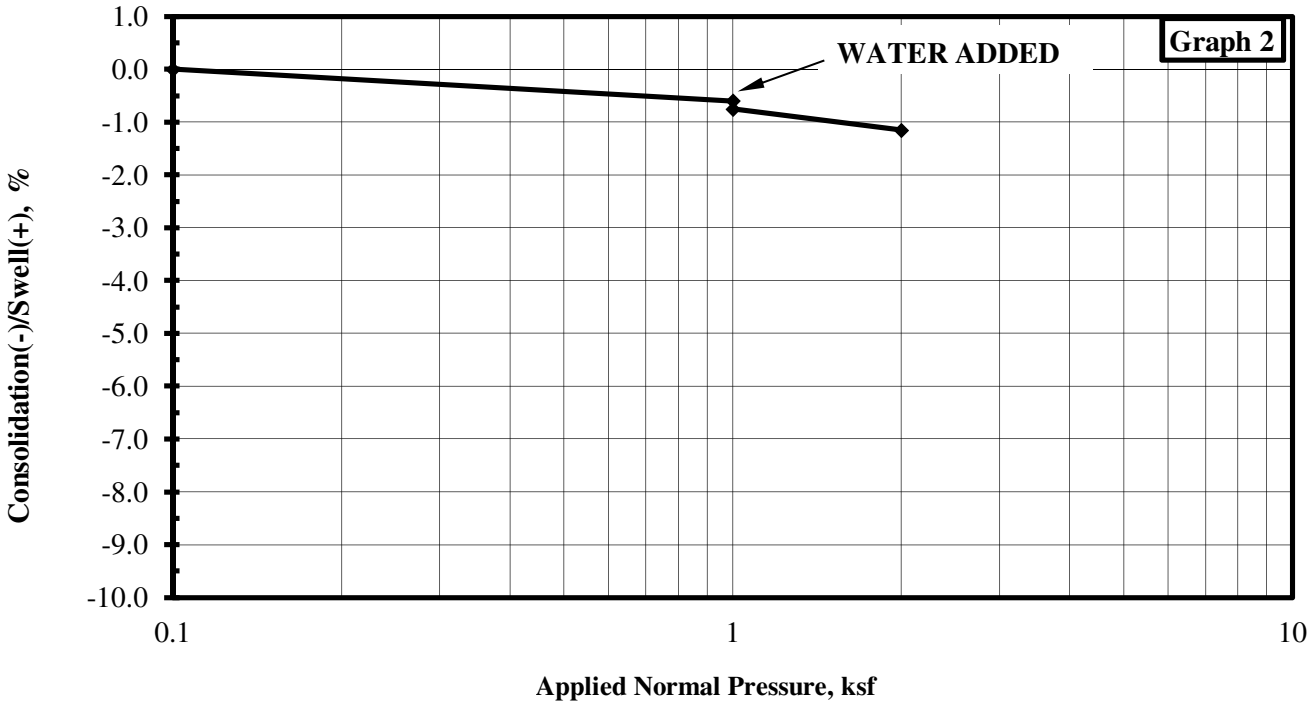




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-24	4	122	8.2	-0.1	GRAVEL,clayey,silty (GC-GM)	Drawn By: KD/SW
2	PW-24	7	119	5.8	-0.3	GRAVEL,clayey,silty (GC-GM)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-10

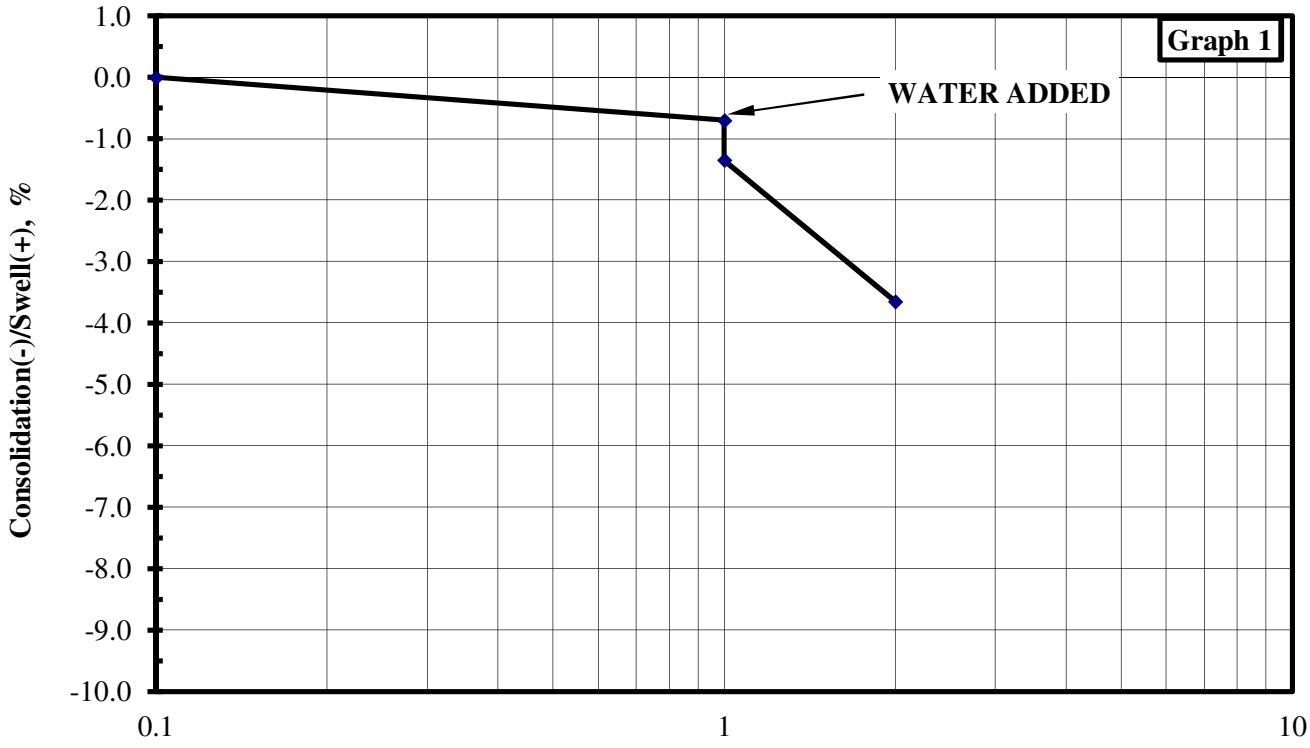
YEH & ASSOCIATES, INC.

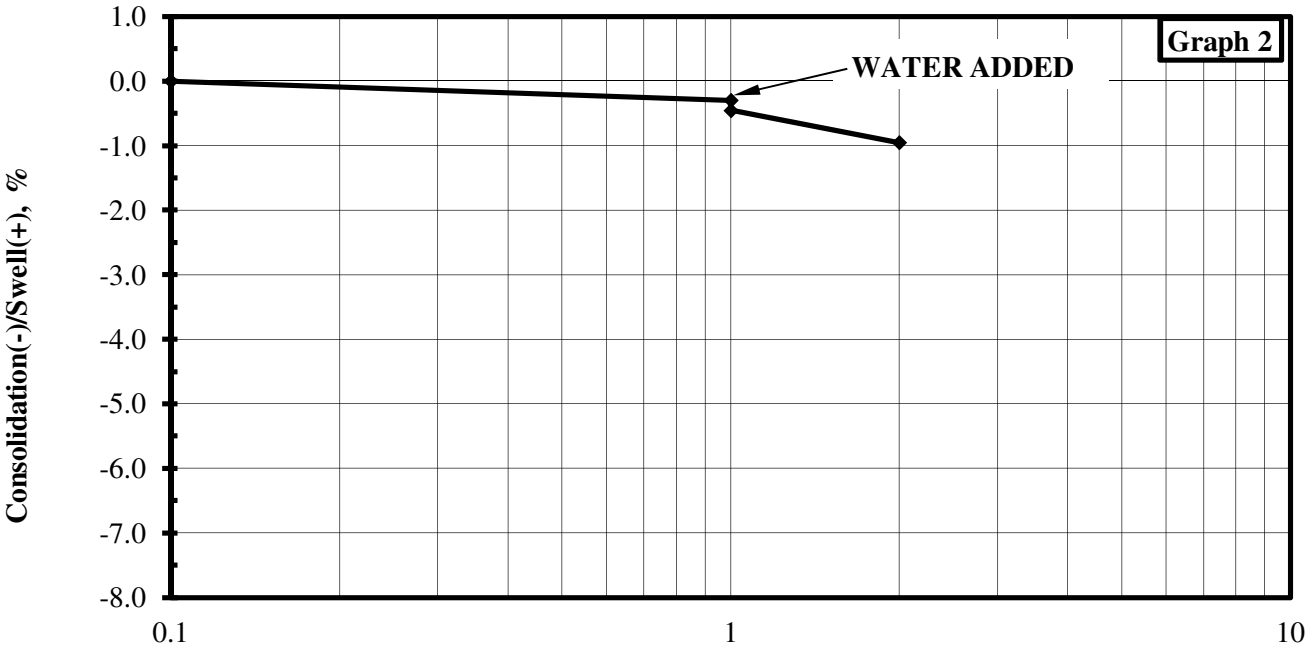




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-25	1.5	117	9.4	-0.3	SAND, clayey, silty (SC-SM)	Drawn By: KD/SW
2	PW-25	9	120	9.9	-0.2	GRAVEL,clayey,silty	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-11

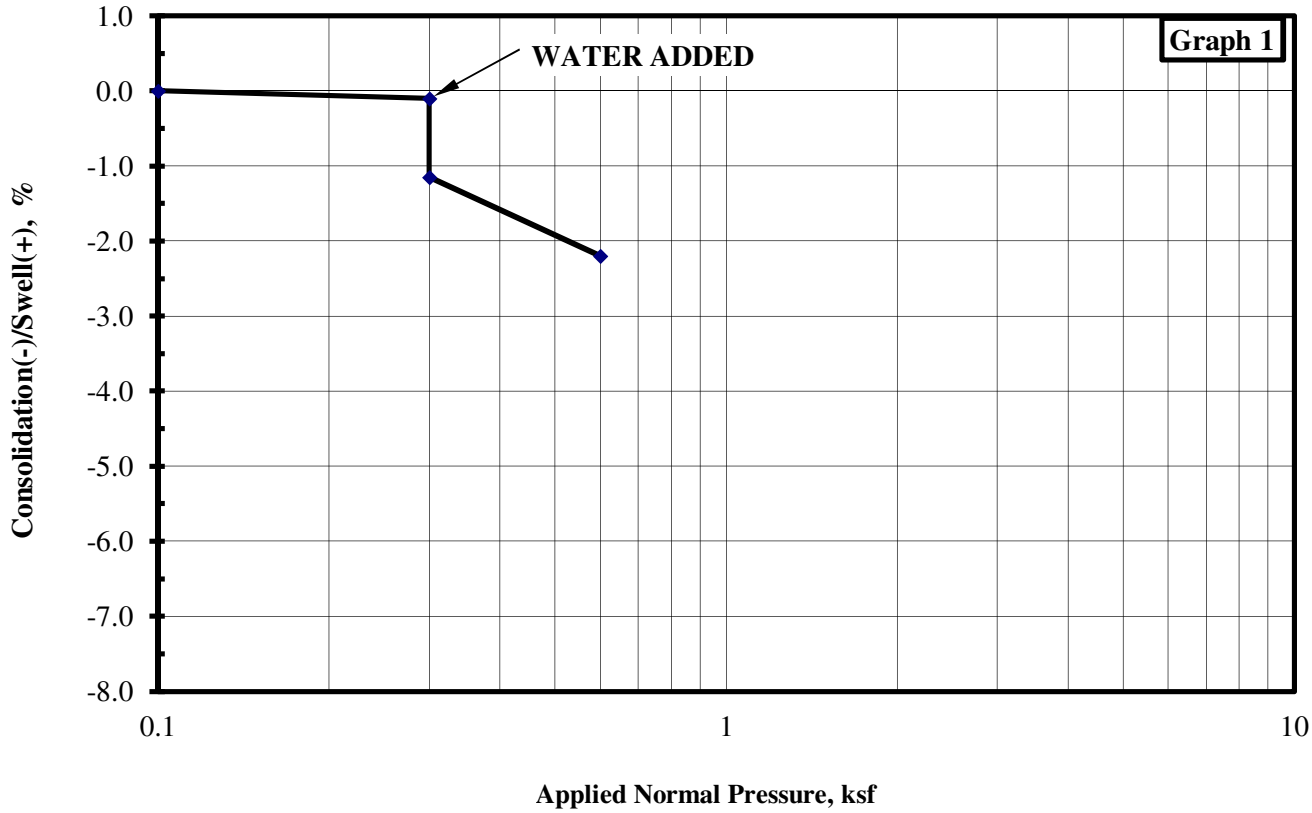
YEH & ASSOCIATES, INC.

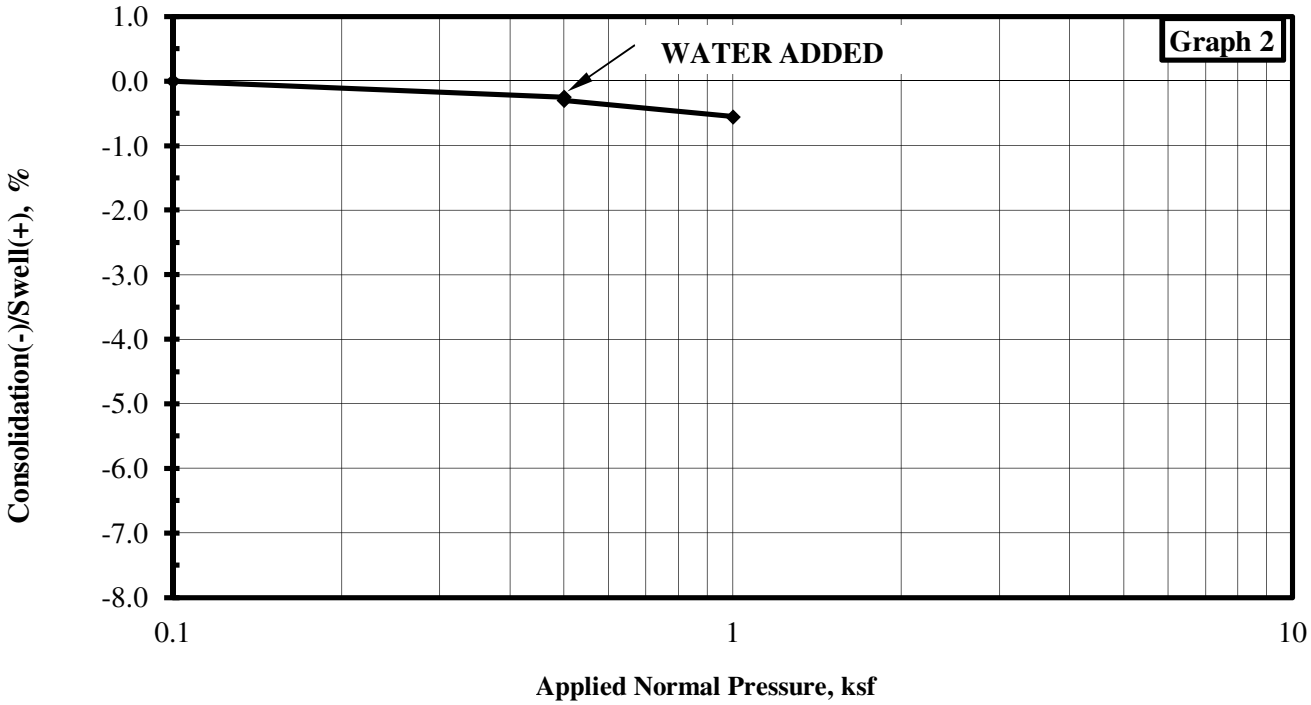




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-26	4	114	8.5	-0.7	GRAVEL,clayey, silty (GC-GM)	Drawn By: KD/SW
2	P-27	9	116	9.2	-0.2	CLAY, sandy (CL)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-12

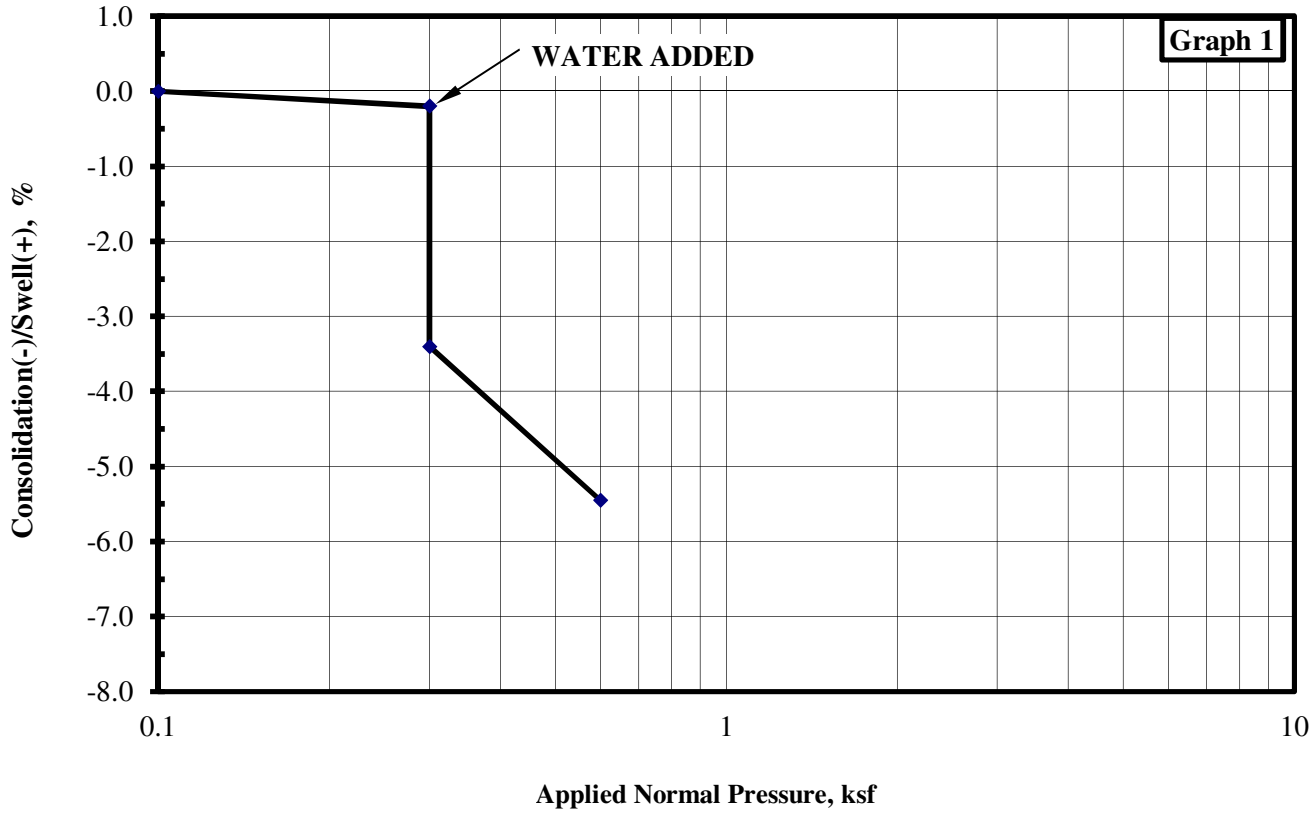
YEH & ASSOCIATES, INC.

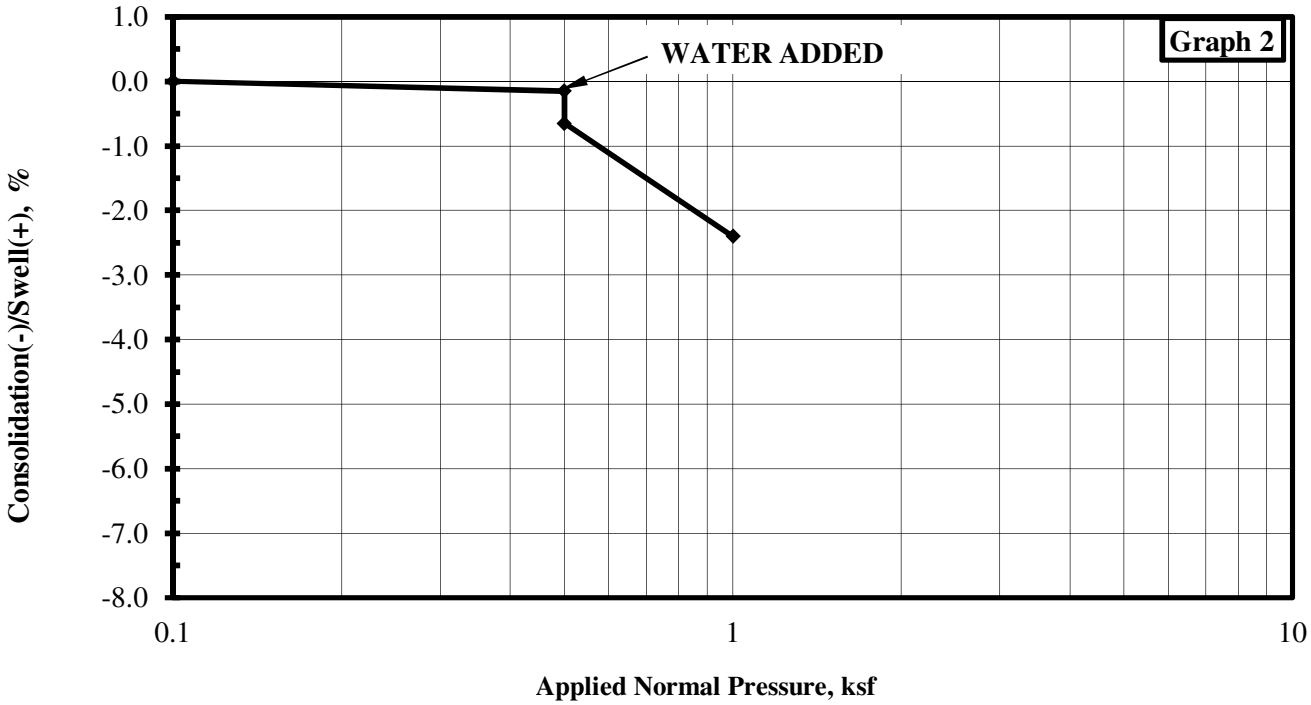




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	P-29	2.5	113	4.3	-1.1	SAND, clayey,silty (SC-SM)	Drawn By: KD/SW
2	P-30	5	128	6.1	-0.1	GRAVEL,clayey,silty (GC-GM)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-13

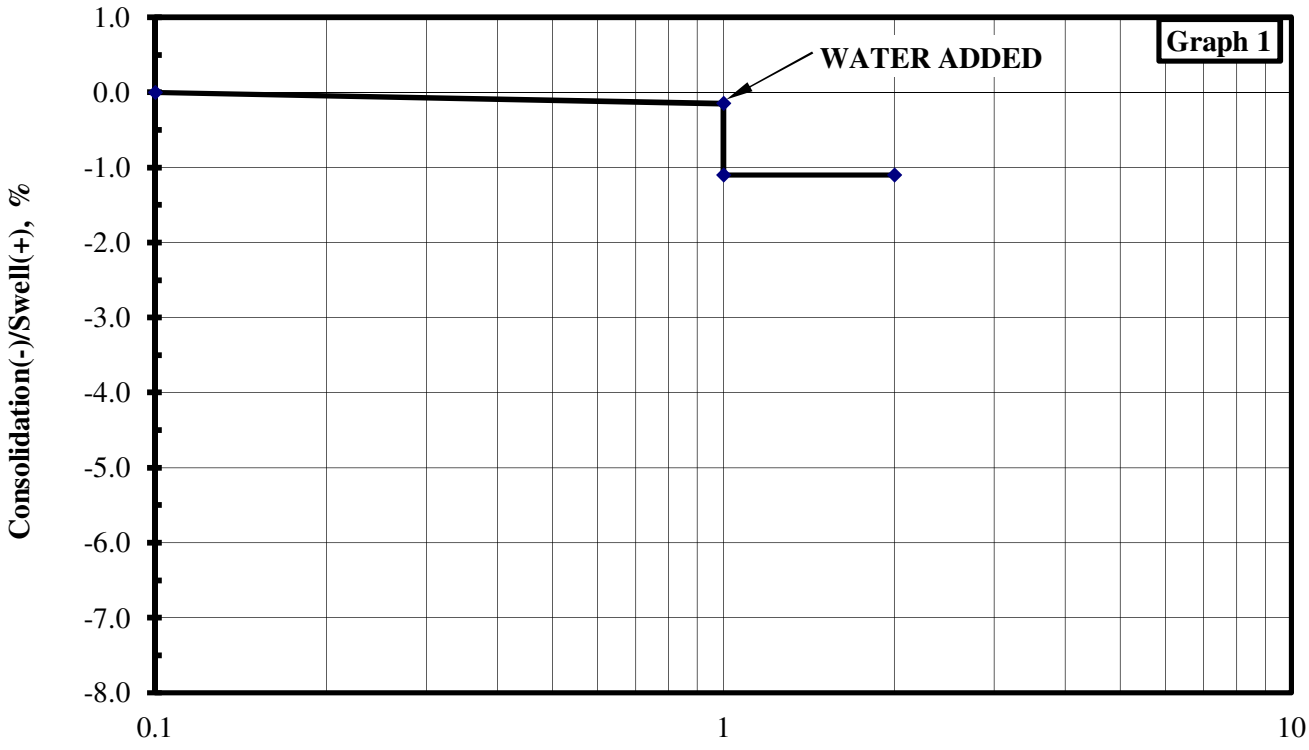
YEH & ASSOCIATES, INC.

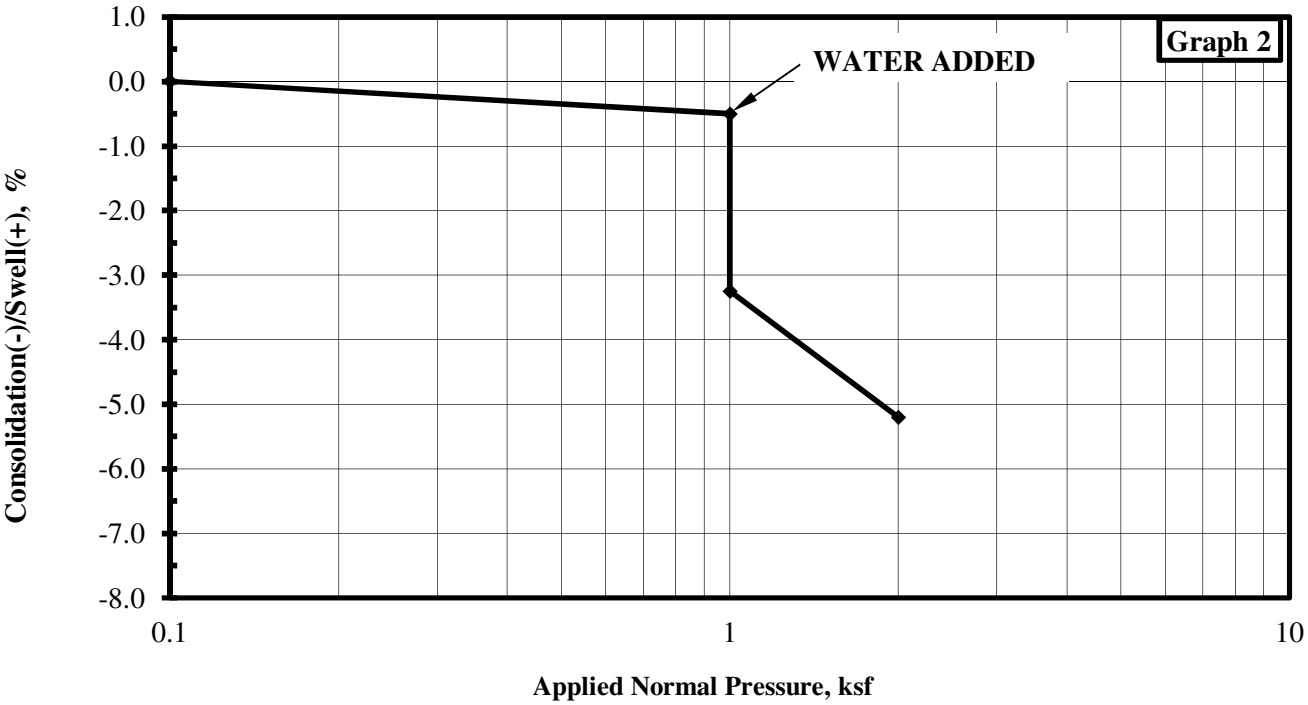




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-31	2	103	3.1	-3.2	SAND, clayey,silty (SC-SM)	Drawn By: KD/SW
2	PW-31	4	112	2.2	-0.5	SAND, clayey,silty (SC-SM)	Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82				Figure B-14

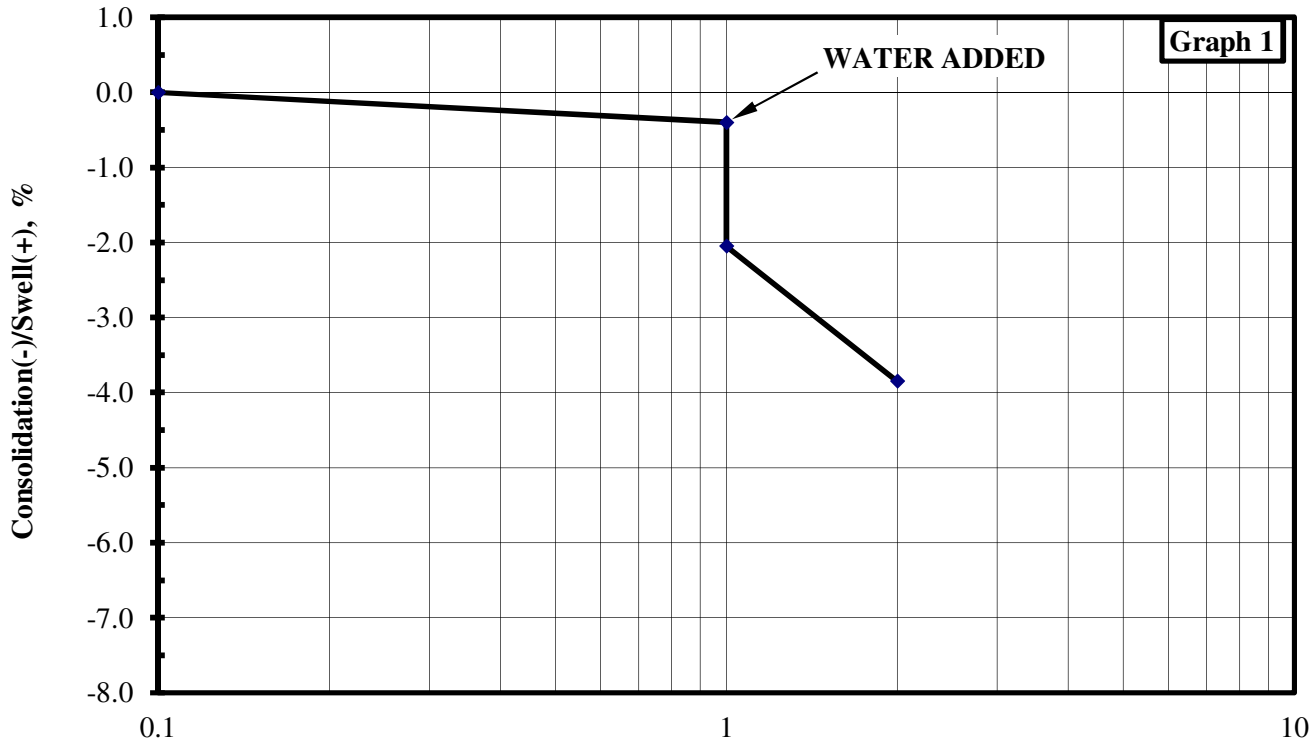
YEH & ASSOCIATES, INC.

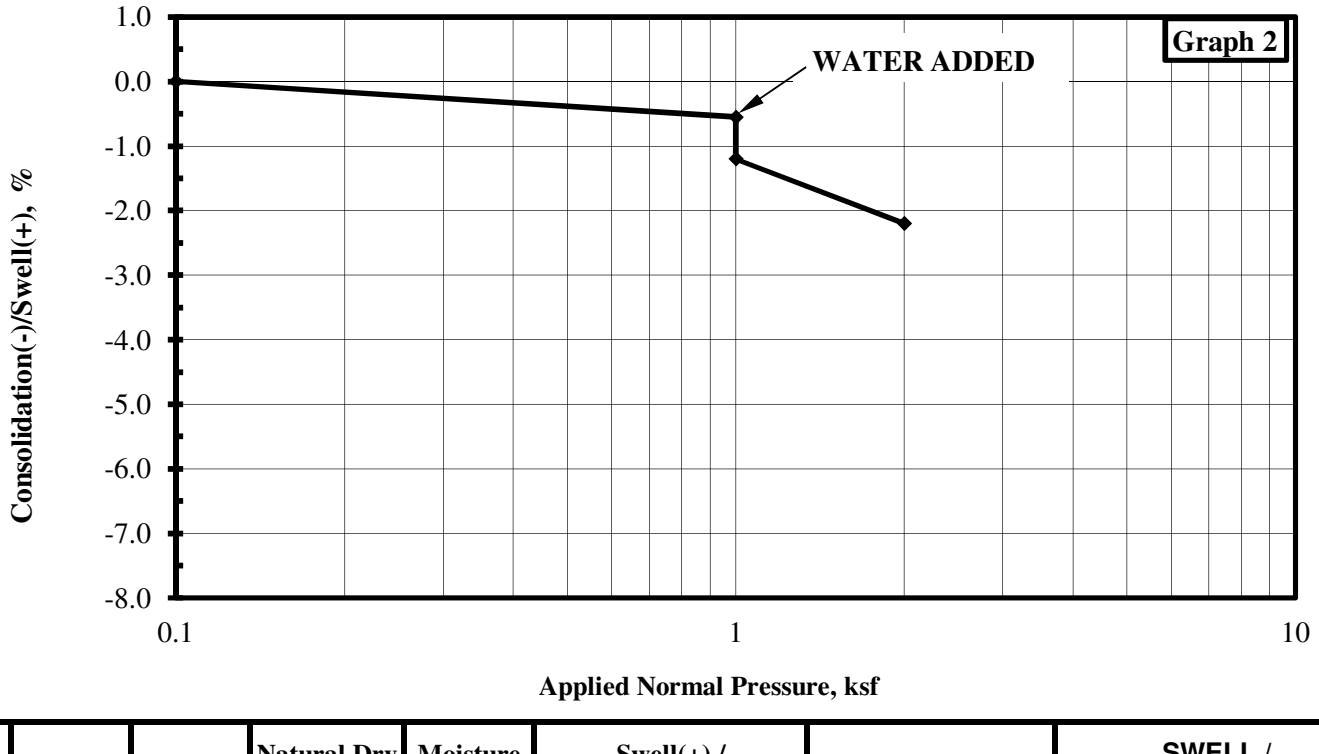




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	PW-31	7	118	2.3	-1.0	SAND, clayey,silty (SC-SM)	Drawn By: KD/SW
2	W-32	12	118	2.2	-2.8	SAND, clayey,silty (SC-SM)	Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82				Figure B-15

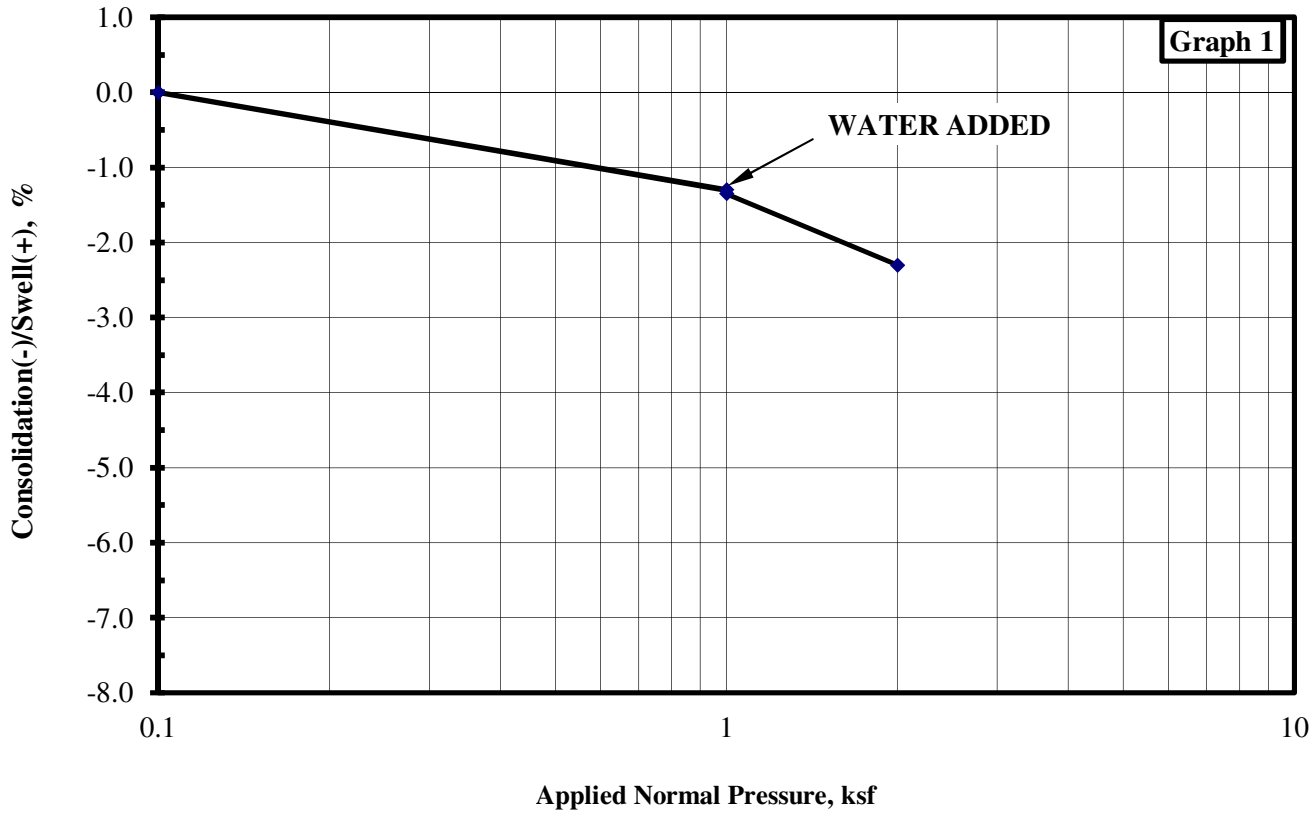
YEH & ASSOCIATES, INC.

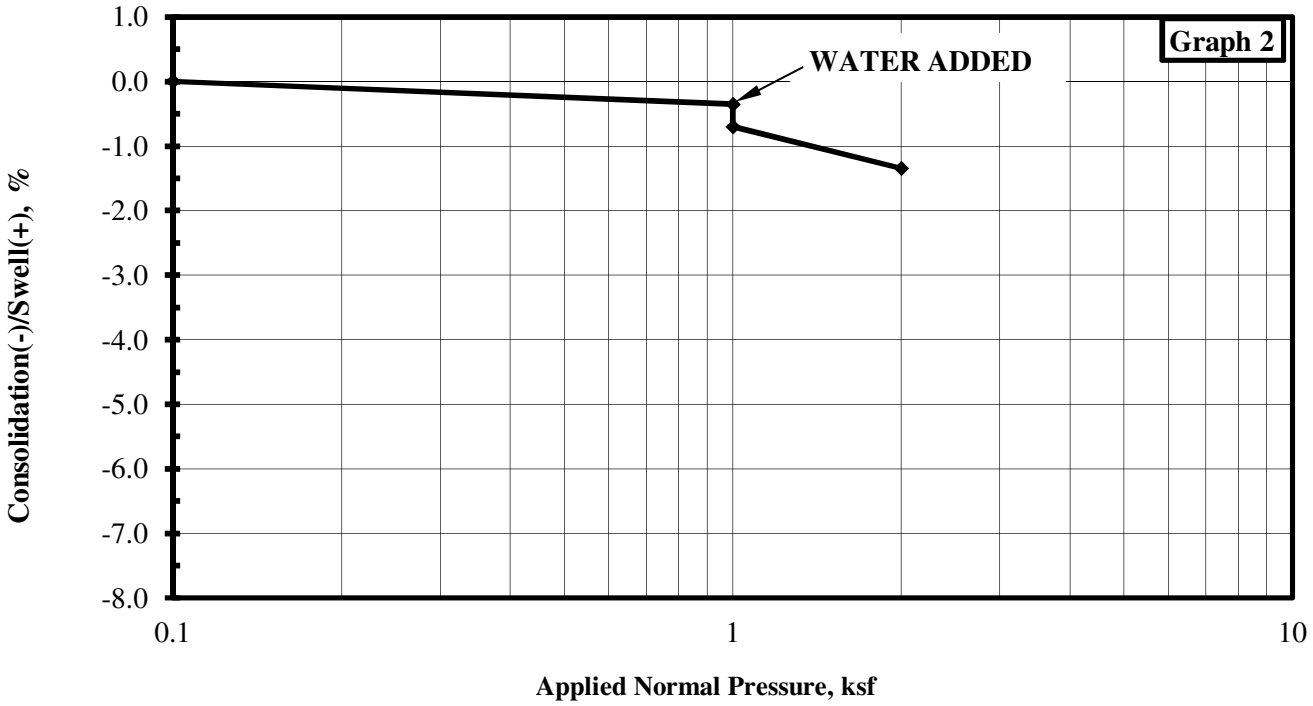




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	W-32	27	121	2.5	-1.6	GRAVEL,clayey,silty (GC-GM)	Drawn By: KD/SW
2	W-32	37	128	5.9	-0.7	GRAVEL,clayey,silty (GC-GM)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-16

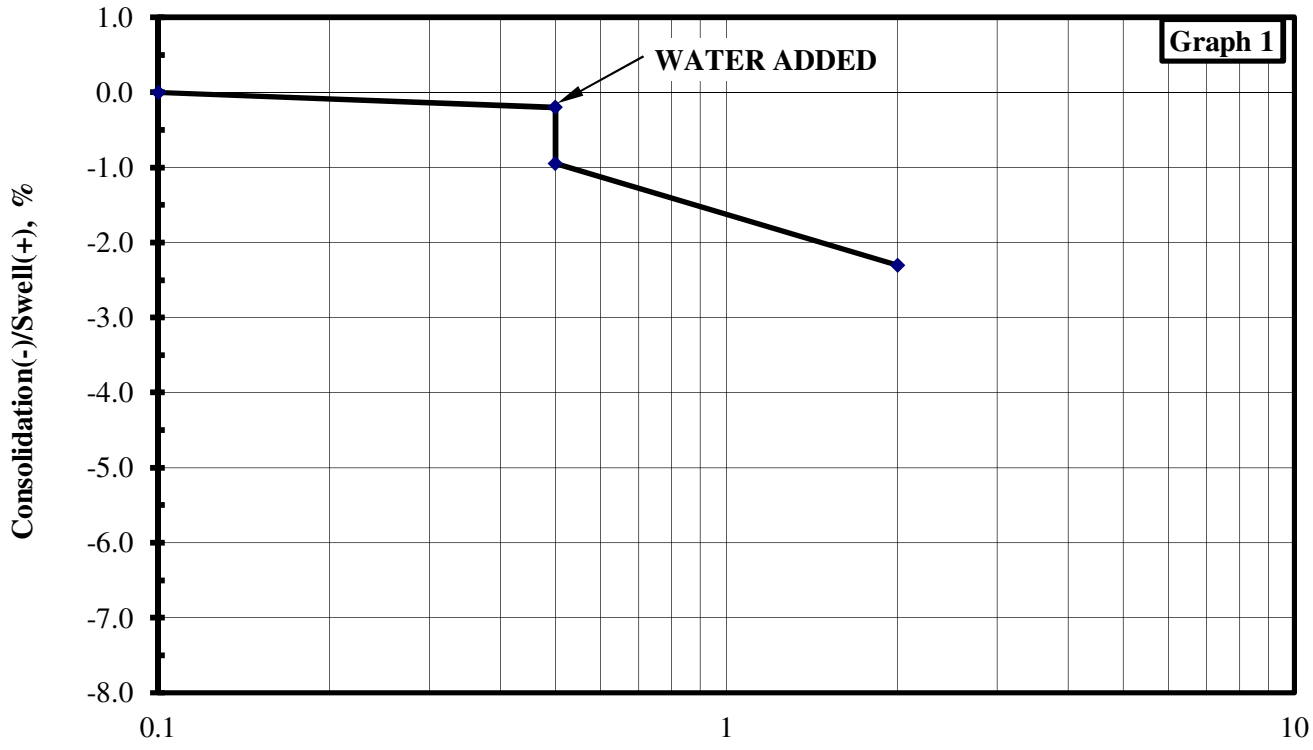
YEH & ASSOCIATES, INC.

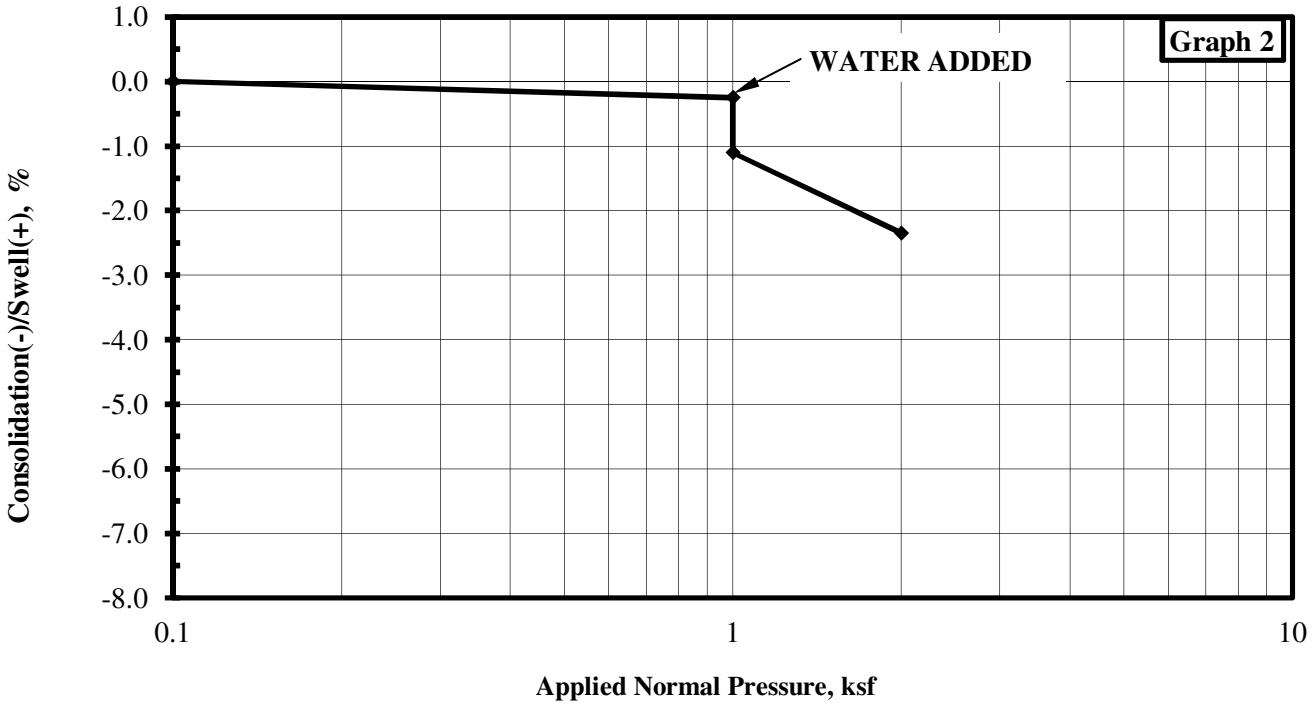




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	W-32	57	99	25.6	-0.1	CLAY (CL)	Drawn By: KD/SW
2	W-33	27	122	3.6	-0.4	GRAVEL, clayey, silty (GC-GM)	Checked By: SWR
Job No:	216-417	Project Name:		South Bridge, Glenwood Springs State Highway 82			Figure B-17

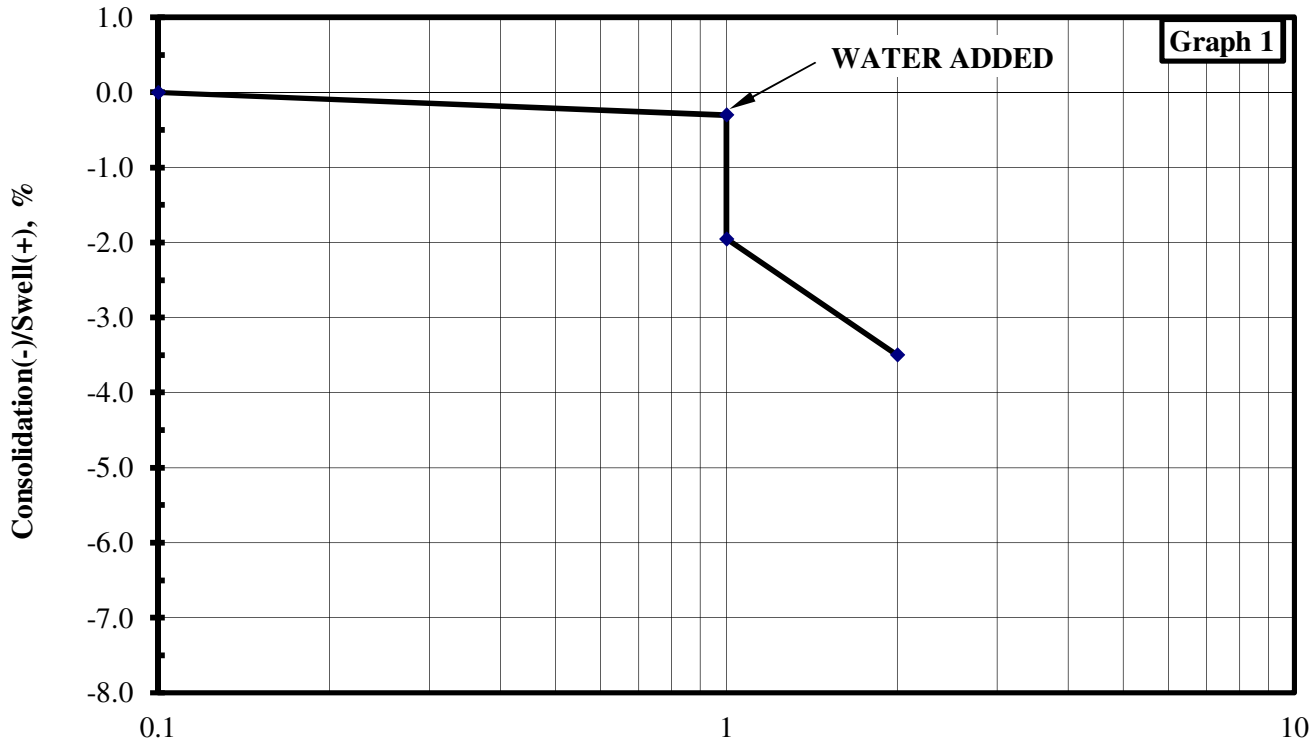
YEH & ASSOCIATES, INC.

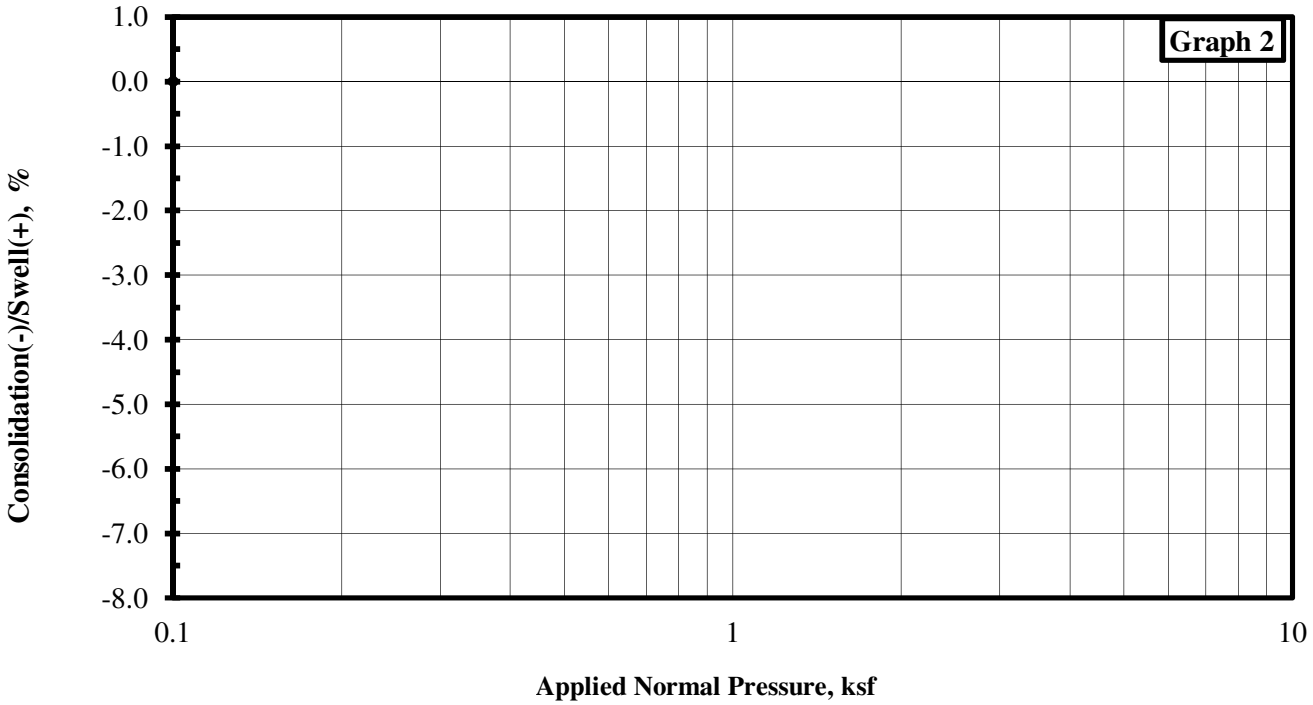




Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	W-34	4	114	4.9	-0.8	SAND, clayey,silty (SC-SM)	Drawn By: KD/SW
2	W-34	8	127	2.8	-0.8	GRAVEL,clayey,silty (GC-GM)	Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82				Figure B-18

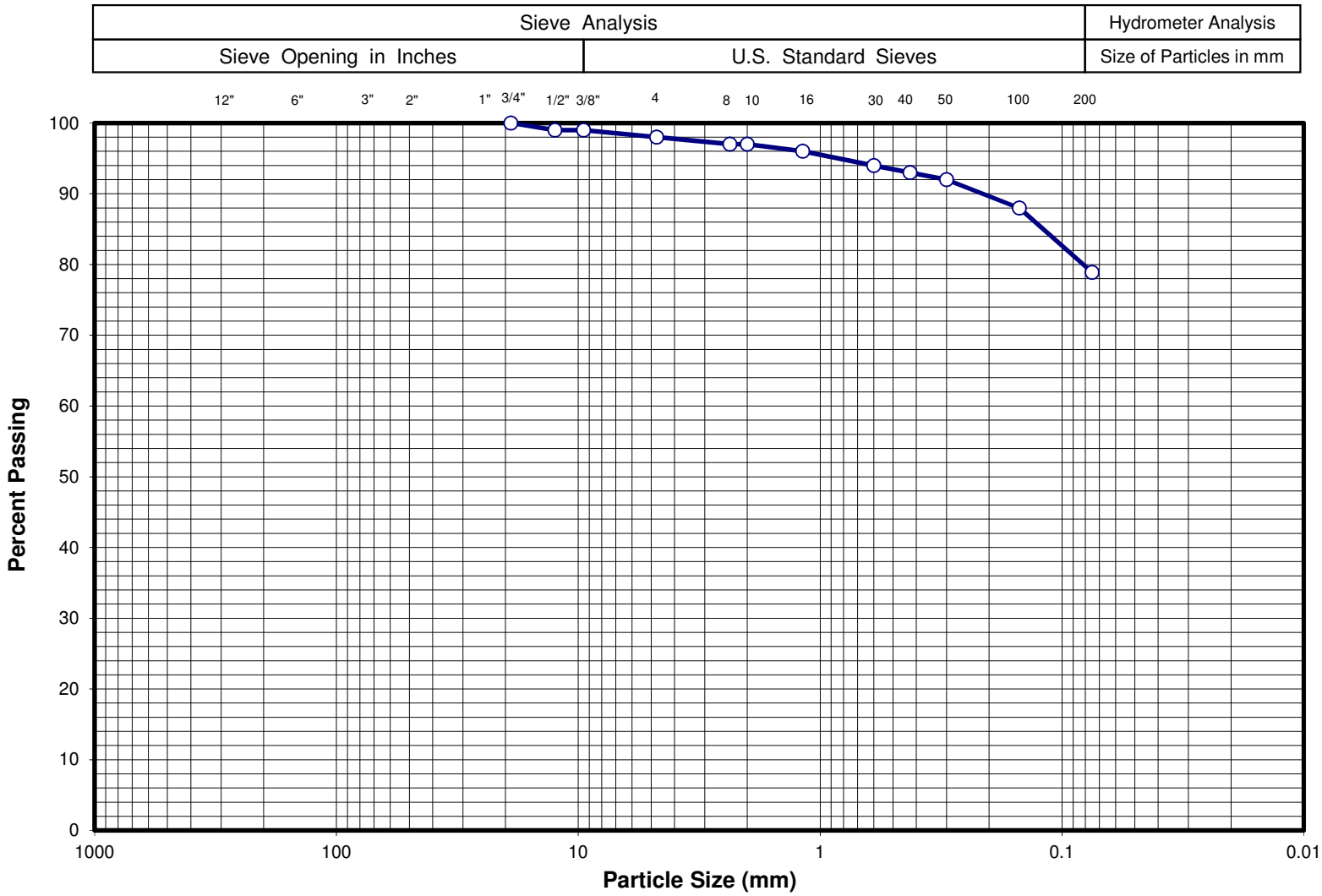
YEH & ASSOCIATES, INC.





Graph Number	Boring Number	Depth (ft)	Natural Dry Density (pcf)	Moisture Content (%)	Swell(+) / Consolidation(-) (%)	Soil Description	SWELL / CONSOLIDATION GRAPH
1	W-34	14	133	1.4	-1.7	GRAVEL,clayey,silty (GC-GM)	Drawn By: KD
2							Checked By: SWR
Job No:	216-417	Project Name:	South Bridge, Glenwood Springs State Highway 82				Figure B-19

YEH & ASSOCIATES, INC.



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	99
⅜"	99
#4	98
#10	97
#40	93
#200	79

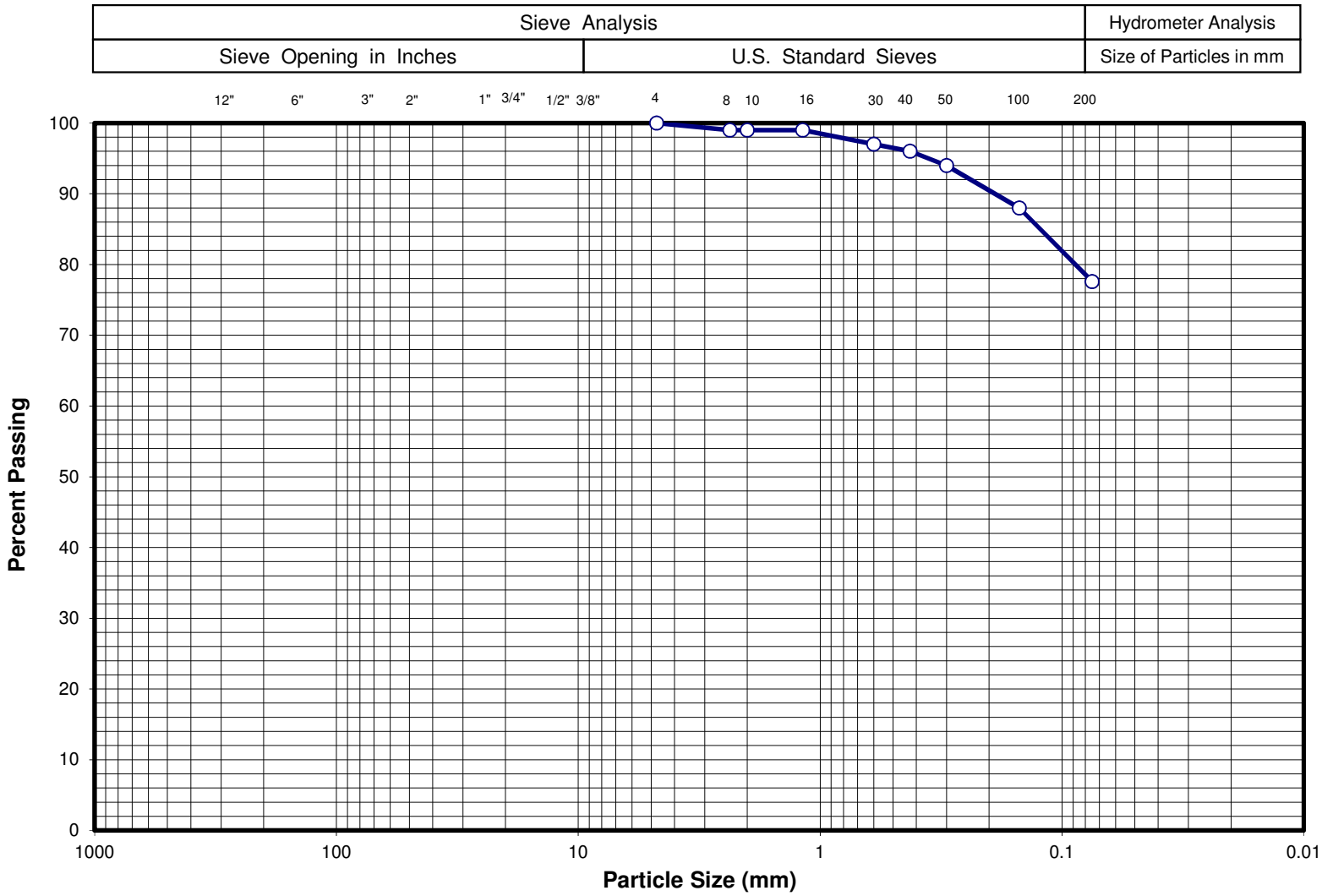
Gravel (%)	2	LL	27	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	19	PL	16	Sample ID:	P-1
Fines (%)	79	PI	11	Sample Depth (ft.):	1.5
Sample Description:	FILL CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-20

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	99
#40	96
#200	78

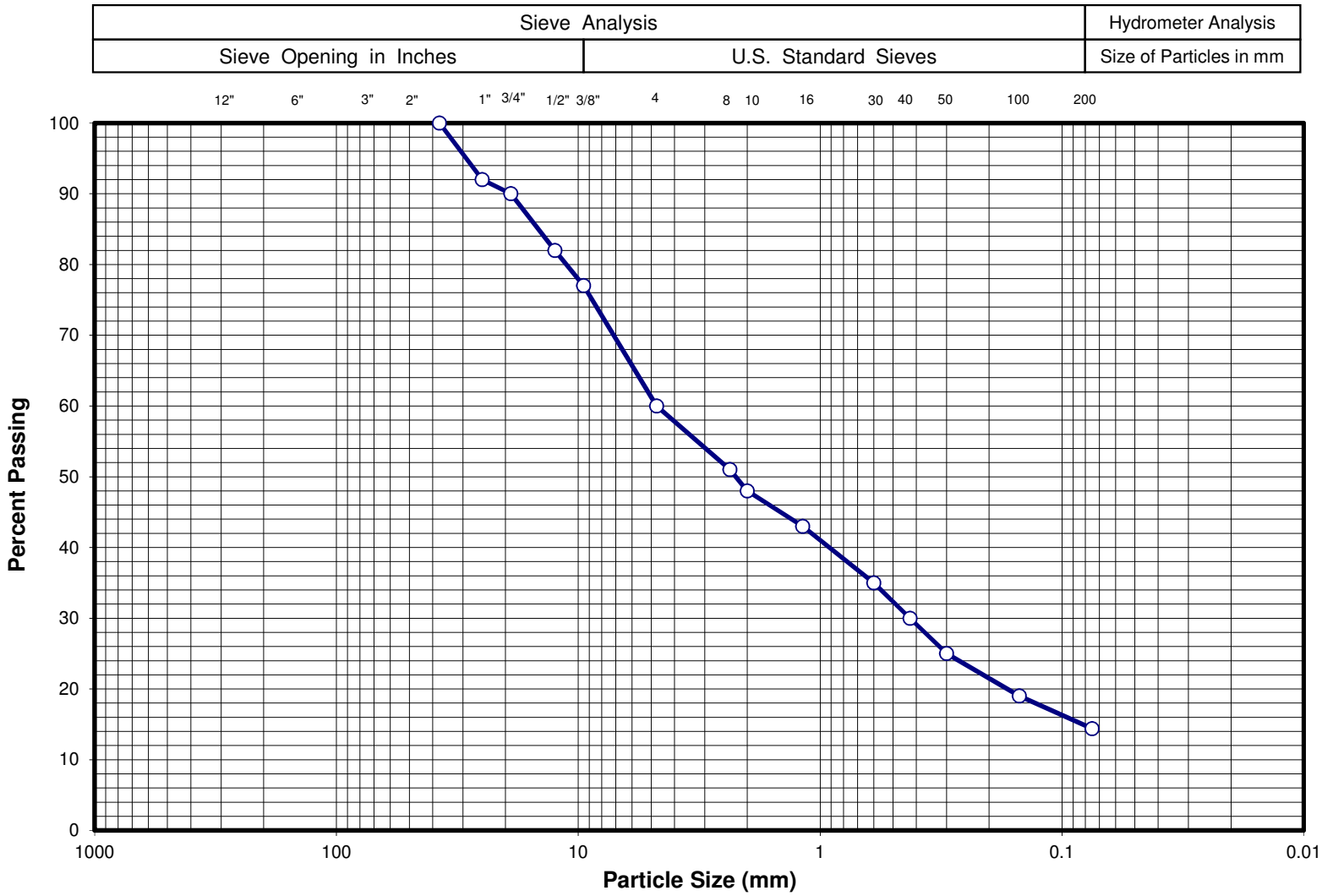
Gravel (%)	0	LL	27	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	22	PL	16	Sample ID:	P-1
Fines (%)	78	PI	11	Sample Depth (ft.):	4.0
Sample Description:	FILL CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-21

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	92
¾ "	90
½"	82
⅜"	77
#4	60
#10	48
#40	30
#200	14

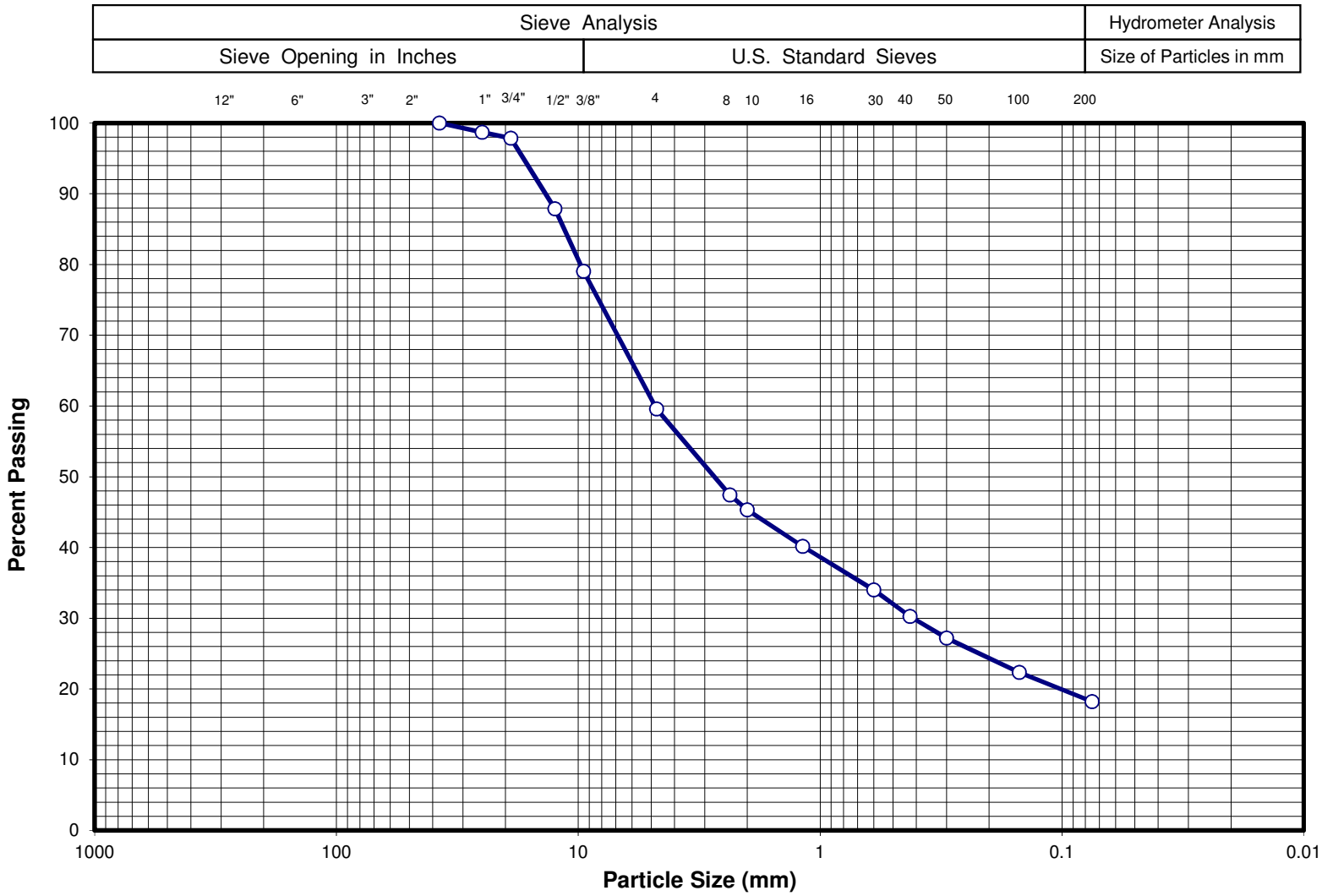
Gravel (%)	40	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	46	PL	NP	Sample ID:	P-2
Fines (%)	14	PI	NP	Sample Depth (ft.):	1.0
Sample Description:	FILL SAND, silty with gravel (BASE) (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-22

Revised 08/25/2017



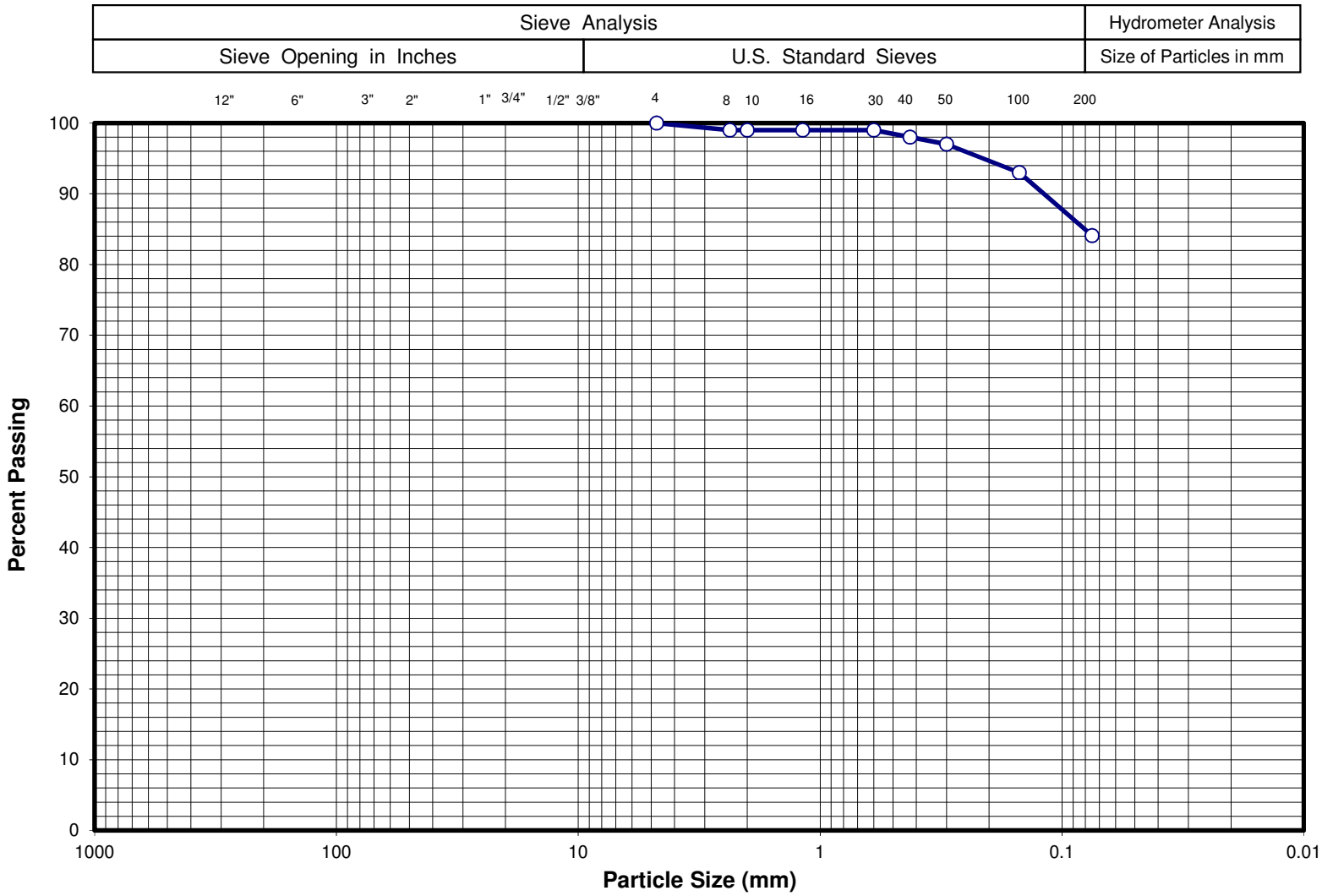
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	99
¾ "	98
½"	88
⅜"	79
#4	60
#10	45
#40	30
#200	18

Gravel (%)	40	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	42	PL	NP	Sample ID:	P-2
Fines (%)	18	PI	NP	Sample Depth (ft.):	2 to 3
Sample Description:	FILL SAND, silty with gravel (BLACK WASTE ROCK MATERIAL) (SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-23



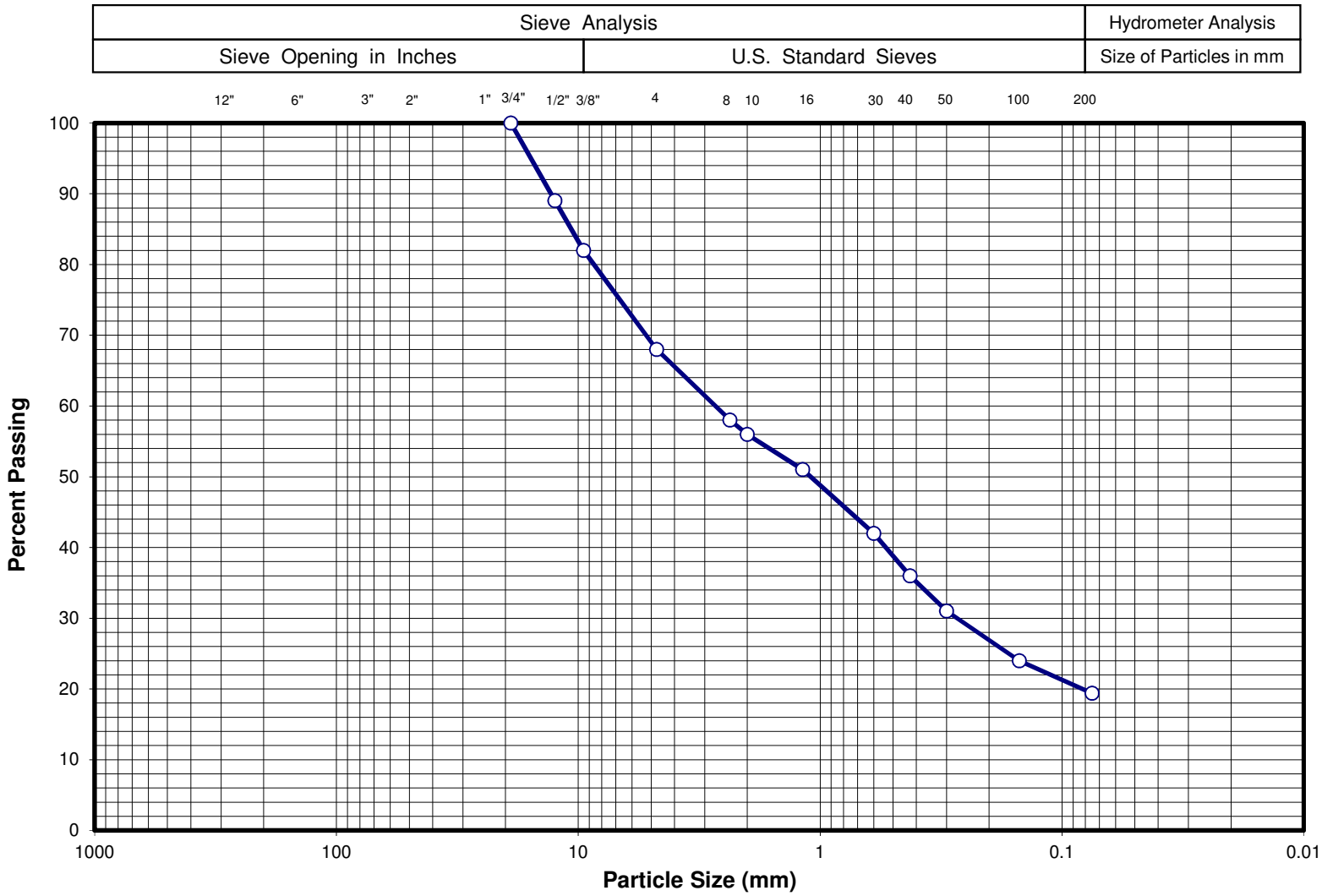
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	99
#40	98
#200	84

Gravel (%)	0	LL	31	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	16	PL	16	Sample ID:	P-2
Fines (%)	84	PI	15	Sample Depth (ft.):	4.0
Sample Description:	CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-24



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	89
⅜"	82
#4	68
#10	56
#40	36
#200	19

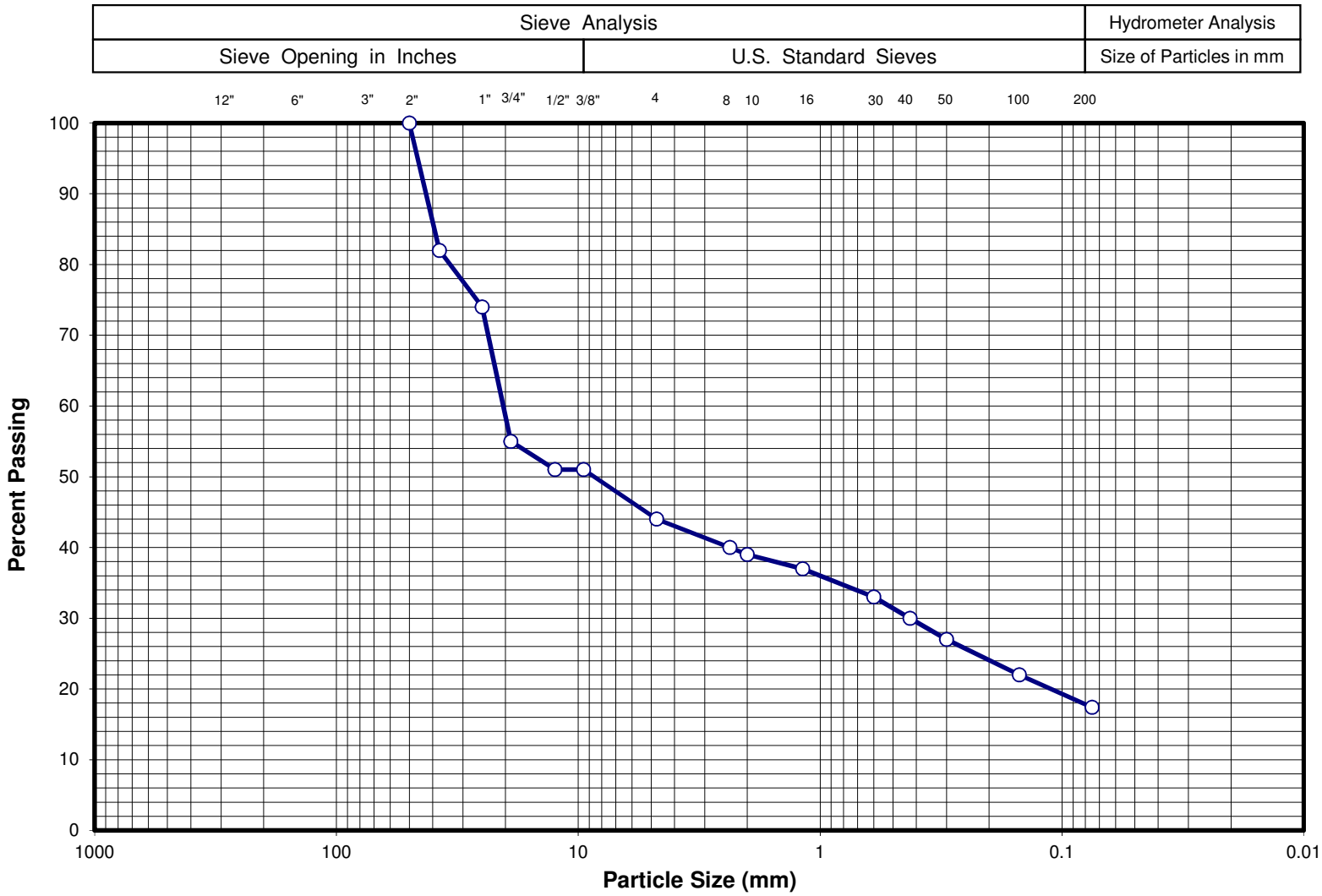
Gravel (%)	32	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	49	PL	NP	Sample ID:	P-3
Fines (%)	19	PI	NP	Sample Depth (ft.):	0.5
Sample Description:	FILL SAND, silty with gravel (BASE) (SM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-25

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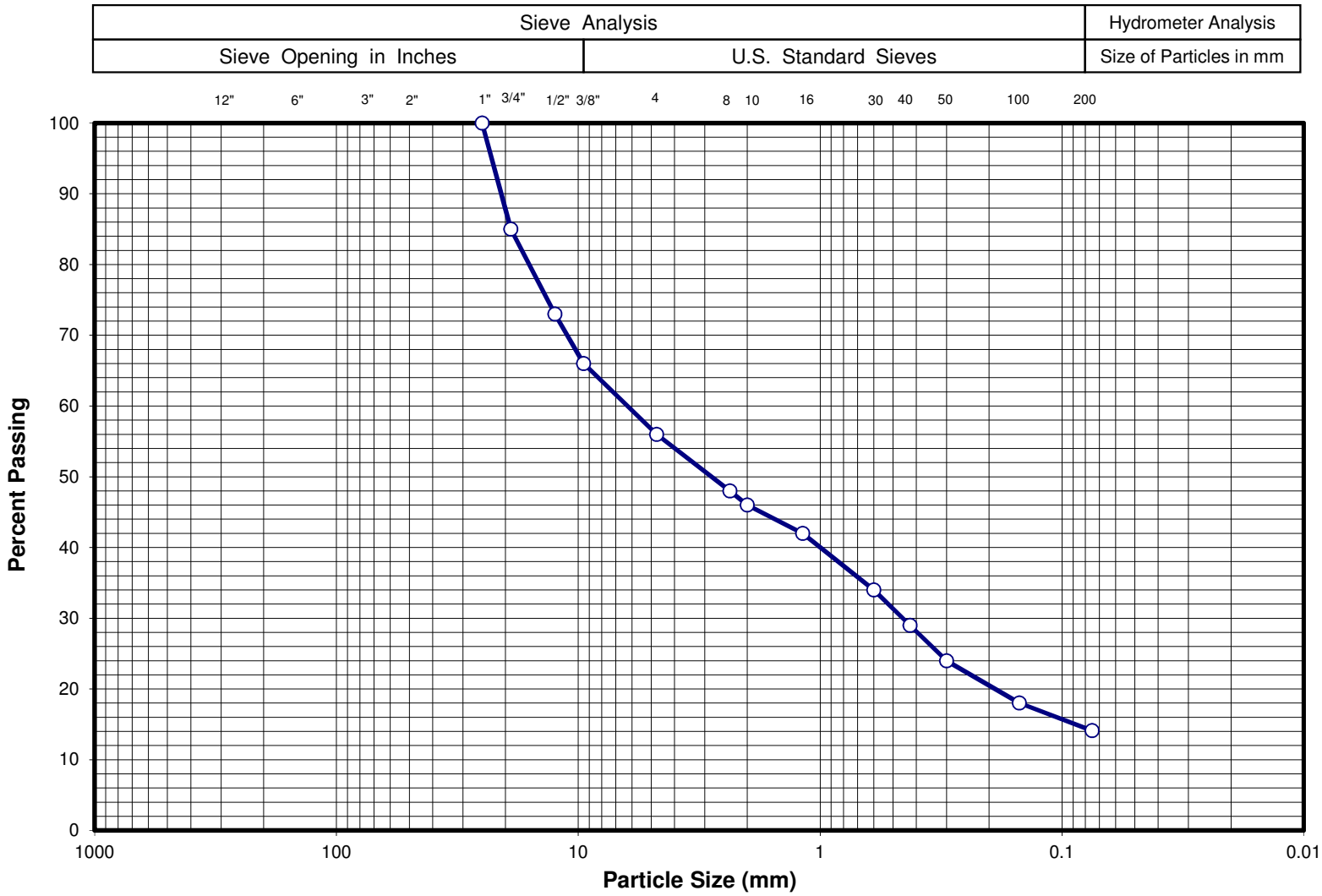
Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	82
1"	74
¾ "	55
½"	51
⅜"	51
#4	44
#10	39
#40	30
#200	17

Gravel (%)	56	LL	35	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	27	PL	14	Sample ID:	P-3
Fines (%)	17	PI	21	Sample Depth (ft.):	2.0
Sample Description:	FILL GRAVEL, clayey with sand (GC)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-26



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	85
½"	73
⅜"	66
#4	56
#10	46
#40	29
#200	14

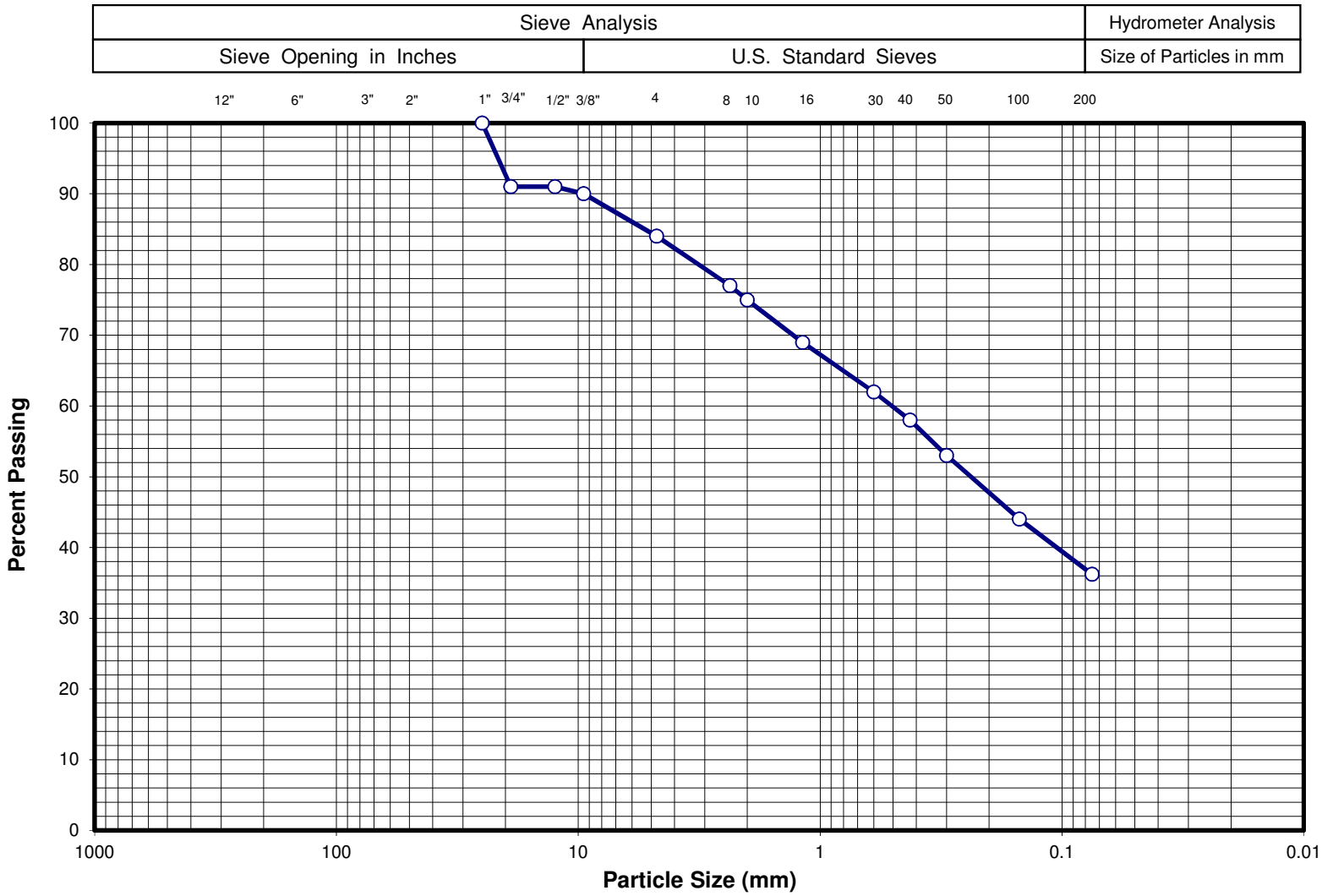
Gravel (%)	44	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	42	PL	NP	Sample ID:	P-3
Fines (%)	14	PI	NP	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-27

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	91
½"	91
⅜"	90
#4	84
#10	75
#40	58
#200	36

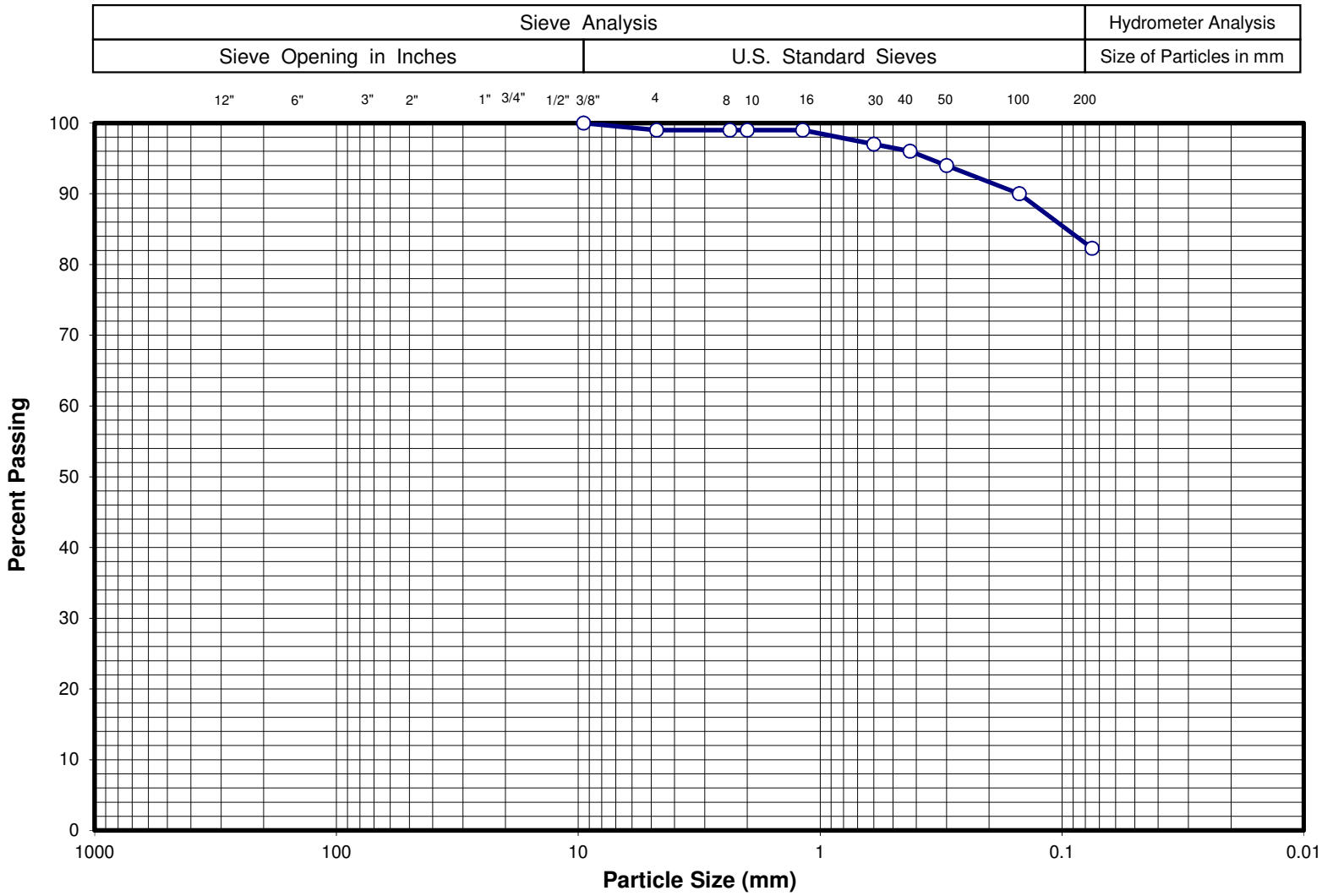
Gravel (%)	16	LL	27	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	48	PL	20	Sample ID:	P-4
Fines (%)	36	PI	7	Sample Depth (ft.):	1.0
Sample Description:	FILL SAND, clayey, silty with gravel (BLACK WASTE ROCK MATERIAL) (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-28

Revised 08/25/2017



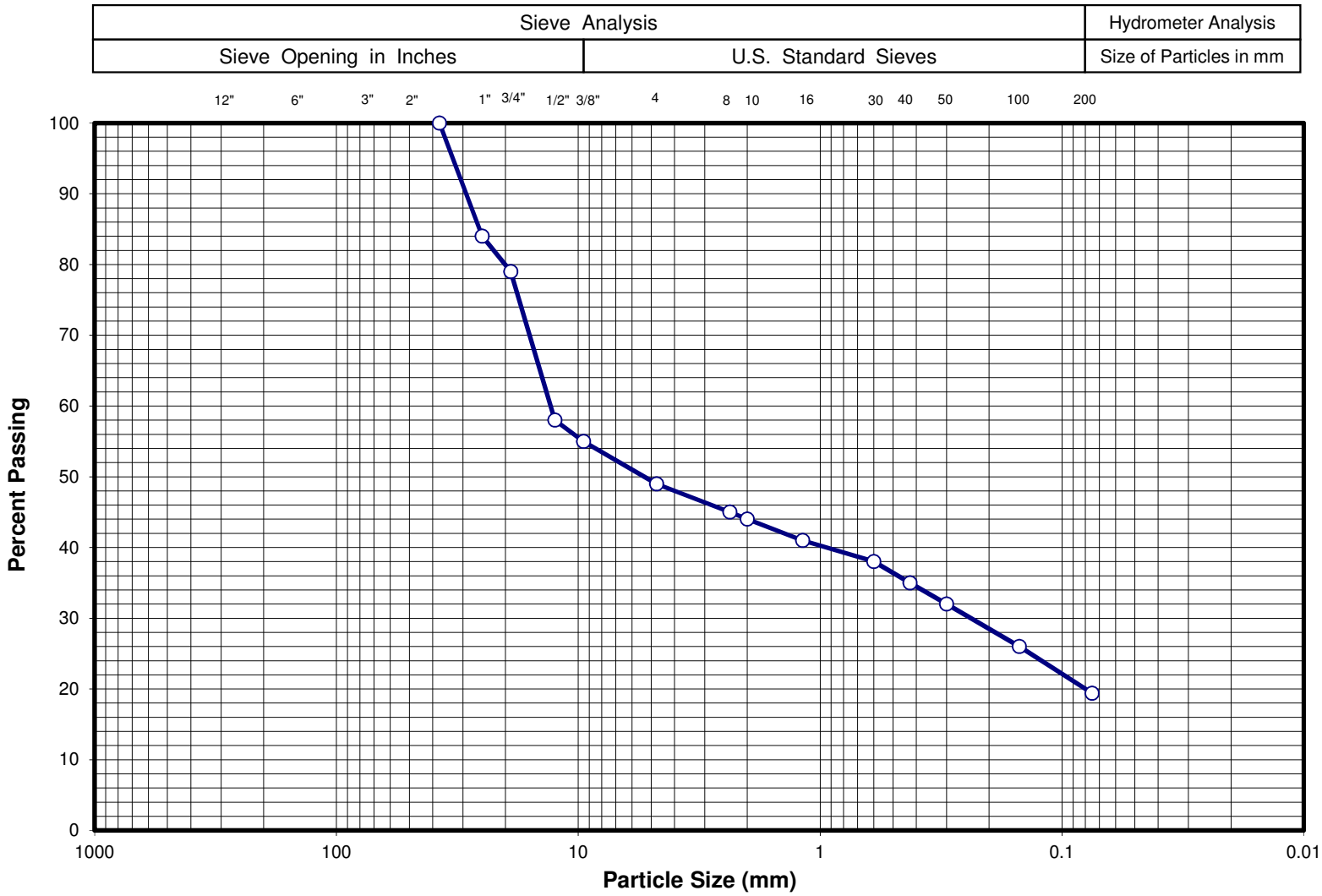
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	99
#10	99
#40	96
#200	82

Gravel (%)	1	LL	31	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	17	PL	14	Sample ID:	P-4
Fines (%)	82	PI	17	Sample Depth (ft.):	1.7
Sample Description:	CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-29



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	84
¾ "	79
½"	58
⅜"	55
#4	49
#10	44
#40	35
#200	19

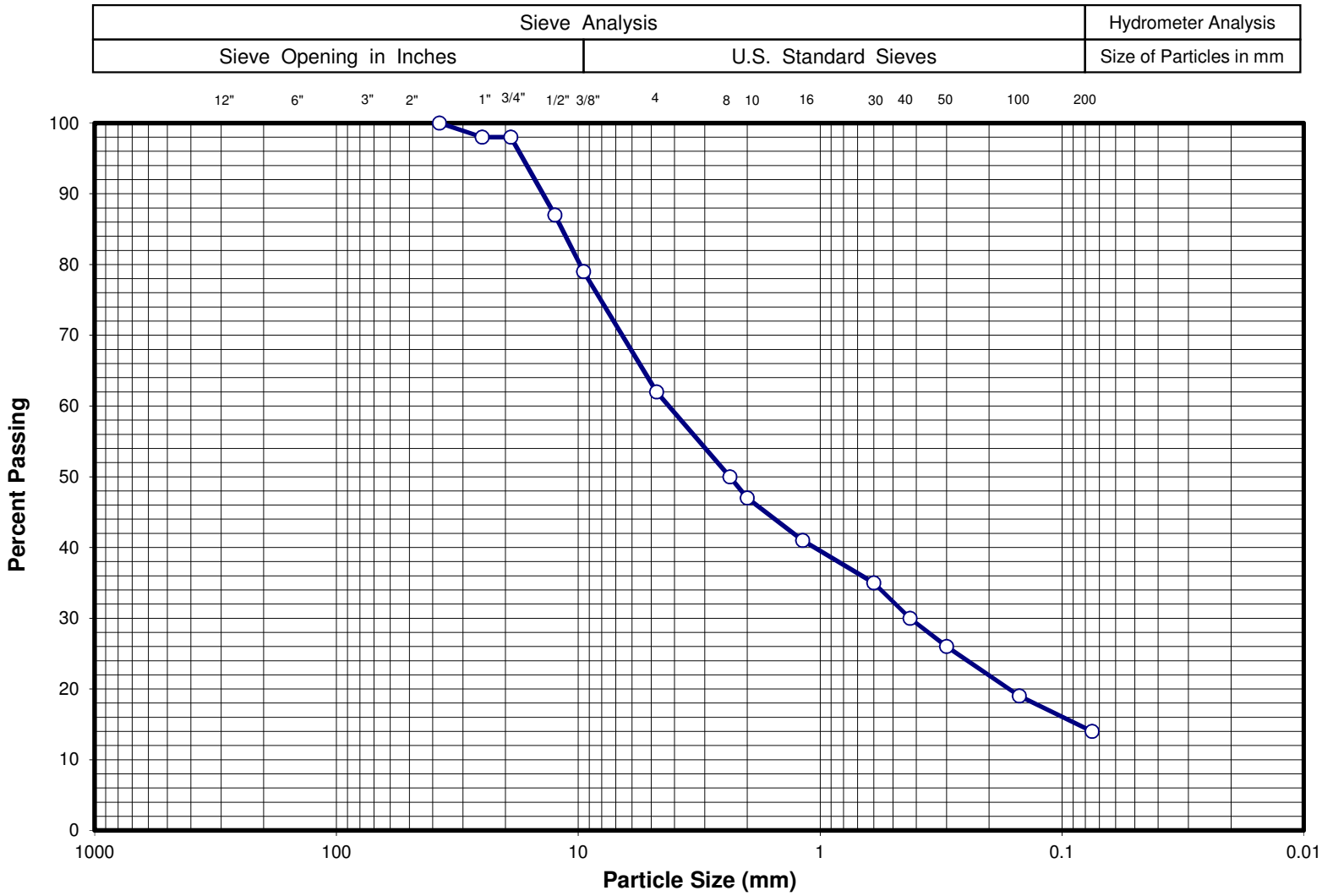
Gravel (%)	51	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	30	PL	NP	Sample ID:	P-5
Fines (%)	19	PI	NP	Sample Depth (ft.):	1.0
Sample Description:	FILL GRAVEL, silty with sand (BLACK WASTE ROCK MATERIAL) (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-30

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	98
¾ "	98
½"	87
⅜"	79
#4	62
#10	47
#40	30
#200	14

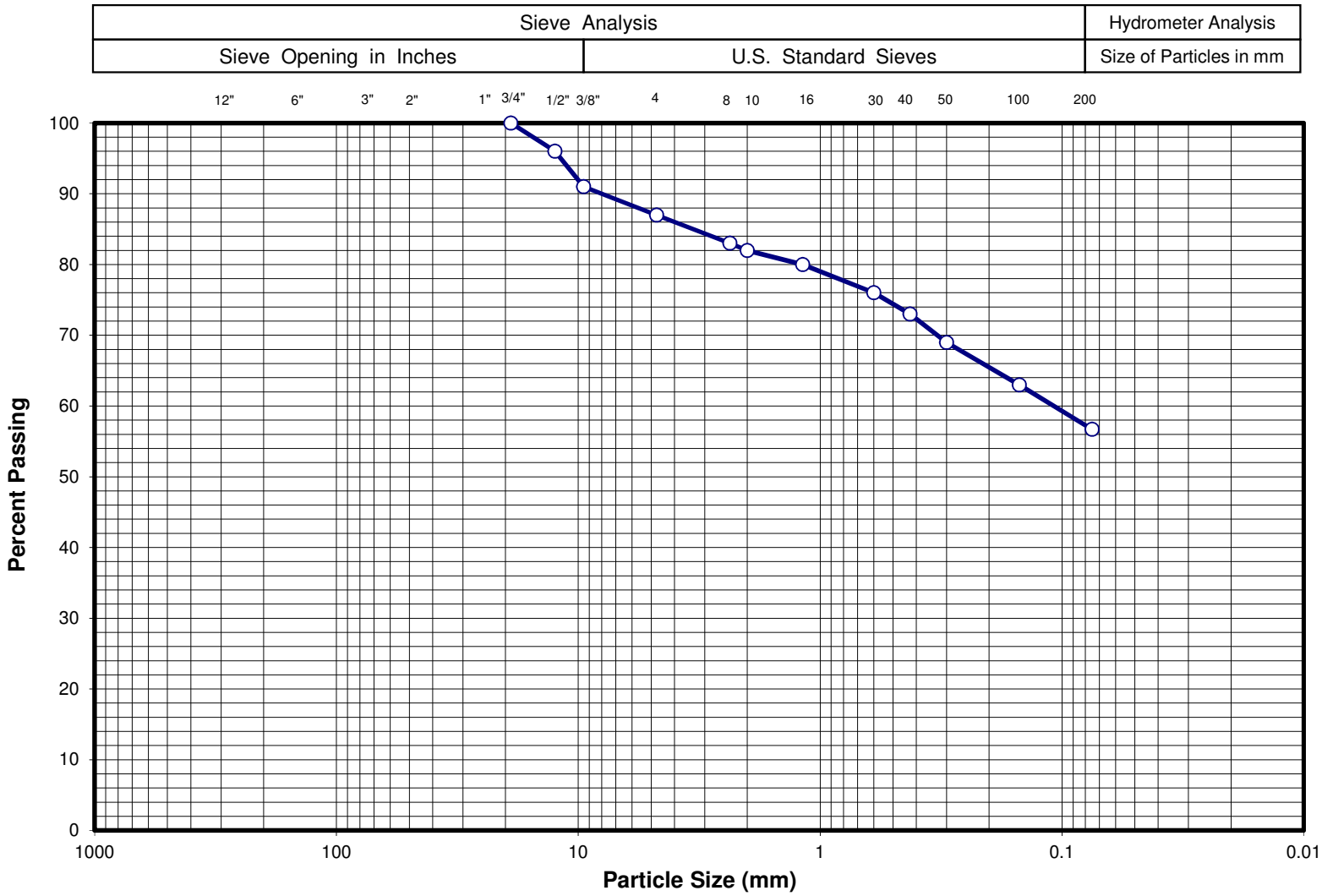
Gravel (%)	38	LL	20	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	48	PL	17	Sample ID:	P-6
Fines (%)	14	PI	3	Sample Depth (ft.):	0.6 to 1.0
Sample Description:	FILL SAND, silty with gravel (BASE) (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-31

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	96
⅜"	91
#4	87
#10	82
#40	73
#200	57

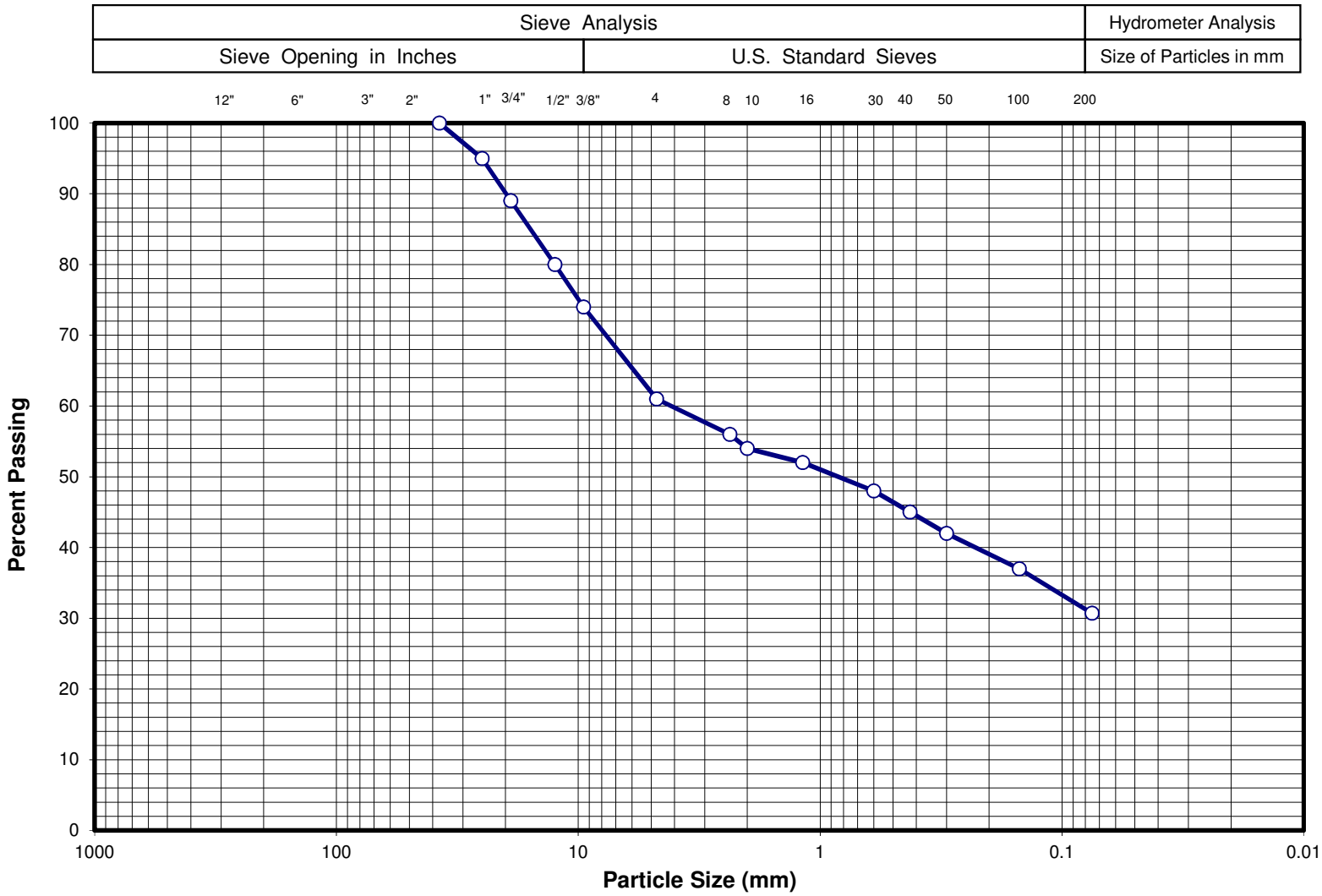
Gravel (%)	13	LL	28	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	30	PL	14	Sample ID:	P-6
Fines (%)	57	PI	14	Sample Depth (ft.):	2.0
Sample Description:	CLAY, sandy (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-32

Revised 08/25/2017



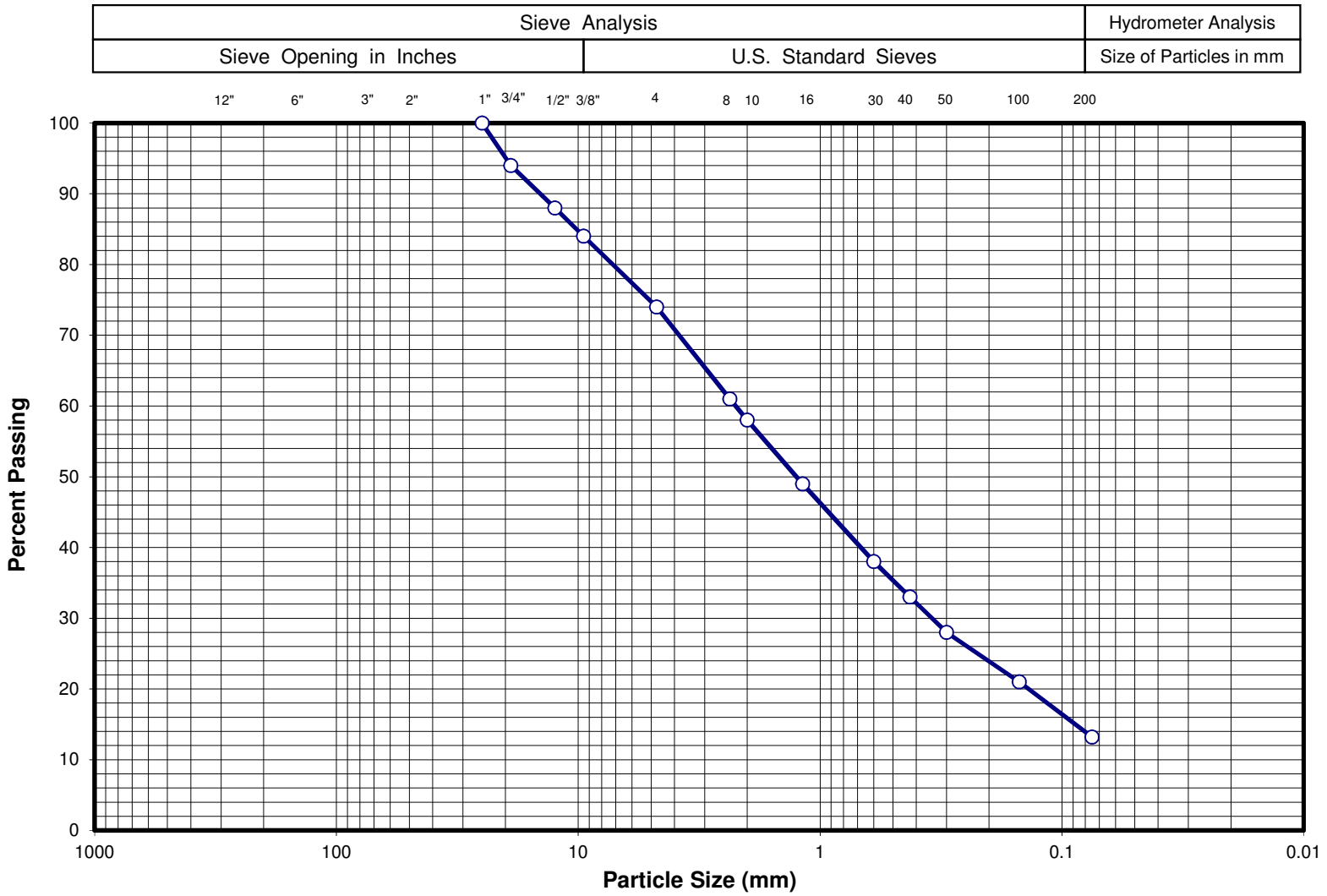
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	95
¾ "	89
½"	80
⅜"	74
#4	61
#10	54
#40	45
#200	31

Gravel (%)	39	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	30	PL	NP	Sample ID:	P-7
Fines (%)	31	PI	NP	Sample Depth (ft.):	1.5
Sample Description:	FILL GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-33



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	94
½"	88
⅜"	84
#4	74
#10	58
#40	33
#200	13

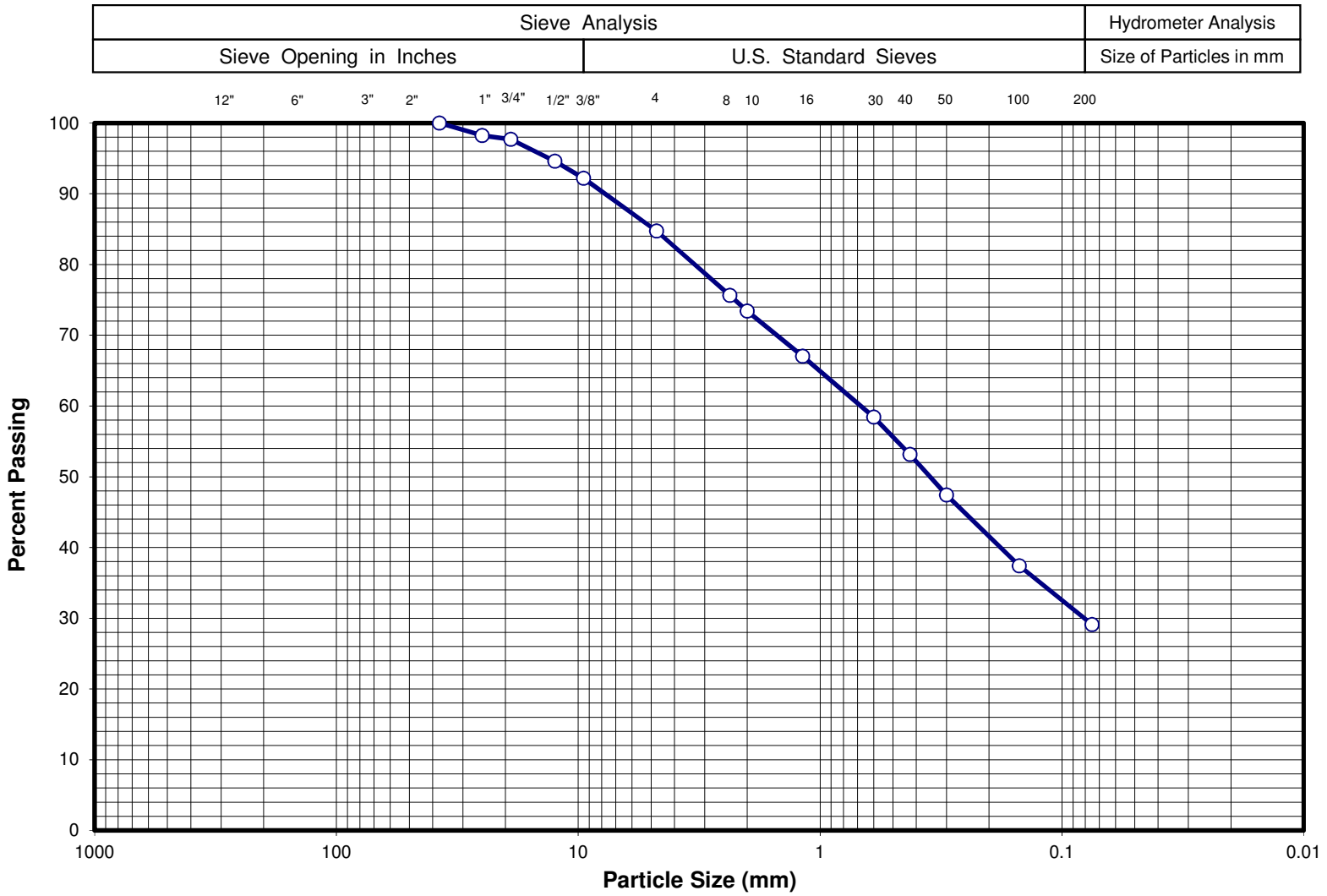
Gravel (%)	26	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	61	PL	NP	Sample ID:	P-7
Fines (%)	13	PI	NP	Sample Depth (ft.):	4.0
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-34

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	98
¾ "	98
½"	95
⅜"	92
#4	85
#10	73
#40	53
#200	29

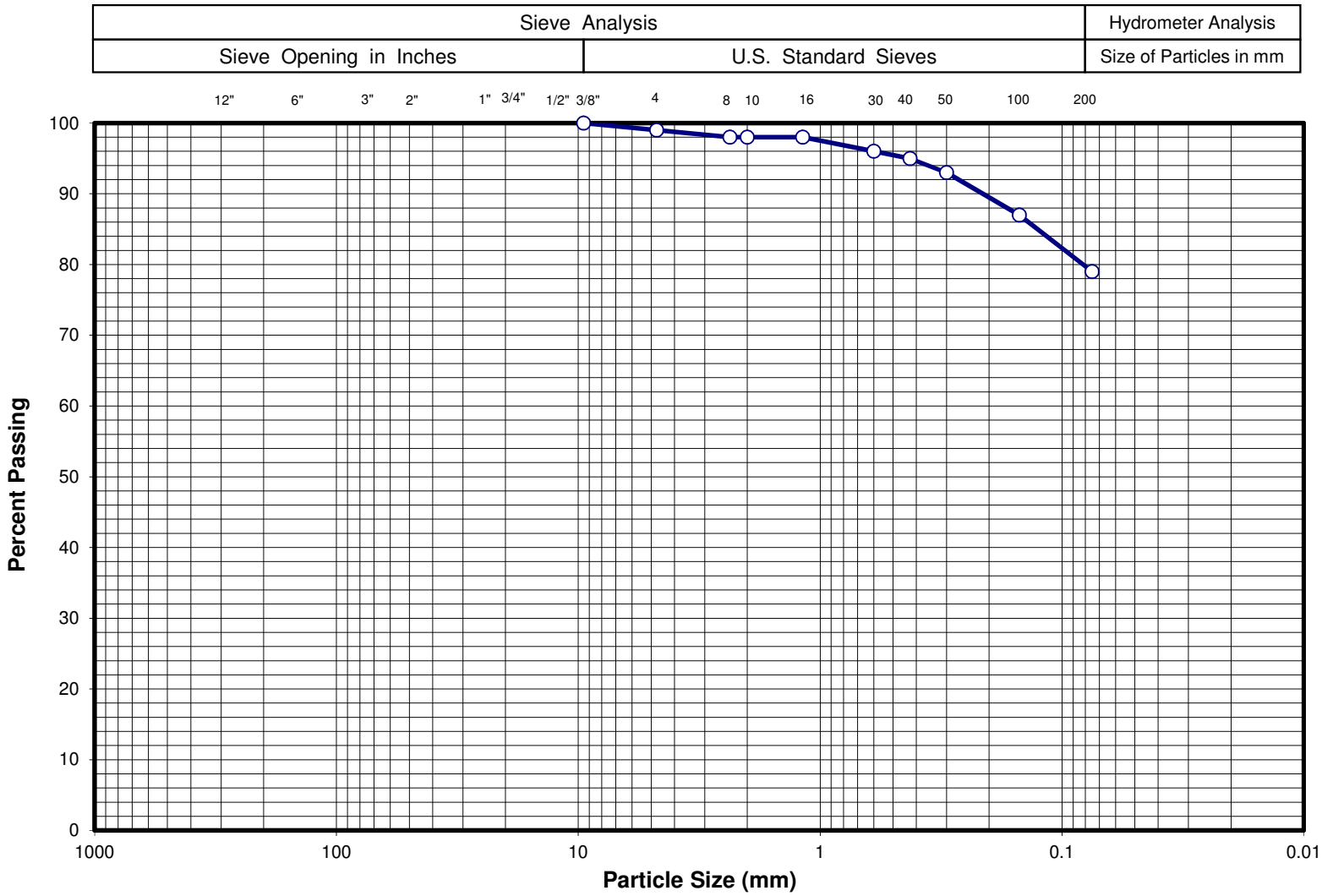
Gravel (%)	15	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	56	PL	NP	Sample ID:	P-8 + P-9
Fines (%)	29	PI	NP	Sample Depth (ft.):	1 to 4
Sample Description:	FILL SAND, silty with gravel (BLACK WASTE ROCK MATERIAL) (SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-35

Revised 08/25/2017



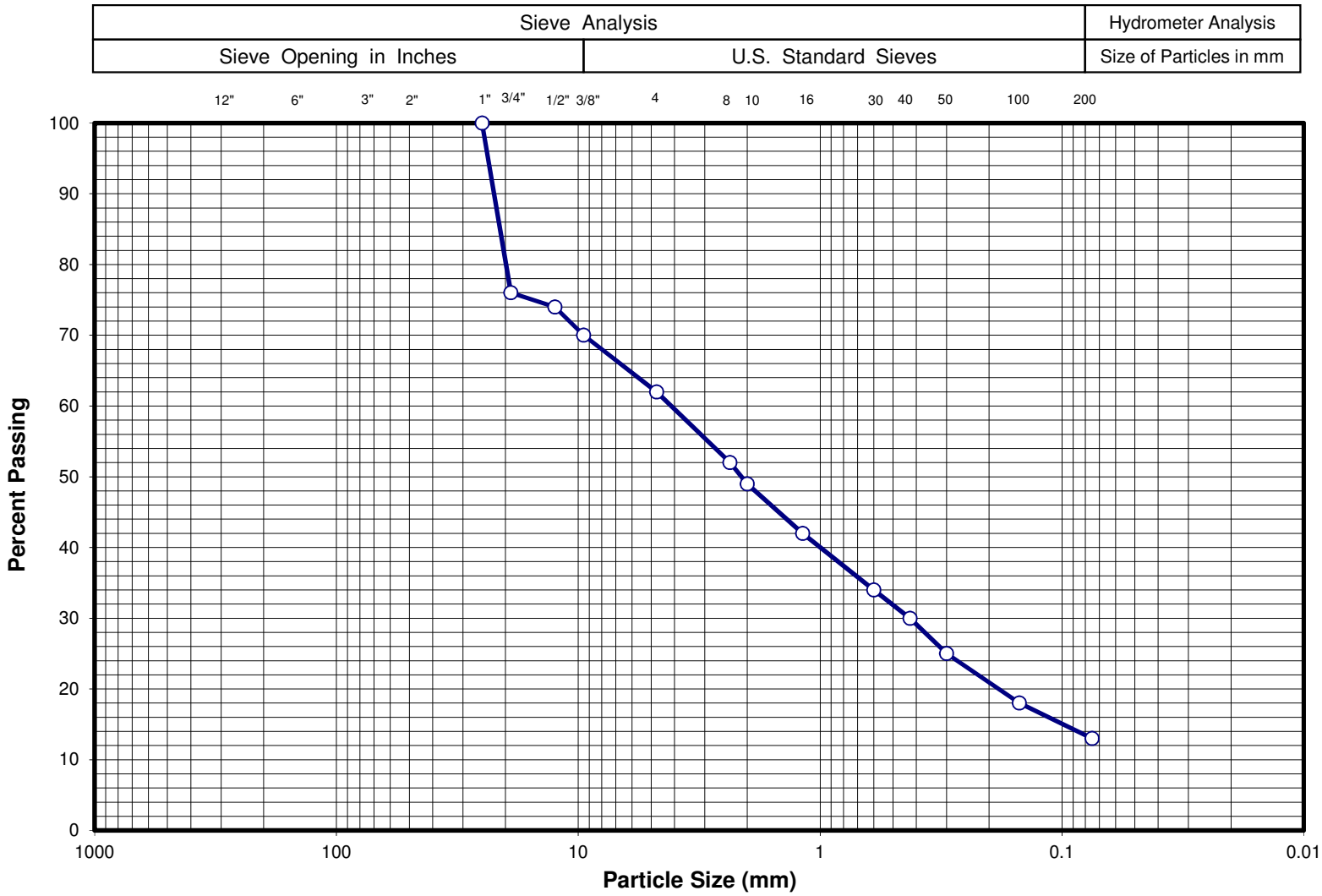
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	99
#10	98
#40	95
#200	79

Gravel (%)	1	LL	26	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	20	PL	14	Sample ID:	P-8
Fines (%)	79	PI	12	Sample Depth (ft.):	2.5
Sample Description:	CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-36



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	76
½"	74
⅜"	70
#4	62
#10	49
#40	30
#200	13

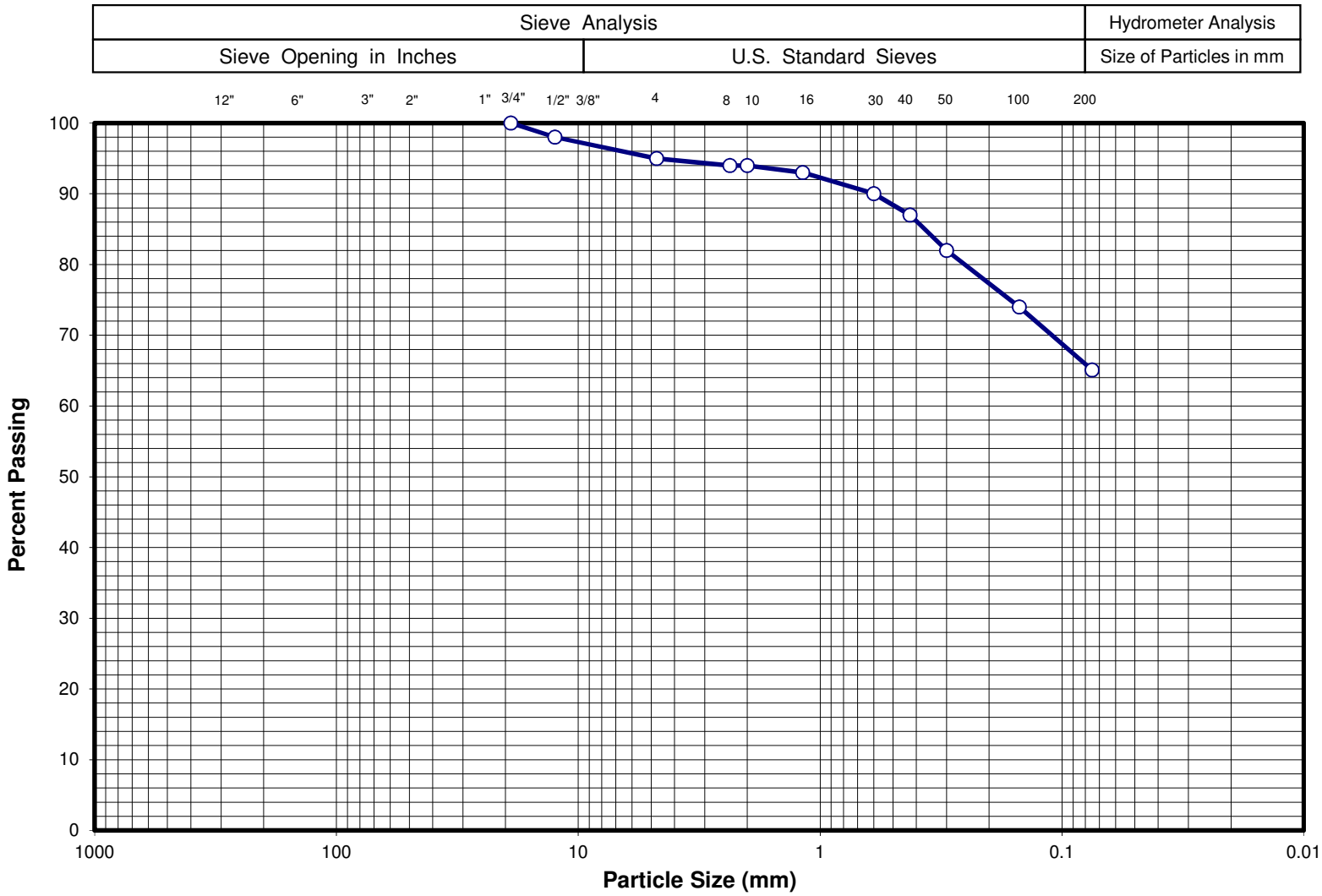
Gravel (%)	38	LL	-	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	49	PL	-	Sample ID:	P-9
Fines (%)	13	PI	-	Sample Depth (ft.):	4.0
Sample Description:	FILL SAND, clayey, silty, with gravel (BLACK WASTE ROCK MATERIAL)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-37

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	98
⅜"	-
#4	95
#10	94
#40	87
#200	65

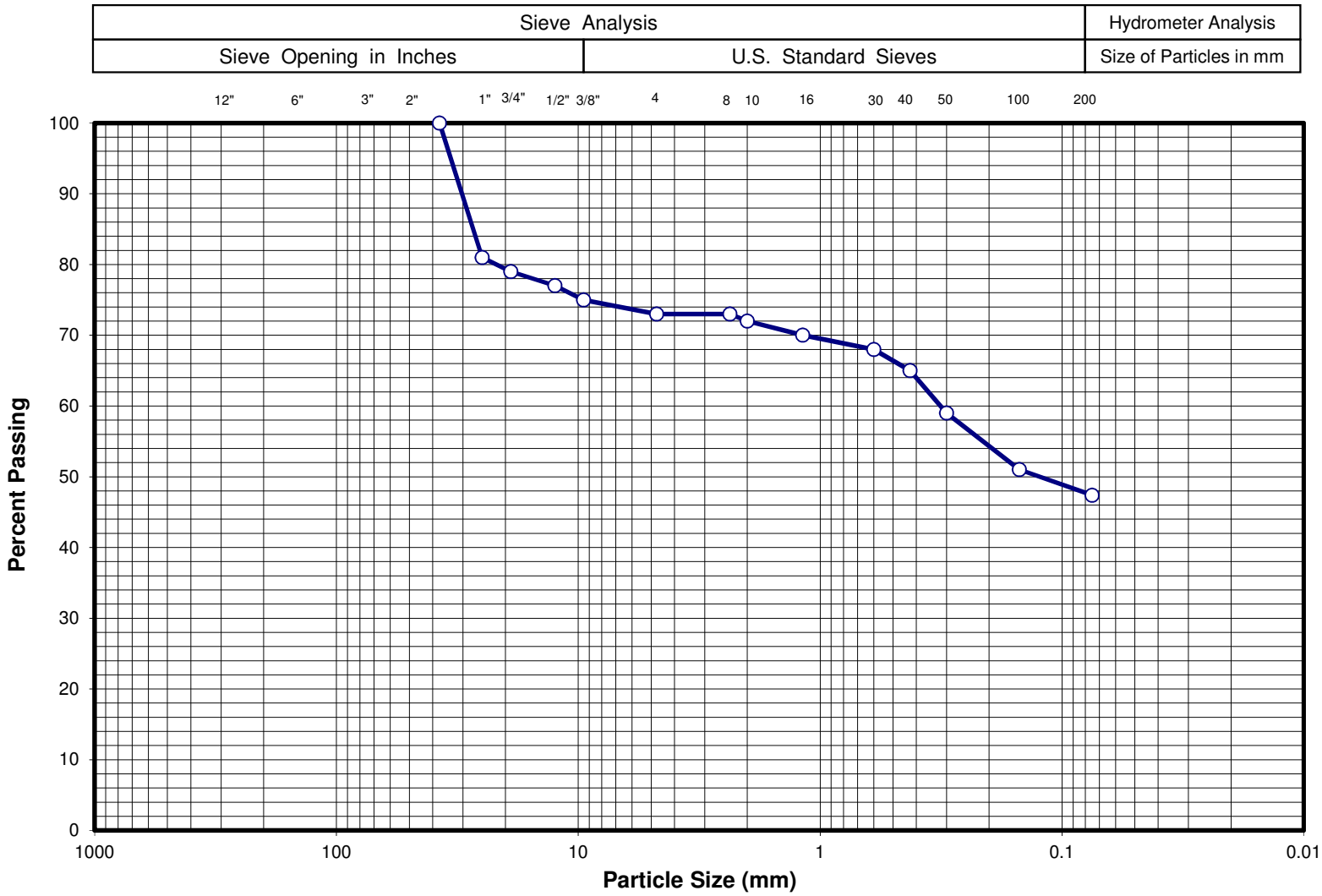
Gravel (%)	5	LL	24	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	30	PL	16	Sample ID:	P-9
Fines (%)	65	PI	8	Sample Depth (ft.):	7.5
Sample Description:	0.5				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-38

Revised 08/25/2017



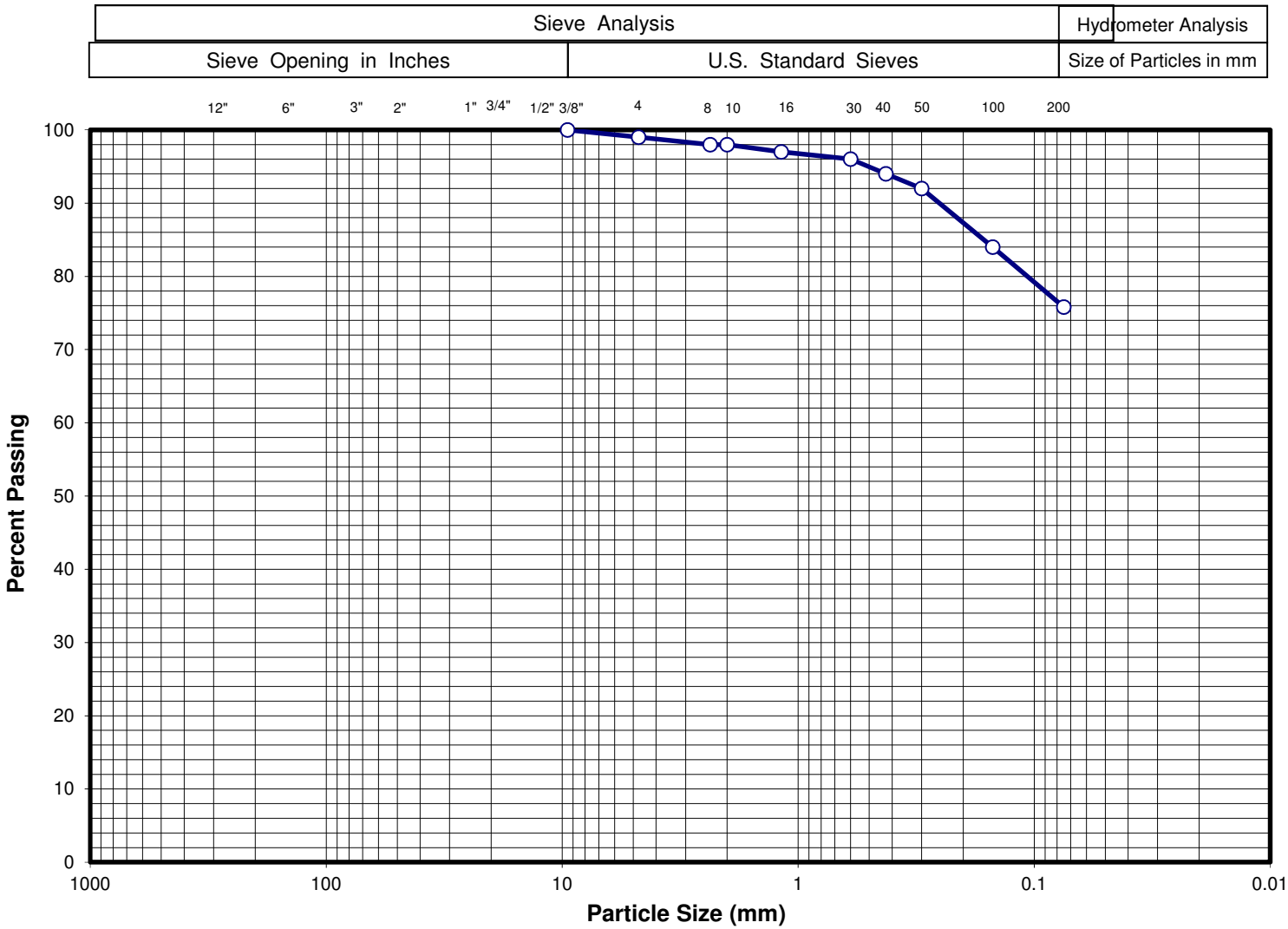
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	81
¾ "	79
½"	77
⅜"	75
#4	73
#10	72
#40	65
#200	47

Gravel (%)	27	LL	26	Project Name:	South Bridge, Glenwood Springs Airport Road Site
Sand (%)	26	PL	16	Sample ID:	P-9
Fines (%)	47	PI	10	Sample Depth (ft.):	10.5
Sample Description:	GRAVEL, clayey with sand, cobbles and boulders (GC)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-39



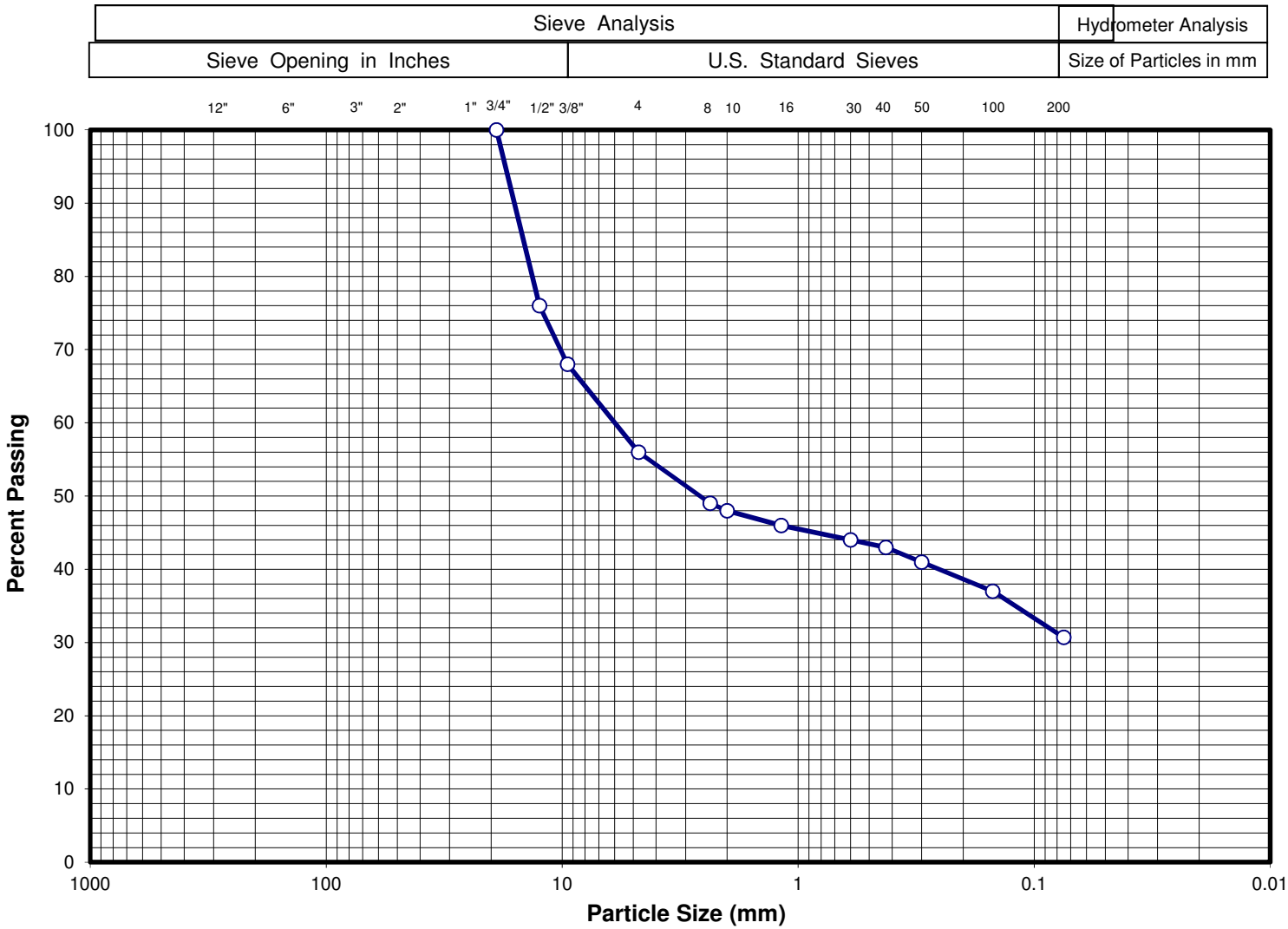
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	99
#10	98
#40	94
#200	76

Gravel (%)	1	LL	25	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	23	PL	14	Sample ID:	P-10
Fines (%)	76	PI	11	Sample Depth (ft.):	2.0
Sample Description:	FILL CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-40



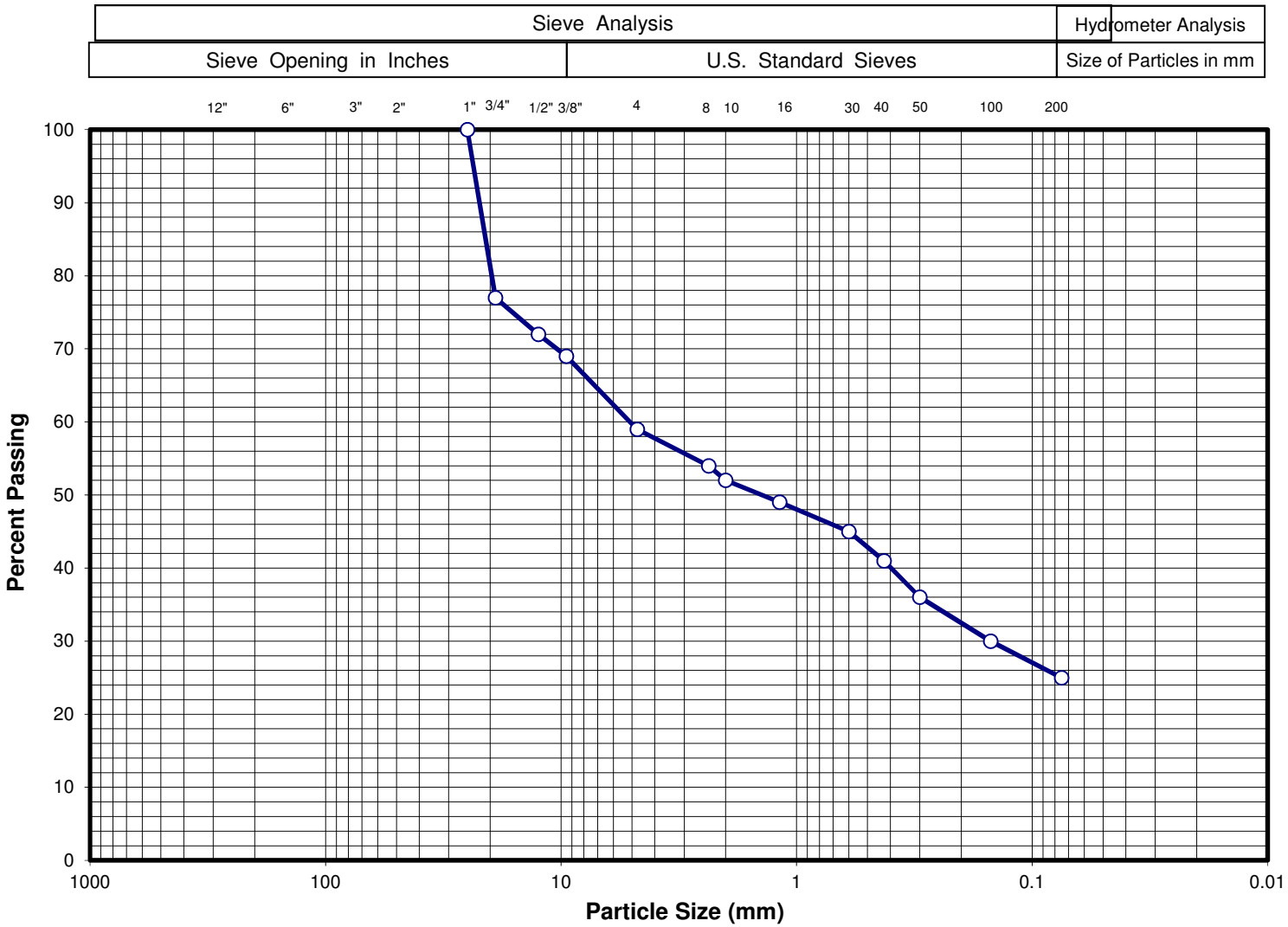
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	76
⅜"	68
#4	56
#10	48
#40	43
#200	31

Gravel (%)	44	LL	27	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	25	PL	14	Sample ID:	P-10
Fines (%)	31	PI	13	Sample Depth (ft.):	4 to 5
Sample Description:	GRAVEL, clayey with sand (GC)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-41



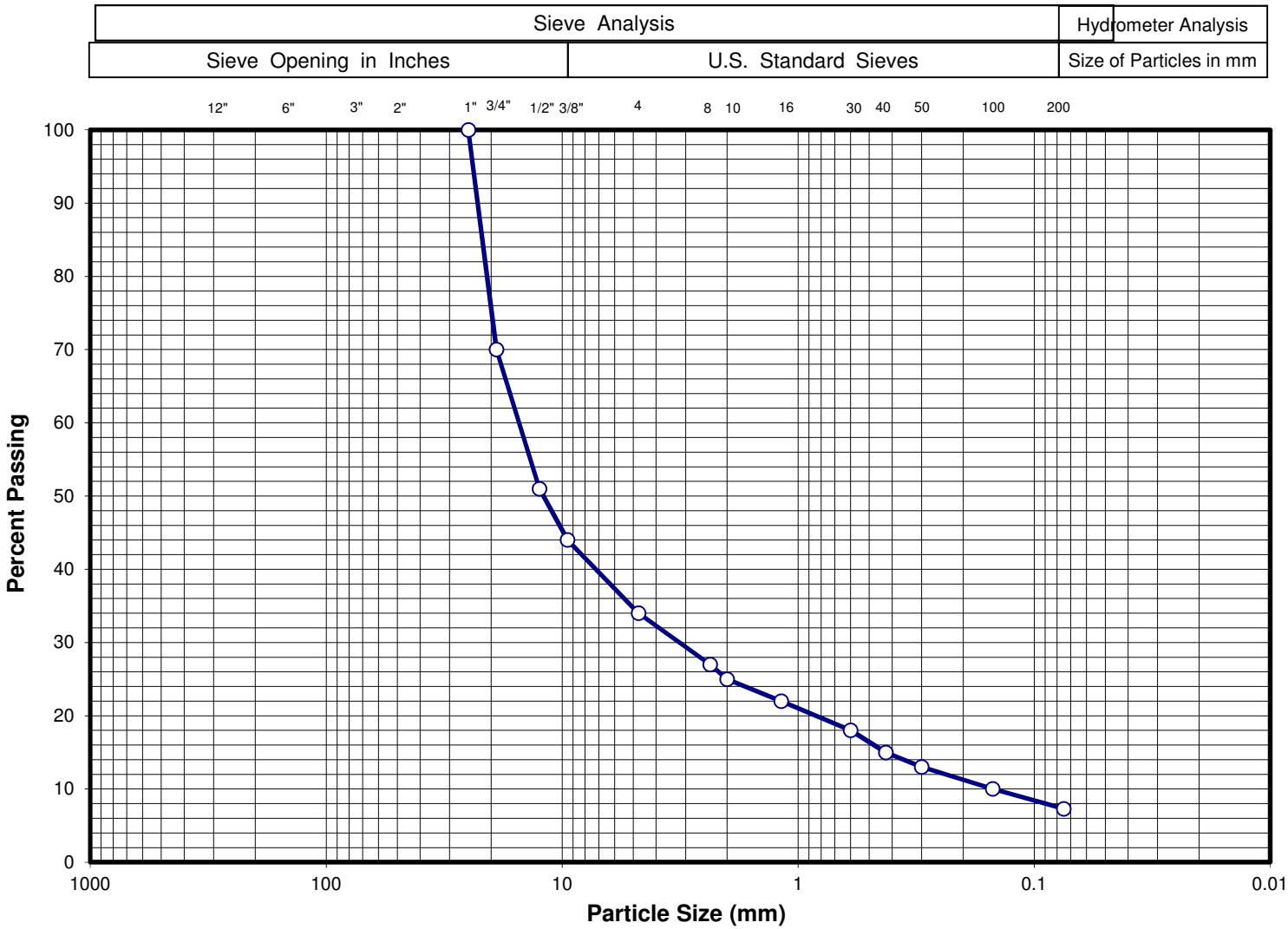
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	77
½"	72
⅜"	69
#4	59
#10	52
#40	41
#200	25

Gravel (%)	41	LL	28	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	34	PL	15	Sample ID:	P-10
Fines (%)	25	PI	13	Sample Depth (ft.):	5.0
Sample Description:	GRAVEL, clayey with sand, cobbles and boulders (GC)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-42



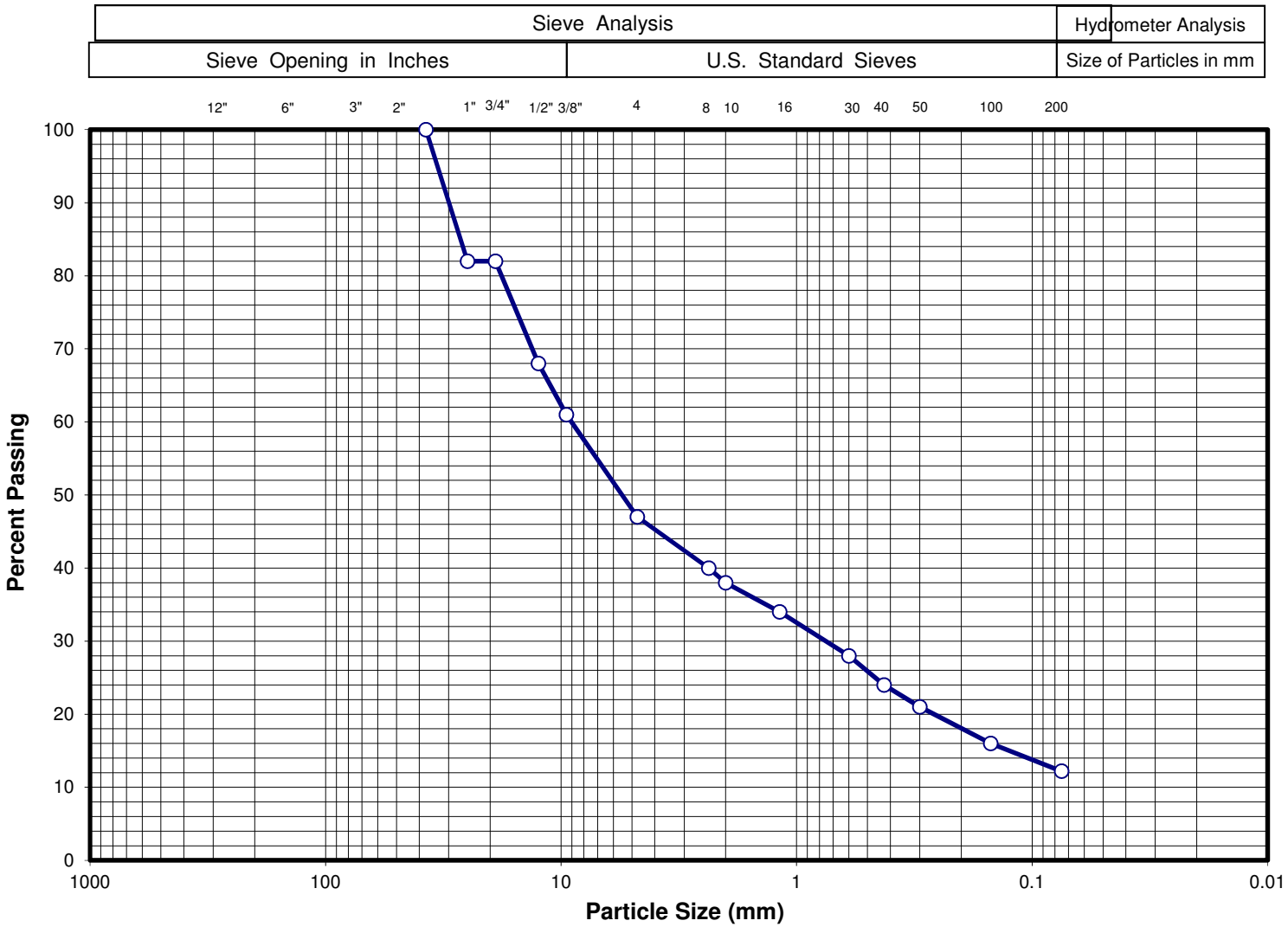
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	70
½"	51
⅜"	44
#4	34
#10	25
#40	15
#200	7

Gravel (%)	66	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	27	PL	NP	Sample ID:	PW-11
Fines (%)	7	PI	NP	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL with silt and sand and cobbles (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-43



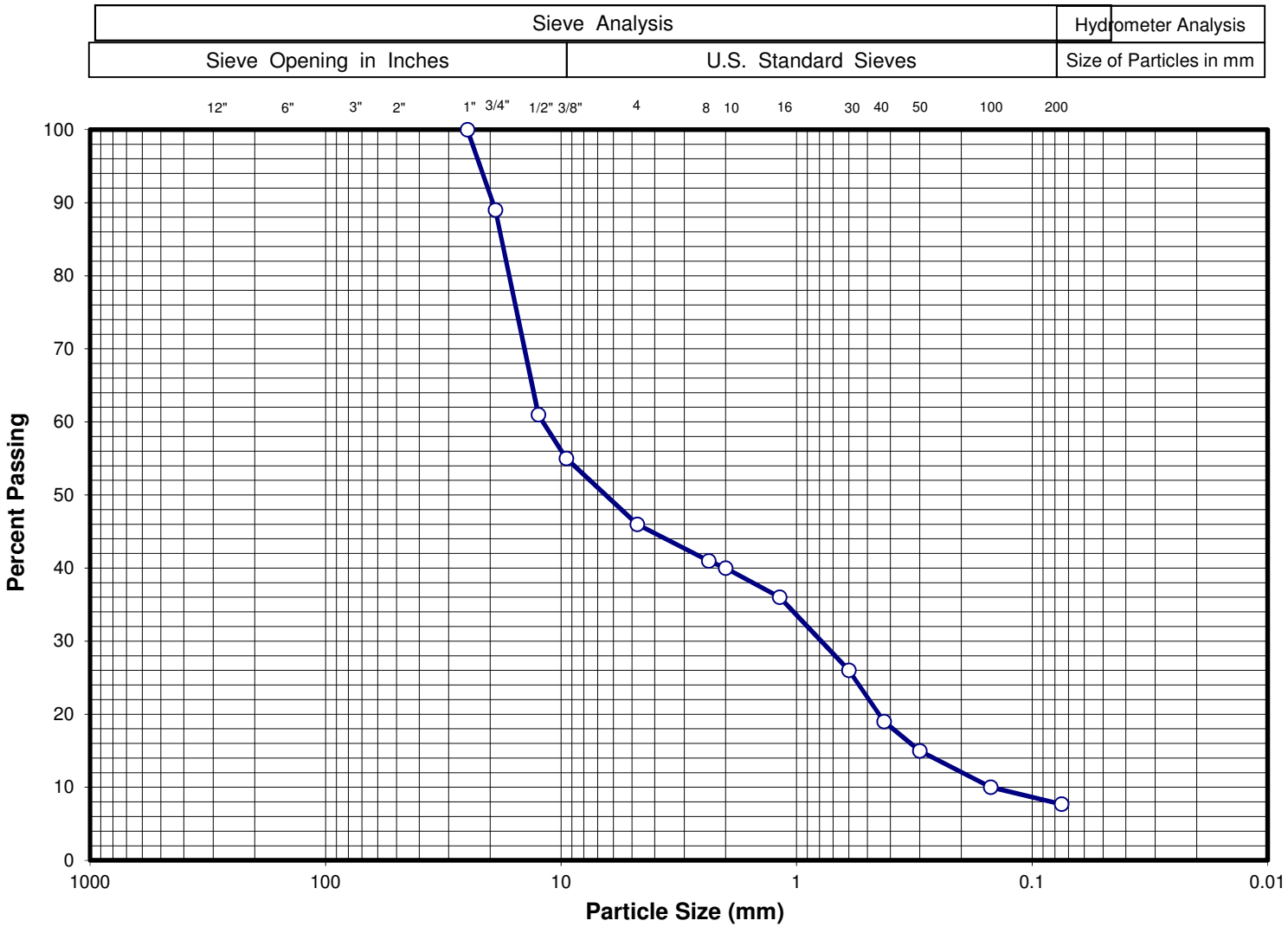
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	82
¾ "	82
½"	68
⅜"	61
#4	47
#10	38
#40	24
#200	12

Gravel (%)	53	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	35	PL	NP	Sample ID:	PW-11
Fines (%)	12	PI	NP	Sample Depth (ft.):	9.0
Sample Description:	GRAVEL, with silt and sand (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-44



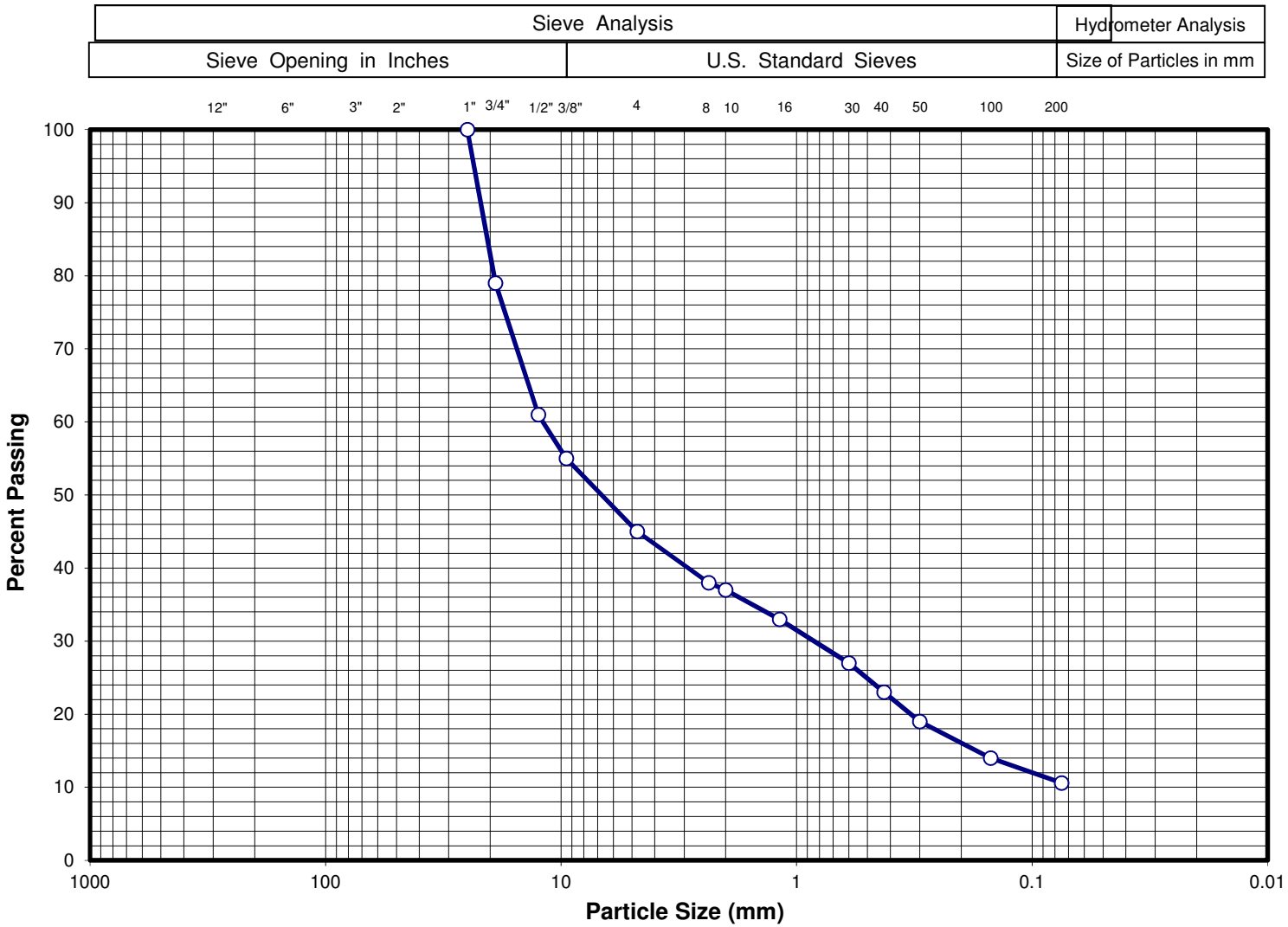
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	89
½"	61
⅜"	55
#4	46
#10	40
#40	19
#200	8

Gravel (%)	54	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	38	PL	NP	Sample ID:	PW-11
Fines (%)	8	PI	NP	Sample Depth (ft.):	14.0
Sample Description:	GRAVEL with silt and sand (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-45



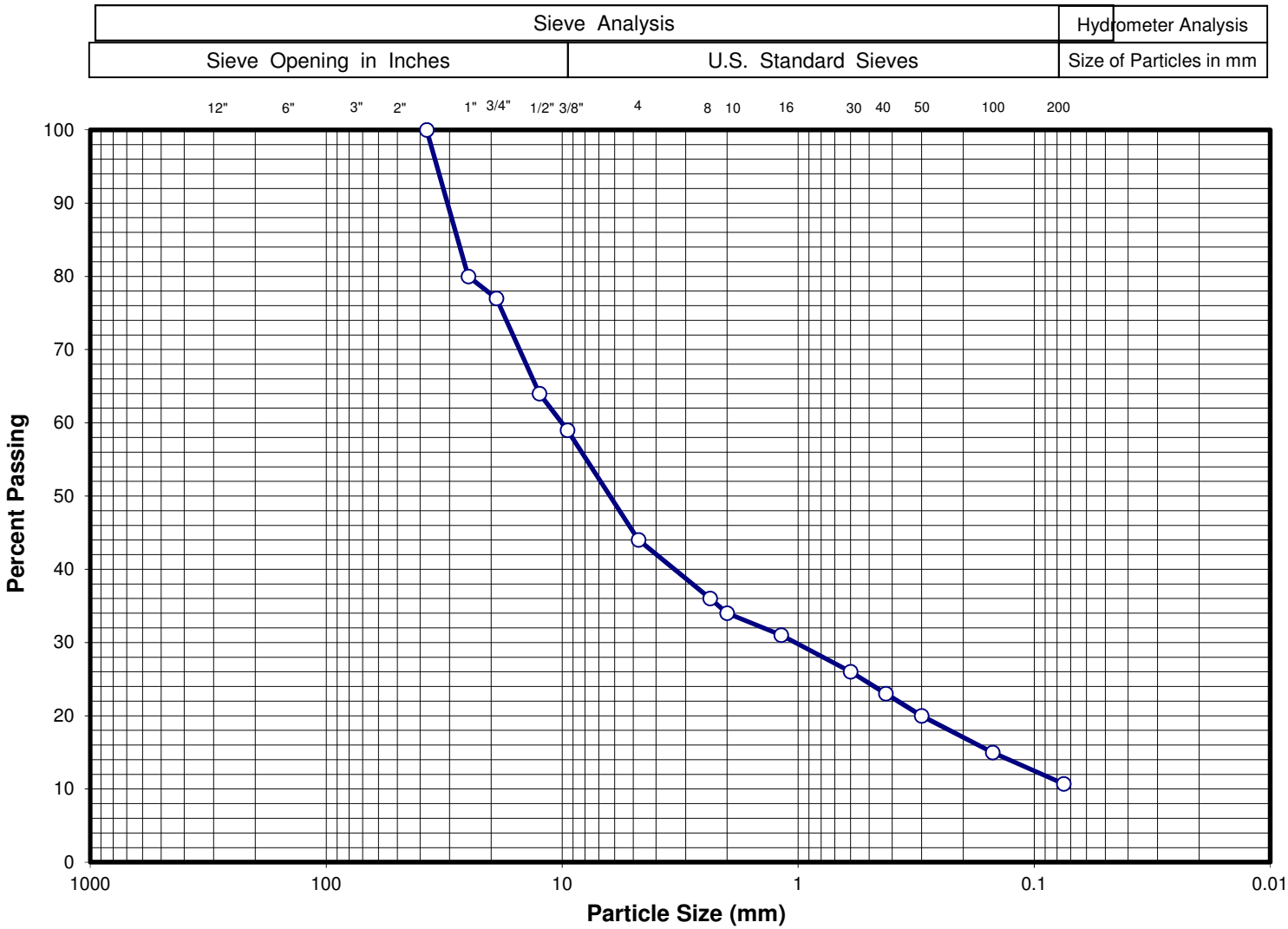
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	79
½"	61
⅜"	55
#4	45
#10	37
#40	23
#200	11

Gravel (%)	55	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	34	PL	NP	Sample ID:	PW-11
Fines (%)	11	PI	NP	Sample Depth (ft.):	19 to 25
Sample Description:	GRAVEL, with silt, sand and cobbles (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-46



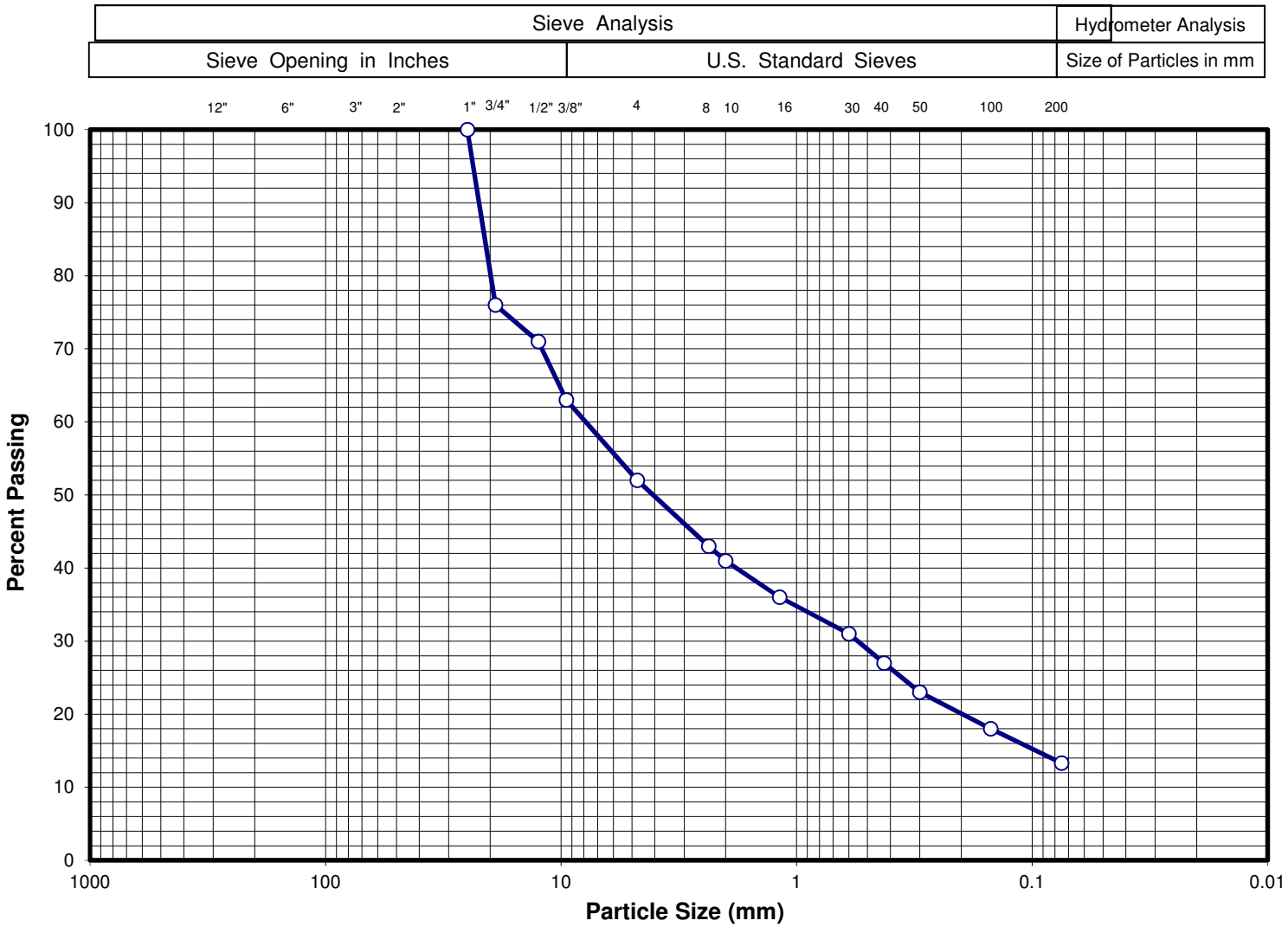
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	80
¾ "	77
½"	64
⅜"	59
#4	44
#10	34
#40	23
#200	11

Gravel (%)	56	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	33	PL	NP	Sample ID:	PW-12
Fines (%)	11	PI	NP	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, with silt, sand, and cobbles (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-47



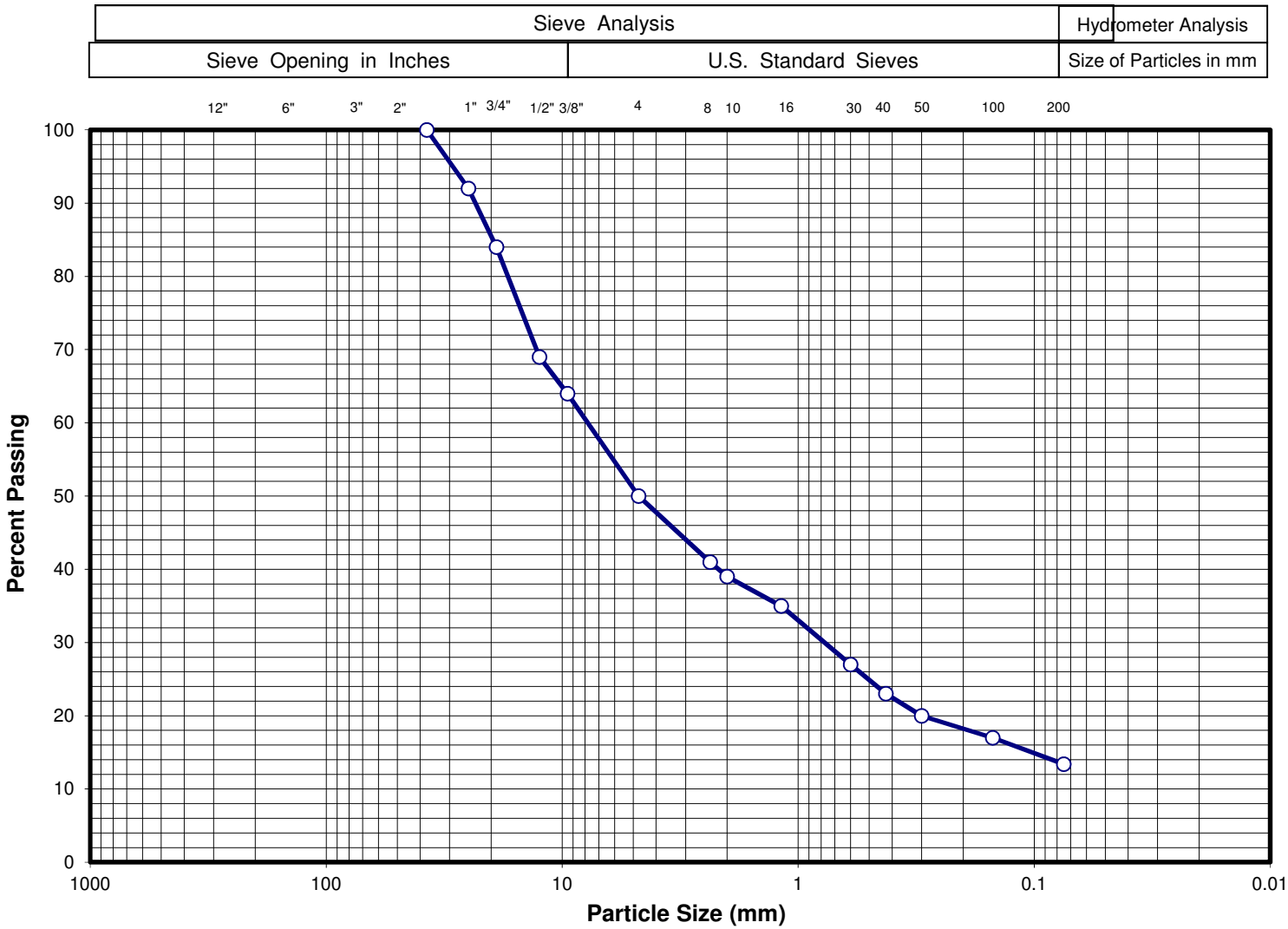
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	76
½"	71
⅜"	63
#4	52
#10	41
#40	27
#200	13

Gravel (%)	48	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	39	PL	NP	Sample ID:	PW-12
Fines (%)	13	PI	NP	Sample Depth (ft.):	14.0
Sample Description:	GRAVEL, silty with sand and cobbles (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-48



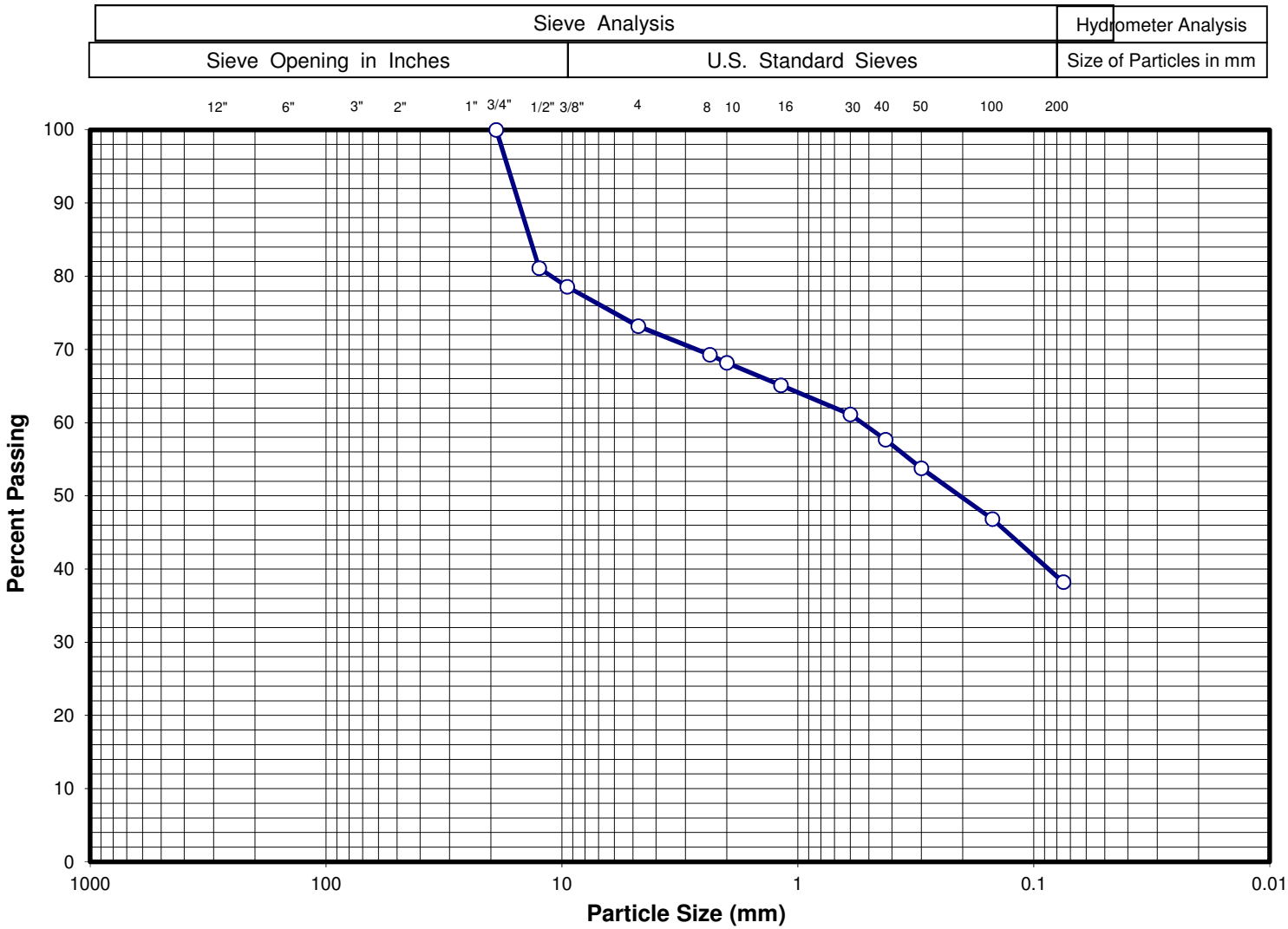
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	92
¾ "	84
½"	69
⅜"	64
#4	50
#10	39
#40	23
#200	13

Gravel (%)	50	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	37	PL	NP	Sample ID:	PW-12
Fines (%)	13	PI	NP	Sample Depth (ft.):	19 to 25
Sample Description:	GRAVEL, silty with sand and cobbles (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-49



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	81
⅜"	79
#4	73
#10	68
#40	58
#200	38

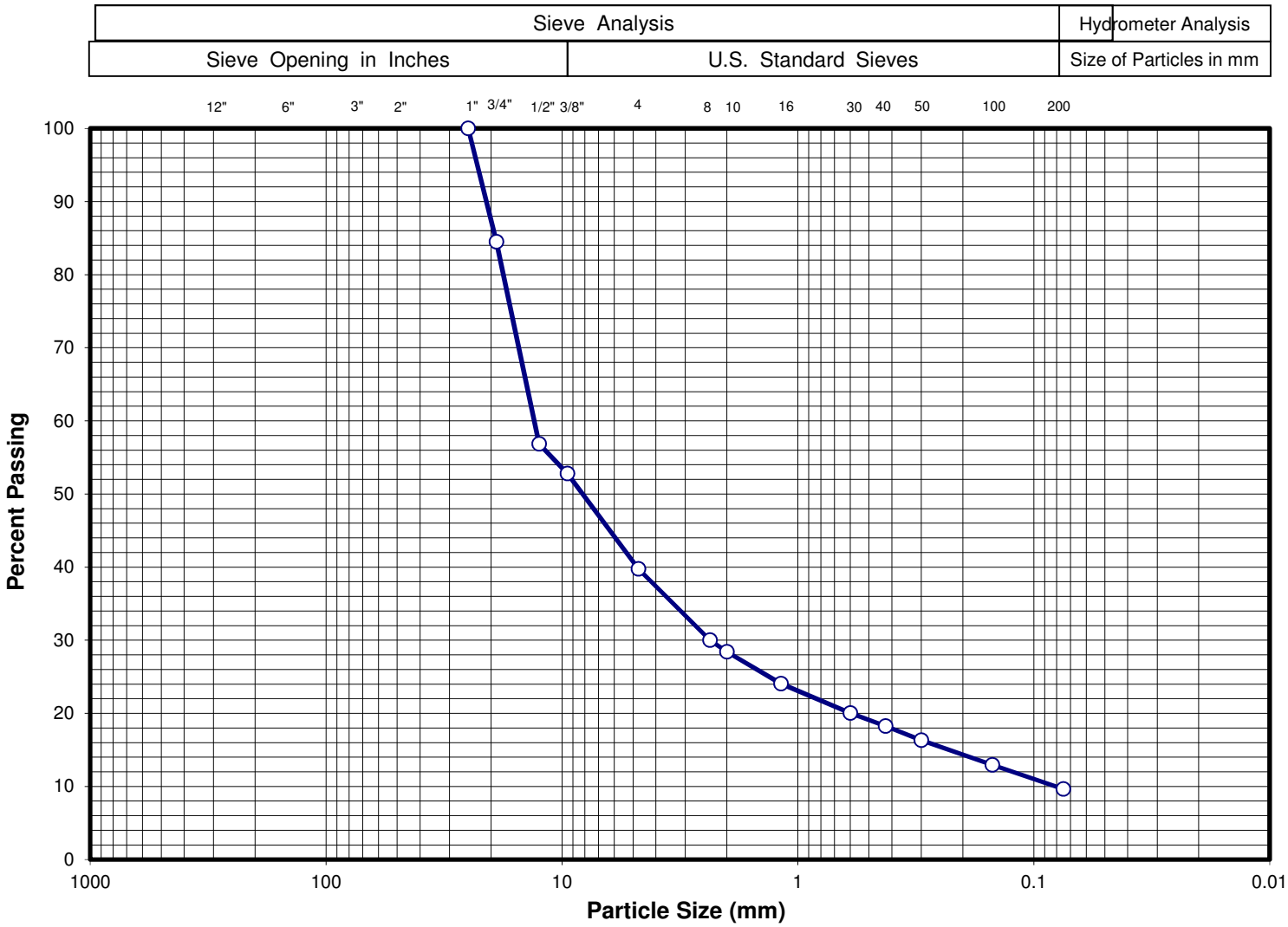
Gravel (%)	27	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	35	PL	NP	Sample ID:	P-13
Fines (%)	38	PI	NP	Sample Depth (ft.):	3.0 to 3.5
Sample Description:	FILL SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-50

Revised 08/25/2017



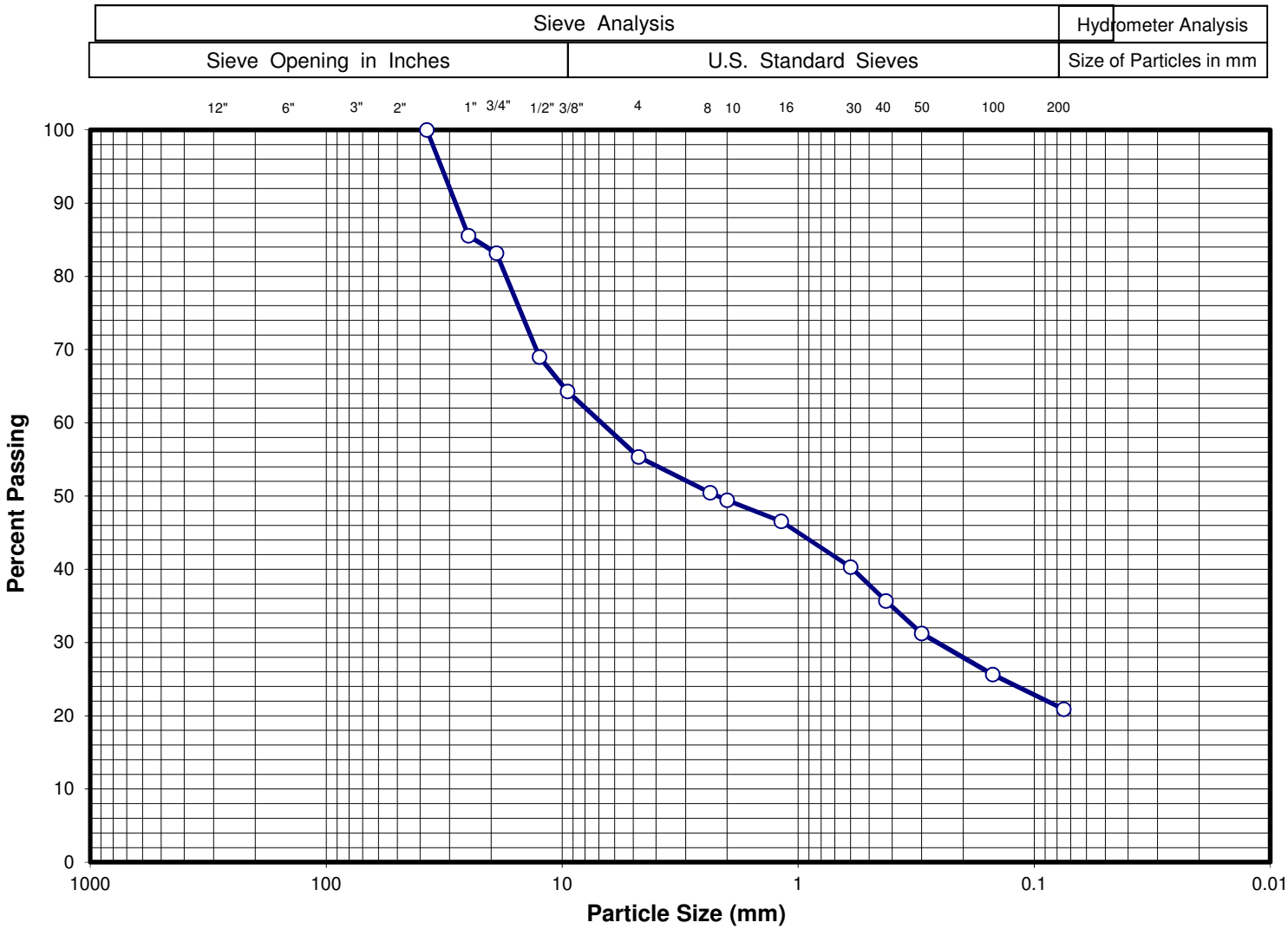
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	85
½"	57
⅜"	53
#4	40
#10	28
#40	18
#200	10

Gravel (%)	60	LL	NV	Project Name:	South Bridge, Glenwood Springs Sourth Bridge Connector Road
Sand (%)	30	PL	NP	Sample ID:	P-13
Fines (%)	10	PI	NP	Sample Depth (ft.):	7.0
Sample Description:	GRAVEL with silt, sand, cobbles and boulders (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-51



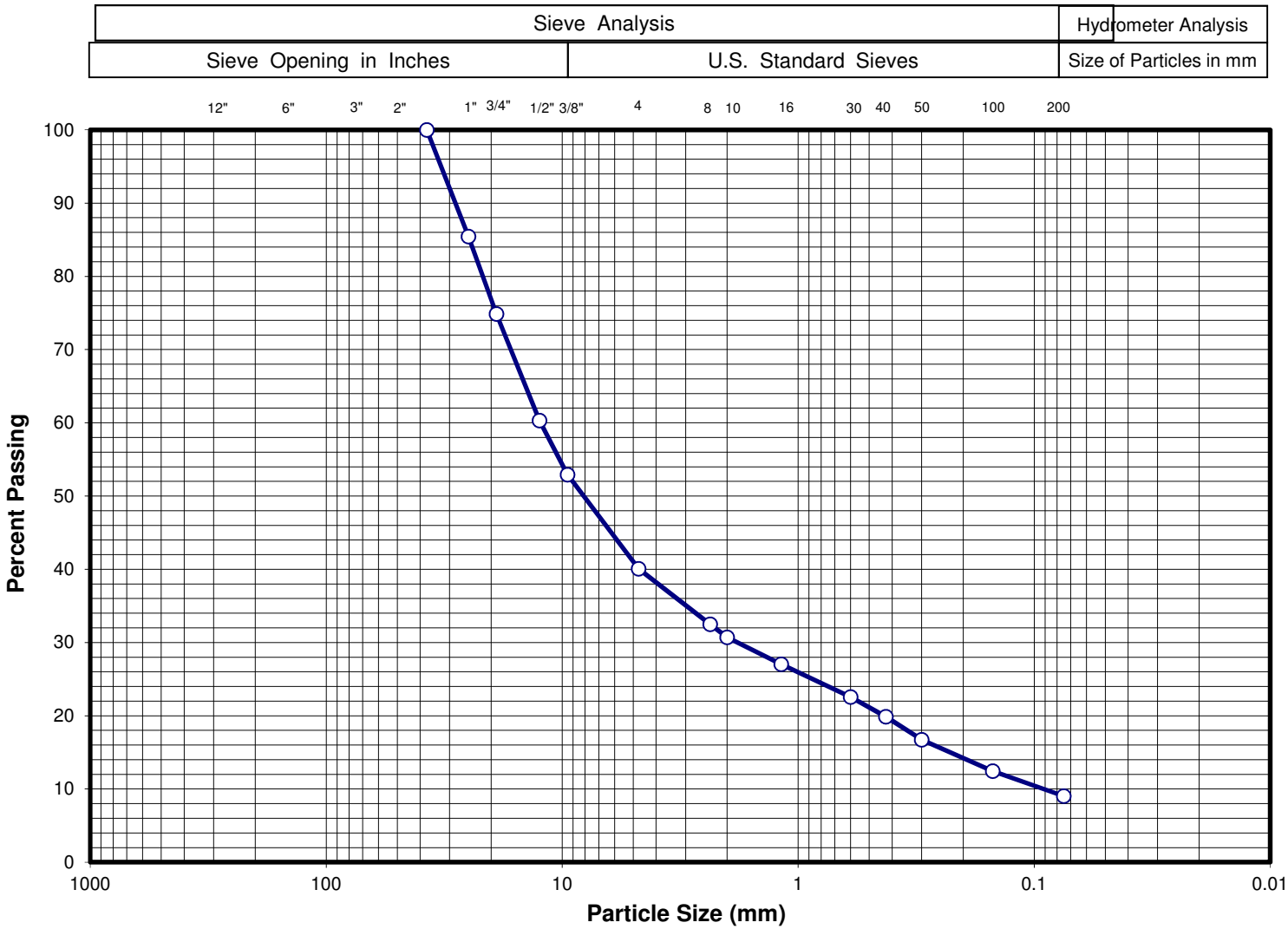
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	86
¾ "	83
½"	69
⅜"	64
#4	55
#10	49
#40	36
#200	21

Gravel (%)	45	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	34	PL	NP	Sample ID:	PW-14
Fines (%)	21	PI	NP	Sample Depth (ft.):	9.0
Sample Description:	FILL GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-52



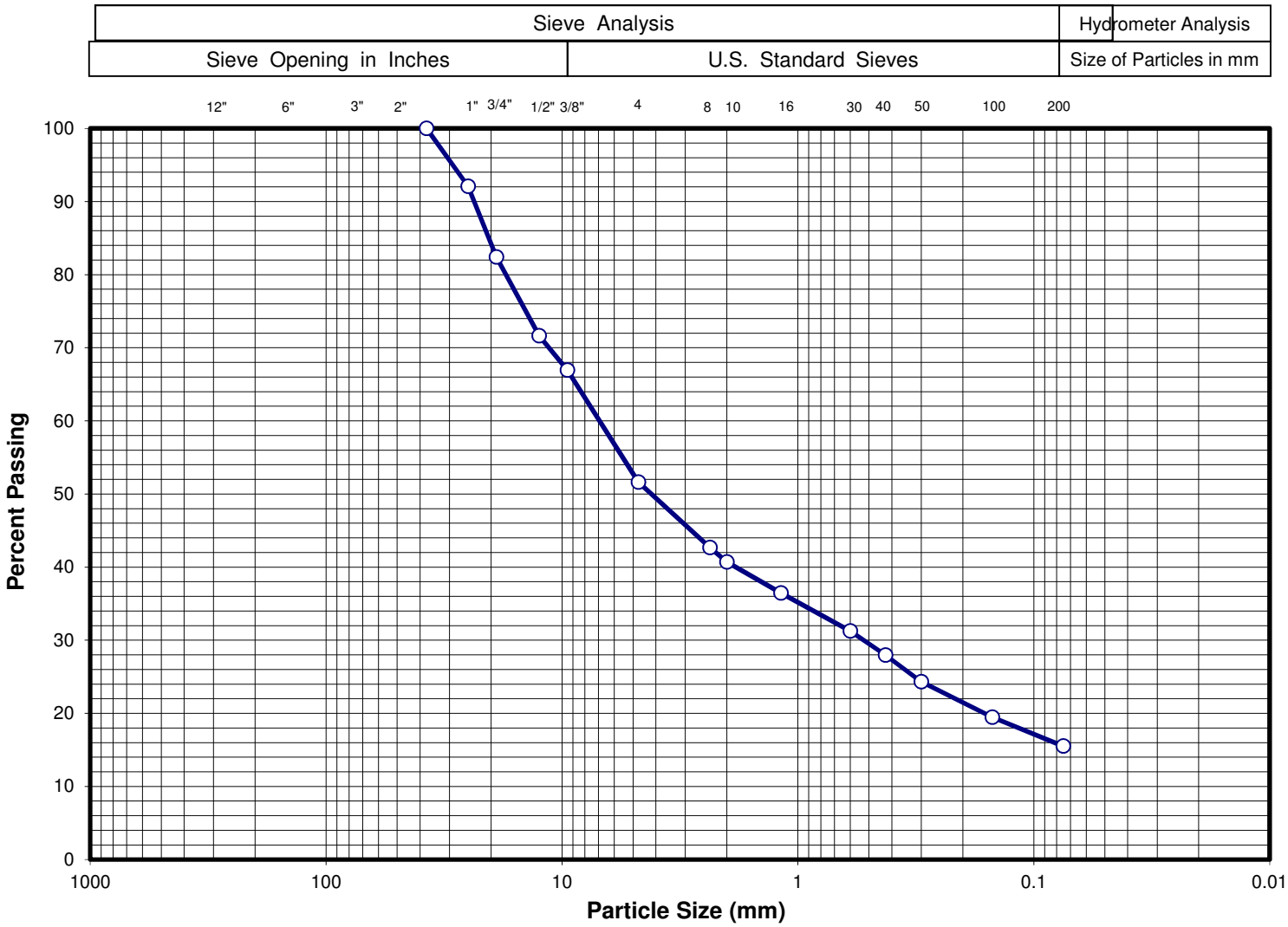
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	85
¾ "	75
½"	60
⅜"	53
#4	40
#10	31
#40	20
#200	9

Gravel (%)	60	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	31	PL	NP	Sample ID:	PW-14
Fines (%)	9	PI	NP	Sample Depth (ft.):	14.0
Sample Description:	GRAVEL, with silt, sand, cobbles, and boulders (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-53



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	92
¾ "	82
½"	72
⅜"	67
#4	52
#10	41
#40	28
#200	16

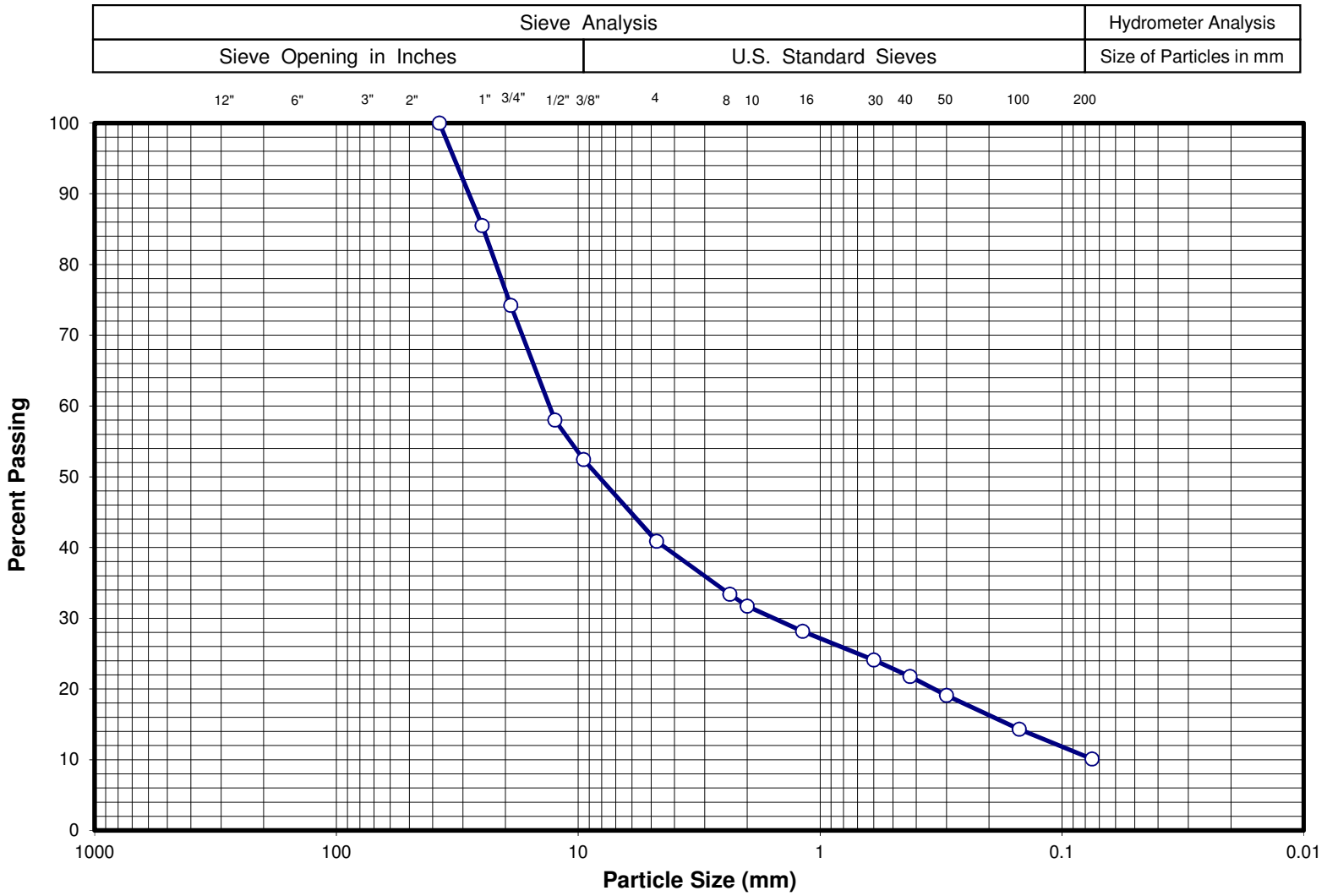
Gravel (%)	48	LL	NV	Project Name:	South Bridge, Glenwood Springs Airport Tunnel
Sand (%)	36	PL	NP	Sample ID:	PW-14
Fines (%)	16	PI	NP	Sample Depth (ft.):	24.0
Sample Description:	GRAVEL, silty, with sand, cobbles and boulders (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-54

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	85
¾ "	74
½"	58
⅜"	52
#4	41
#10	32
#40	22
#200	10

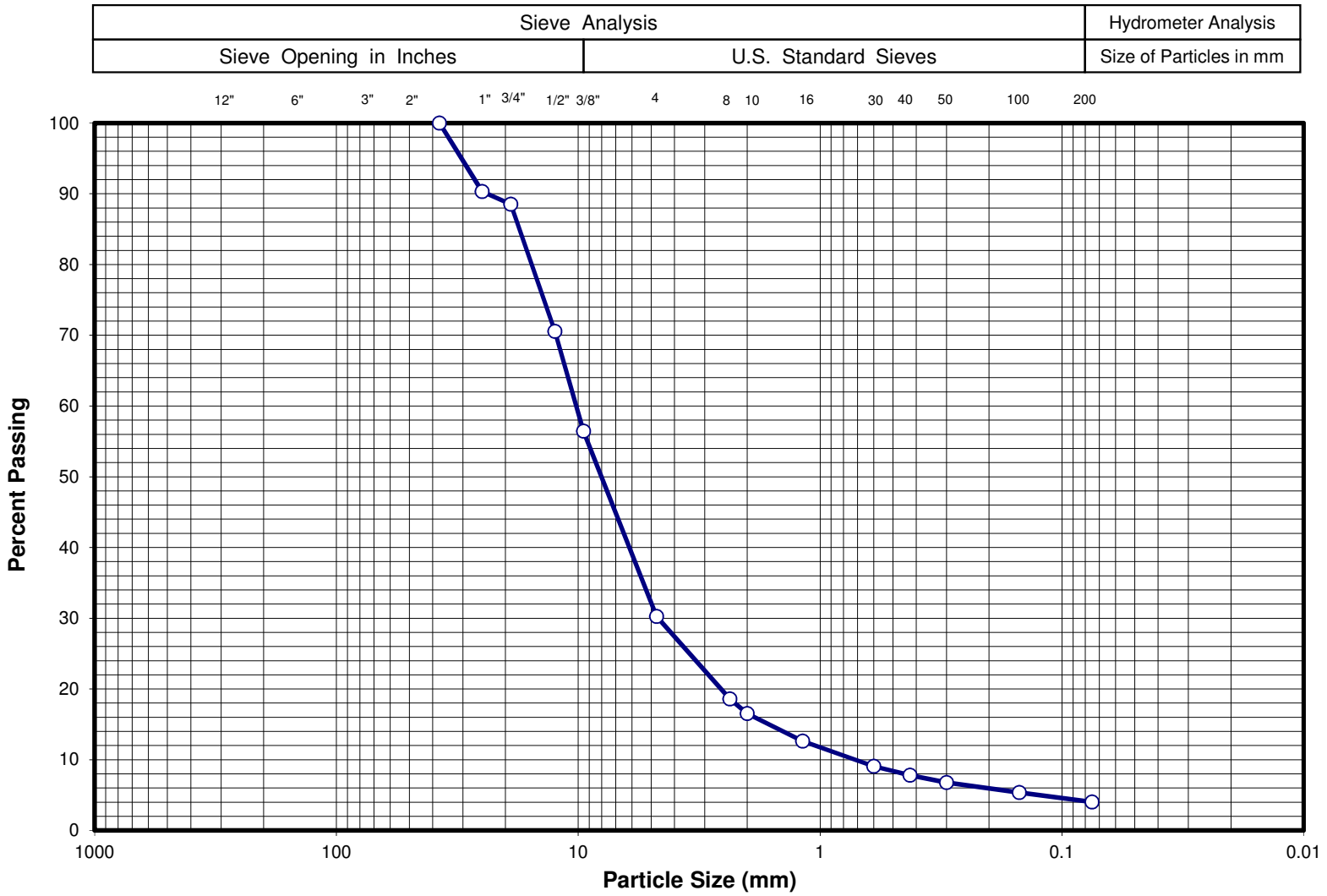
Gravel (%)	59	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	31	PL	NP	Sample ID:	A-1
Fines (%)	10	PI	NP	Sample Depth (ft.):	7.0
Sample Description:	GRAVEL with silt, sand and cobbles (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-55

Revised 08/25/2017



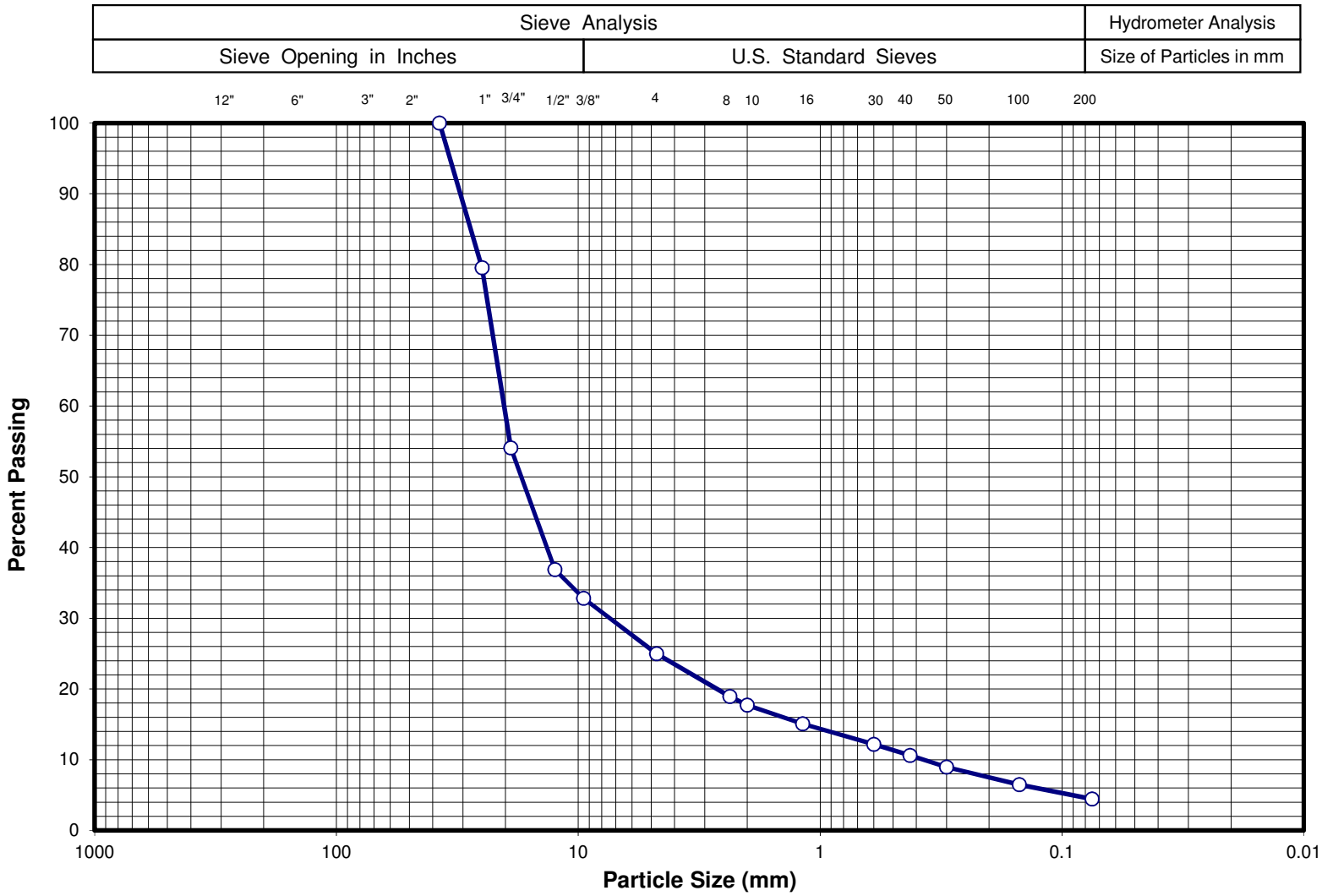
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	90
¾ "	89
½"	71
⅜"	56
#4	30
#10	17
#40	8
#200	4

Gravel (%)	70	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	26	PL	NP	Sample ID:	A-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL with sand, cobbles, and boulders (GW)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-56



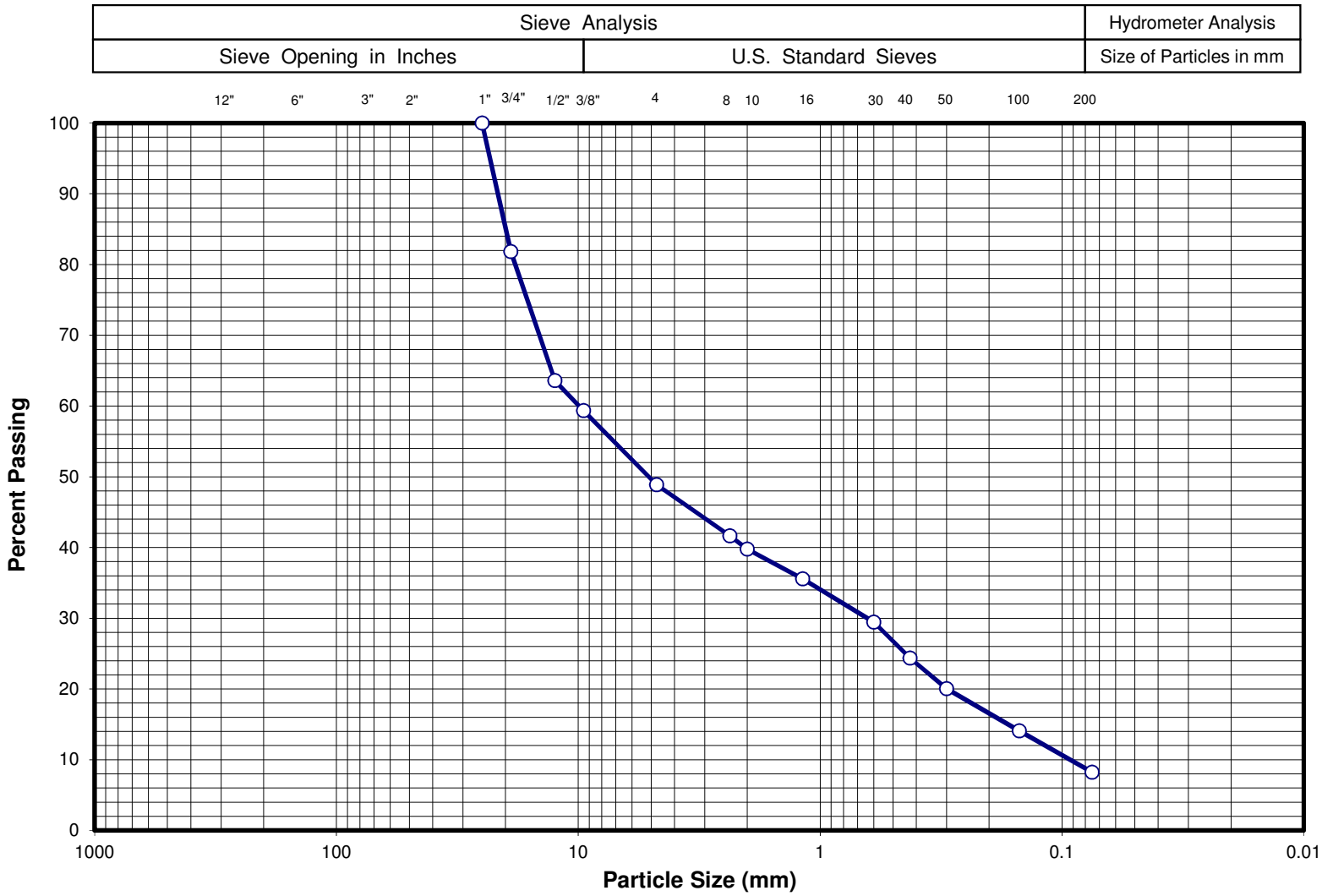
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	80
¾ "	54
½"	37
⅜"	33
#4	25
#10	18
#40	11
#200	4

Gravel (%)	75	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	21	PL	NP	Sample ID:	A-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	22.0
Sample Description:	GRAVEL with sand, cobbles, and boulders (GP)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-57



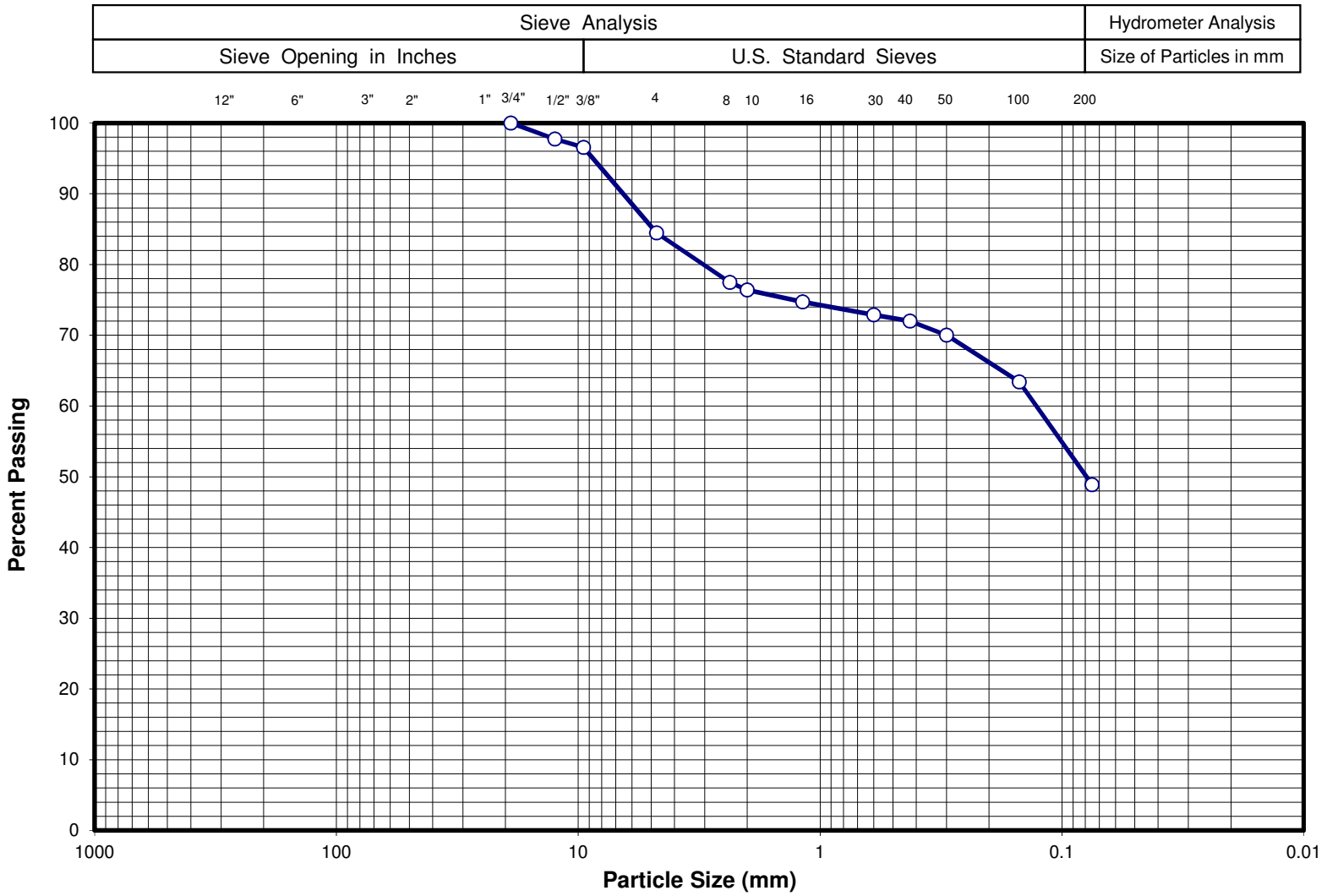
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	82
½"	64
⅜"	59
#4	49
#10	40
#40	24
#200	8

Gravel (%)	51	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	41	PL	NP	Sample ID:	A-2
Fines (%)	8	PI	NP	Sample Depth (ft.):	37.0
Sample Description:	GRAVEL with silt, sand, cobbles, and boulders (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-58



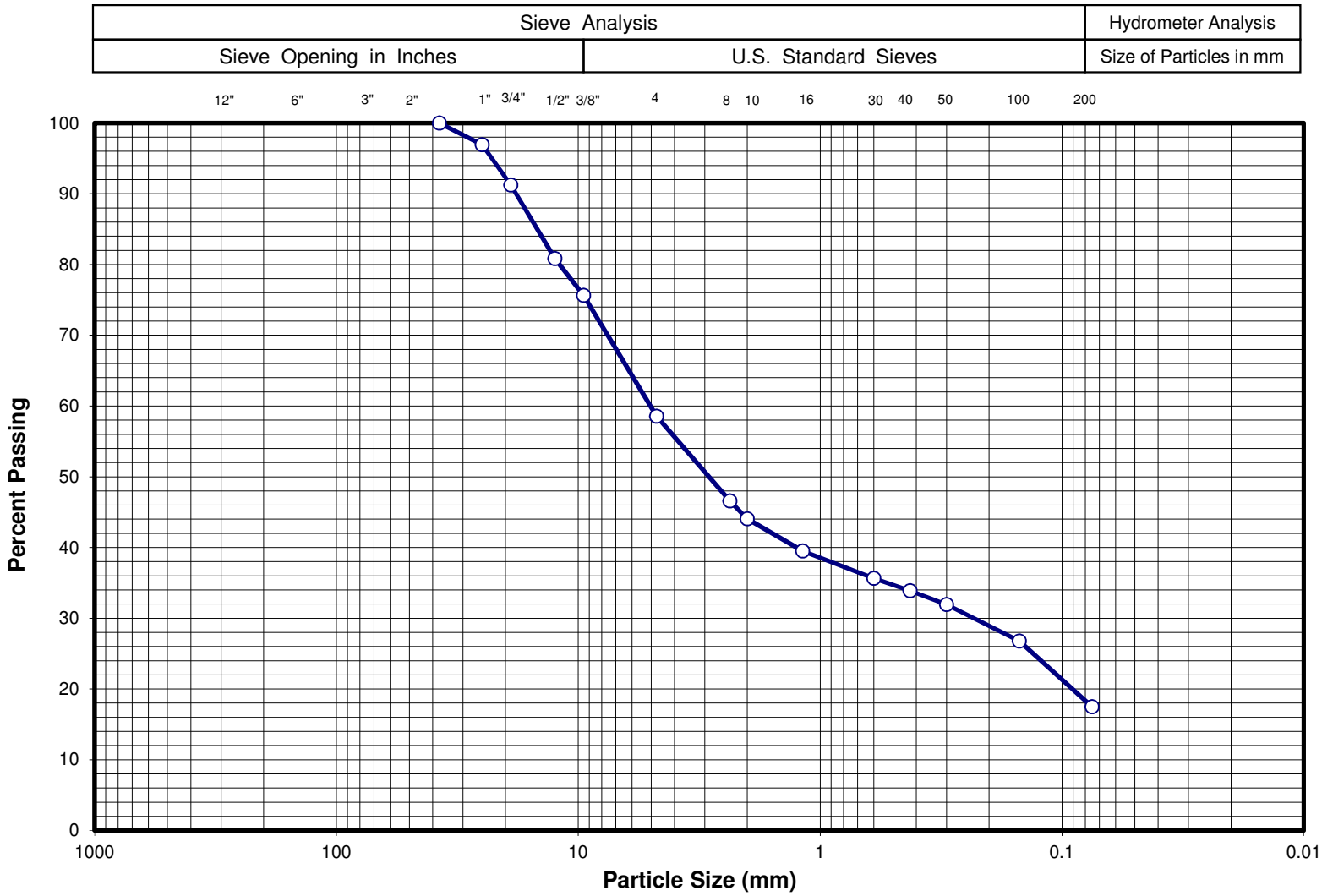
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	98
⅜"	97
#4	84
#10	76
#40	72
#200	49

Gravel (%)	16	LL	25	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	35	PL	15	Sample ID:	A-2
Fines (%)	49	PI	10	Sample Depth (ft.):	68.0
Sample Description:	SAND, clayey with gravel, cobbles, and boulders (SC)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-59



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	97
¾ "	91
½"	81
⅜"	76
#4	59
#10	44
#40	34
#200	17

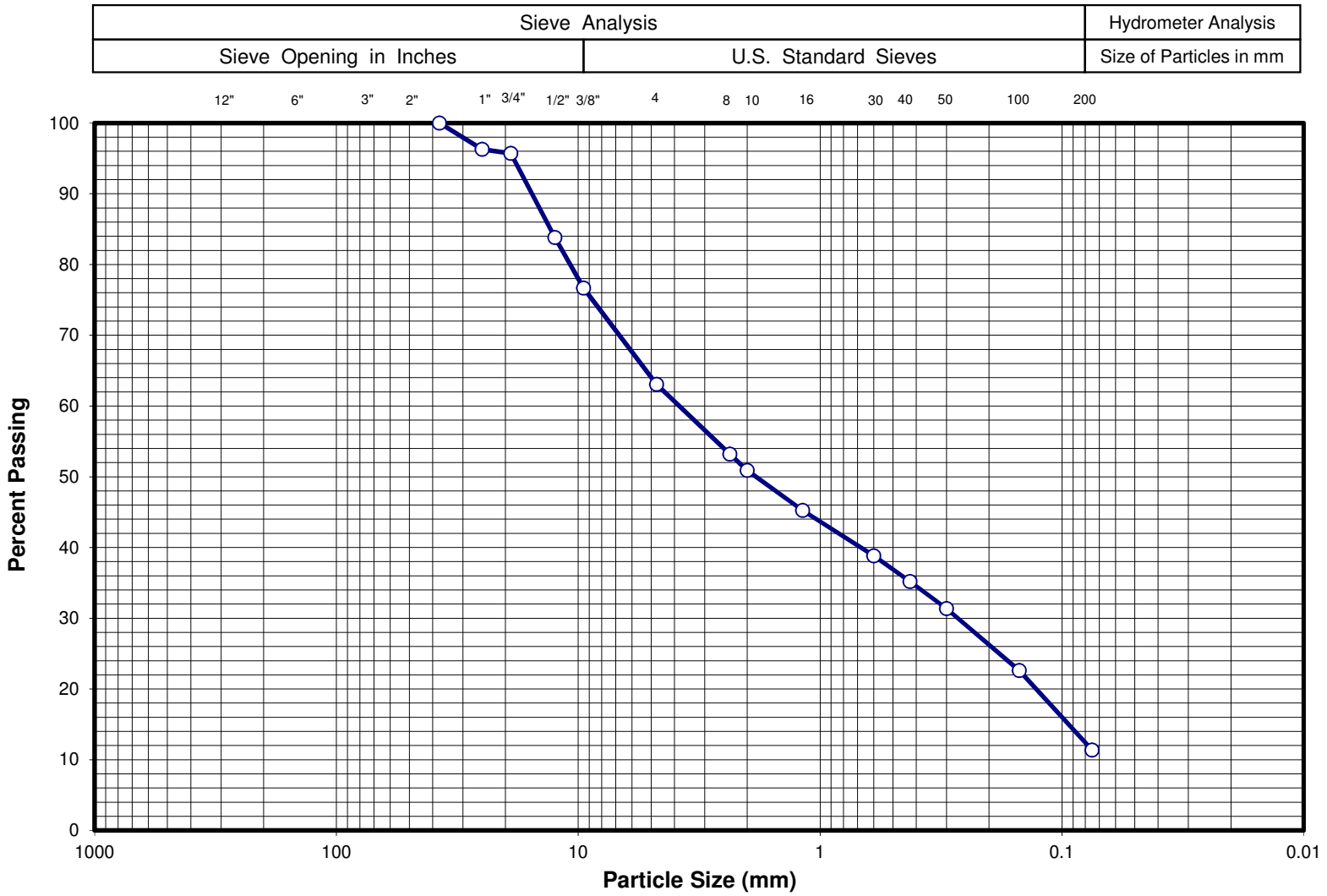
Gravel (%)	41	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	42	PL	NP	Sample ID:	A-2
Fines (%)	17	PI	NP	Sample Depth (ft.):	79.5
Sample Description:	SAND, silty with gravel, cobbles, and boulders (SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-60

Revised 08/25/2017



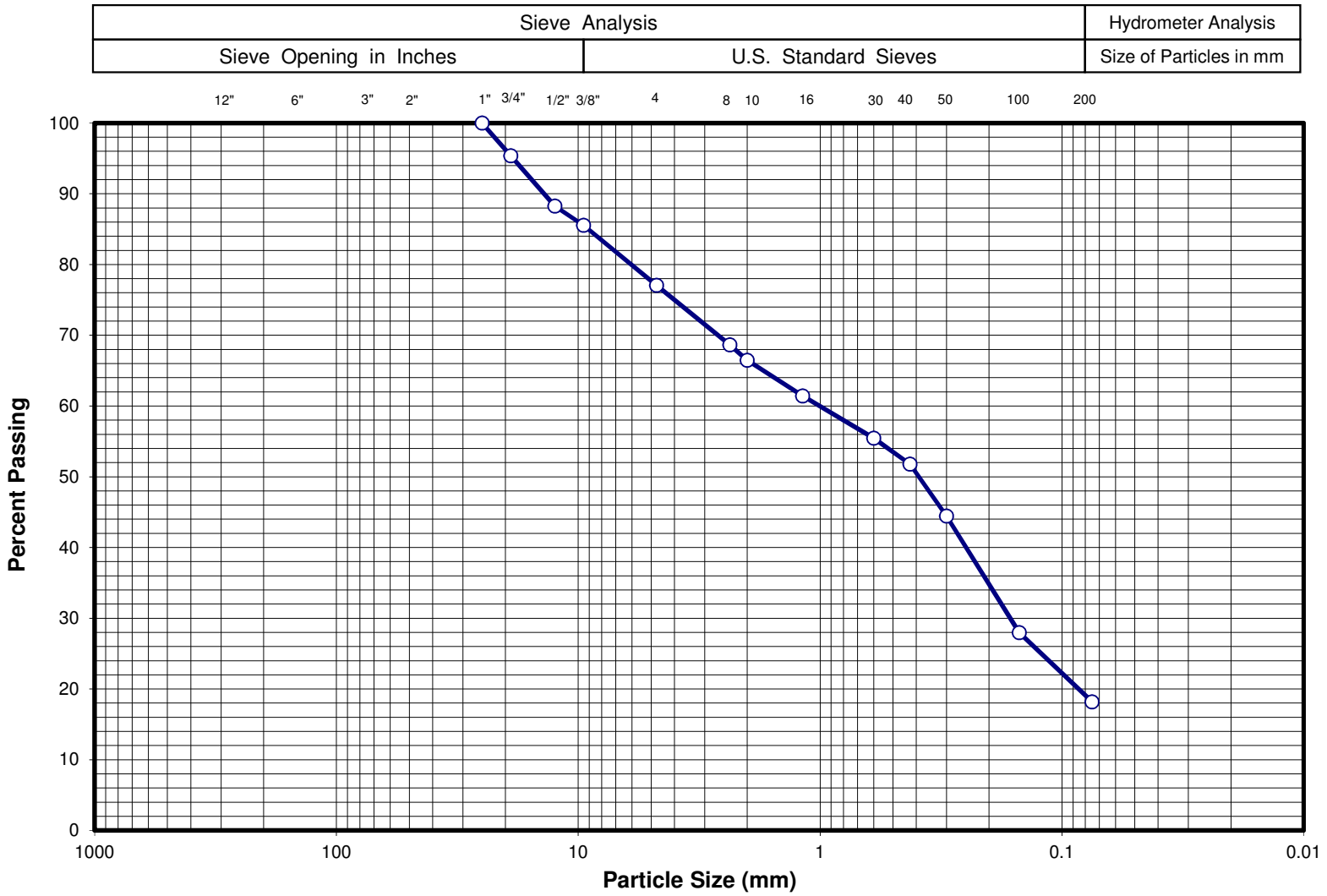
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	96
¾ "	96
½"	84
⅜"	77
#4	63
#10	51
#40	35
#200	11

Gravel (%)	37	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	52	PL	NP	Sample ID:	A-2
Fines (%)	11	PI	NP	Sample Depth (ft.):	89.5
Sample Description:	SAND, with silt, gravel, cobbles, and boulders (SP-SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-61



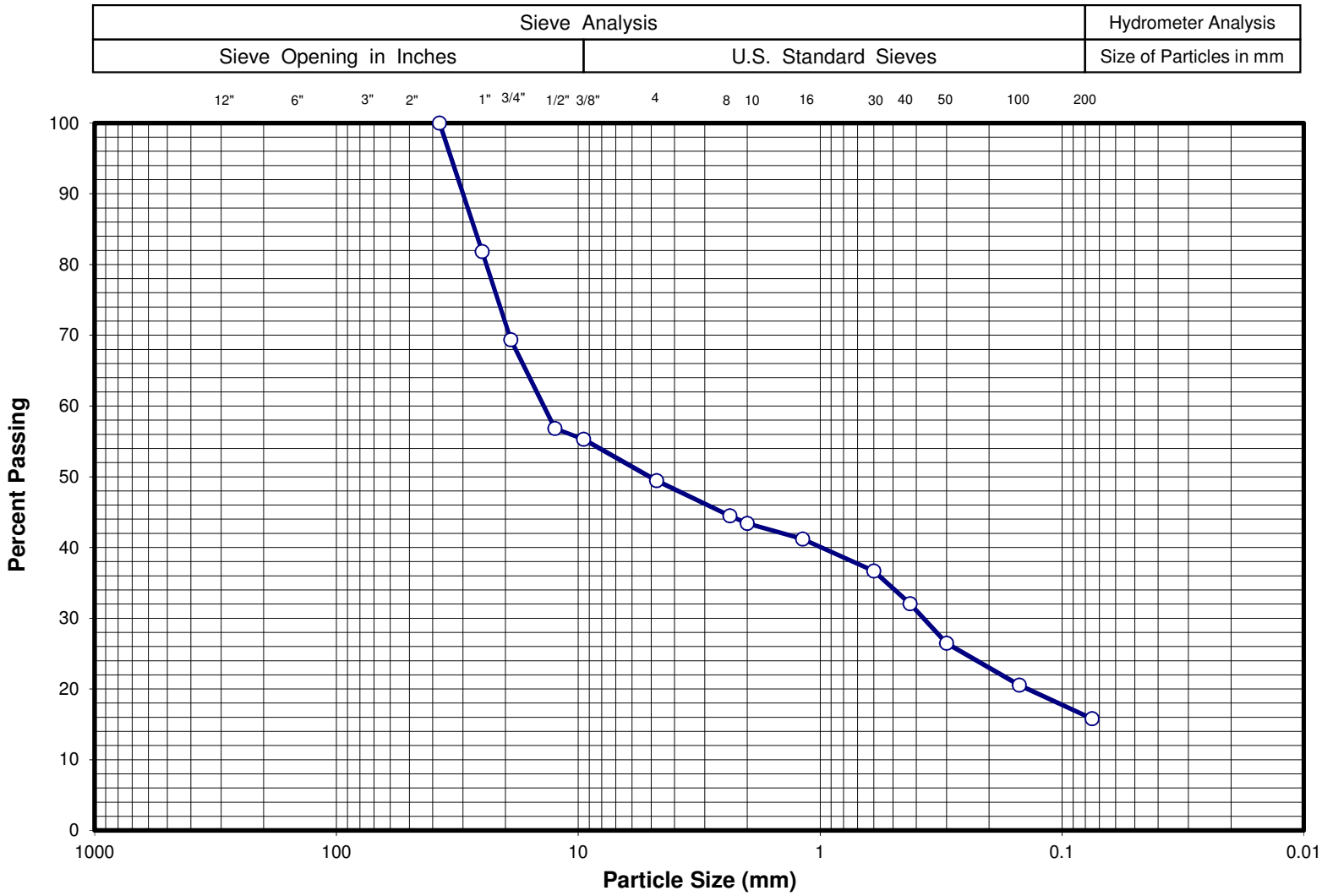
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	95
½"	88
⅜"	86
#4	77
#10	66
#40	52
#200	18

Gravel (%)	23	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Abutments
Sand (%)	59	PL	NP	Sample ID:	A-2
Fines (%)	18	PI	NP	Sample Depth (ft.):	99.5
Sample Description:	SAND, silty with gravel, cobbles, and boulders (SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-62



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	82
¾ "	69
½"	57
⅜"	55
#4	49
#10	43
#40	32
#200	16

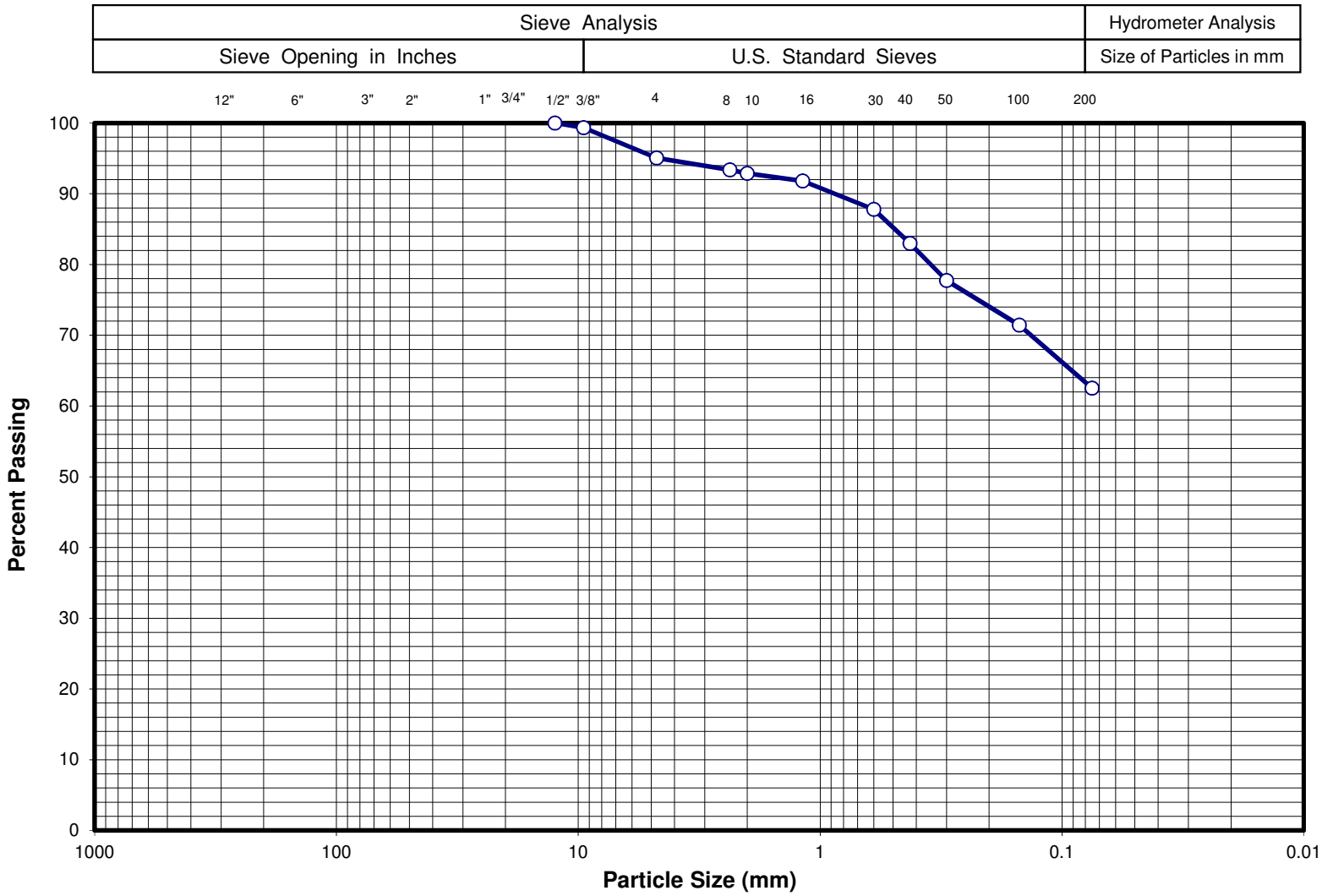
Gravel (%)	51	LL	-	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	33	PL	-	Sample ID:	PW-15
Fines (%)	16	PI	-	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL silty with sand and cobbles				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-63

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	99
#4	95
#10	93
#40	83
#200	63

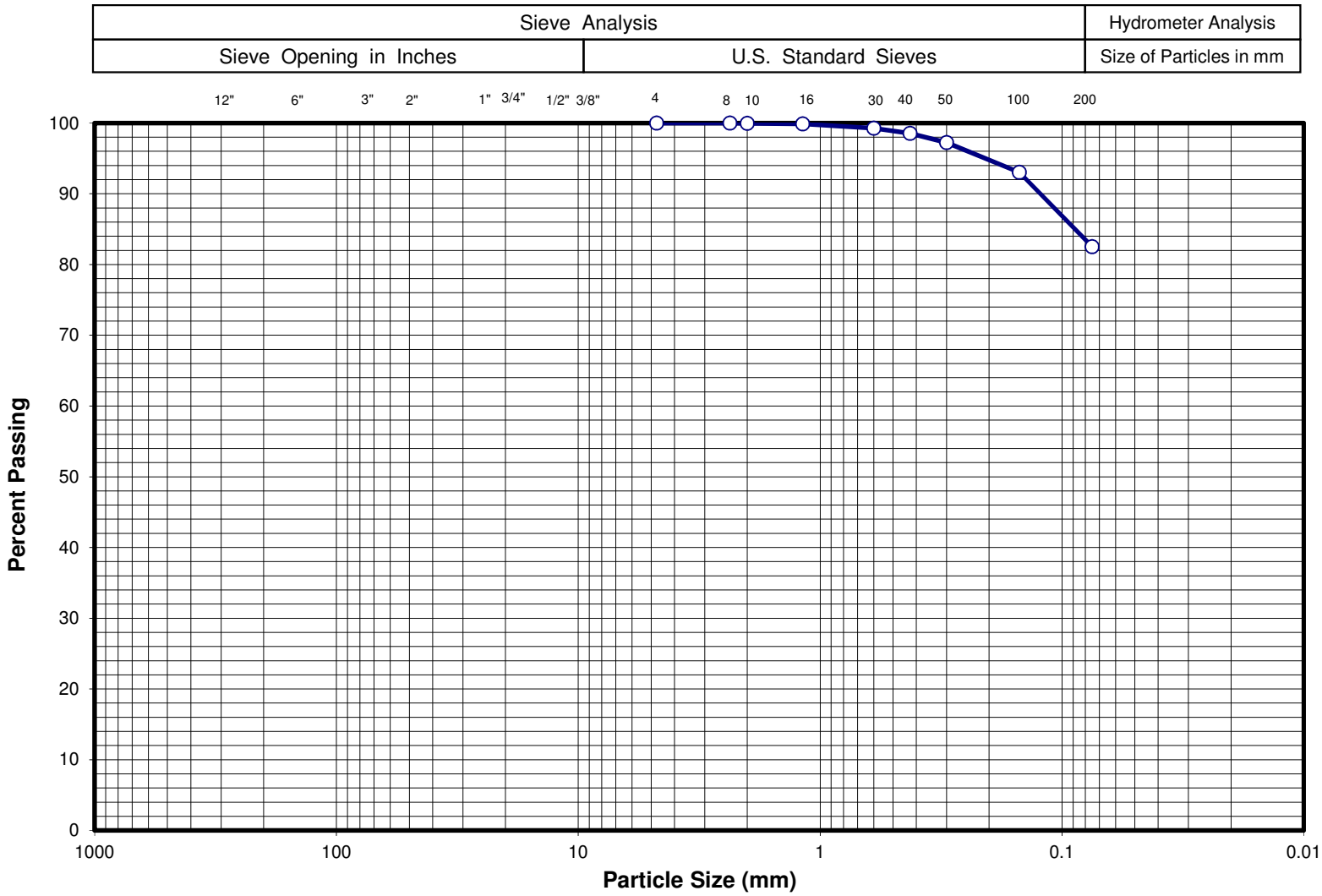
Gravel (%)	5	LL	31	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	32	PL	17	Sample ID:	P-16
Fines (%)	63	PI	14	Sample Depth (ft.):	1.0
Sample Description:	CLAY, sandy (CL)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-64

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	99
#200	83

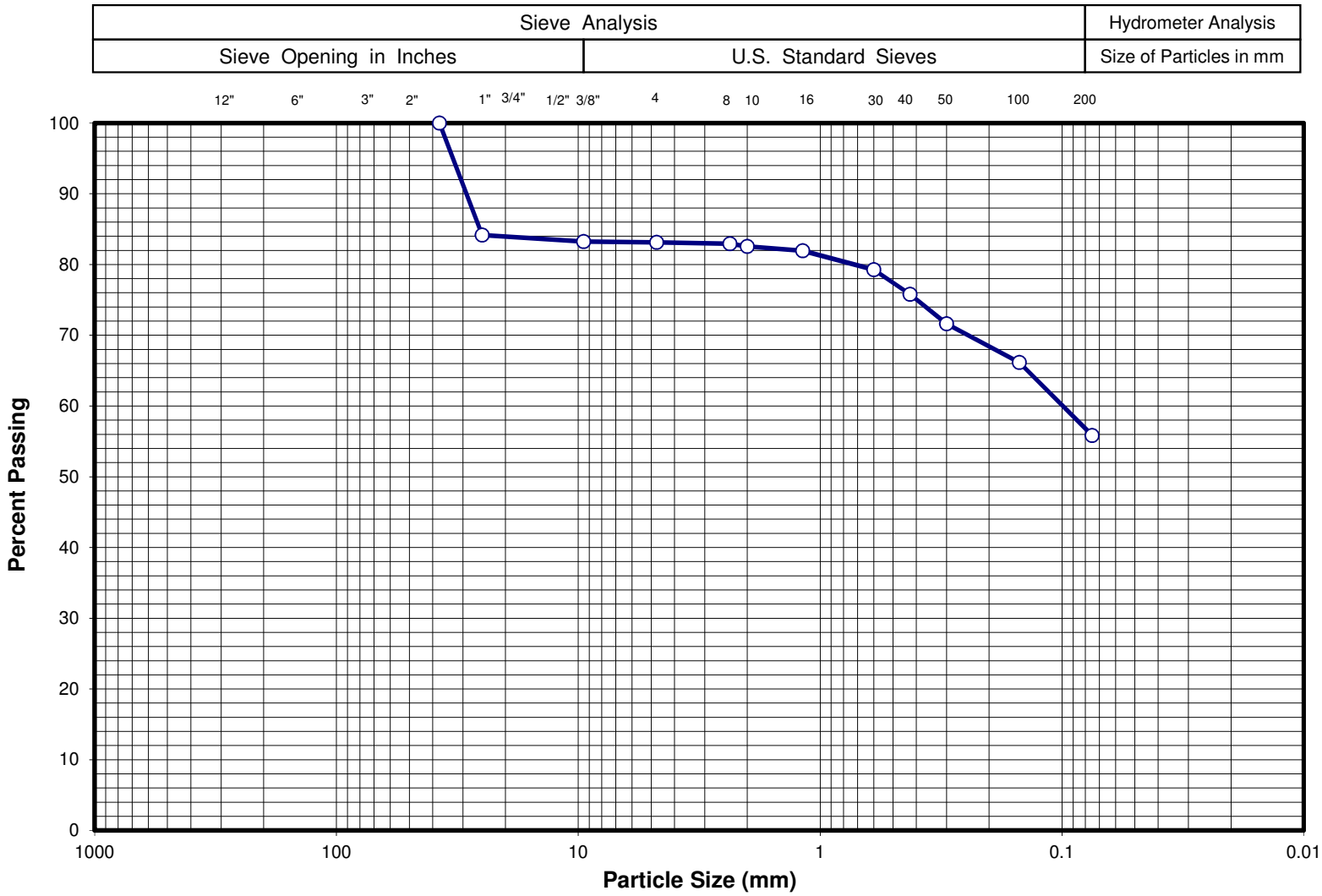
Gravel (%)	0	LL	29	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	17	PL	19	Sample ID:	PW-17
Fines (%)	83	PI	10	Sample Depth (ft.):	2.5
Sample Description:	CLAY with sand (CL)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-65

Revised 08/25/2017



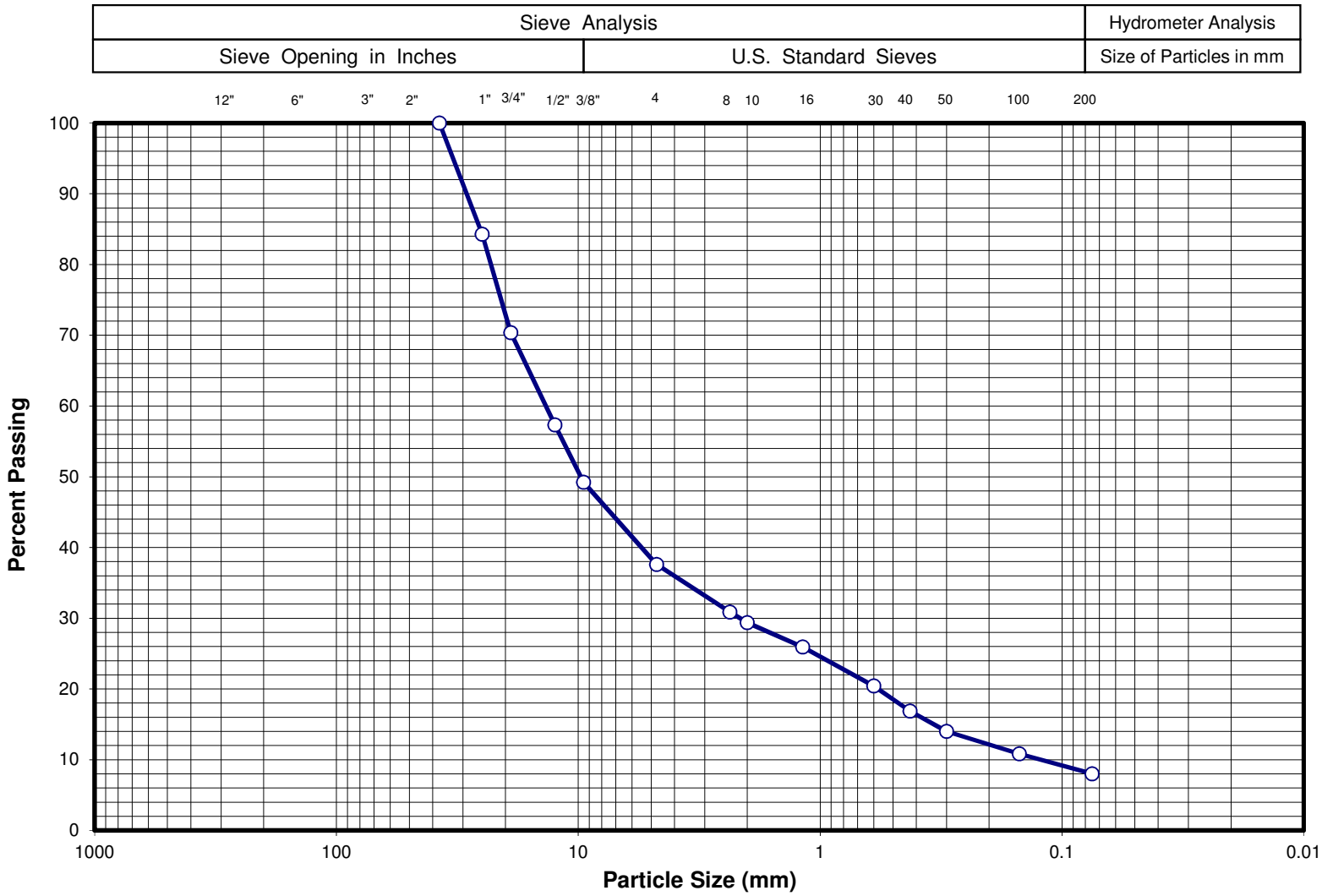
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	84
¾ "	-
½"	-
⅜"	83
#4	83
#10	83
#40	76
#200	56

Gravel (%)	17	LL	29	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	27	PL	14	Sample ID:	PW-17
Fines (%)	56	PI	15	Sample Depth (ft.):	7.5
Sample Description:	CLAY with sand, gravel and cobbles (CL)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-66



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	84
¾ "	70
½"	57
⅜"	49
#4	38
#10	29
#40	17
#200	8

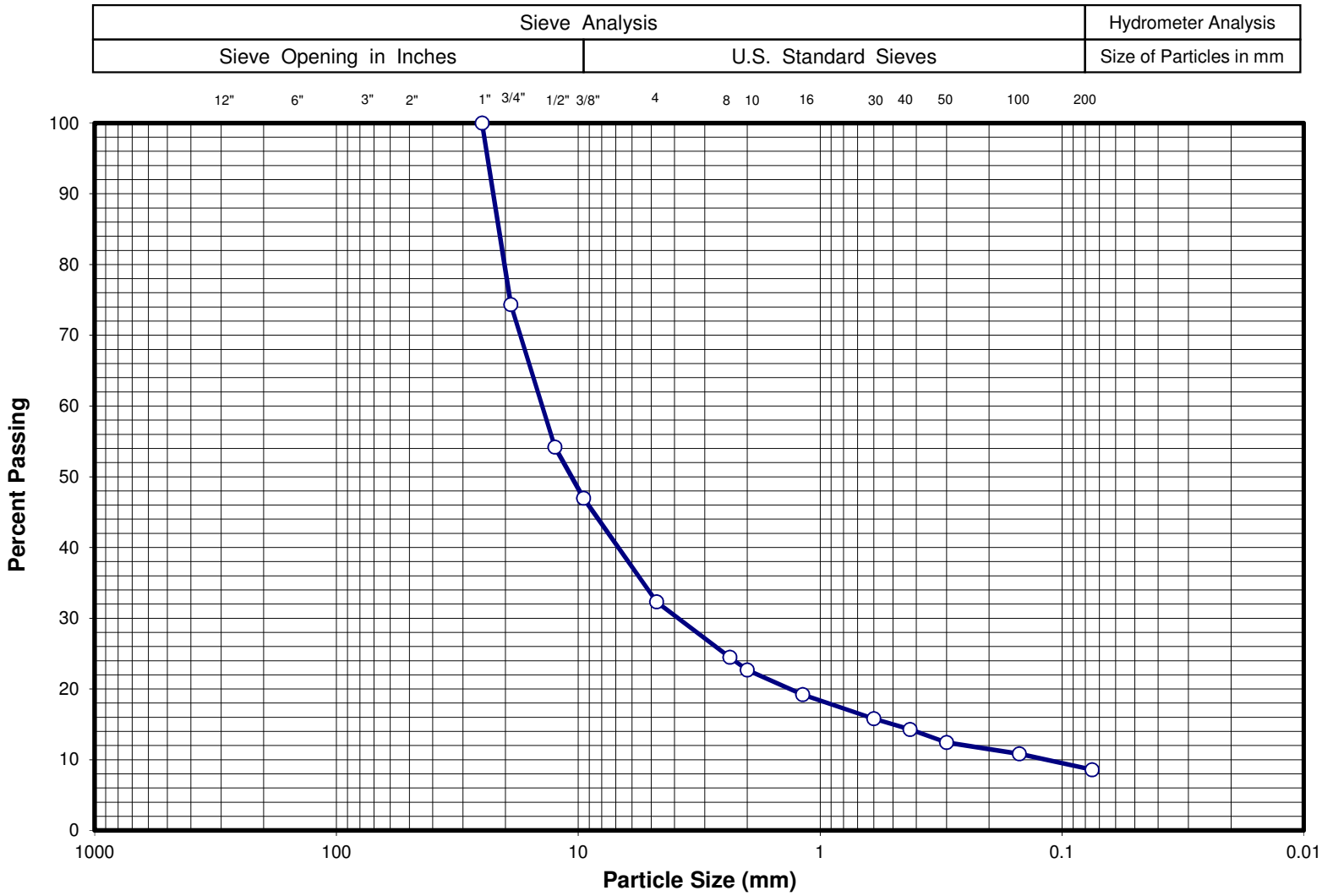
Gravel (%)	62	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	30	PL	NP	Sample ID:	W-17
Fines (%)	8	PI	NP	Sample Depth (ft.):	12.5
Sample Description:	GRAVEL, with silt, sand, and cobbles (GW-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-67

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	74
½"	54
⅜"	47
#4	32
#10	23
#40	14
#200	9

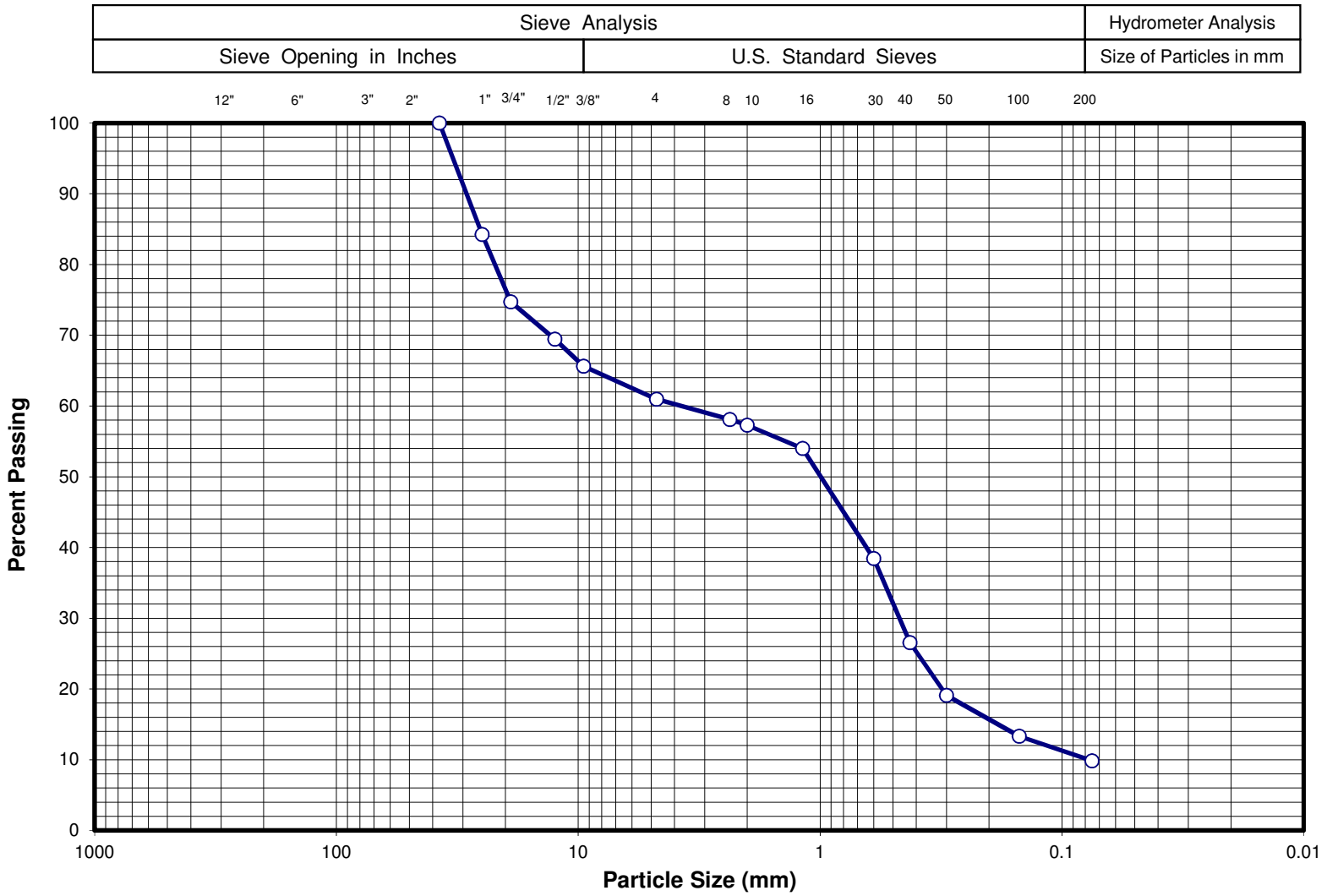
Gravel (%)	68	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	23	PL	NP	Sample ID:	PW-17
Fines (%)	9	PI	NP	Sample Depth (ft.):	17.5
Sample Description:	GRAVEL with silt, sand and cobbles (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-68

Revised 08/25/2017



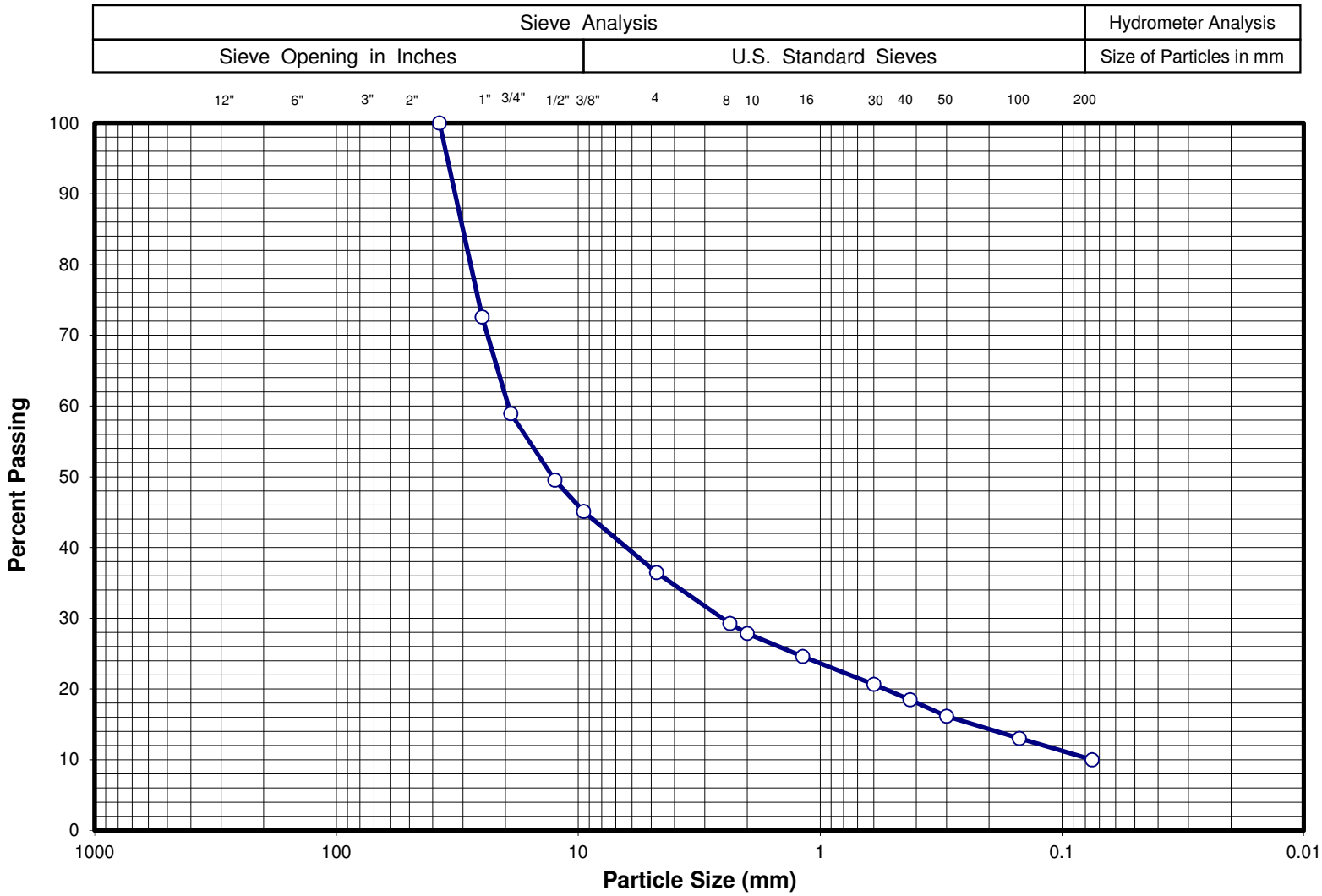
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	84
¾ "	75
½"	69
⅜"	66
#4	61
#10	57
#40	27
#200	10

Gravel (%)	39	LL	NV	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	51	PL	NP	Sample ID:	PW-17
Fines (%)	10	PI	NP	Sample Depth (ft.):	27.5
Sample Description:	SAND, with silt, gravel, and cobbles (SP-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-69



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	73
¾ "	59
½"	50
⅜"	45
#4	36
#10	28
#40	18
#200	10

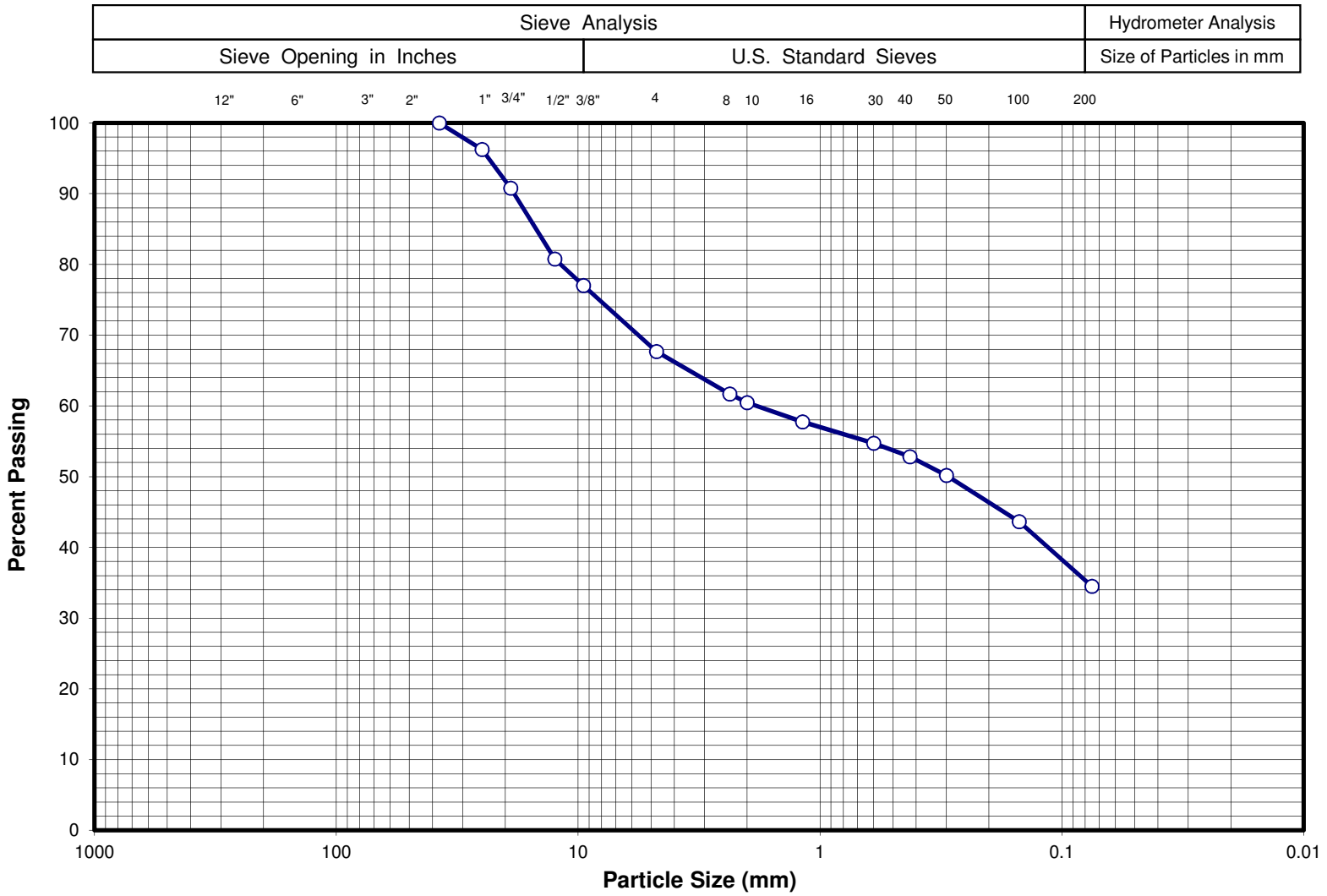
Gravel (%)	64	LL	-	Project Name:	South Bridge, Glenwood Springs South Bridge Connector Road
Sand (%)	26	PL	-	Sample ID:	PW-17
Fines (%)	10	PI	-	Sample Depth (ft.):	37.5
Sample Description:	GRAVEL with silt, sand, cobbles and boulders				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-70

Revised 08/25/2017



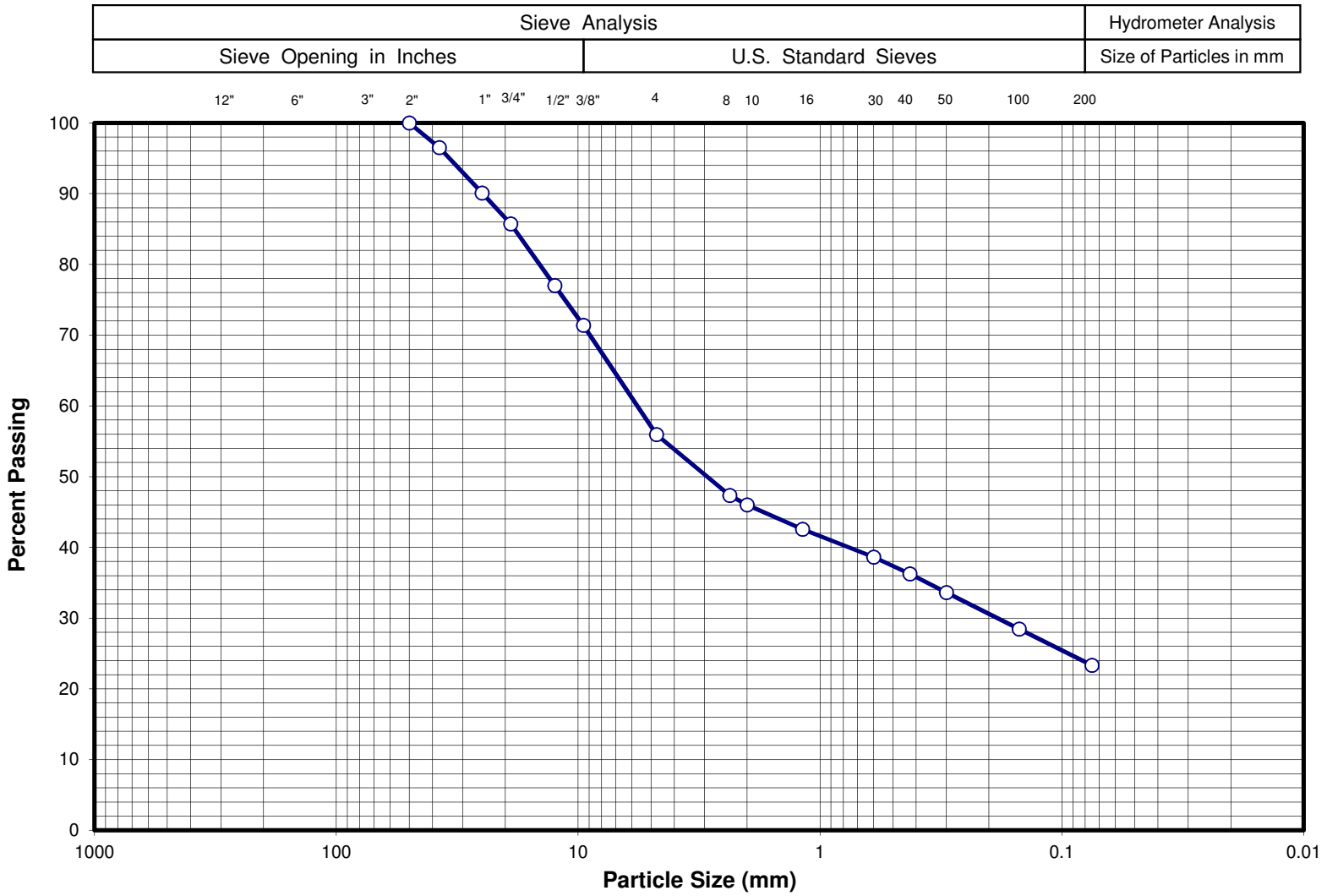
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	96
¾ "	91
½"	81
⅜"	77
#4	68
#10	60
#40	53
#200	35

Gravel (%)	32	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	33	PL	20	Sample ID:	PW-18
Fines (%)	35	PI	2	Sample Depth (ft.):	1.0
Sample Description:	SAND, silty with gravel (BASE)(SM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-71



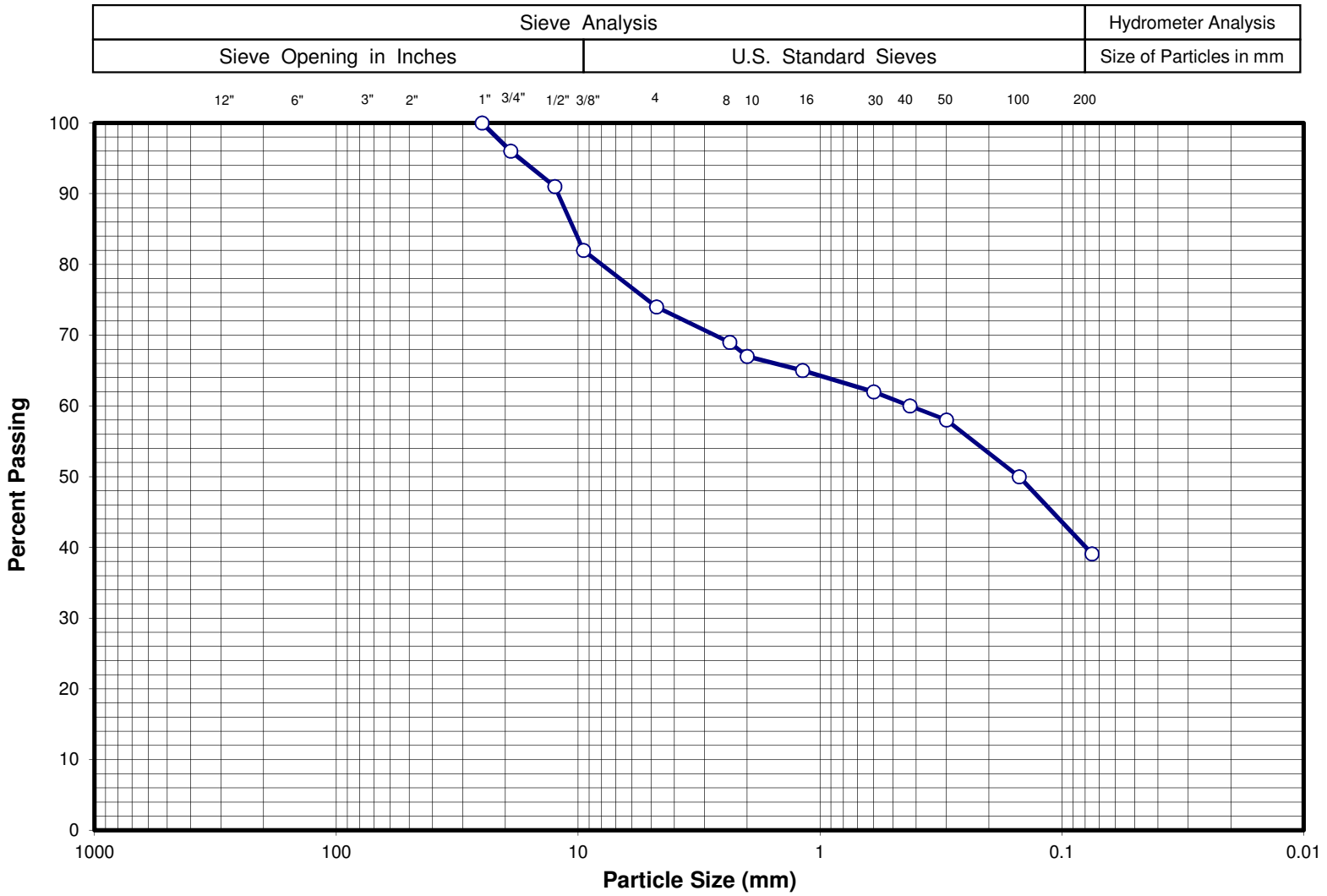
Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	97
1"	90
¾ "	86
½"	77
⅜"	71
#4	56
#10	46
#40	36
#200	23

Gravel (%)	44	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	33	PL	NP	Sample ID:	PW-18
Fines (%)	23	PI	NP	Sample Depth (ft.):	2 to 6
Sample Description:	GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-72



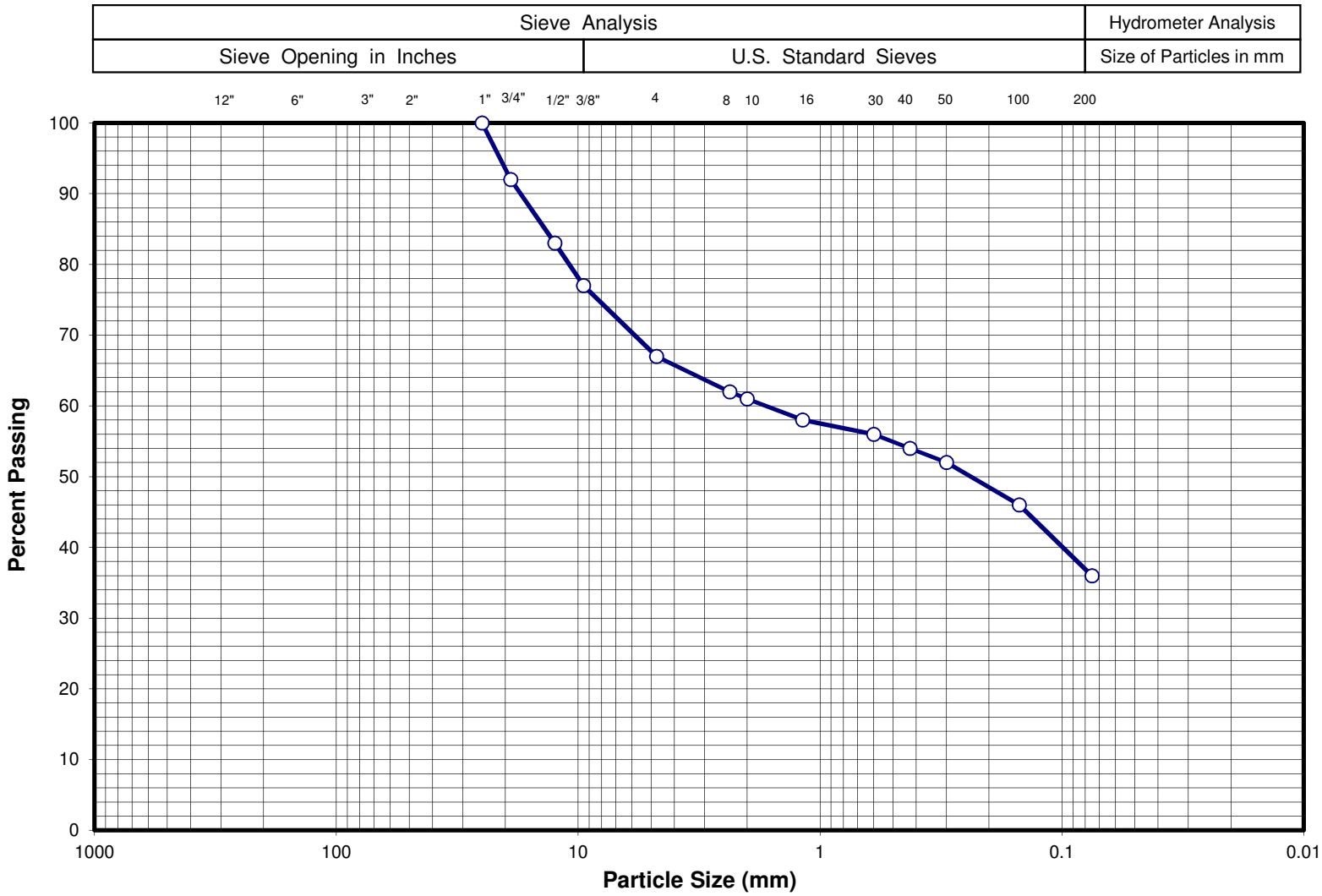
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	96
½"	91
⅜"	82
#4	74
#10	67
#40	60
#200	39

Gravel (%)	26	LL	23	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	35	PL	17	Sample ID:	PW-18
Fines (%)	39	PI	6	Sample Depth (ft.):	9.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-73



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	92
½"	83
⅜"	77
#4	67
#10	61
#40	54
#200	36

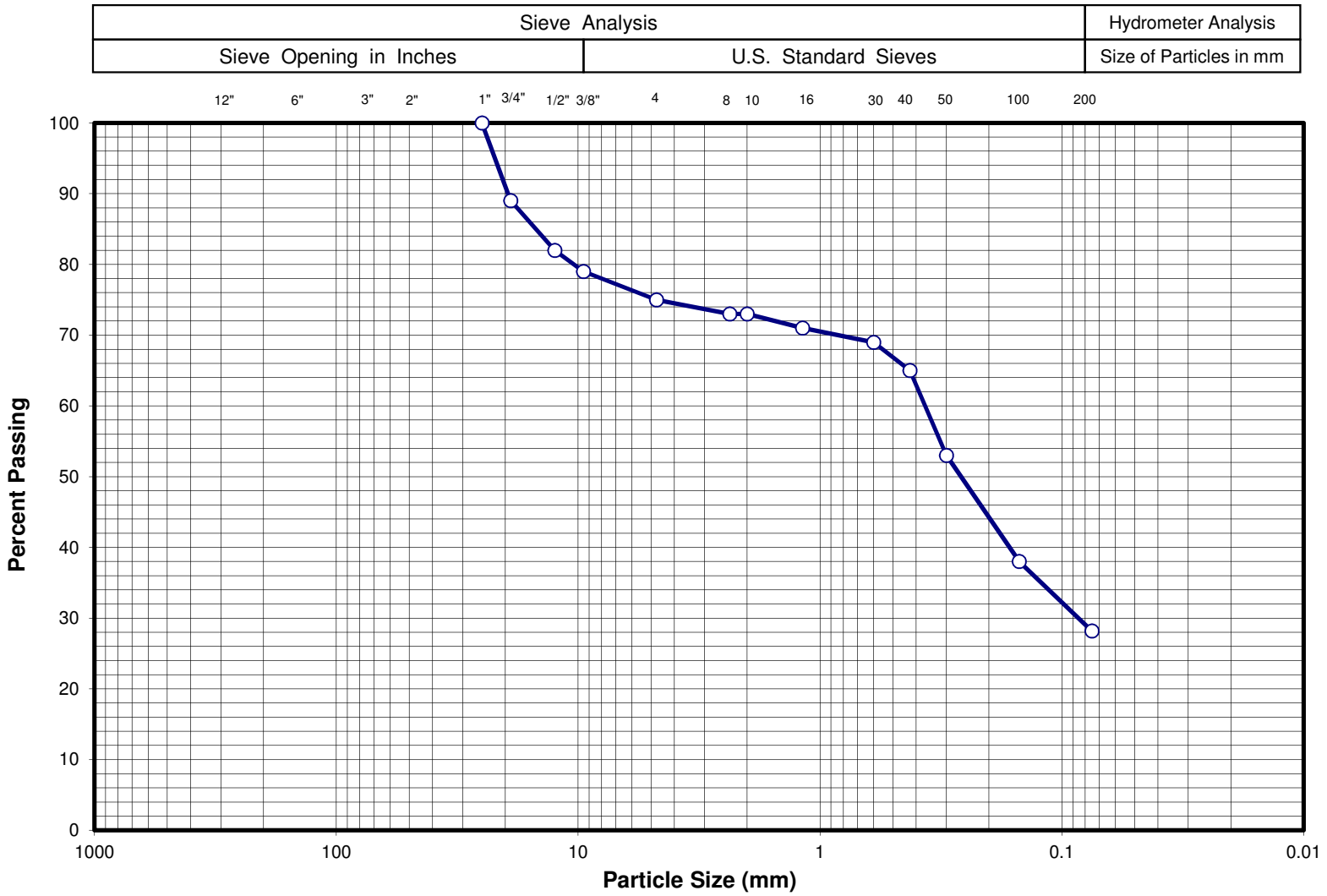
Gravel (%)	33	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	31	PL	18	Sample ID:	PW-18
Fines (%)	36	PI	3	Sample Depth (ft.):	14.0
Sample Description:	GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-74

Revised 08/25/2017



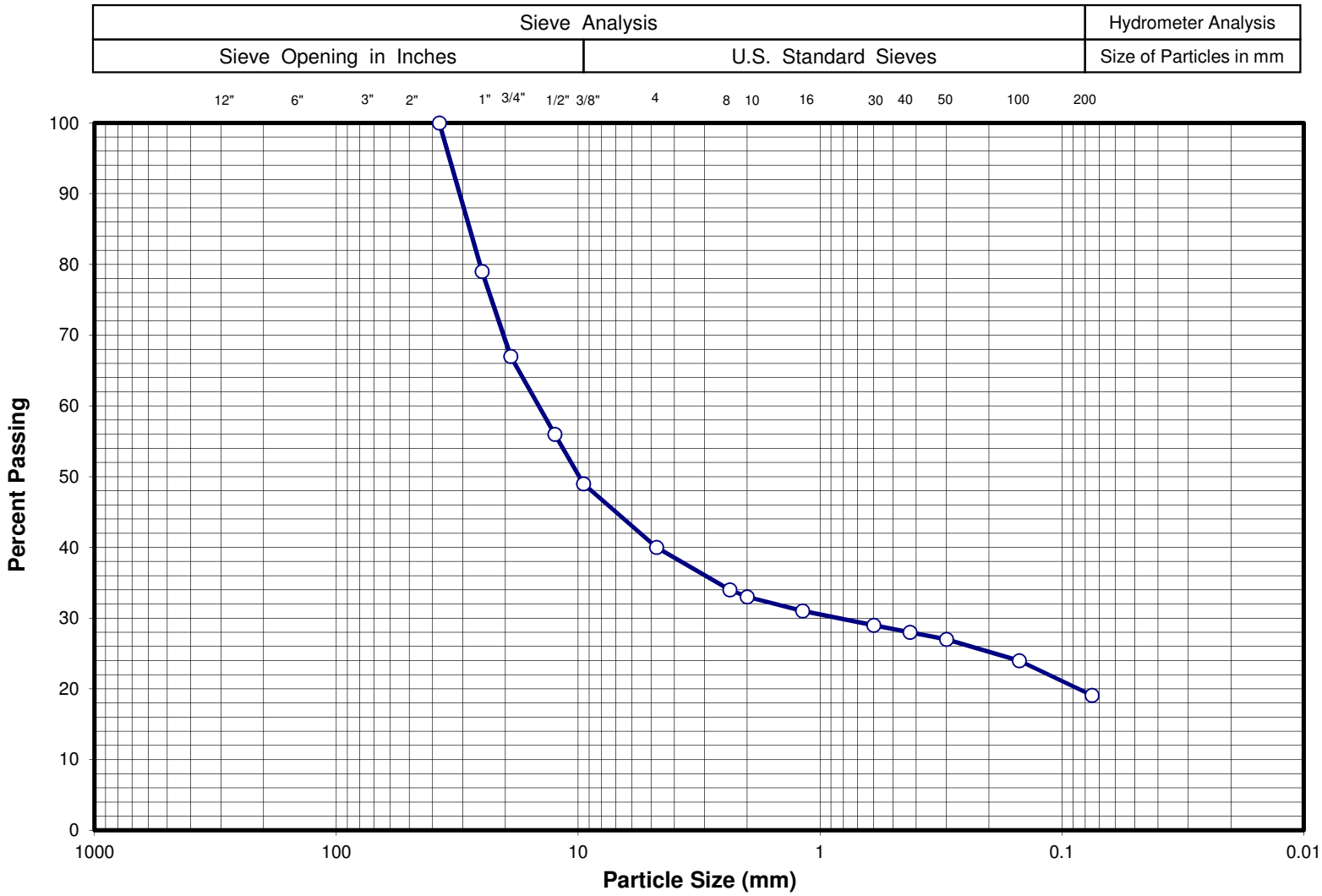
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	89
½"	82
⅜"	79
#4	75
#10	73
#40	65
#200	28

Gravel (%)	25	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	47	PL	18	Sample ID:	PW-18
Fines (%)	28	PI	4	Sample Depth (ft.):	19.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-75



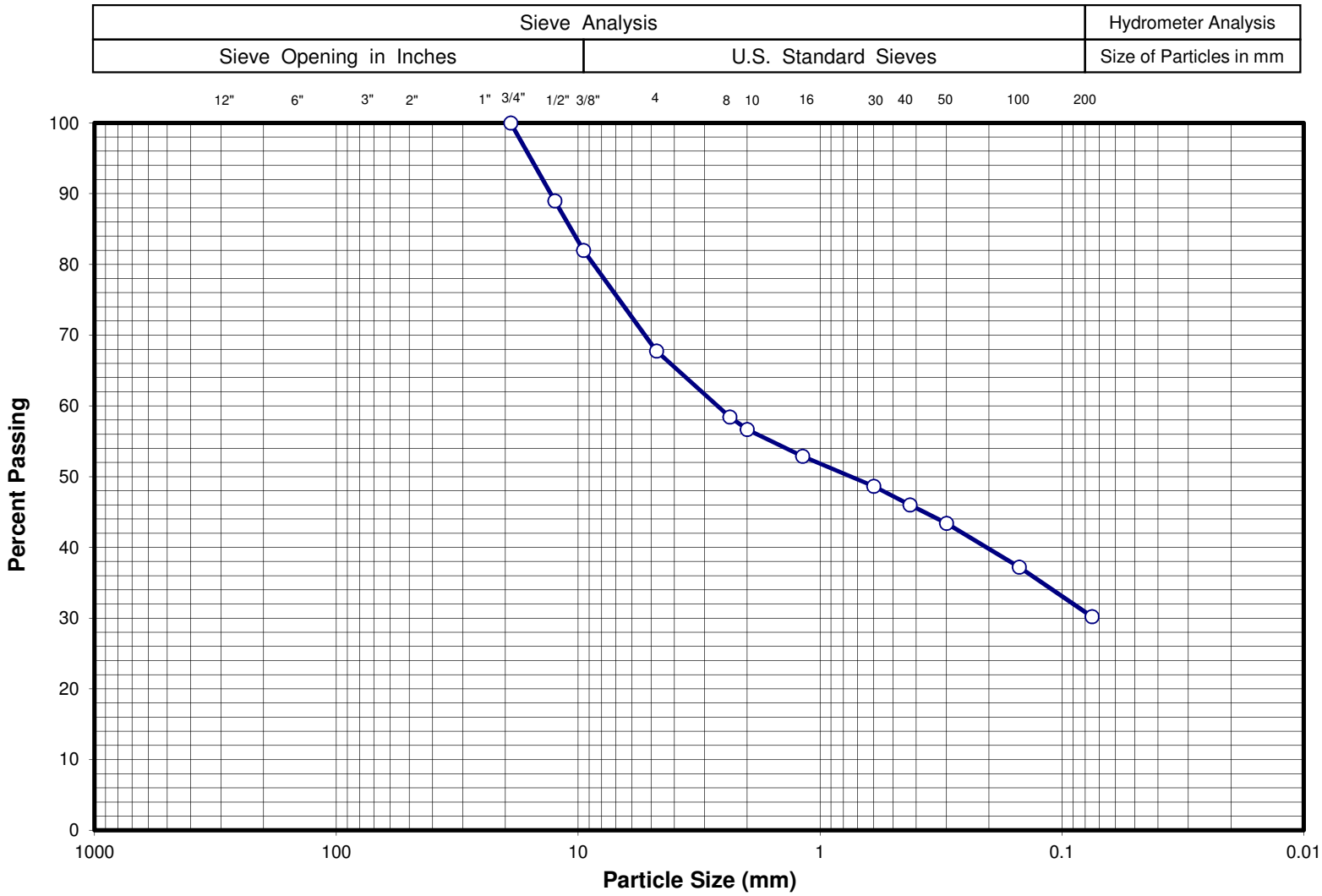
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	79
¾ "	67
½"	56
⅜"	49
#4	40
#10	33
#40	28
#200	19

Gravel (%)	60	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	21	PL	16	Sample ID:	PW-19
Fines (%)	19	PI	5	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-76



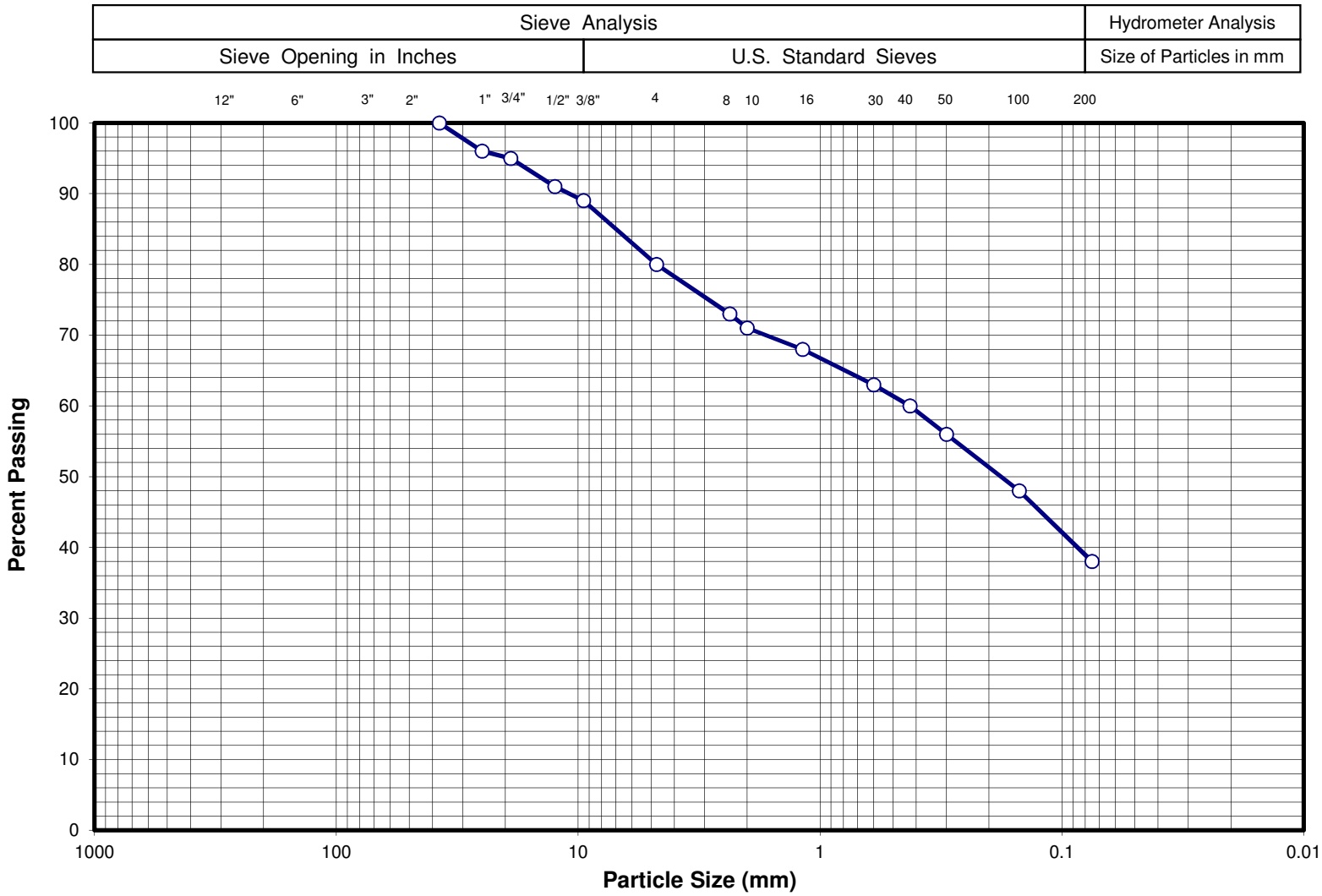
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	89
⅜"	82
#4	68
#10	57
#40	46
#200	30

Gravel (%)	32	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	38	PL	NP	Sample ID:	PW-19 + PW-20
Fines (%)	30	PI	NP	Sample Depth (ft.):	5 to 15
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-77



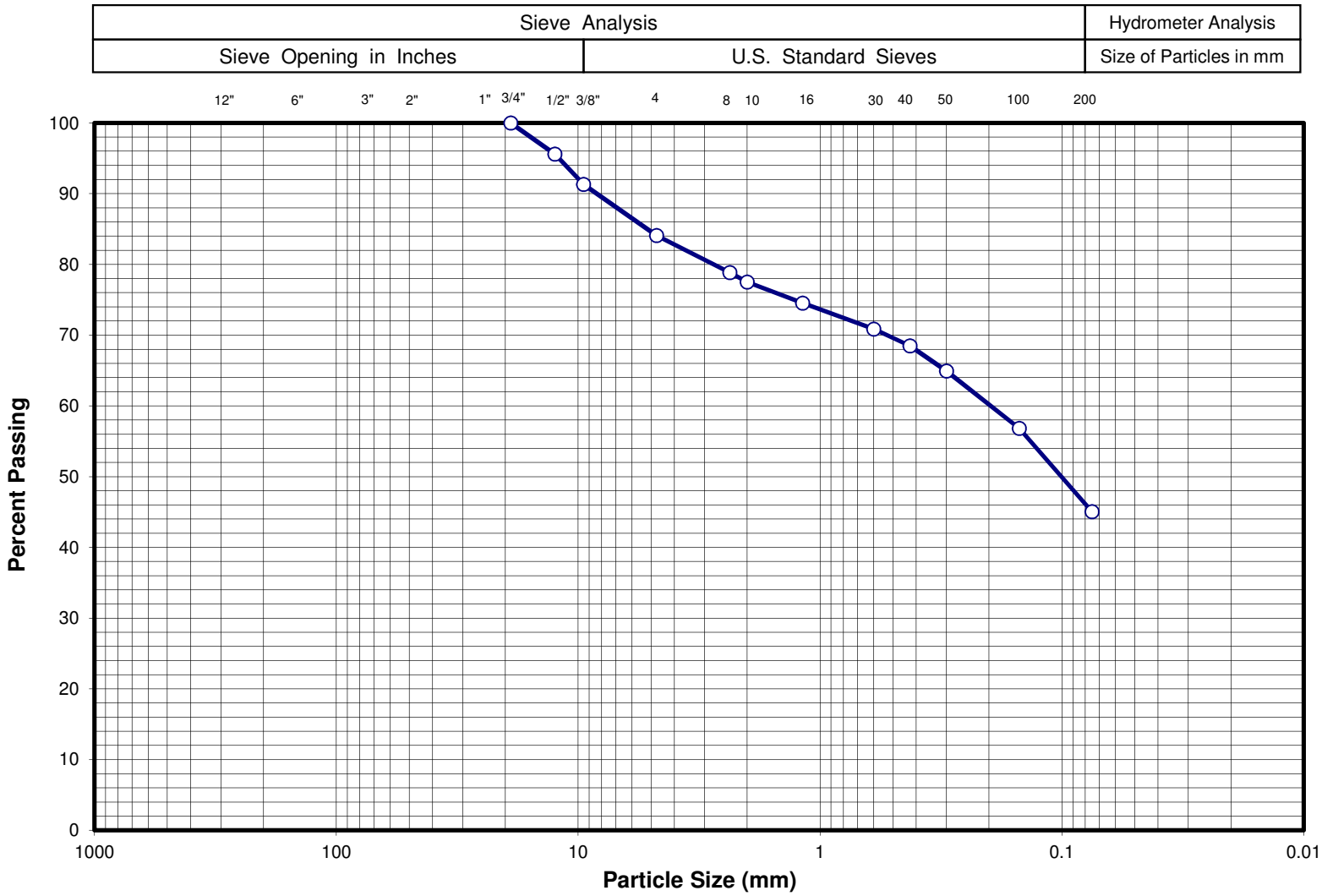
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	96
¾ "	95
½"	91
⅜"	89
#4	80
#10	71
#40	60
#200	38

Gravel (%)	20	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	42	PL	13	Sample ID:	PW-19
Fines (%)	38	PI	8	Sample Depth (ft.):	9.0
Sample Description:	SAND, clayey with gravel (SC)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-78



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	96
⅜"	91
#4	84
#10	78
#40	68
#200	45

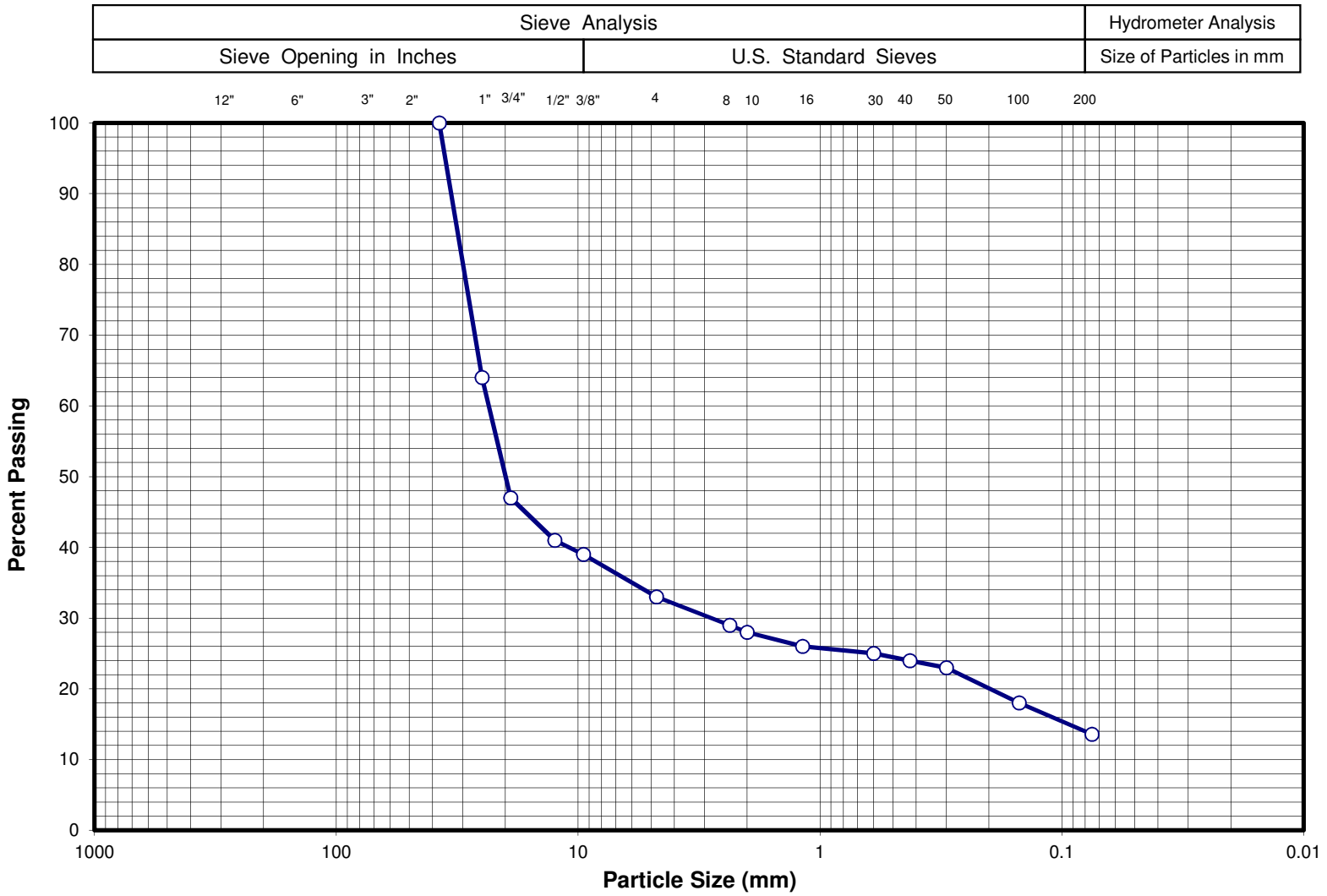
Gravel (%)	16	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	39	PL	16	Sample ID:	PW-19
Fines (%)	45	PI	5	Sample Depth (ft.):	14.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-79

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	64
¾ "	47
½"	41
⅜"	39
#4	33
#10	28
#40	24
#200	14

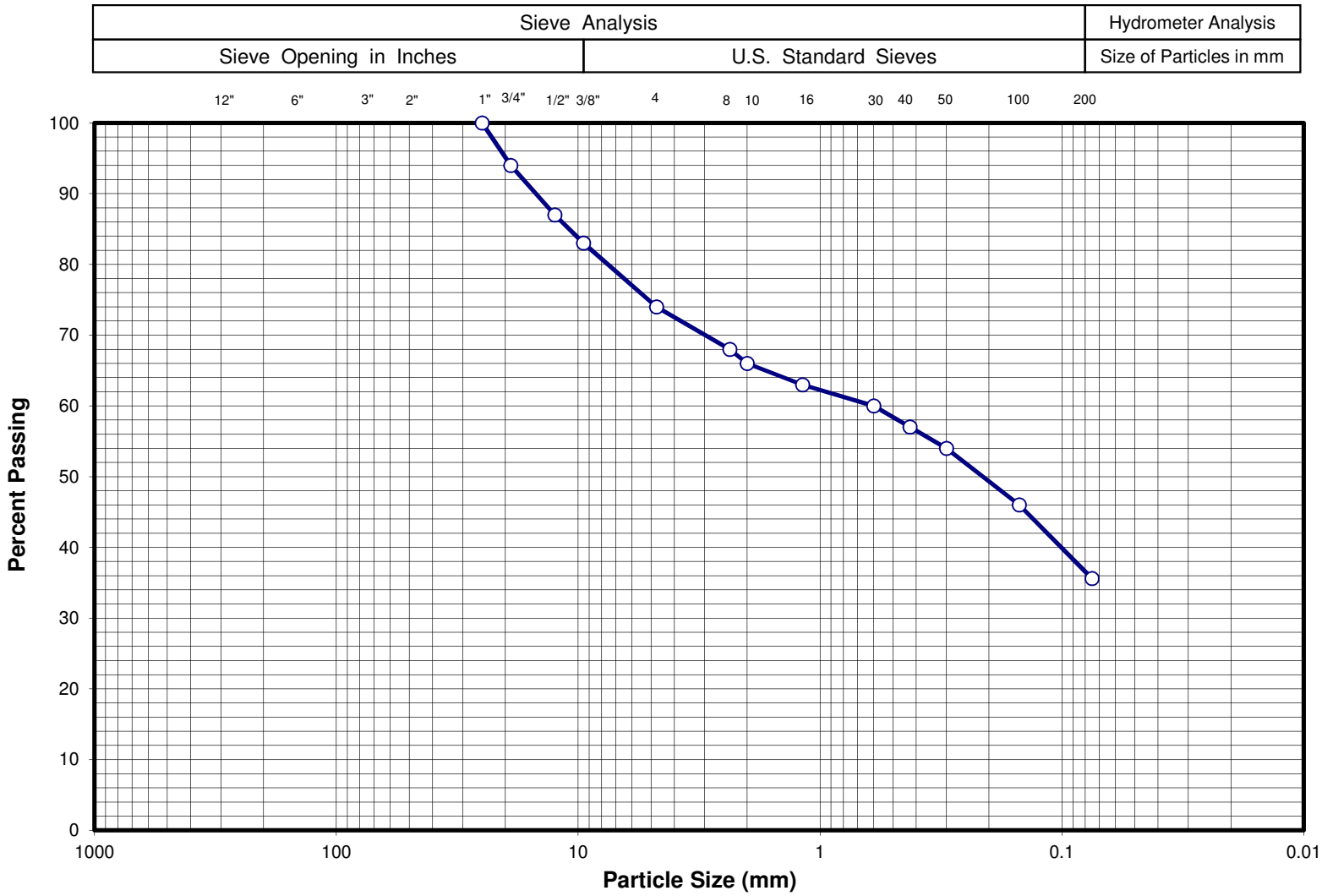
Gravel (%)	67	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	19	PL	17	Sample ID:	PW-19
Fines (%)	14	PI	5	Sample Depth (ft.):	19.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-80

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	94
½"	87
⅜"	83
#4	74
#10	66
#40	57
#200	36

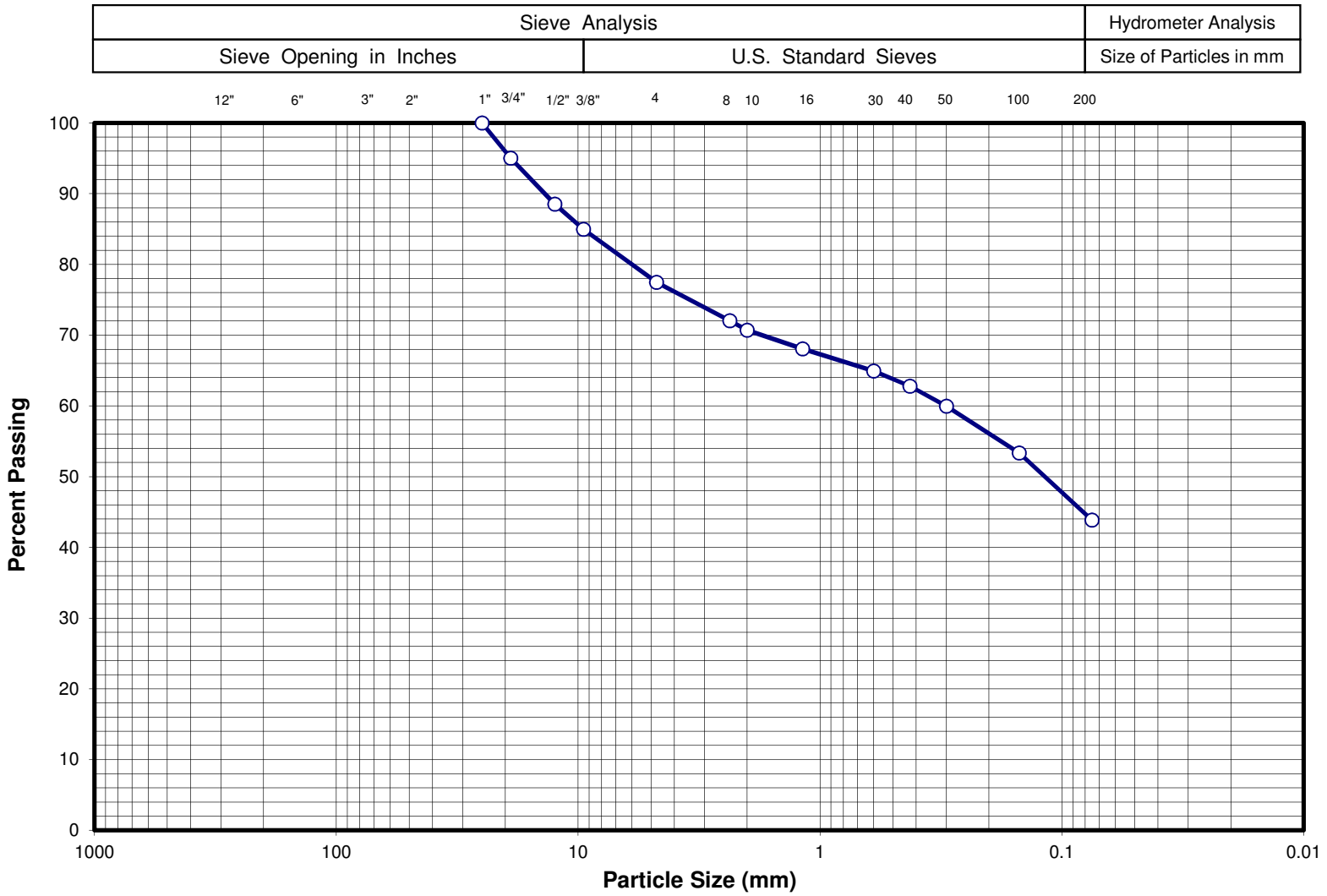
Gravel (%)	26	LL	19	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	38	PL	16	Sample ID:	PW-20
Fines (%)	36	PI	3	Sample Depth (ft.):	4.0
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-81

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	95
½"	89
⅜"	85
#4	77
#10	71
#40	63
#200	44

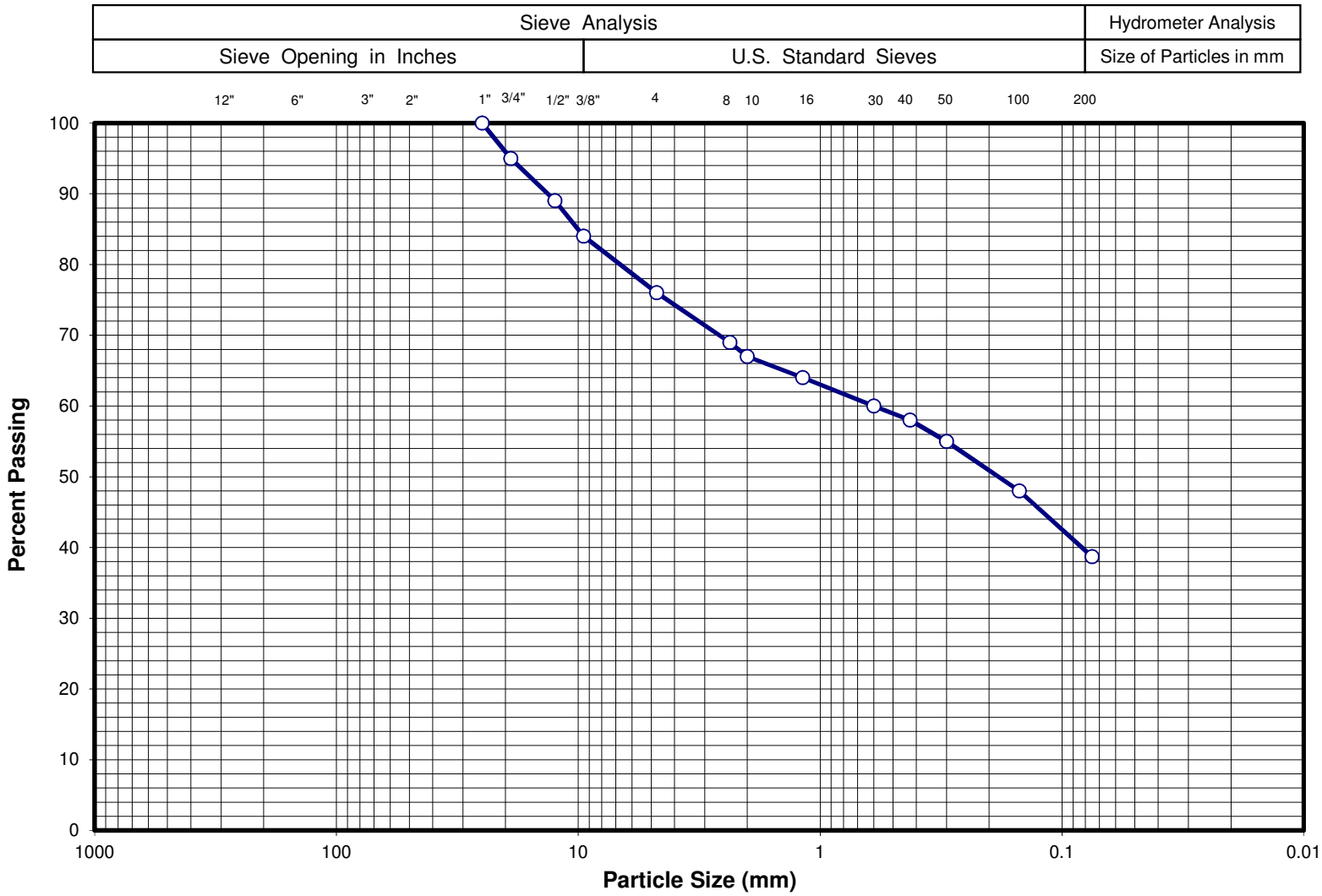
Gravel (%)	23	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	33	PL	NP	Sample ID:	PW-20
Fines (%)	44	PI	NP	Sample Depth (ft.):	9.0
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-82

Revised 08/25/2017



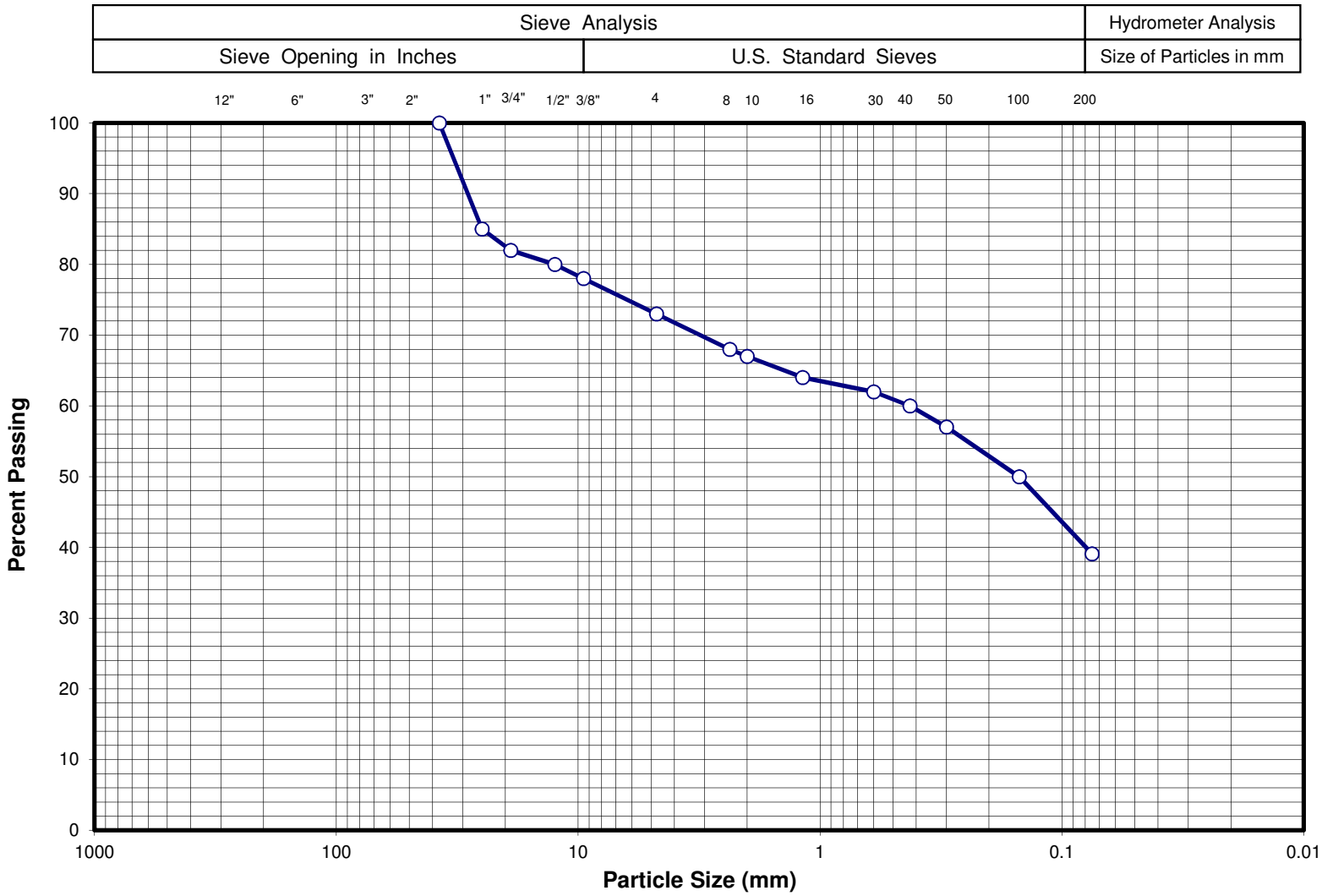
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	95
½"	89
⅜"	84
#4	76
#10	67
#40	58
#200	39

Gravel (%)	24	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	37	PL	17	Sample ID:	PW-20
Fines (%)	39	PI	4	Sample Depth (ft.):	19.0
Sample Description:	SAND, clayey, silty with gravel and cobbles (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-83



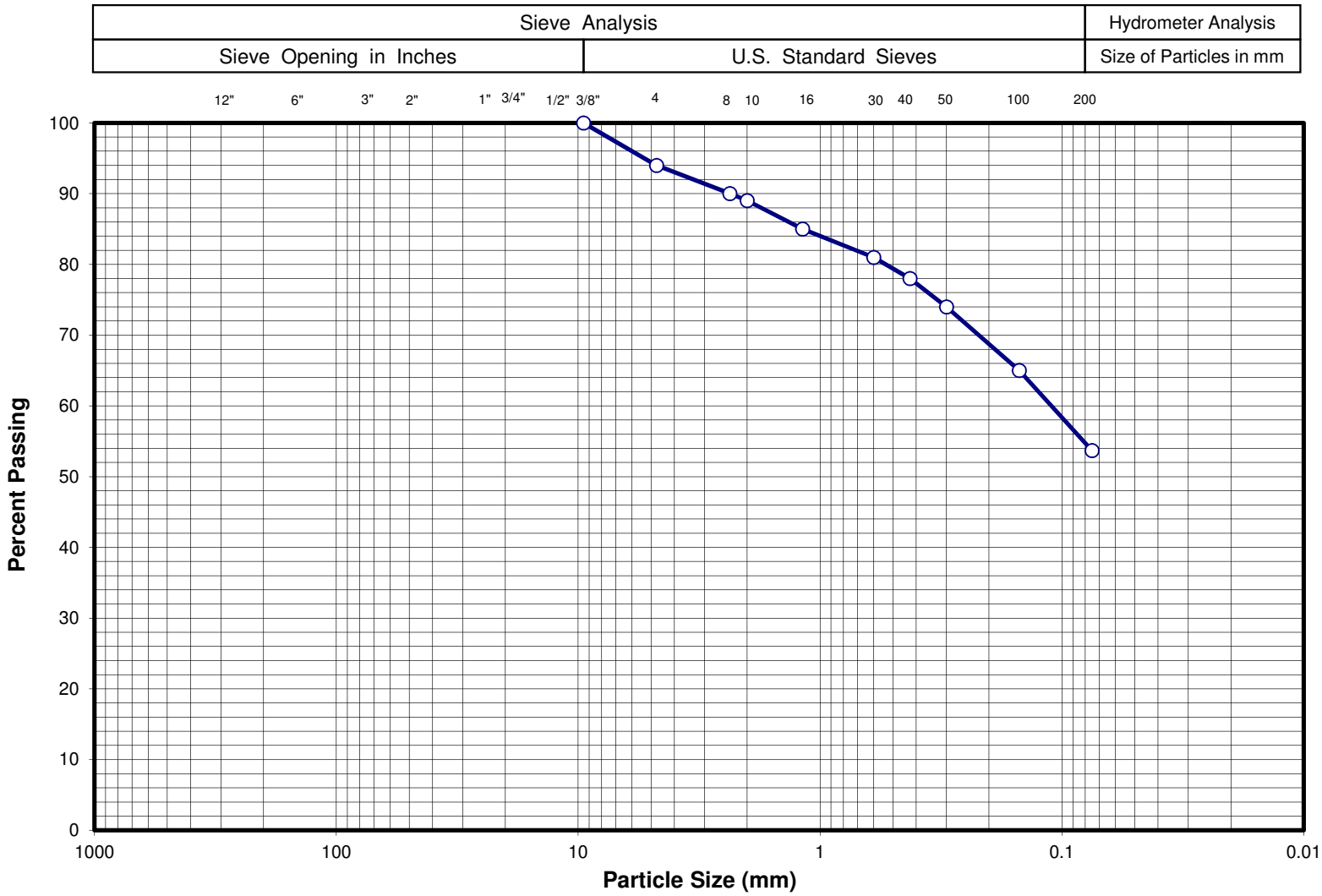
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	85
¾ "	82
½"	80
⅜"	78
#4	73
#10	67
#40	60
#200	39

Gravel (%)	27	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	34	PL	18	Sample ID:	PW-20
Fines (%)	39	PI	3	Sample Depth (ft.):	24.0
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-84



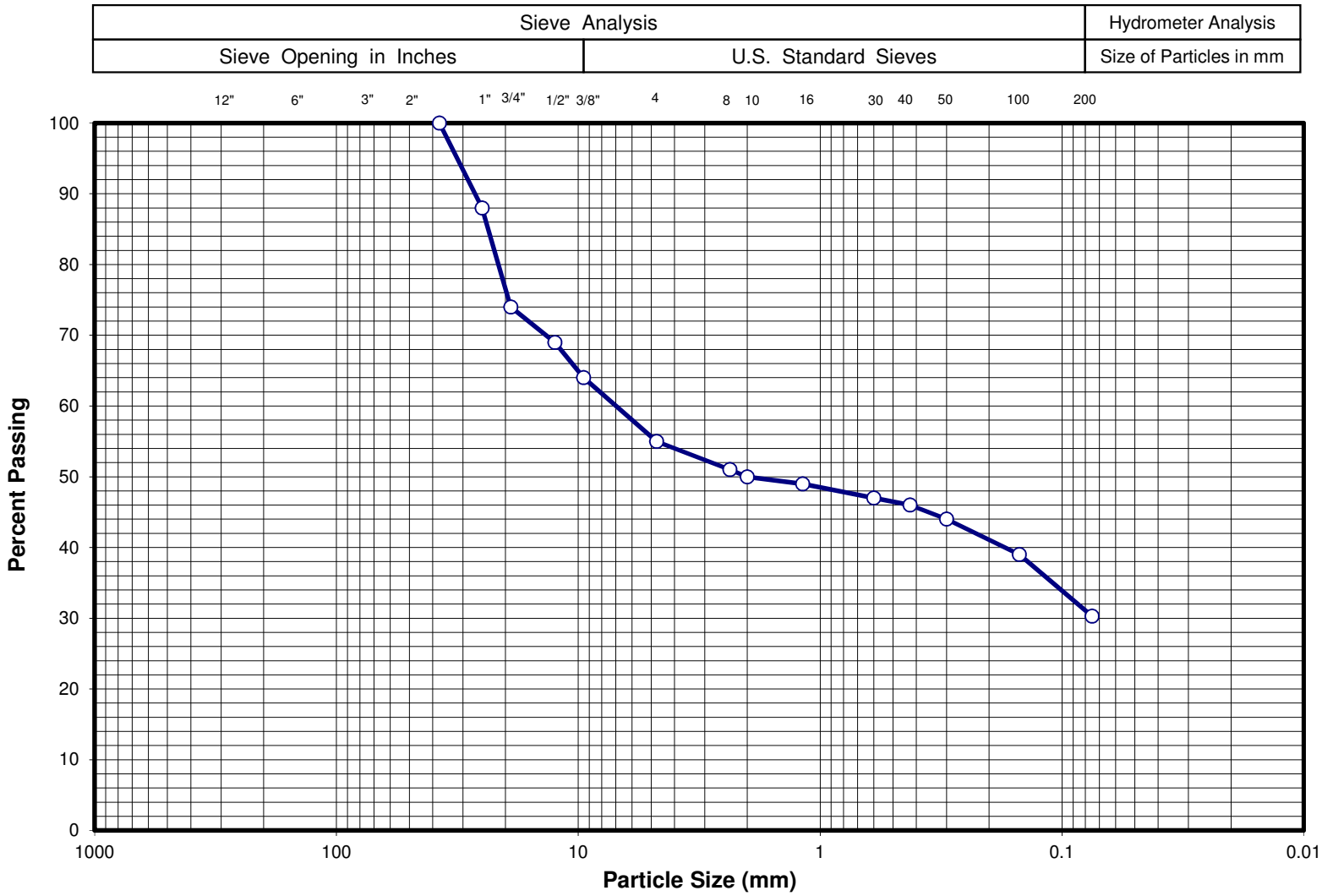
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	94
#10	89
#40	78
#200	54

Gravel (%)	6	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	40	PL	17	Sample ID:	PW-20
Fines (%)	54	PI	4	Sample Depth (ft.):	34.0
Sample Description:	CLAY, silty, sandy (CL-ML)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-85



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	88
¾ "	74
½"	69
⅜"	64
#4	55
#10	50
#40	46
#200	30

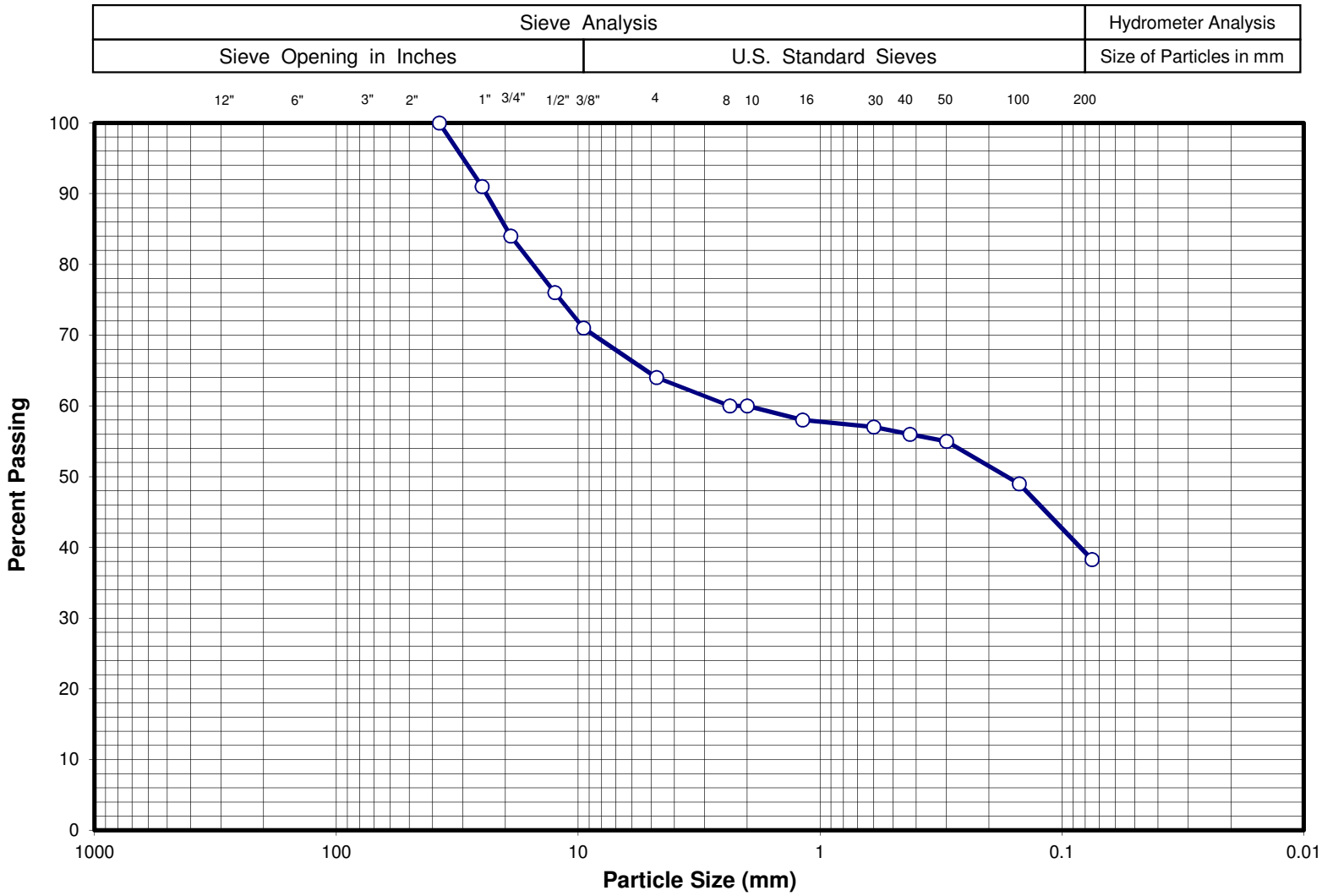
Gravel (%)	45	LL	23	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	25	PL	17	Sample ID:	A-3
Fines (%)	30	PI	6	Sample Depth (ft.):	9.0
Sample Description:	GRAVEL, clayey, silty, with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-86

Revised 08/25/2017



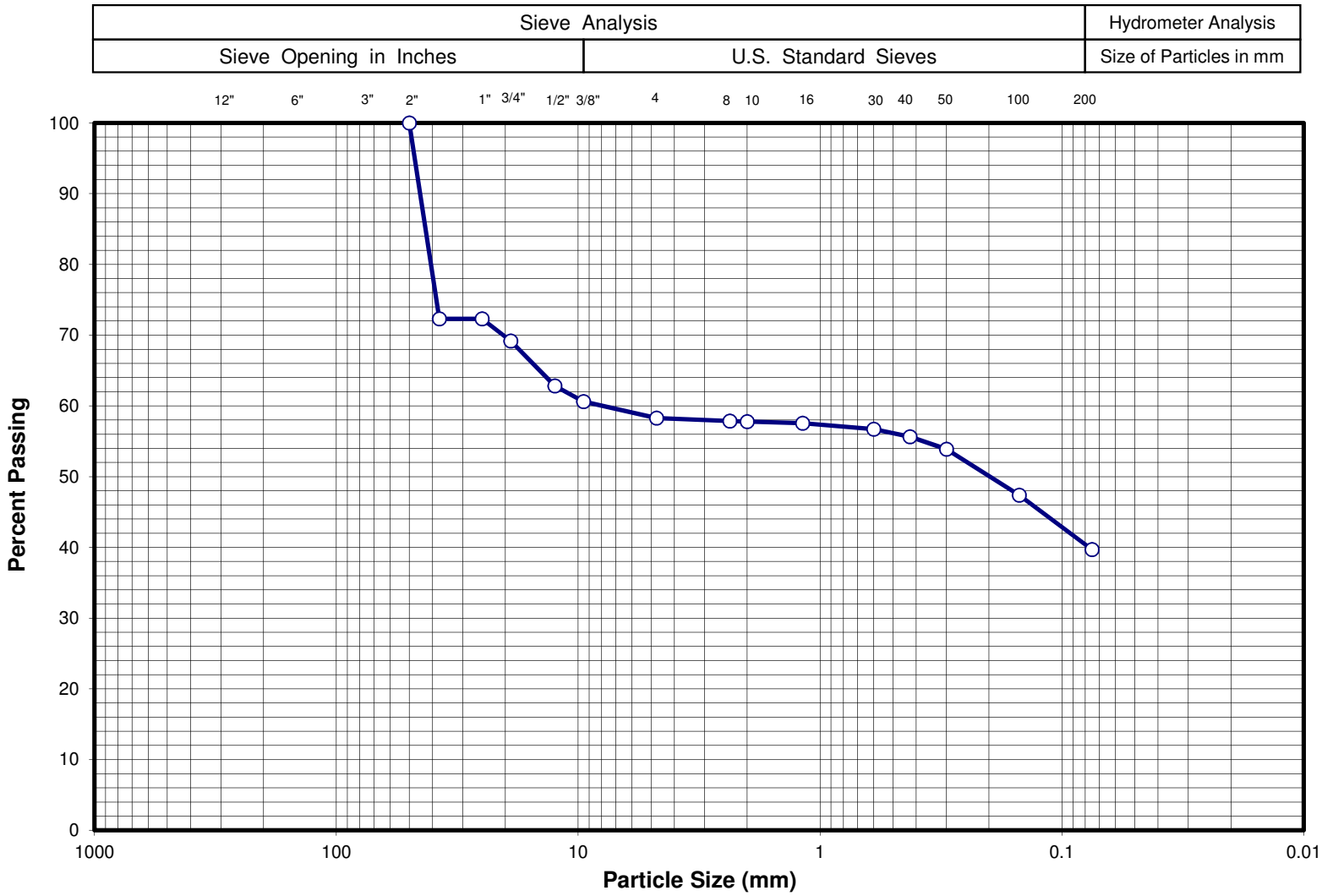
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	91
¾ "	84
½"	76
⅜"	71
#4	64
#10	60
#40	56
#200	38

Gravel (%)	36	LL	20	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	26	PL	16	Sample ID:	A-3
Fines (%)	38	PI	4	Sample Depth (ft.):	24.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-87



Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	72
1"	72
¾ "	69
½"	63
⅜"	61
#4	58
#10	58
#40	56
#200	40

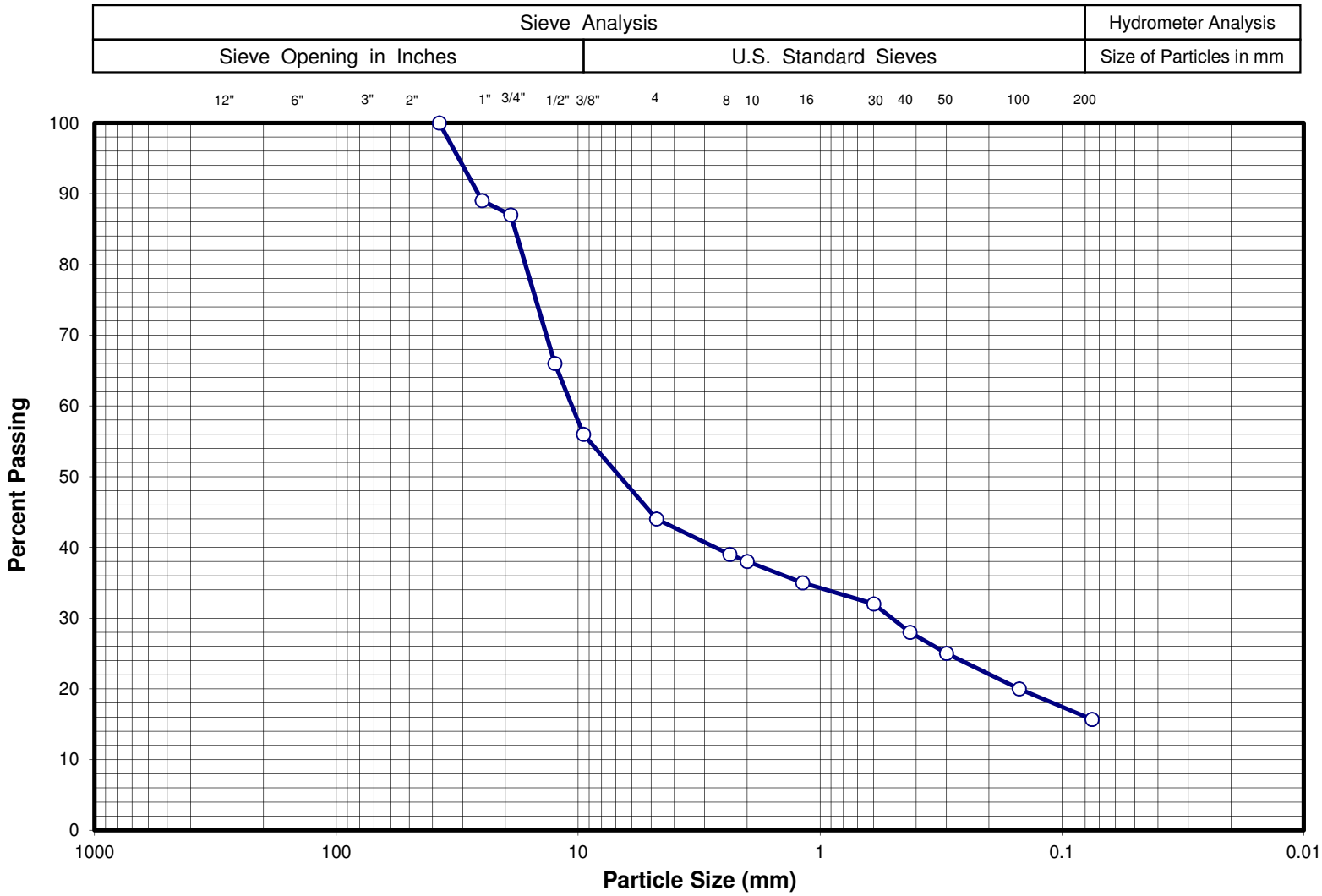
Gravel (%)	42	LL	27	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	18	PL	16	Sample ID:	A-3
Fines (%)	40	PI	11	Sample Depth (ft.):	39.0
Sample Description:	GRAVEL, clayey with sand (GC)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-88

Revised 08/25/2017



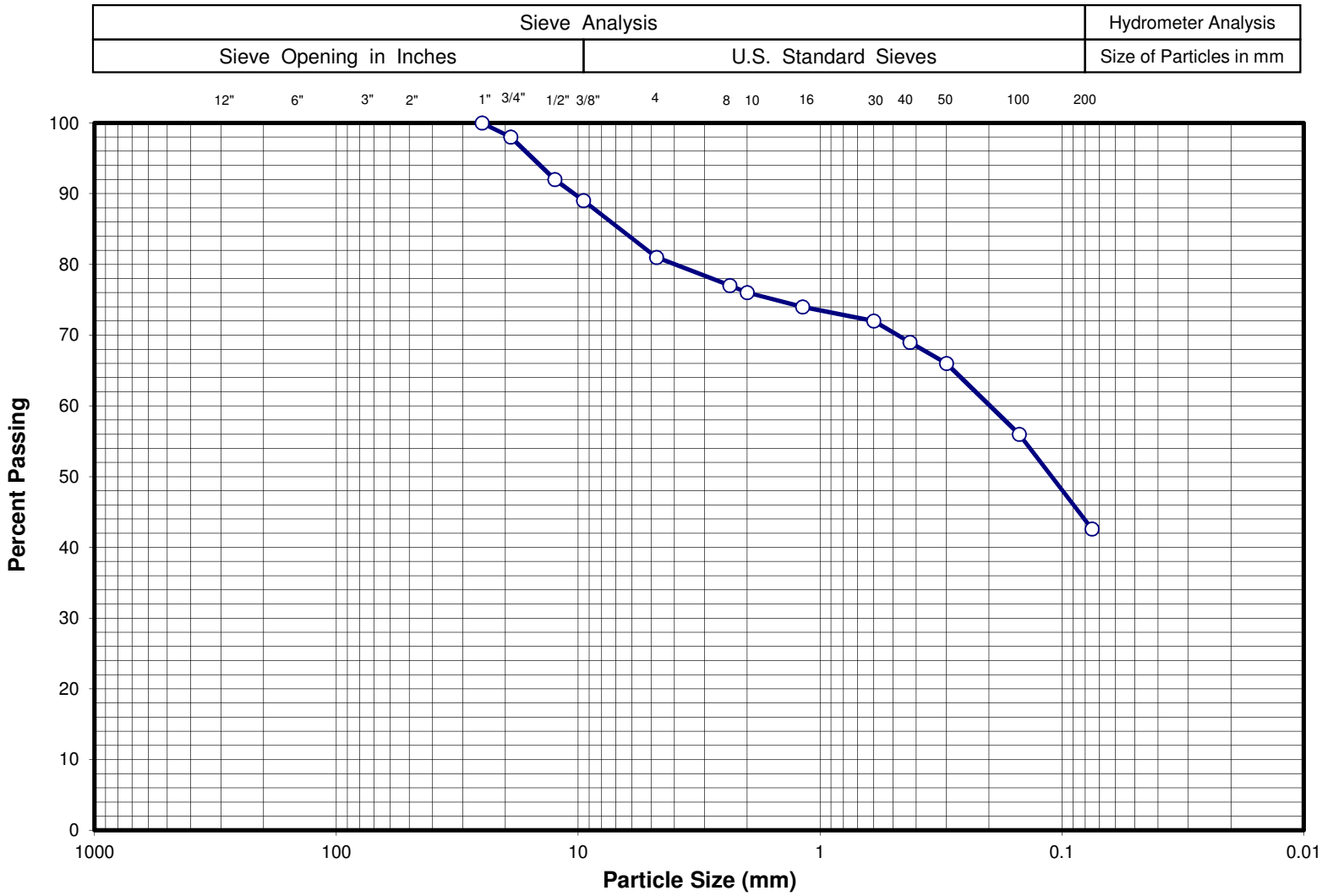
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	89
¾ "	87
½"	66
⅜"	56
#4	44
#10	38
#40	28
#200	16

Gravel (%)	56	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	28	PL	NP	Sample ID:	A-3
Fines (%)	16	PI	NP	Sample Depth (ft.):	39.5
Sample Description:	GRAVEL, silty with sand, cobbles and boulders (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-89



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	98
½"	92
⅜"	89
#4	81
#10	76
#40	69
#200	43

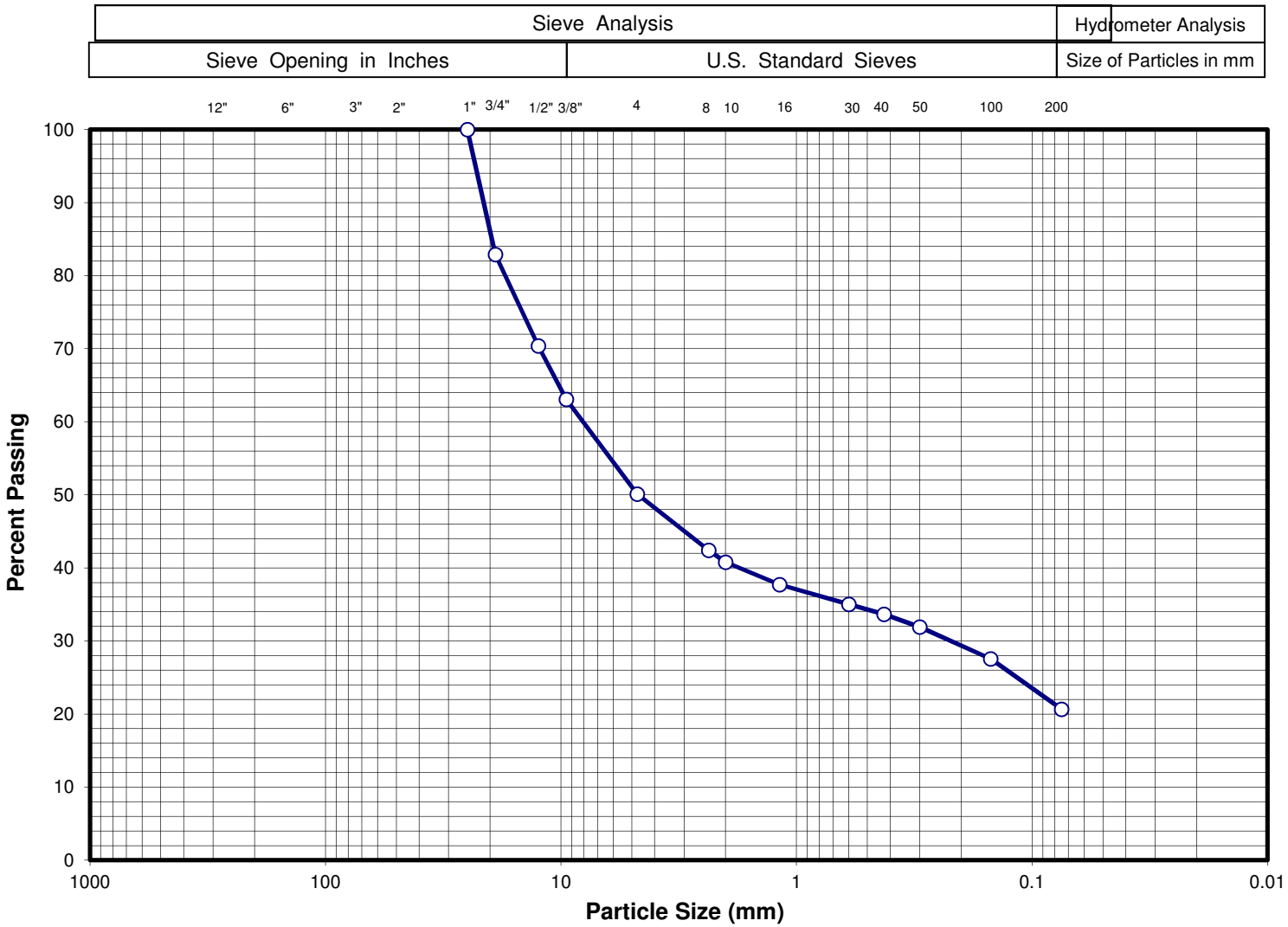
Gravel (%)	19	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	38	PL	17	Sample ID:	A-4
Fines (%)	43	PI	4	Sample Depth (ft.):	7.0 to 13.5
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-90

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	83
½"	70
⅜"	63
#4	50
#10	41
#40	34
#200	21

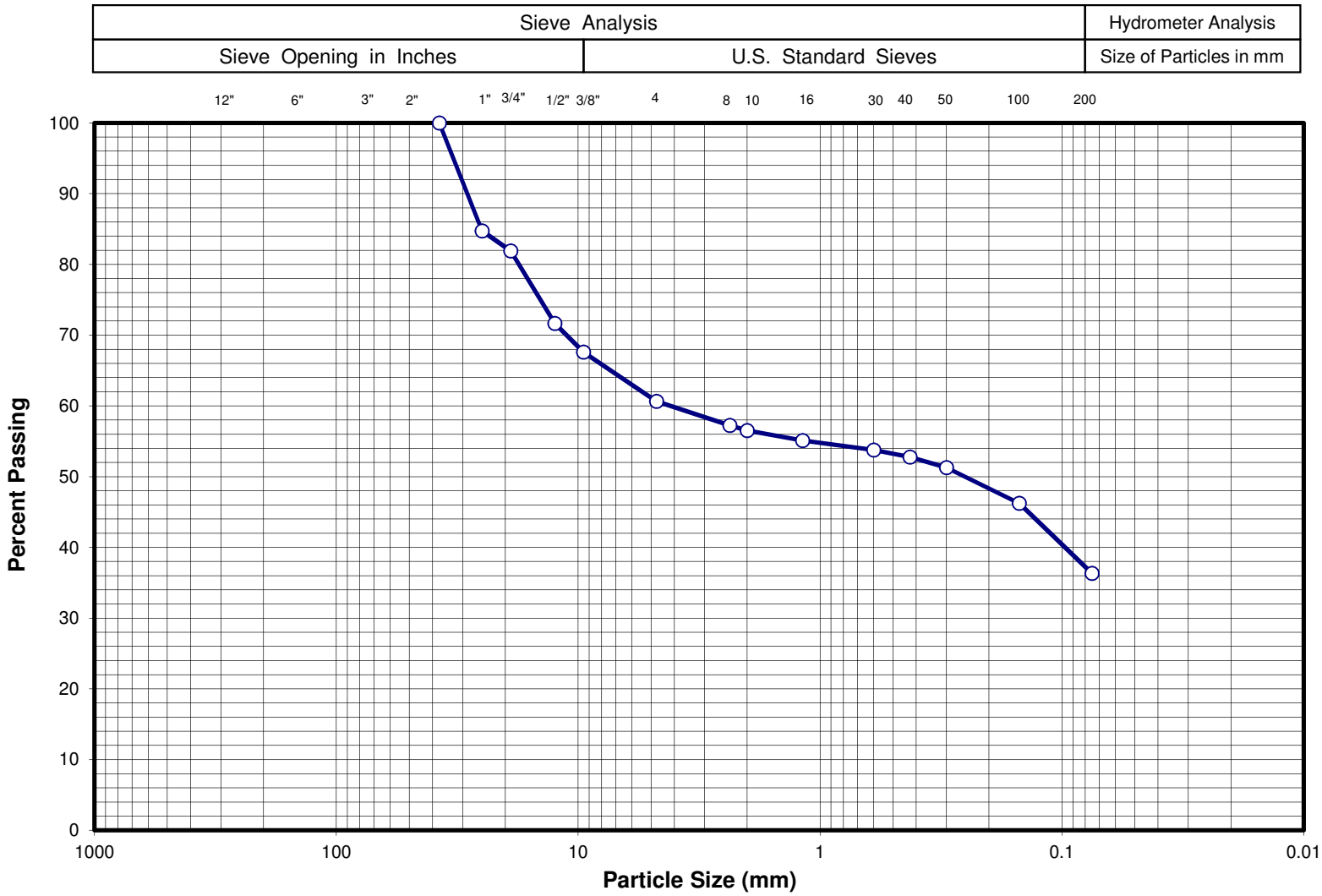
Gravel (%)	50	LL	22	Project Name:	South Bridge, Glenwood Springs Airport/HCE-South Bridge Abutments
Sand (%)	29	PL	18	Sample ID:	A-4
Fines (%)	21	PI	4	Sample Depth (ft.):	22.0
Sample Description:	GRAVEL, clayey, silty with sand and cobbles (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-91

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	85
¾ "	82
½"	72
⅜"	68
#4	61
#10	57
#40	53
#200	36

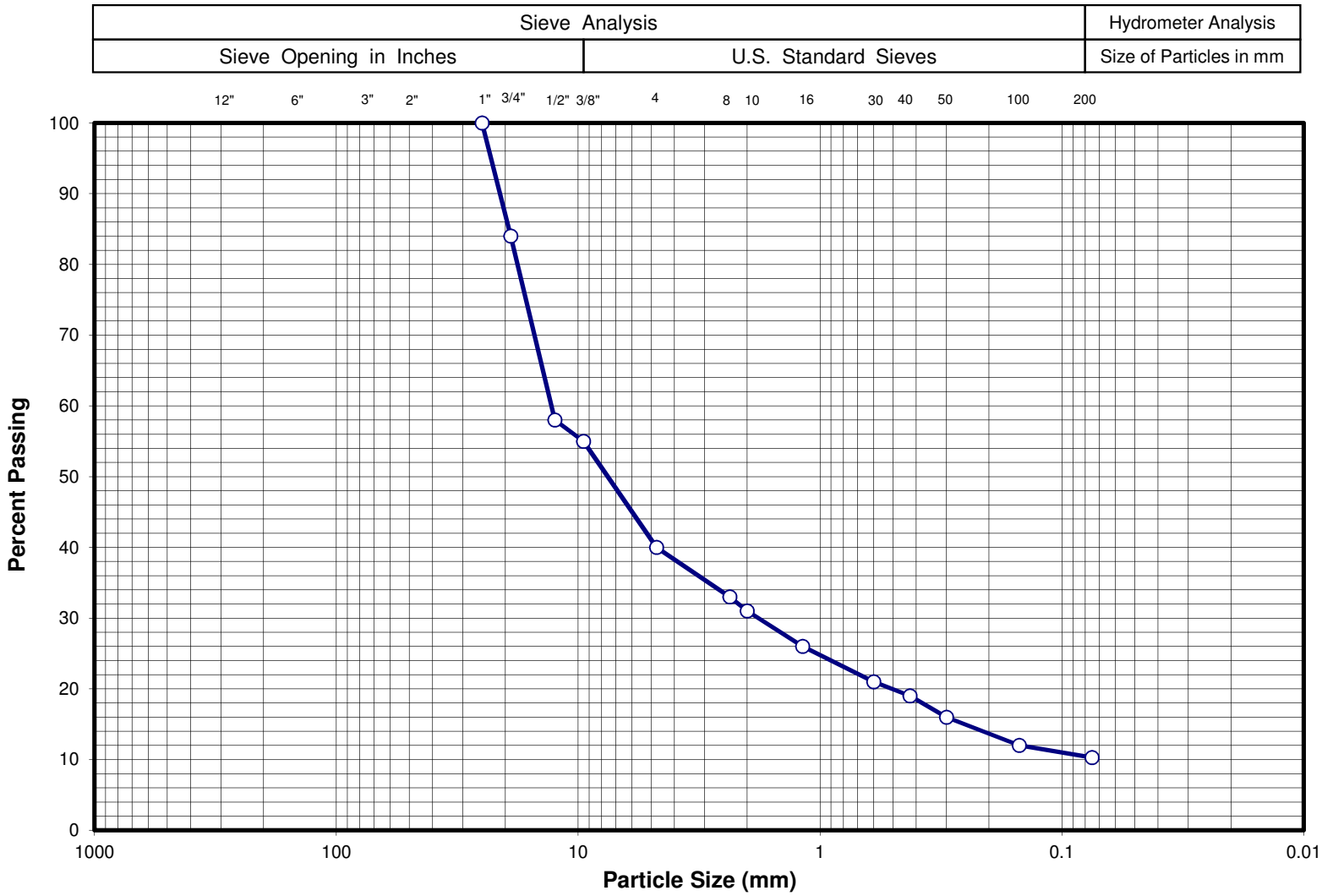
Gravel (%)	39	LL	24	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	25	PL	16	Sample ID:	A-4
Fines (%)	36	PI	8	Sample Depth (ft.):	27.0
Sample Description:	GRAVEL, clayey with sand, cobbles and boulders (GC)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-92

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	84
½"	58
⅜"	55
#4	40
#10	31
#40	19
#200	10

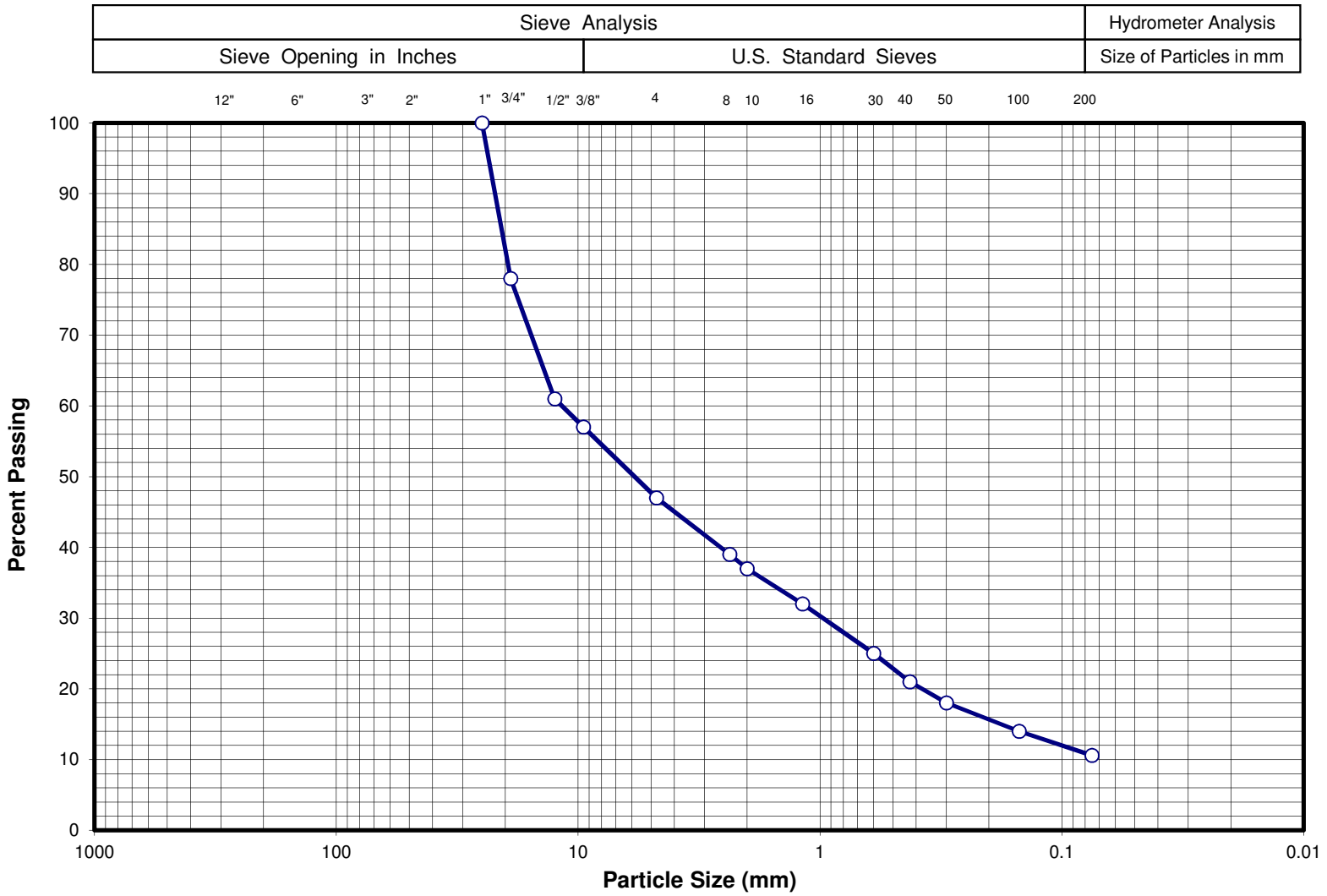
Gravel (%)	60	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	30	PL	NP	Sample ID:	A-4
Fines (%)	10	PI	NP	Sample Depth (ft.):	42.0
Sample Description:	GRAVEL with silt, sand, cobbles and boulders (GW-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-93

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	78
½"	61
⅜"	57
#4	47
#10	37
#40	21
#200	11

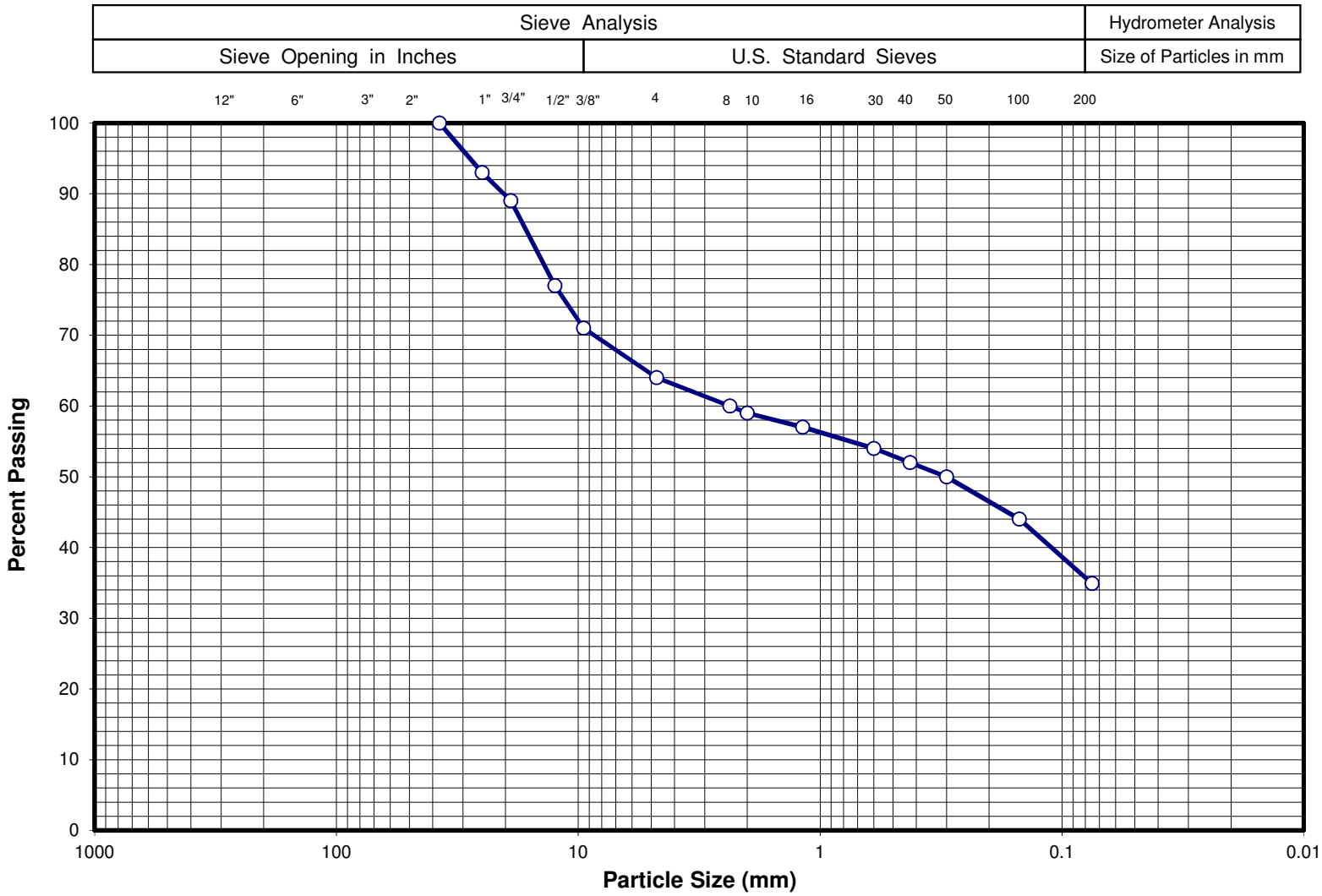
Gravel (%)	53	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site-SH 82 Abutments
Sand (%)	36	PL	NP	Sample ID:	A-4
Fines (%)	11	PI	NP	Sample Depth (ft.):	72.0
Sample Description:	GRAVEL with silt, sand, cobbles and boulders (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-94

Revised 08/25/2017



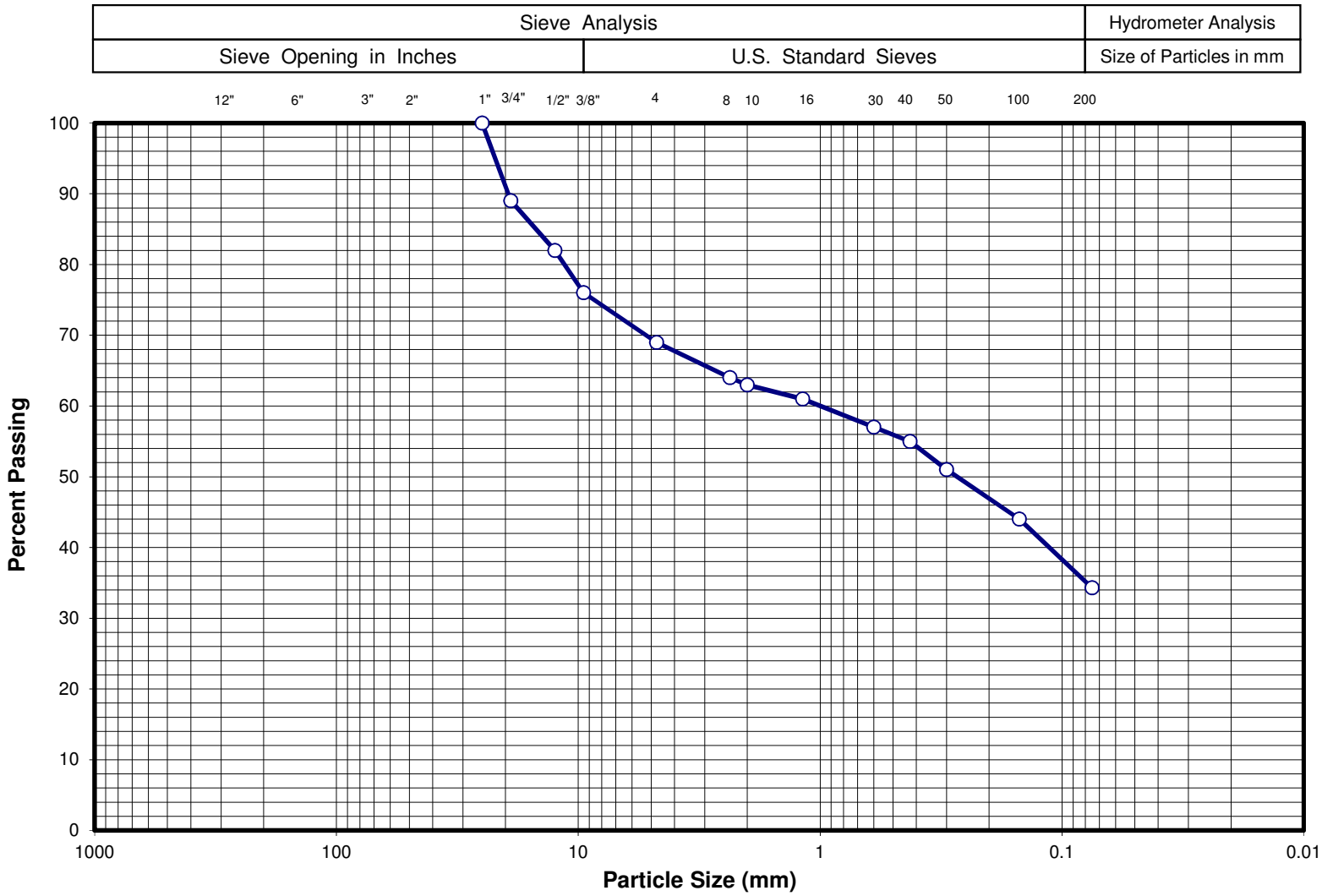
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	93
¾ "	89
½"	77
⅜"	71
#4	64
#10	59
#40	52
#200	35

Gravel (%)	36	LL	23	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	29	PL	17	Sample ID:	PW-21
Fines (%)	35	PI	6	Sample Depth (ft.):	2.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-95



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	89
½"	82
⅜"	76
#4	69
#10	63
#40	55
#200	34

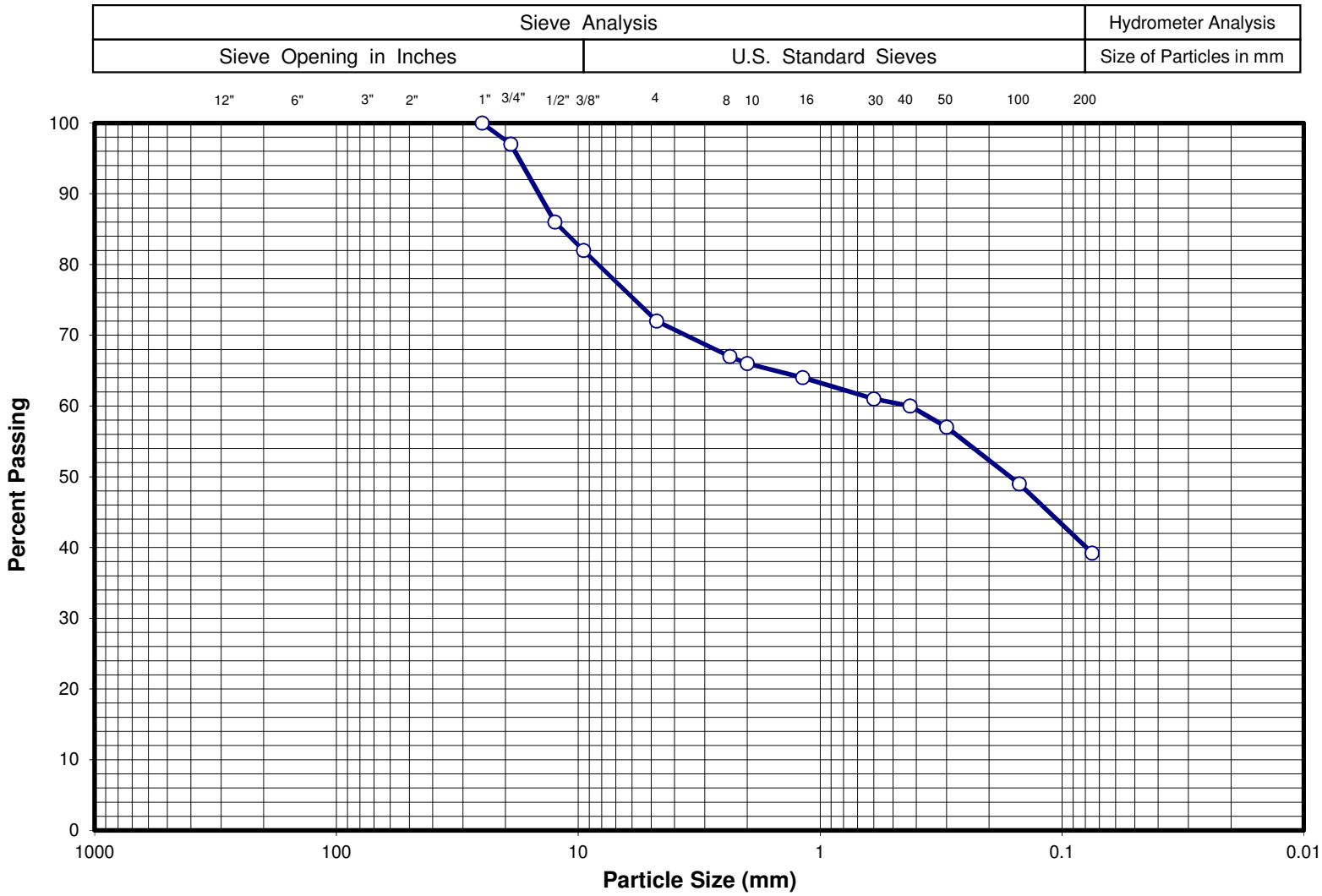
Gravel (%)	31	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	35	PL	14	Sample ID:	PW-21
Fines (%)	34	PI	8	Sample Depth (ft.):	4.0
Sample Description:	SAND, clayey with gravel (SC)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-96

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	97
½"	86
⅜"	82
#4	72
#10	66
#40	60
#200	39

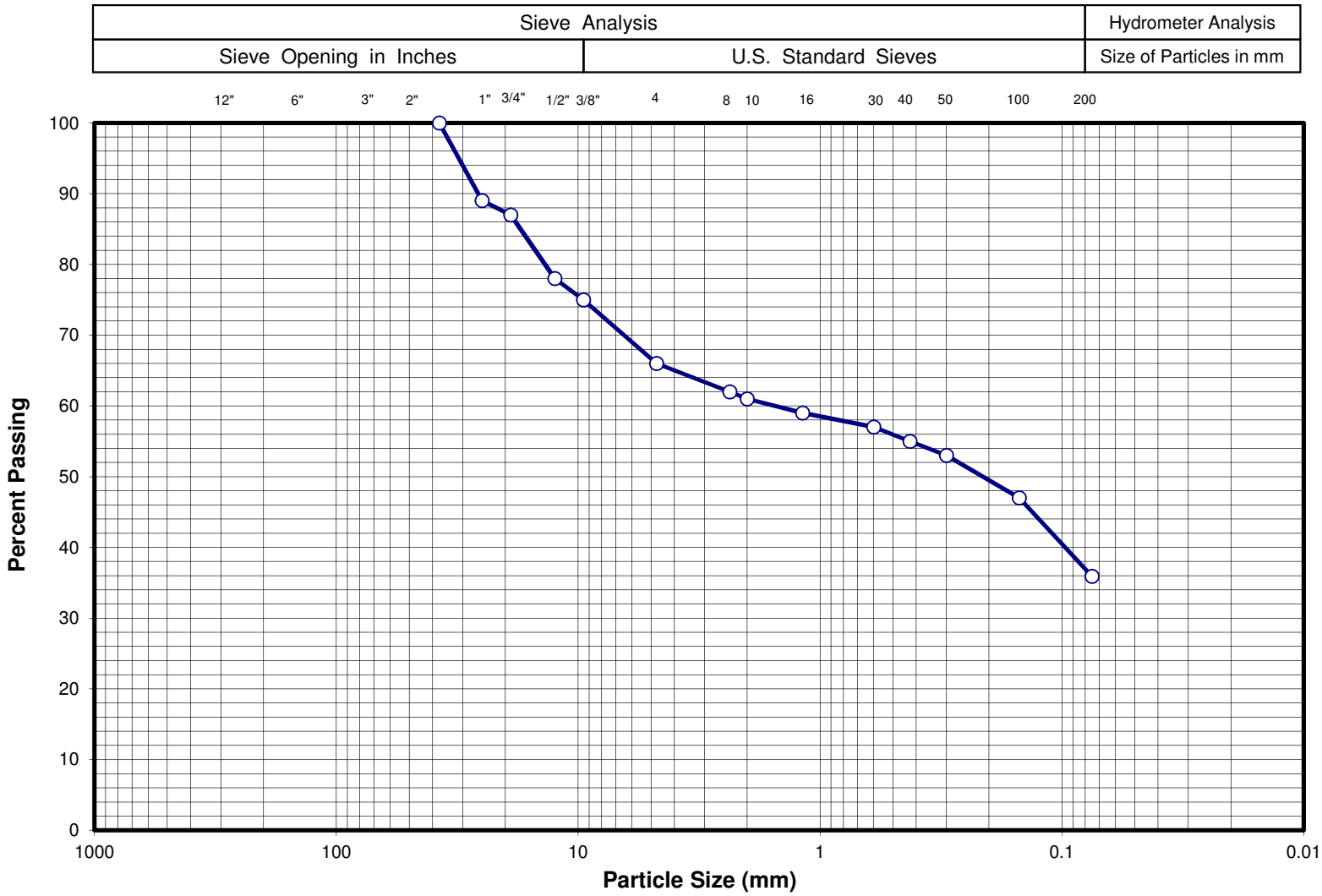
Gravel (%)	28	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	33	PL	17	Sample ID:	PW-22
Fines (%)	39	PI	5	Sample Depth (ft.):	2.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-97

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	89
¾ "	87
½"	78
⅜"	75
#4	66
#10	61
#40	55
#200	36

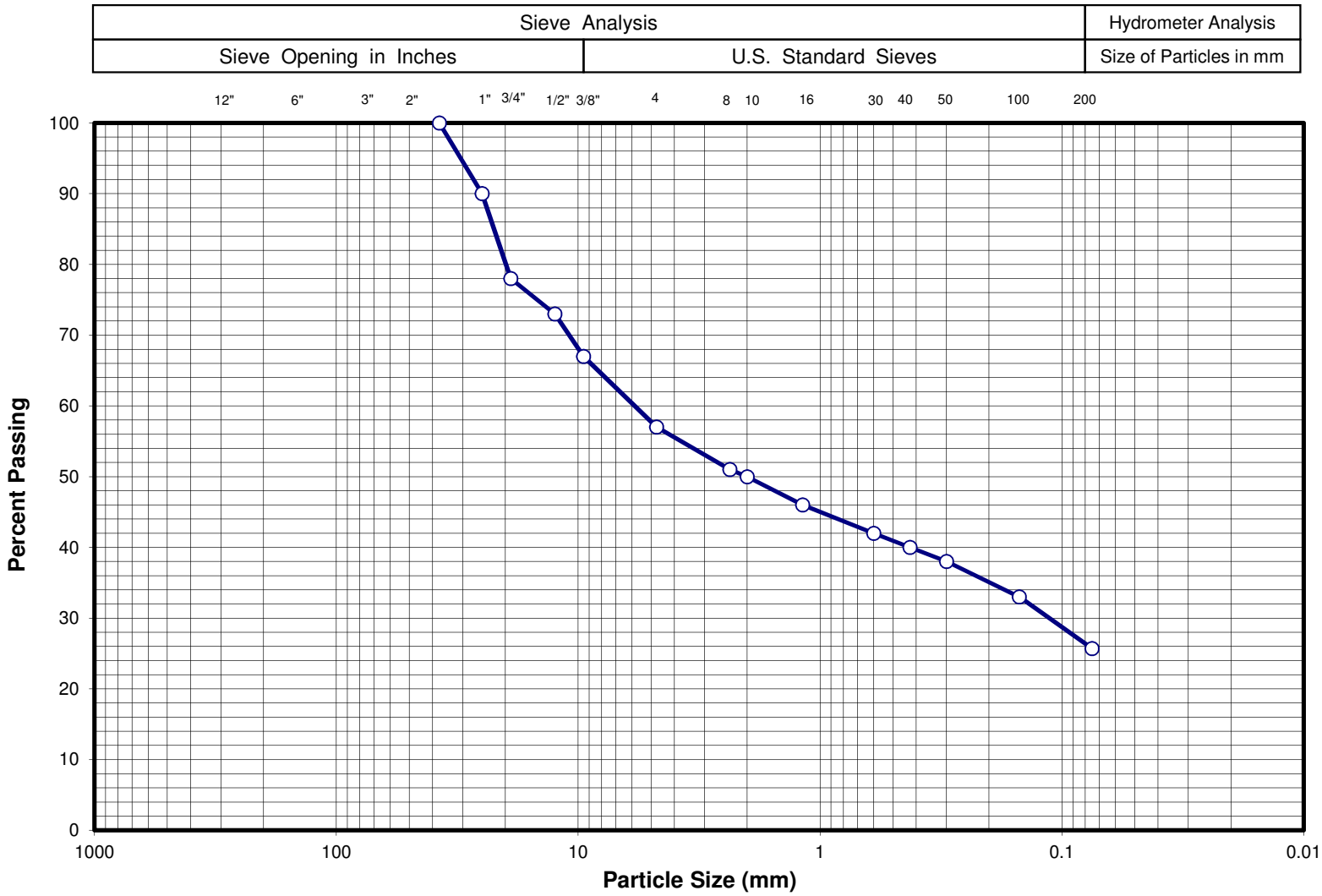
Gravel (%)	34	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	30	PL	17	Sample ID:	PW-22
Fines (%)	36	PI	4	Sample Depth (ft.):	7.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-98

Revised 08/25/2017



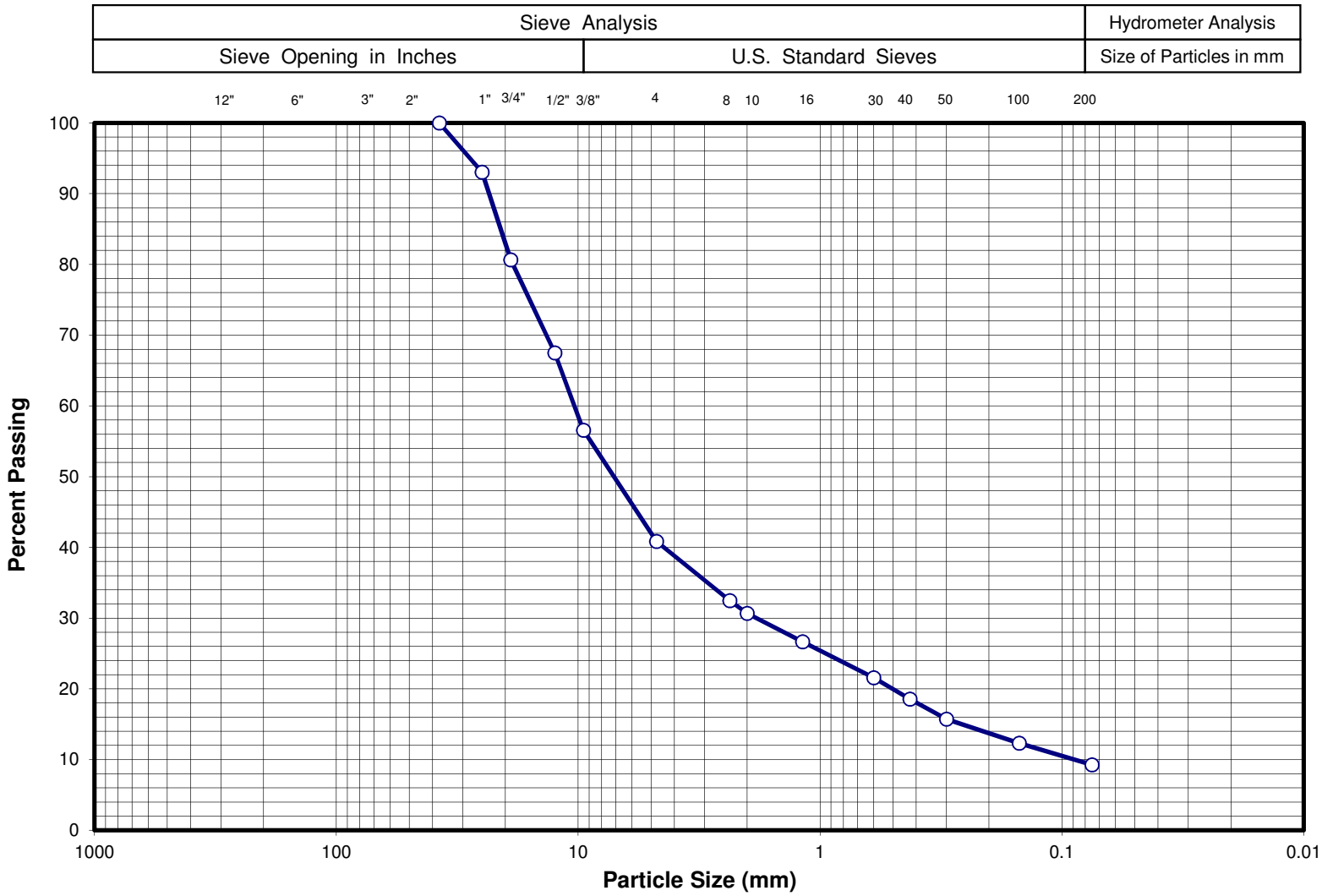
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	90
¾ "	78
½"	73
⅜"	67
#4	57
#10	50
#40	40
#200	26

Gravel (%)	43	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	31	PL	NP	Sample ID:	PW-22
Fines (%)	26	PI	NP	Sample Depth (ft.):	17.0
Sample Description:	GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-99



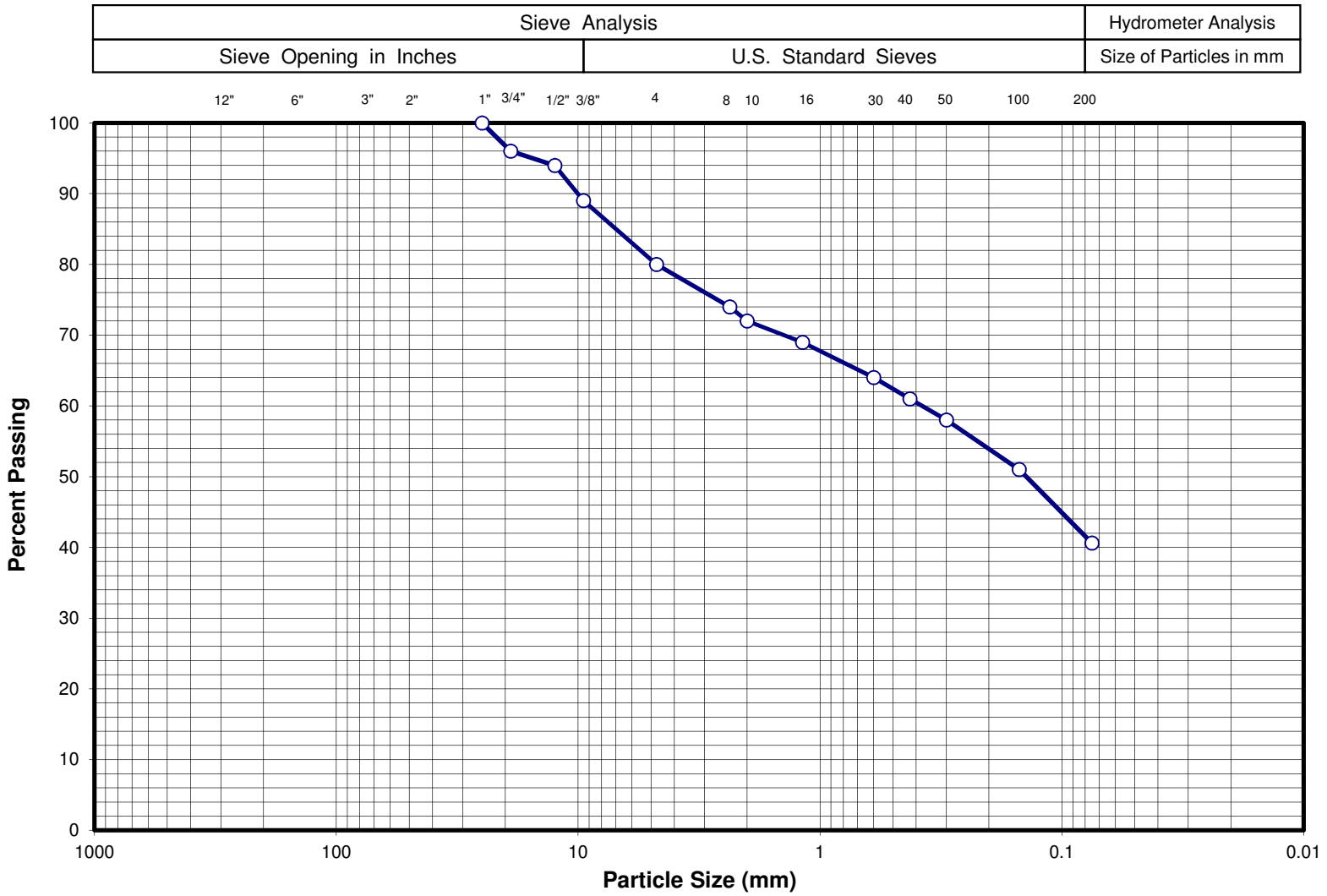
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	93
¾ "	81
½"	68
⅜"	57
#4	41
#10	31
#40	19
#200	9

Gravel (%)	59	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	32	PL	NP	Sample ID:	PW-22
Fines (%)	9	PI	NP	Sample Depth (ft.):	52.0
Sample Description:	GRAVEL with silt, sand, cobbles and boulders (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-100



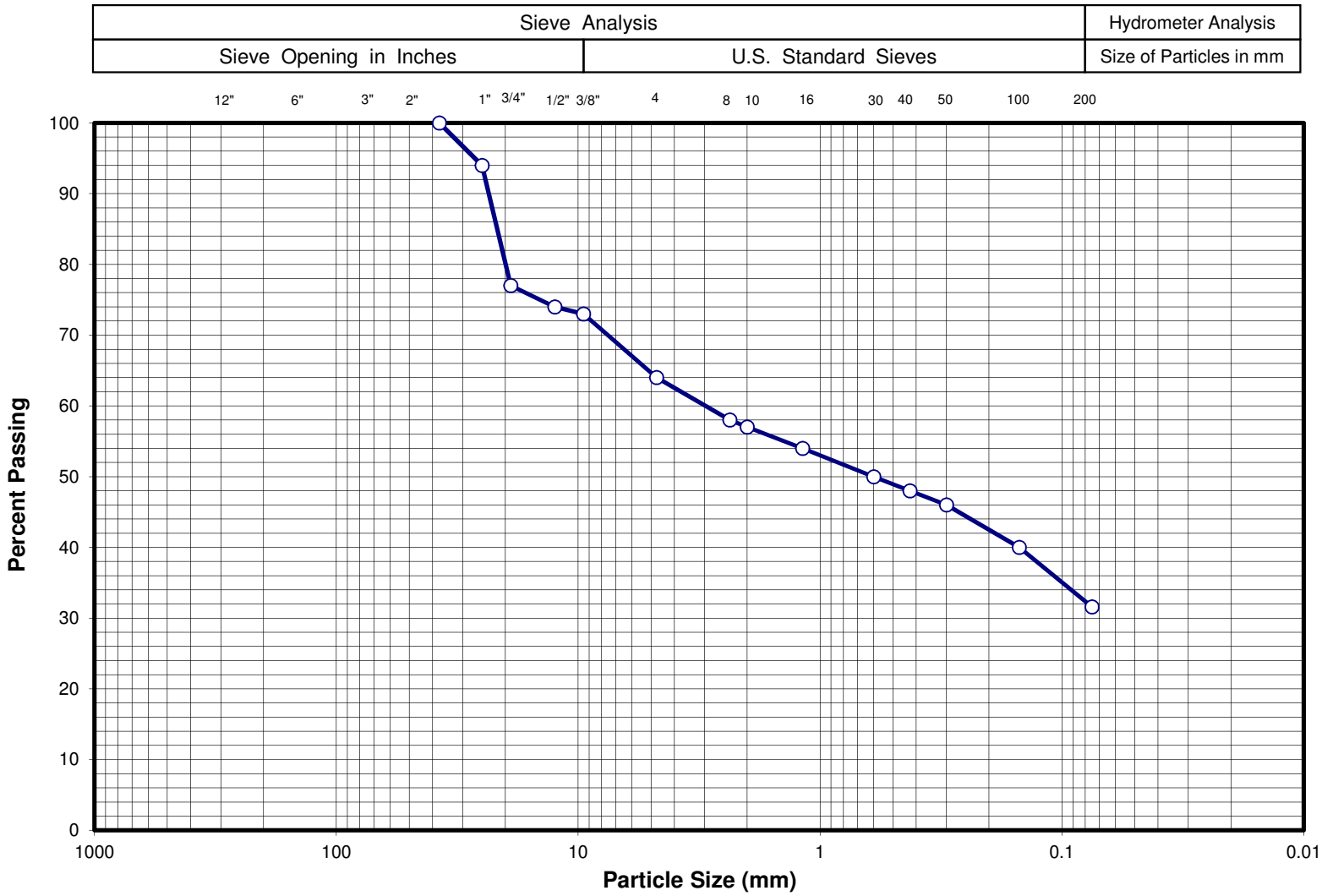
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	96
½"	94
⅜"	89
#4	80
#10	72
#40	61
#200	41

Gravel (%)	20	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	39	PL	19	Sample ID:	PW-23
Fines (%)	41	PI	3	Sample Depth (ft.):	1.3
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-101



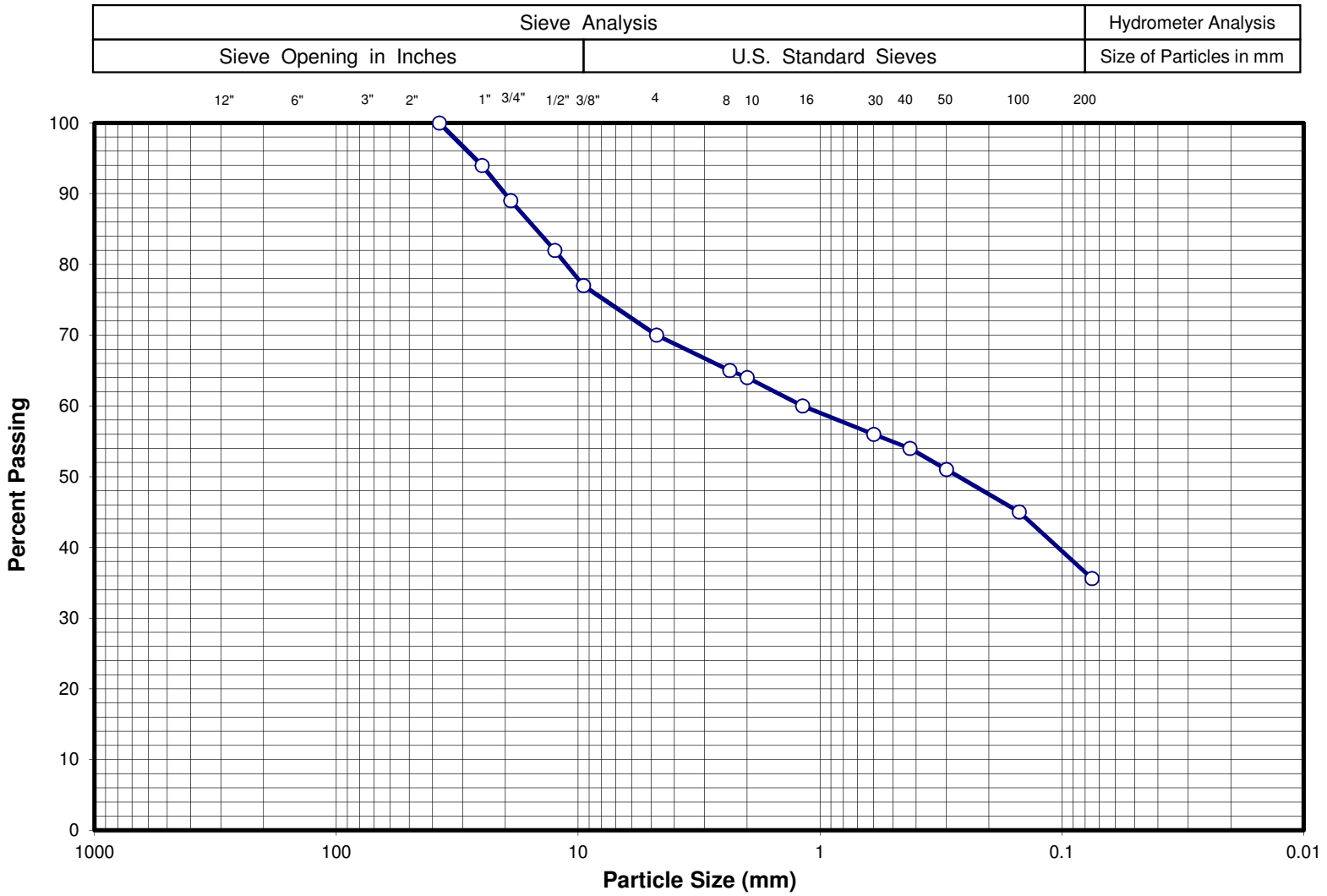
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	94
¾ "	77
½"	74
⅜"	73
#4	64
#10	57
#40	48
#200	32

Gravel (%)	36	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	32	PL	16	Sample ID:	PW-23
Fines (%)	32	PI	6	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-102



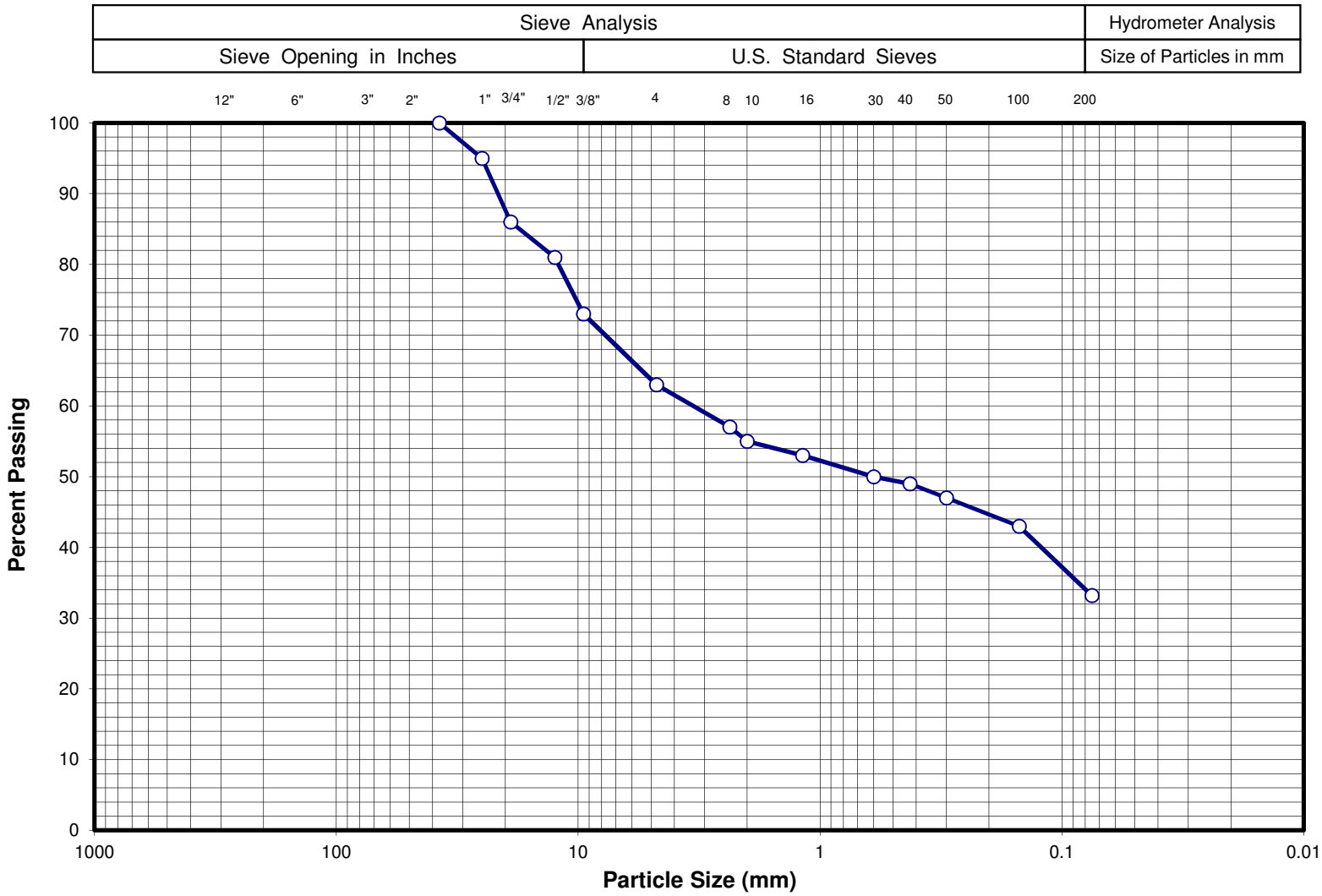
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	94
¾ "	89
½"	82
⅜"	77
#4	70
#10	64
#40	54
#200	36

Gravel (%)	30	LL	23	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	34	PL	16	Sample ID:	PW-23
Fines (%)	36	PI	7	Sample Depth (ft.):	9.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-103



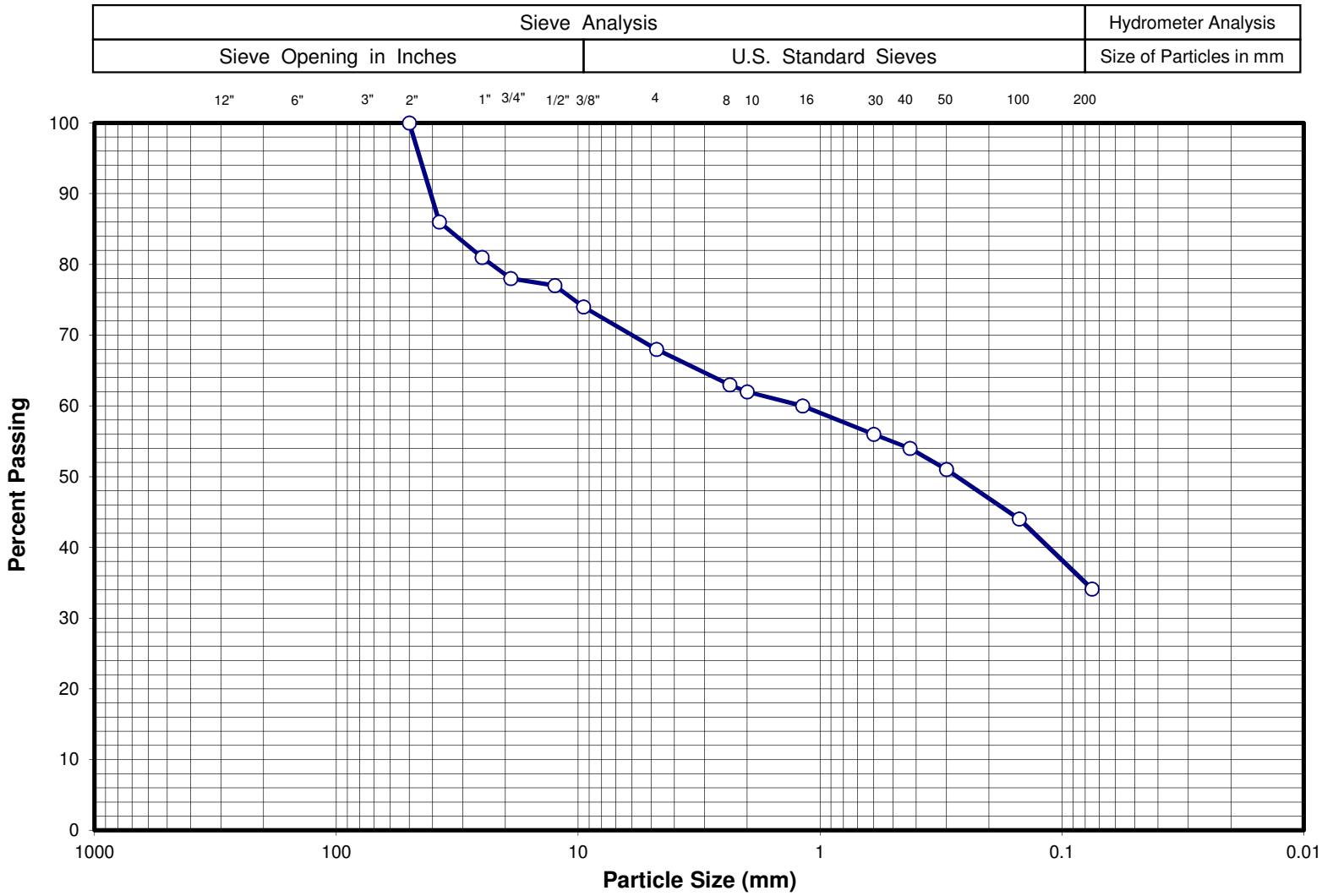
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	95
¾ "	86
½"	81
⅜"	73
#4	63
#10	55
#40	49
#200	33

Gravel (%)	37	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	30	PL	20	Sample ID:	PW-23
Fines (%)	33	PI	2	Sample Depth (ft.):	14.0
Sample Description:	GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-104



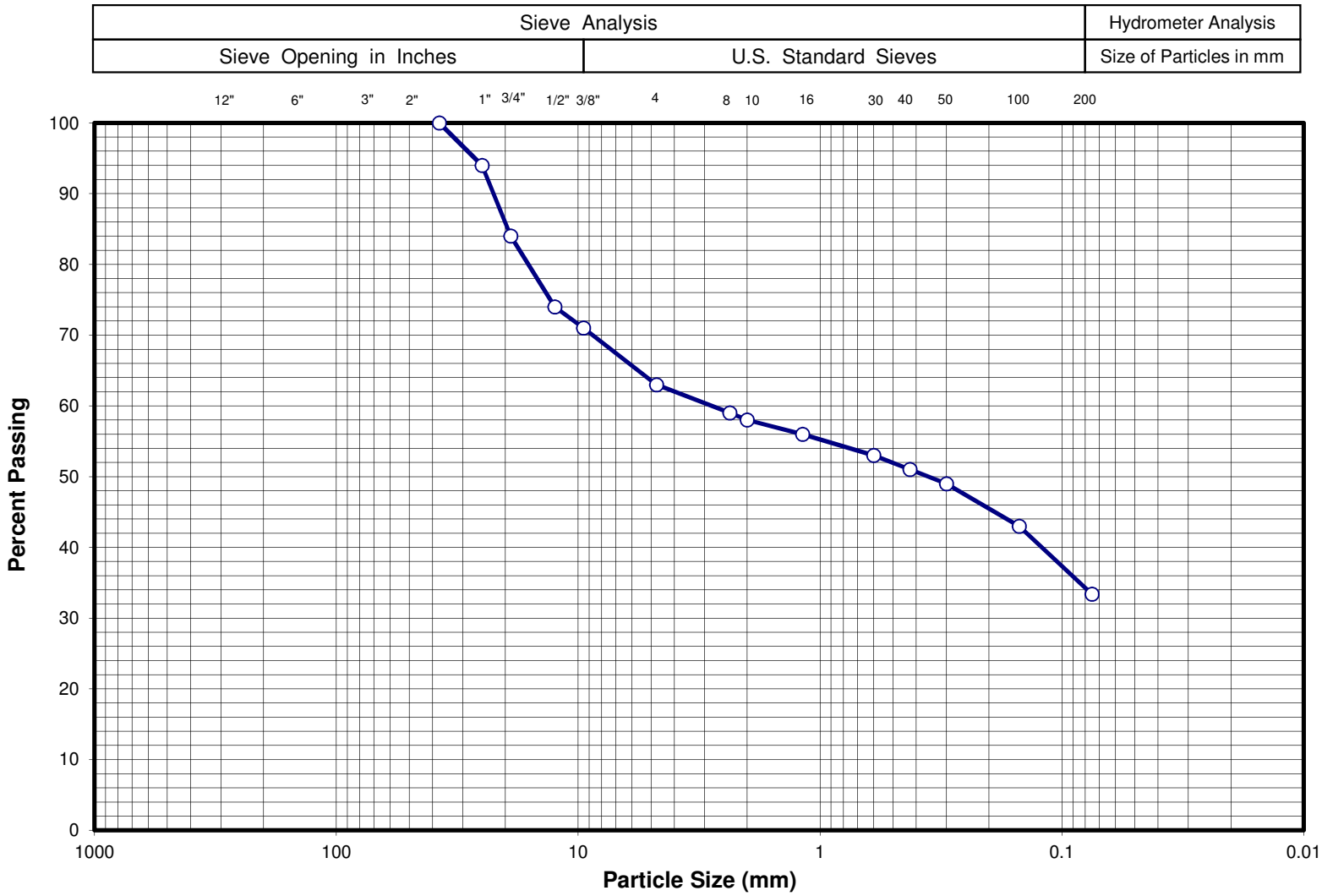
Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	86
1"	81
¾ "	78
½"	77
⅜"	74
#4	68
#10	62
#40	54
#200	34

Gravel (%)	32	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	34	PL	20	Sample ID:	PW-24
Fines (%)	34	PI	2	Sample Depth (ft.):	2.0
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-105



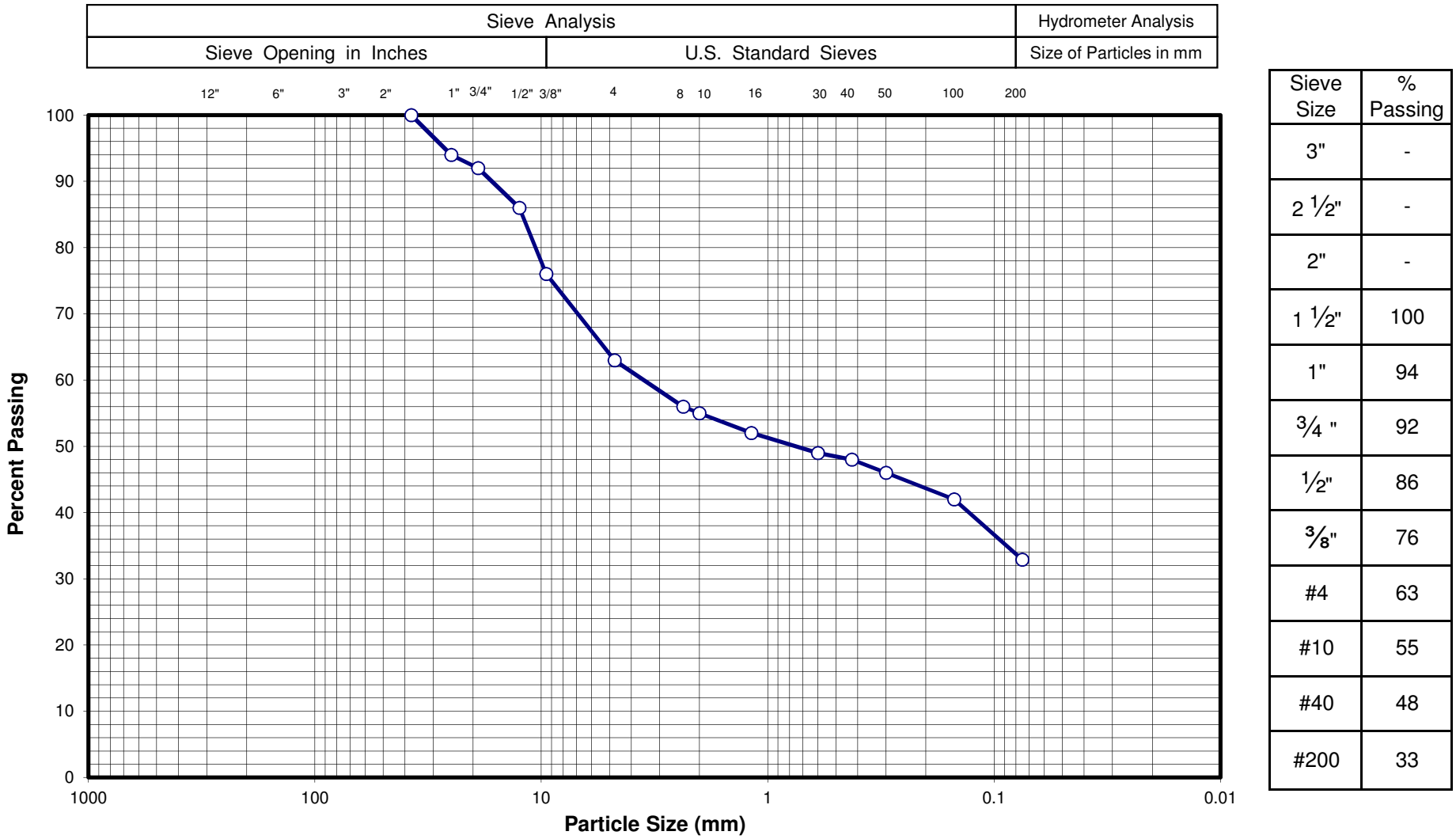
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	94
¾ "	84
½"	74
⅜"	71
#4	63
#10	58
#40	51
#200	33

Gravel (%)	37	LL	23	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	30	PL	19	Sample ID:	PW-24
Fines (%)	33	PI	4	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, clayey, silty with sand and cobbles (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-106



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	94
¾ "	92
½"	86
⅜"	76
#4	63
#10	55
#40	48
#200	33

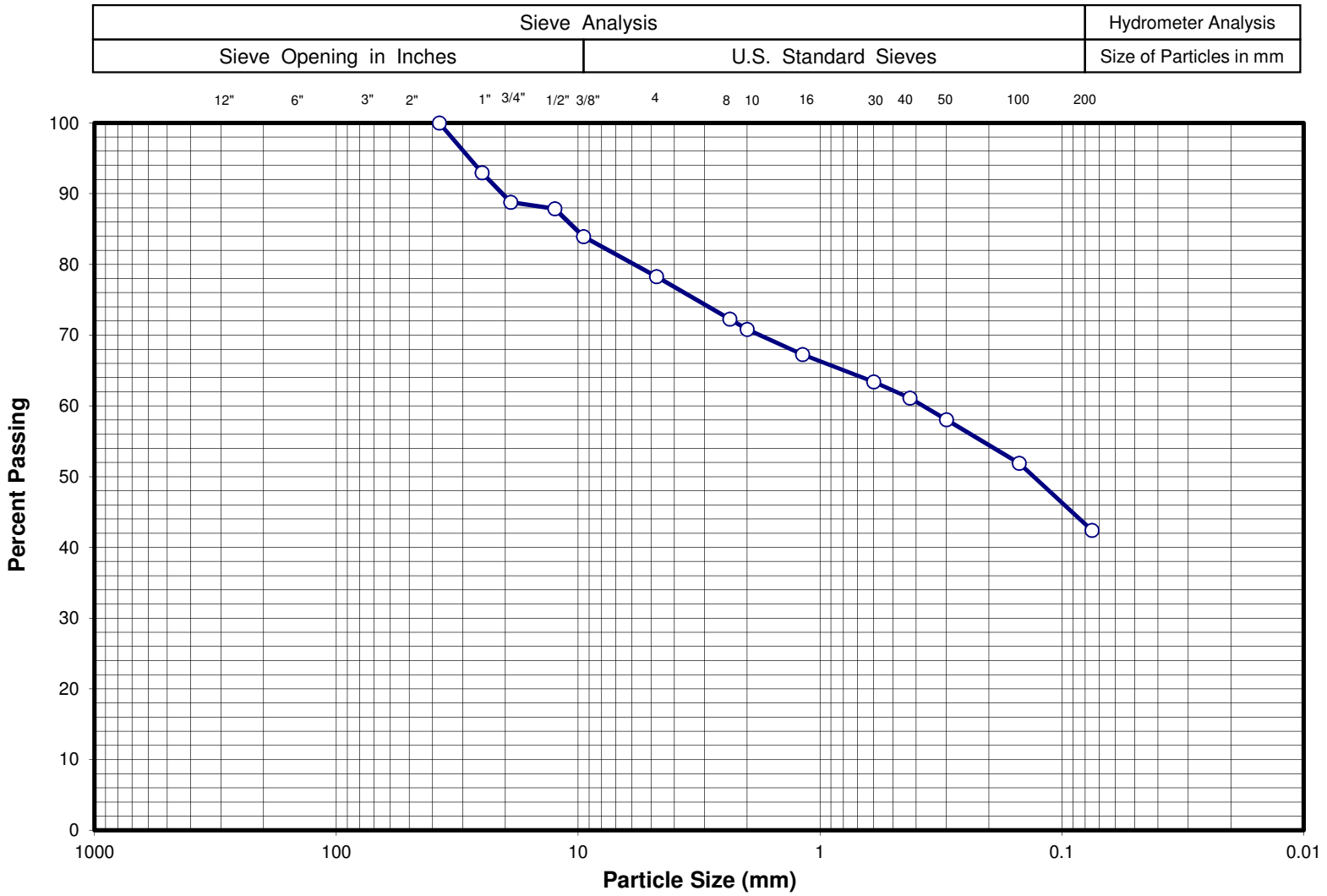
Gravel (%)	37	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	30	PL	17	Sample ID:	PW-24
Fines (%)	33	PI	5	Sample Depth (ft.):	7.0
Sample Description:	GRAVEL, clayey, silty with sand, cobbles and boulders (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-107

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	93
¾ "	89
½"	88
⅜"	84
#4	78
#10	71
#40	61
#200	42

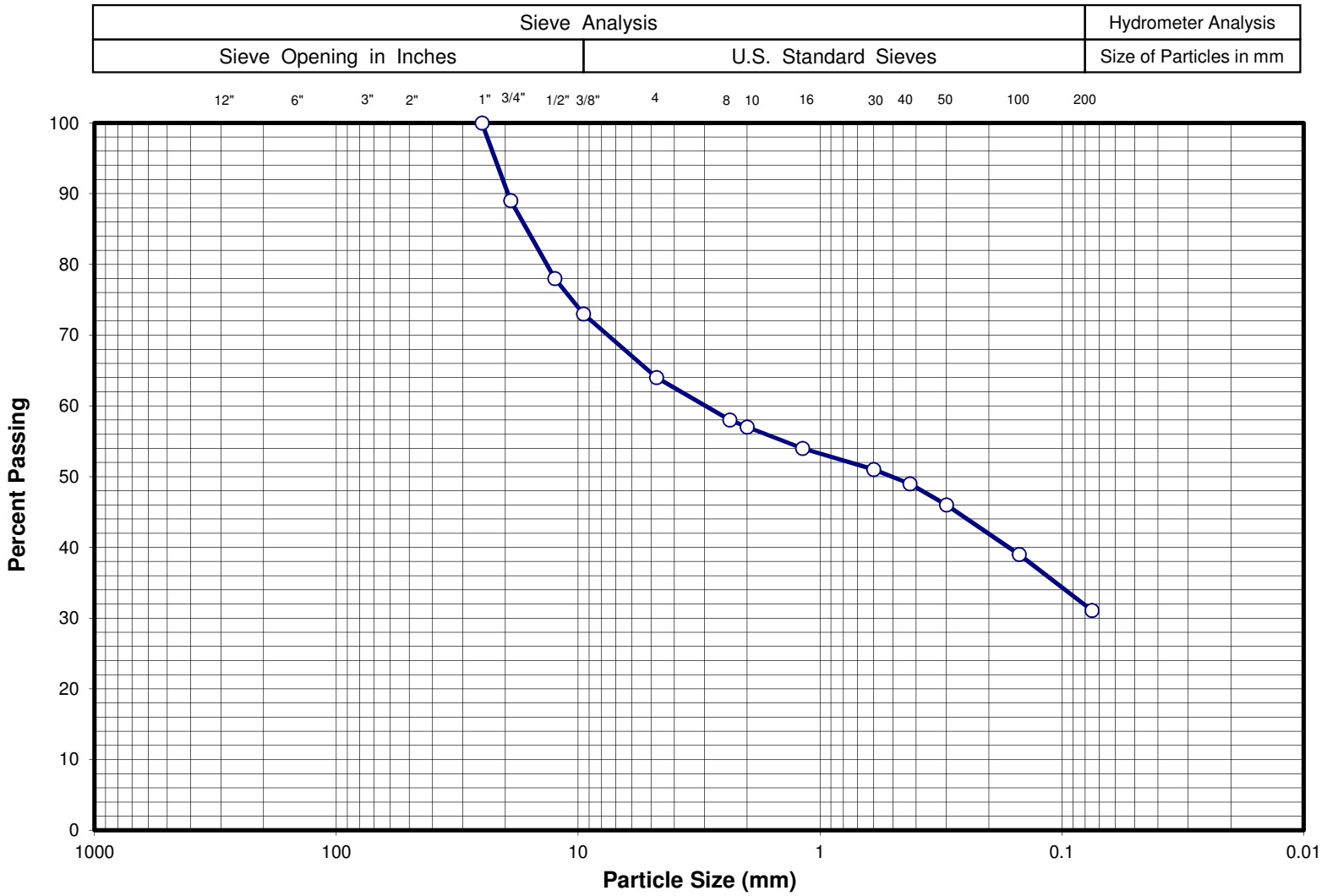
Gravel (%)	22	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	36	PL	16	Sample ID:	PW-25
Fines (%)	42	PI	5	Sample Depth (ft.):	1.5
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-108

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	89
½"	78
⅜"	73
#4	64
#10	57
#40	49
#200	31

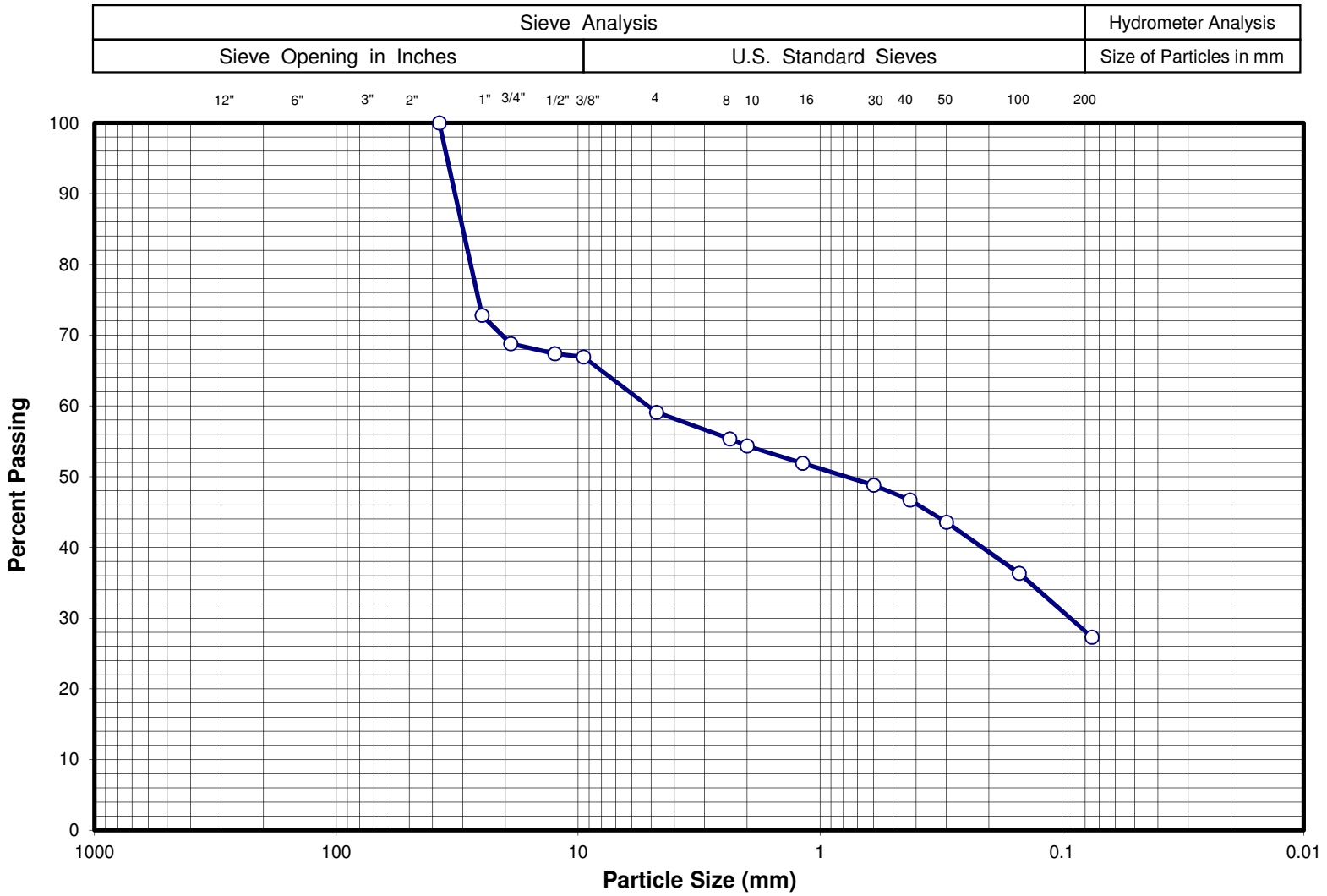
Gravel (%)	36	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	33	PL	16	Sample ID:	PW-25
Fines (%)	31	PI	6	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, clayey, silty with sand and cobbles (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-109

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	73
¾ "	69
½"	67
⅜"	67
#4	59
#10	54
#40	47
#200	27

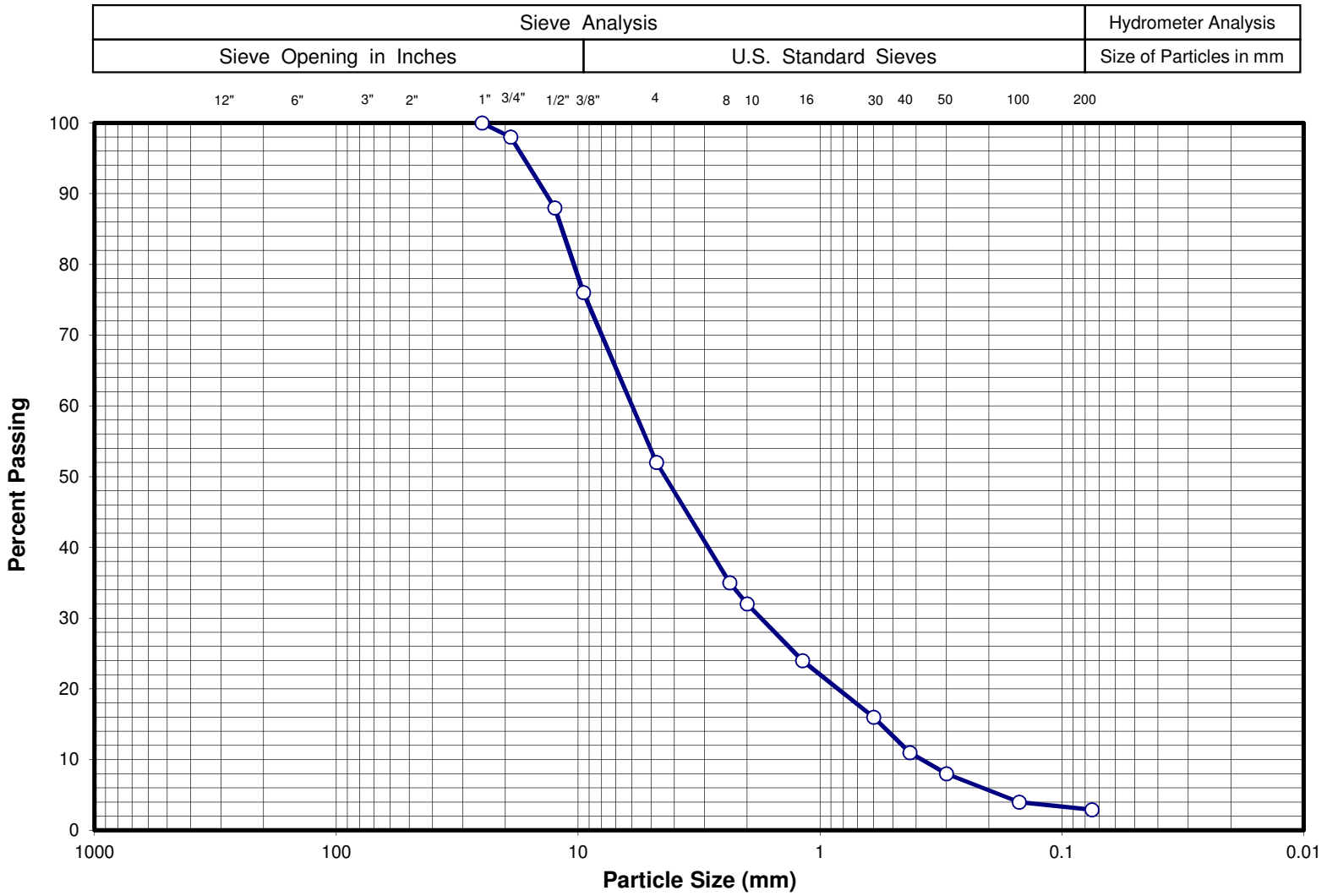
Gravel (%)	41	LL	-	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	32	PL	-	Sample ID:	PW-25
Fines (%)	27	PI	-	Sample Depth (ft.):	9.0
Sample Description:	GRAVEL, clayey, silty with sand and cobbles				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-110

Revised 08/25/2017



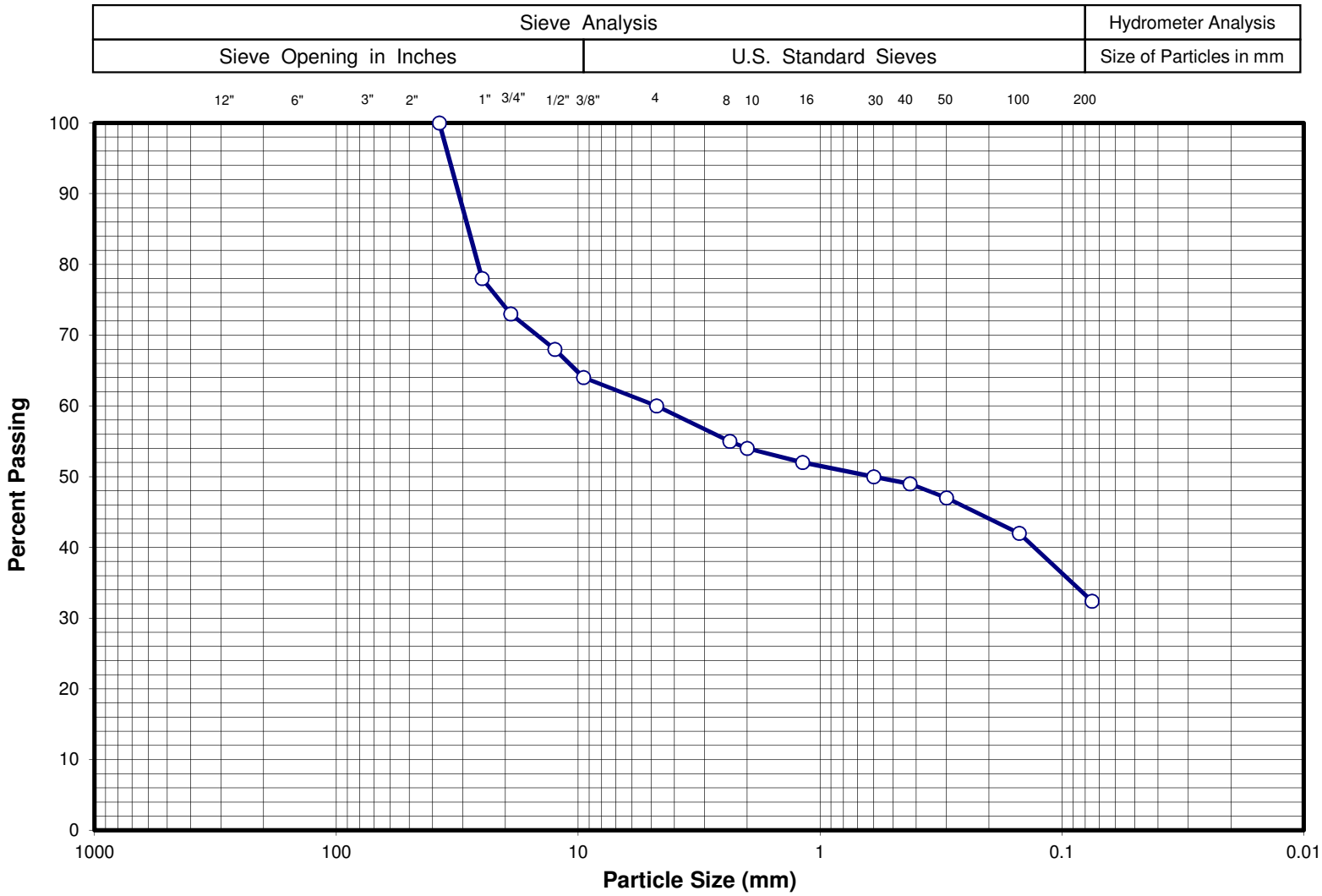
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	98
½"	88
⅜"	76
#4	52
#10	32
#40	11
#200	3

Gravel (%)	48	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	49	PL	NP	Sample ID:	PW-26
Fines (%)	3	PI	NP	Sample Depth (ft.):	0.8 to 1.5
Sample Description:	FILL GRAVEL with sand (BASE) (GW)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-111



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	78
¾ "	73
½"	68
⅜"	64
#4	60
#10	54
#40	49
#200	32

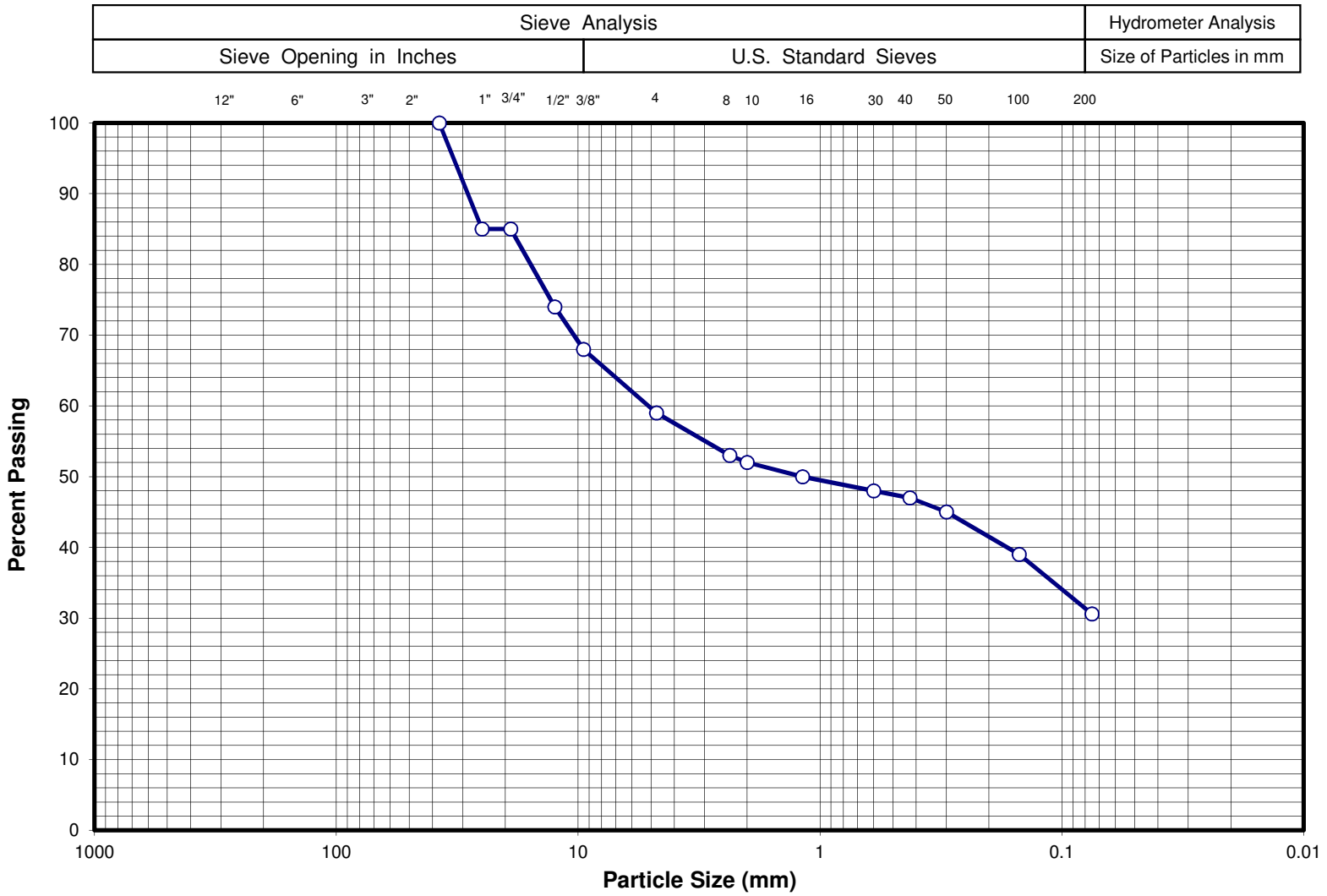
Gravel (%)	40	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	28	PL	16	Sample ID:	PW-26
Fines (%)	32	PI	6	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-112

Revised 08/25/2017



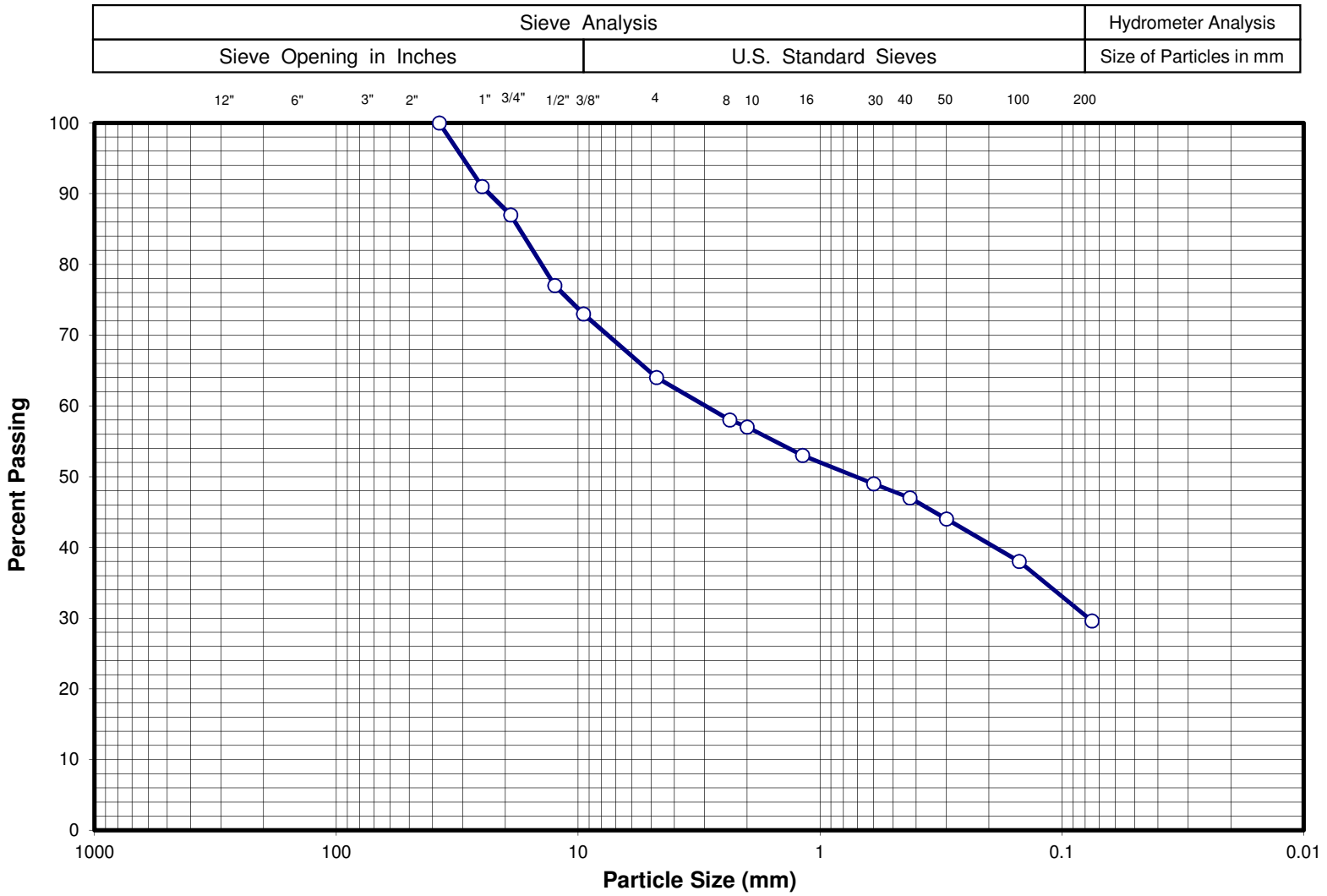
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	85
¾ "	85
½"	74
⅜"	68
#4	59
#10	52
#40	47
#200	31

Gravel (%)	41	LL	25	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	28	PL	20	Sample ID:	PW-26
Fines (%)	31	PI	5	Sample Depth (ft.):	9.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-113



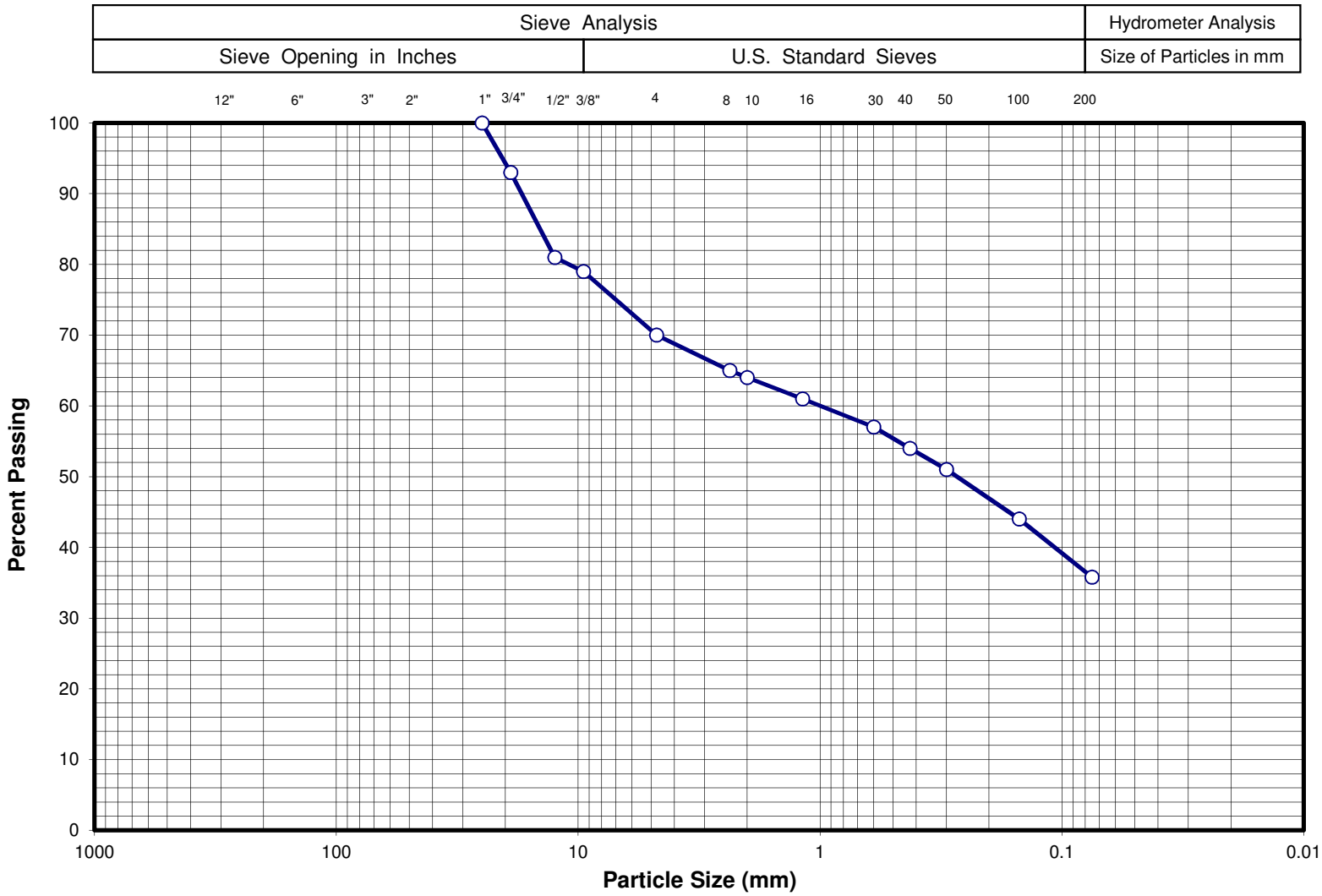
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	91
¾ "	87
½"	77
⅜"	73
#4	64
#10	57
#40	47
#200	30

Gravel (%)	36	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	34	PL	13	Sample ID:	P-27
Fines (%)	30	PI	8	Sample Depth (ft.):	1.2
Sample Description:	GRAVEL, clayey with sand (GC)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-114



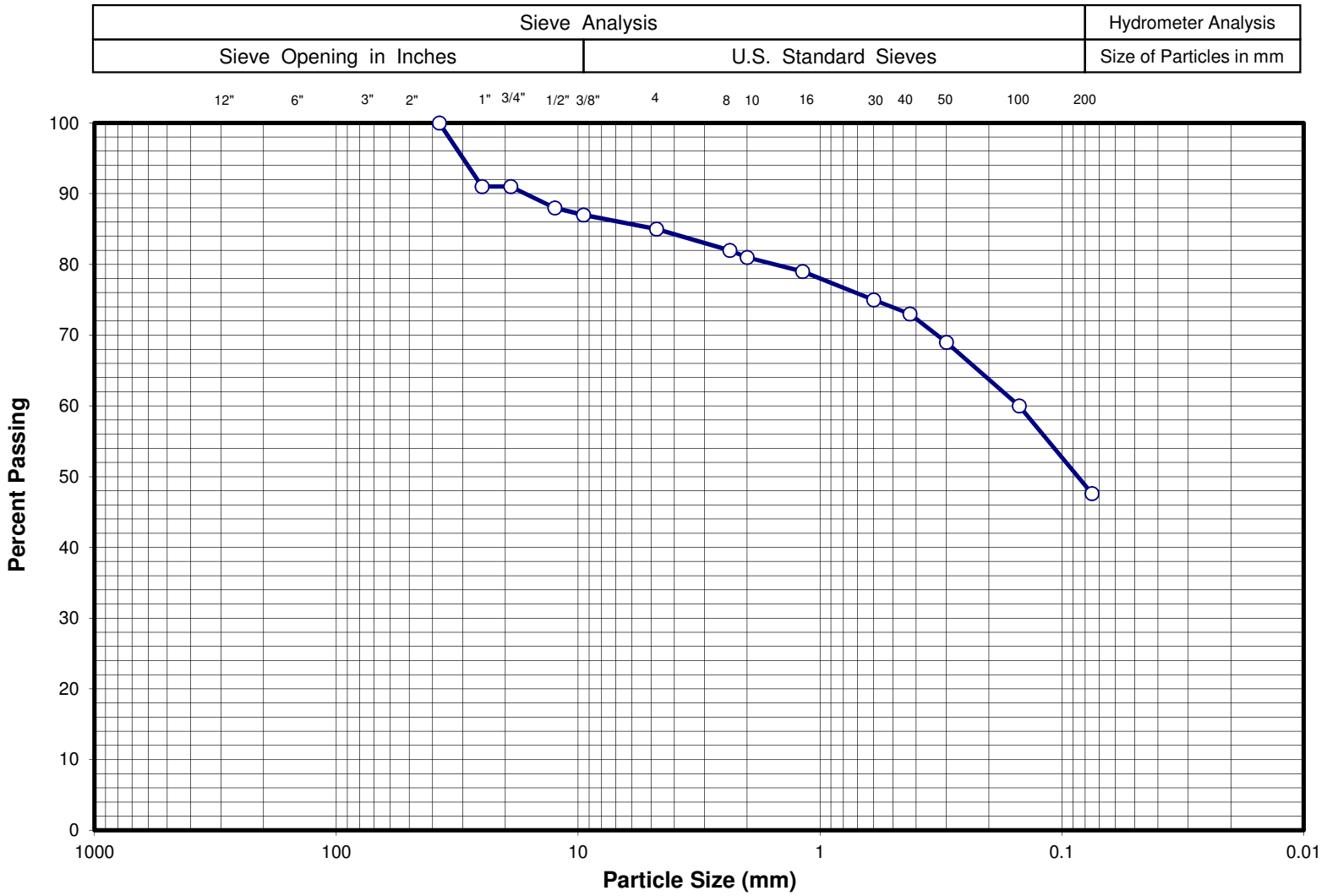
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	93
½"	81
⅜"	79
#4	70
#10	64
#40	54
#200	36

Gravel (%)	30	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	34	PL	13	Sample ID:	P-27
Fines (%)	36	PI	8	Sample Depth (ft.):	4.0
Sample Description:	SAND, clayey with gravel (SC)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-115



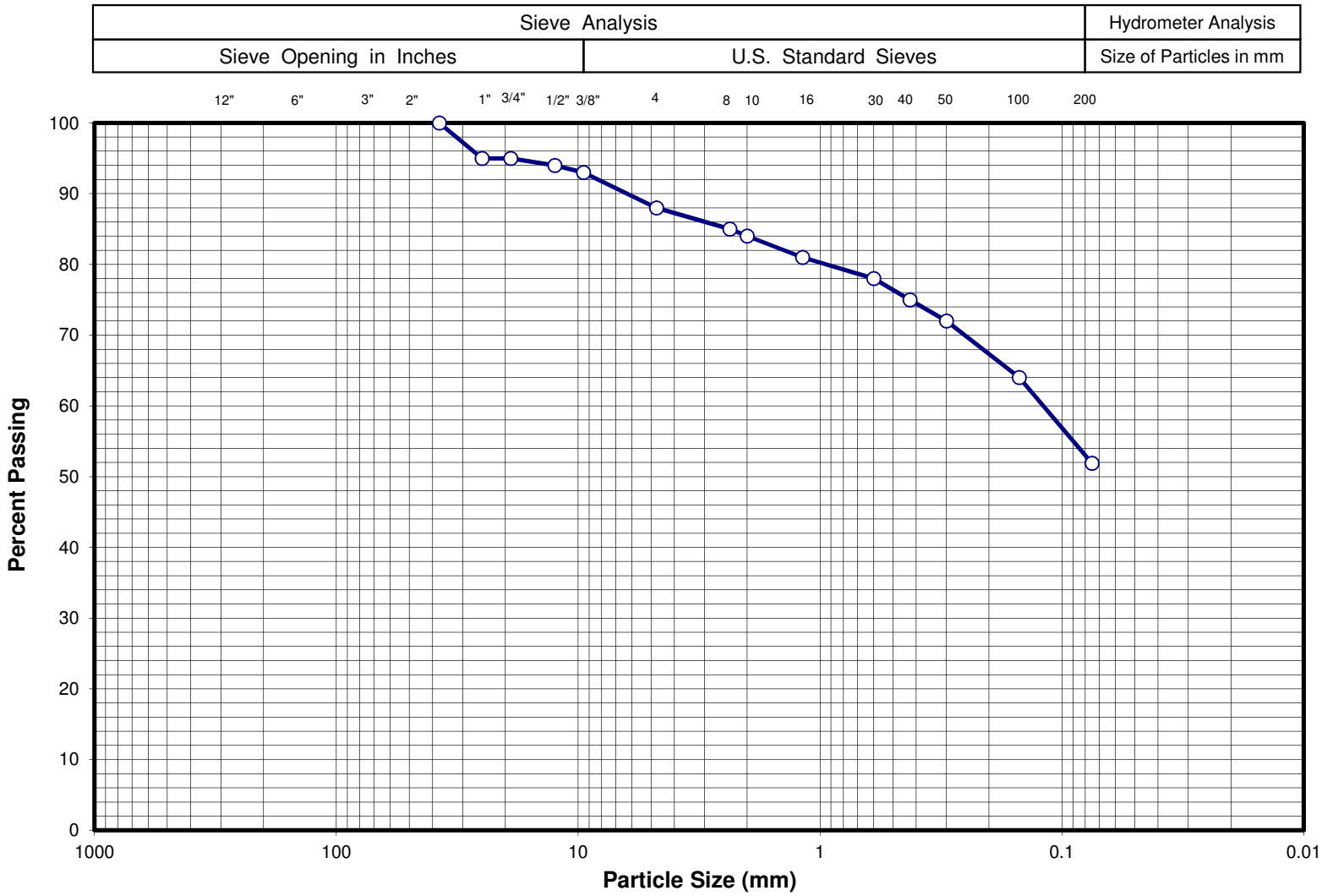
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	91
¾ "	91
½"	88
⅜"	87
#4	85
#10	81
#40	73
#200	48

Gravel (%)	15	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	37	PL	14	Sample ID:	P-27
Fines (%)	48	PI	8	Sample Depth (ft.):	7.0
Sample Description:	SAND, clayey with gravel (SC)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-116



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	95
¾ "	95
½"	94
⅜"	93
#4	88
#10	84
#40	75
#200	52

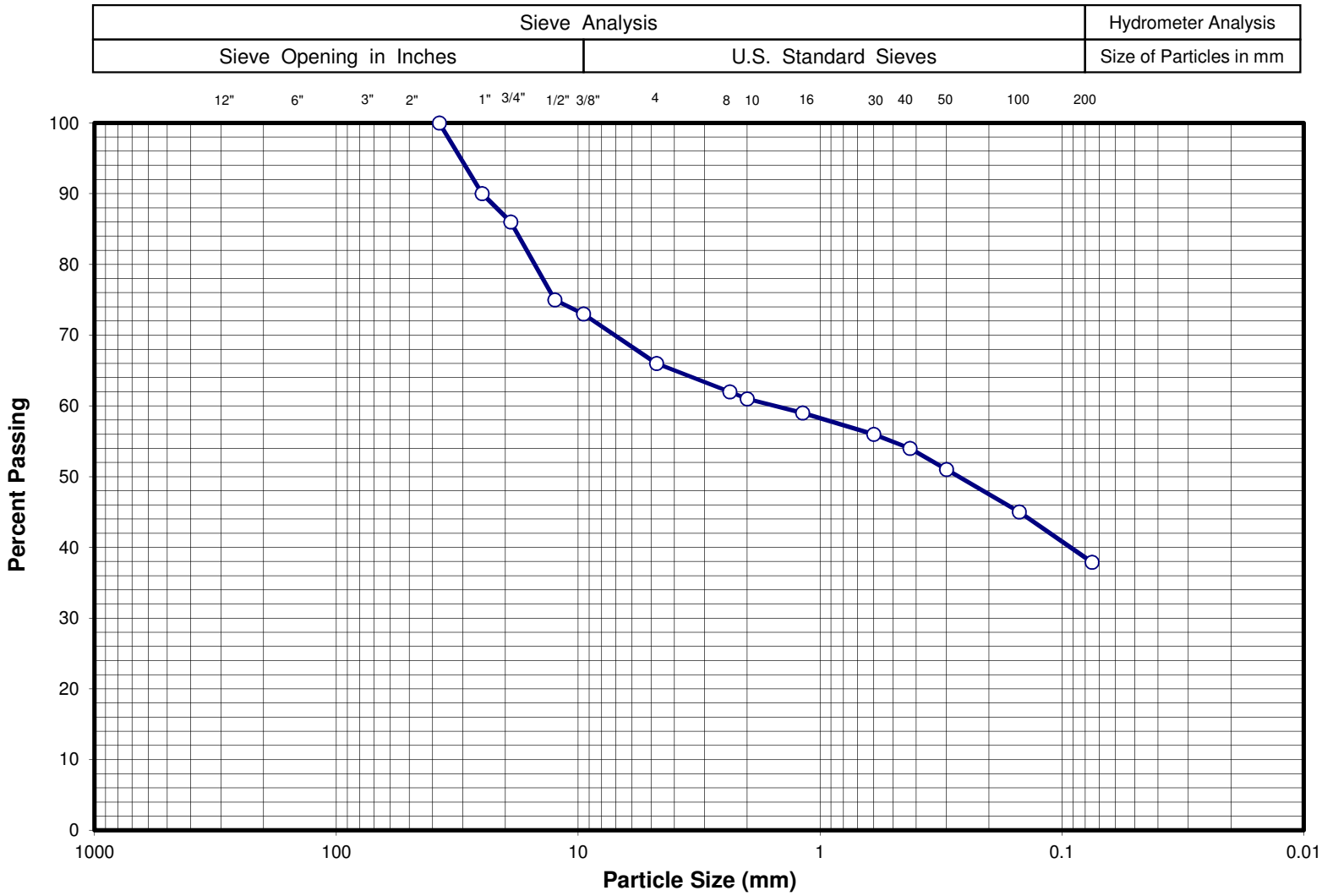
Gravel (%)	12	LL	26	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	36	PL	16	Sample ID:	P-27
Fines (%)	52	PI	10	Sample Depth (ft.):	9.0
Sample Description:	CLAY, sandy (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-117

Revised 08/25/2017



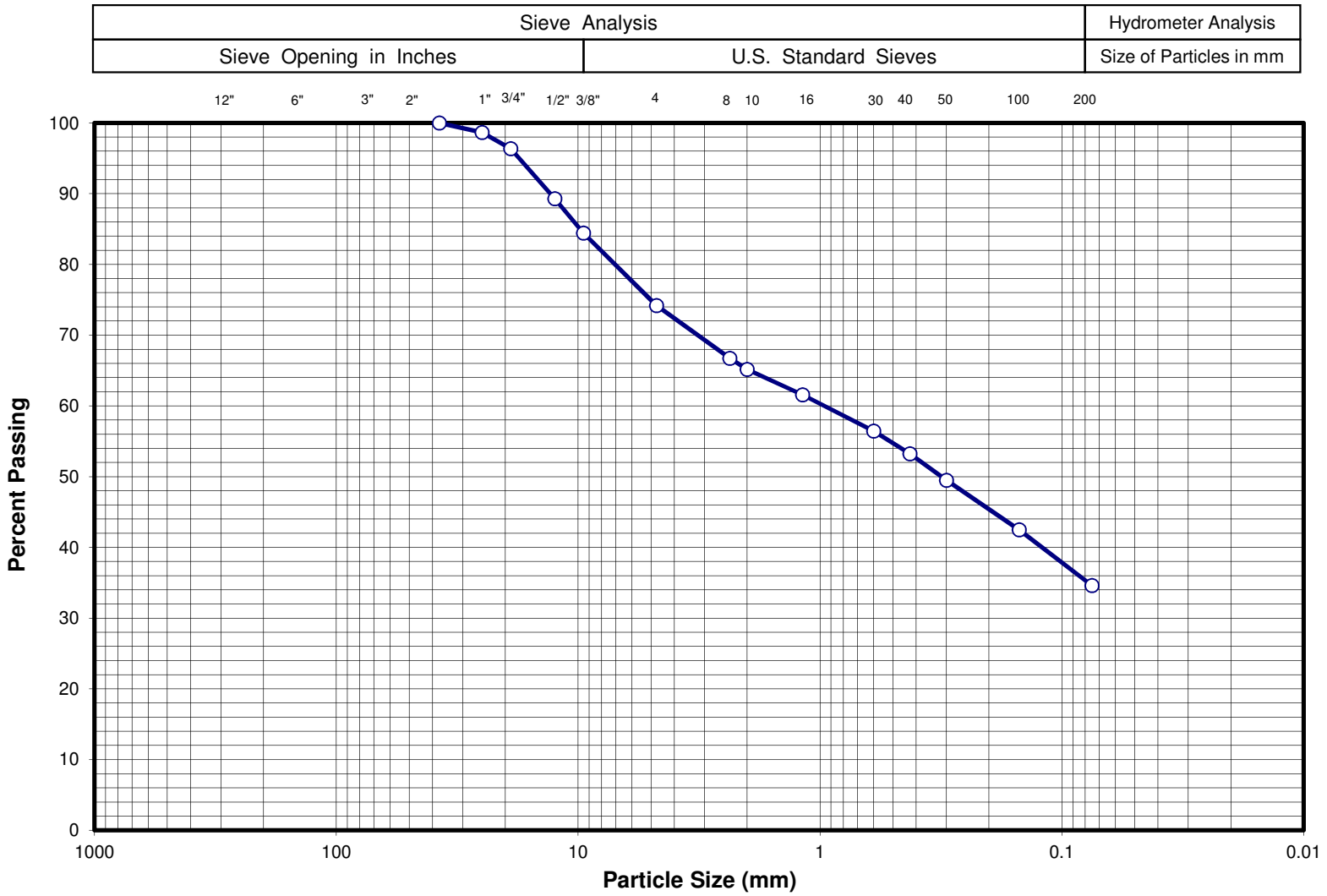
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	90
¾ "	86
½"	75
⅜"	73
#4	66
#10	61
#40	54
#200	38

Gravel (%)	34	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	28	PL	17	Sample ID:	PW-28
Fines (%)	38	PI	4	Sample Depth (ft.):	2.0
Sample Description:	FILL GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-118



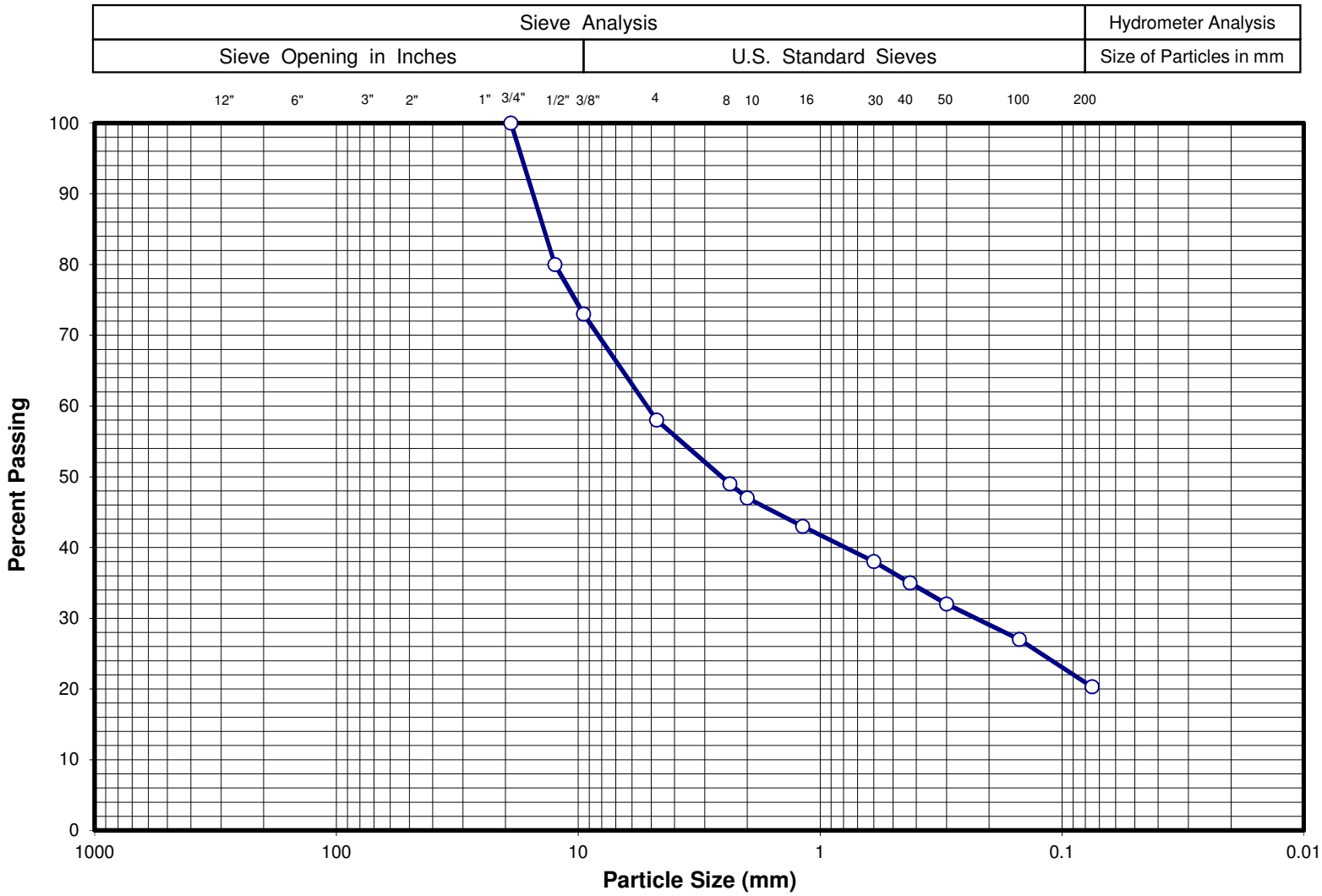
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	99
¾ "	96
½"	89
⅜"	84
#4	74
#10	65
#40	53
#200	35

Gravel (%)	26	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	39	PL	NP	Sample ID:	PW-28
Fines (%)	35	PI	NP	Sample Depth (ft.):	2 to 4
Sample Description:	FILL SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-119



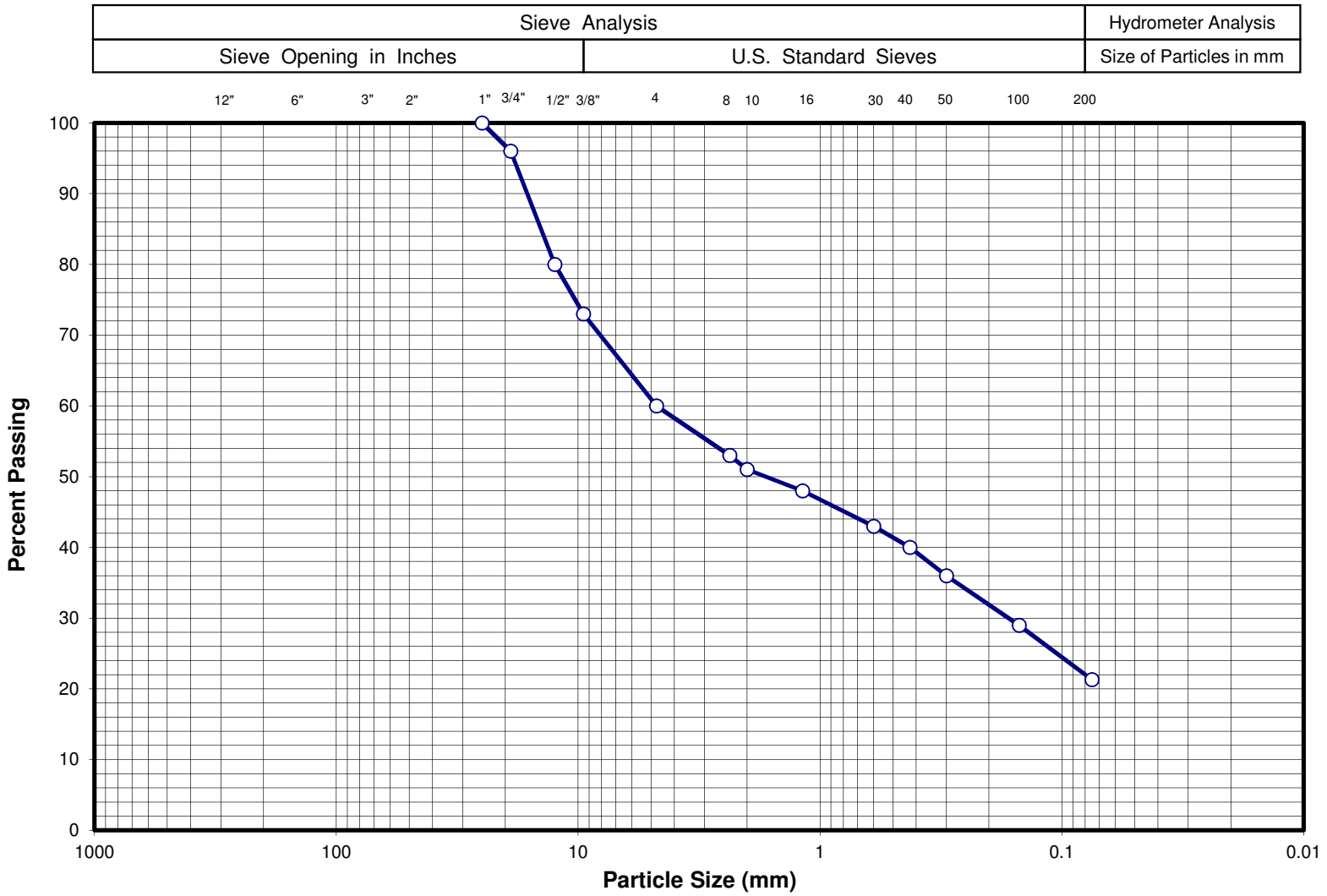
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	80
⅜"	73
#4	58
#10	47
#40	35
#200	20

Gravel (%)	42	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	38	PL	16	Sample ID:	PW-28
Fines (%)	20	PI	5	Sample Depth (ft.):	4.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-120



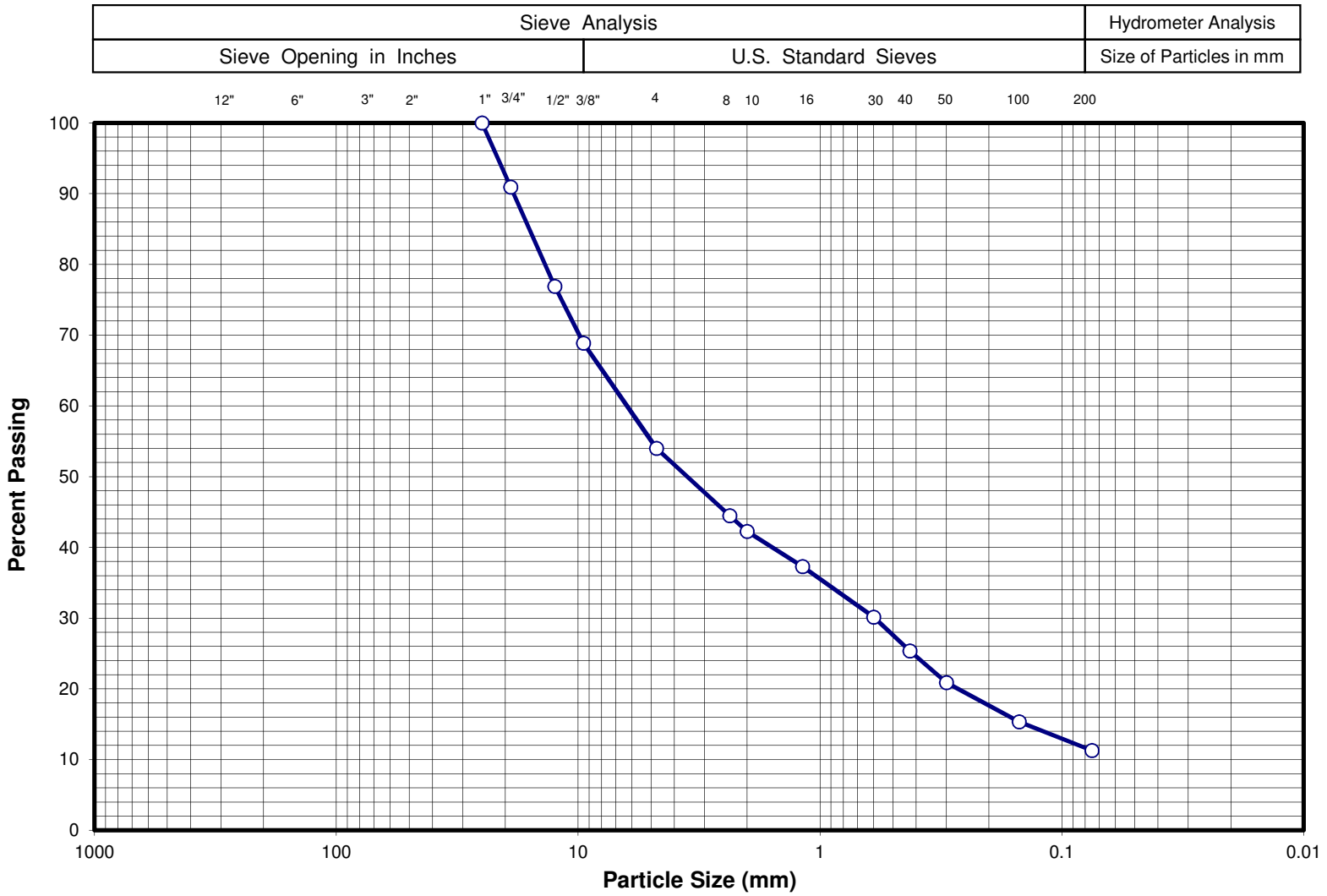
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	96
½"	80
⅜"	73
#4	60
#10	51
#40	40
#200	21

Gravel (%)	40	LL	19	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	39	PL	16	Sample ID:	PW-28
Fines (%)	21	PI	3	Sample Depth (ft.):	7.0
Sample Description:	GRAVEL, silty with sand, cobbles and boulders (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-121



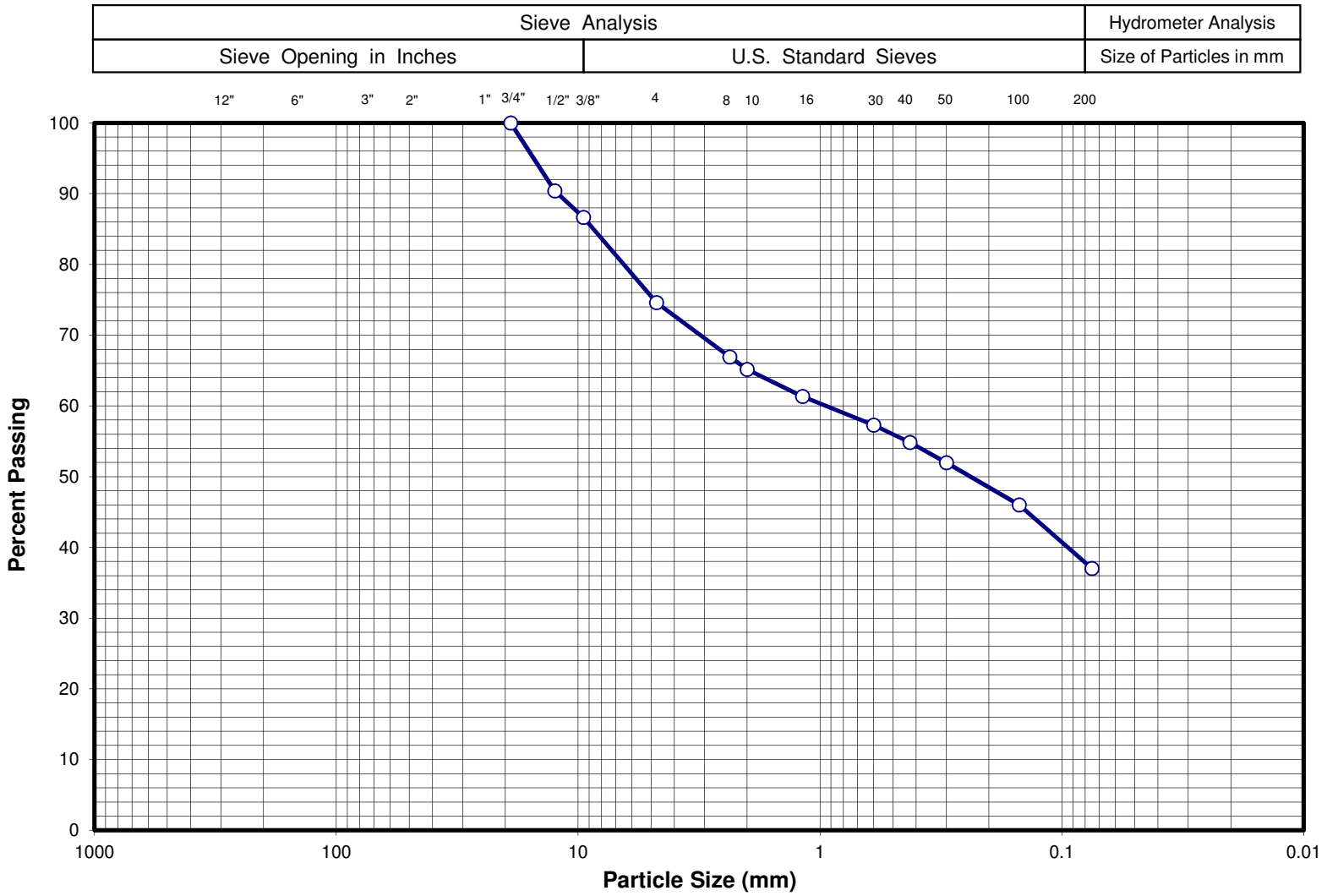
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	91
½"	77
⅜"	69
#4	54
#10	42
#40	25
#200	11

Gravel (%)	46	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	43	PL	NP	Sample ID:	P-29
Fines (%)	11	PI	NP	Sample Depth (ft.):	0.8
Sample Description:	FILL GRAVEL with silt and sand (BASE) (GW-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-122



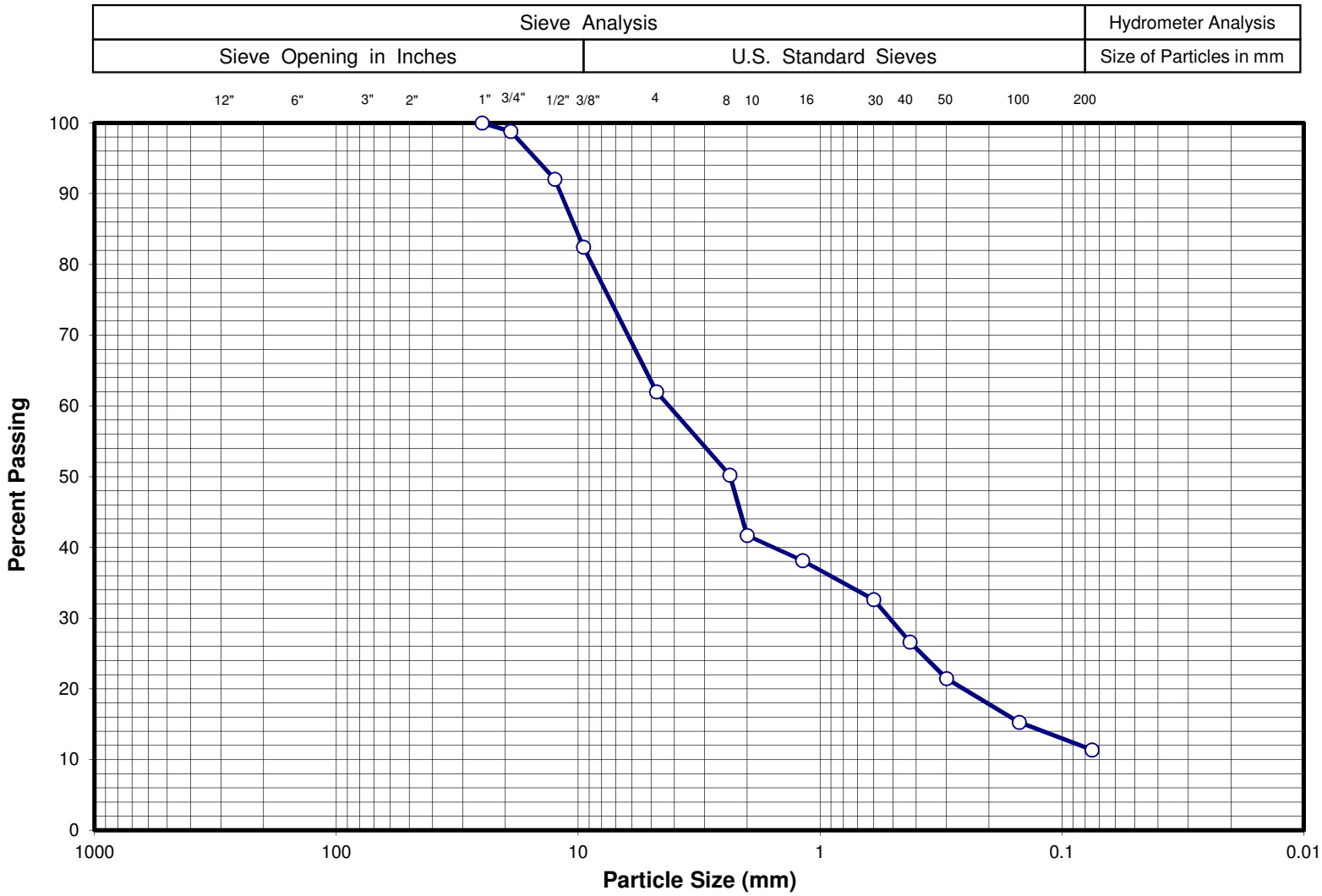
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	90
⅜"	87
#4	75
#10	65
#40	55
#200	37

Gravel (%)	25	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	38	PL	17	Sample ID:	P-29
Fines (%)	37	PI	5	Sample Depth (ft.):	2.5
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-123



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	99
½"	92
⅜"	82
#4	62
#10	42
#40	27
#200	11

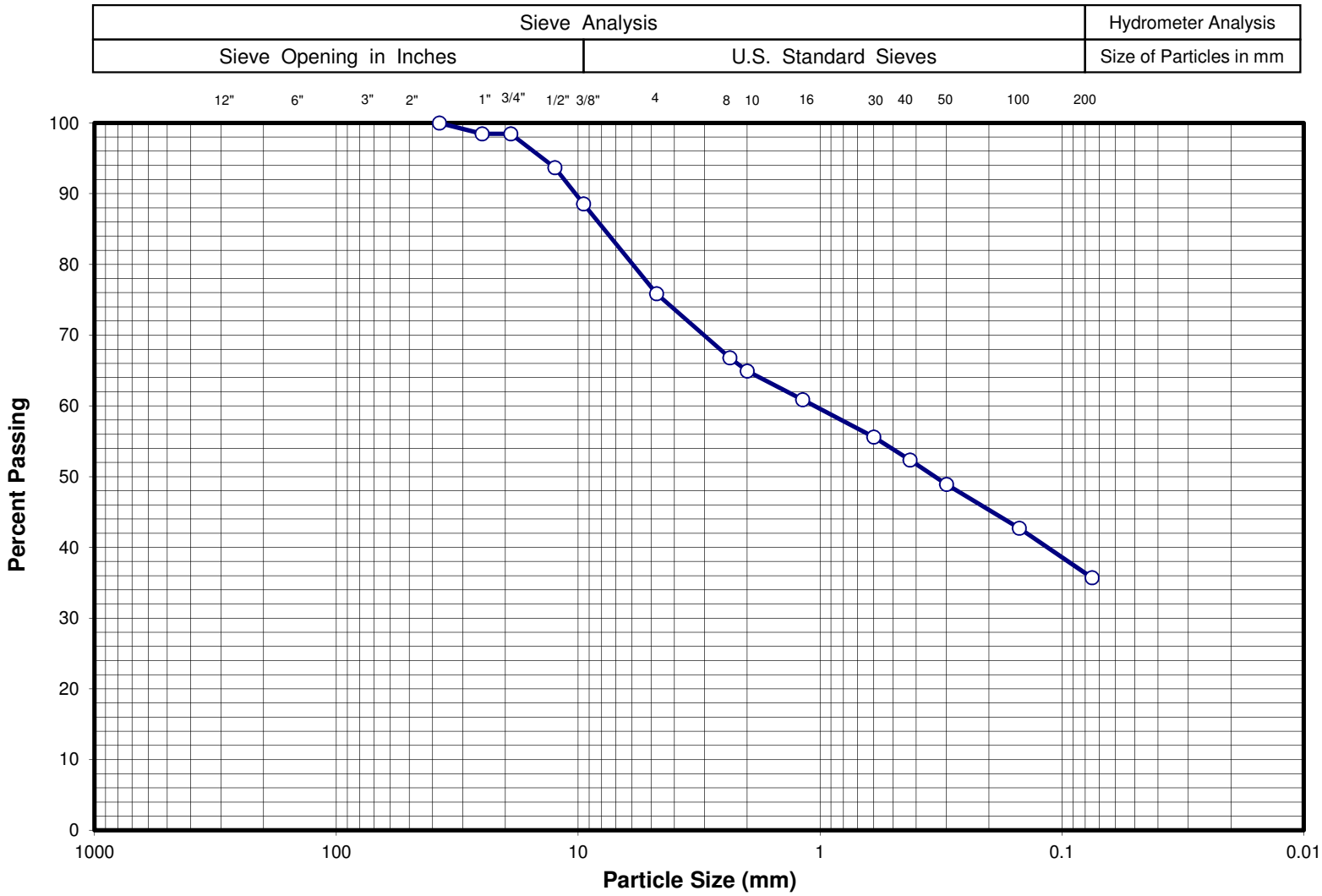
Gravel (%)	38	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	51	PL	NP	Sample ID:	P-30
Fines (%)	11	PI	NP	Sample Depth (ft.):	0.5
Sample Description:	FILL SAND with silt and gravel (BASE) (SP-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-124

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	98
¾ "	98
½"	94
⅜"	89
#4	76
#10	65
#40	52
#200	36

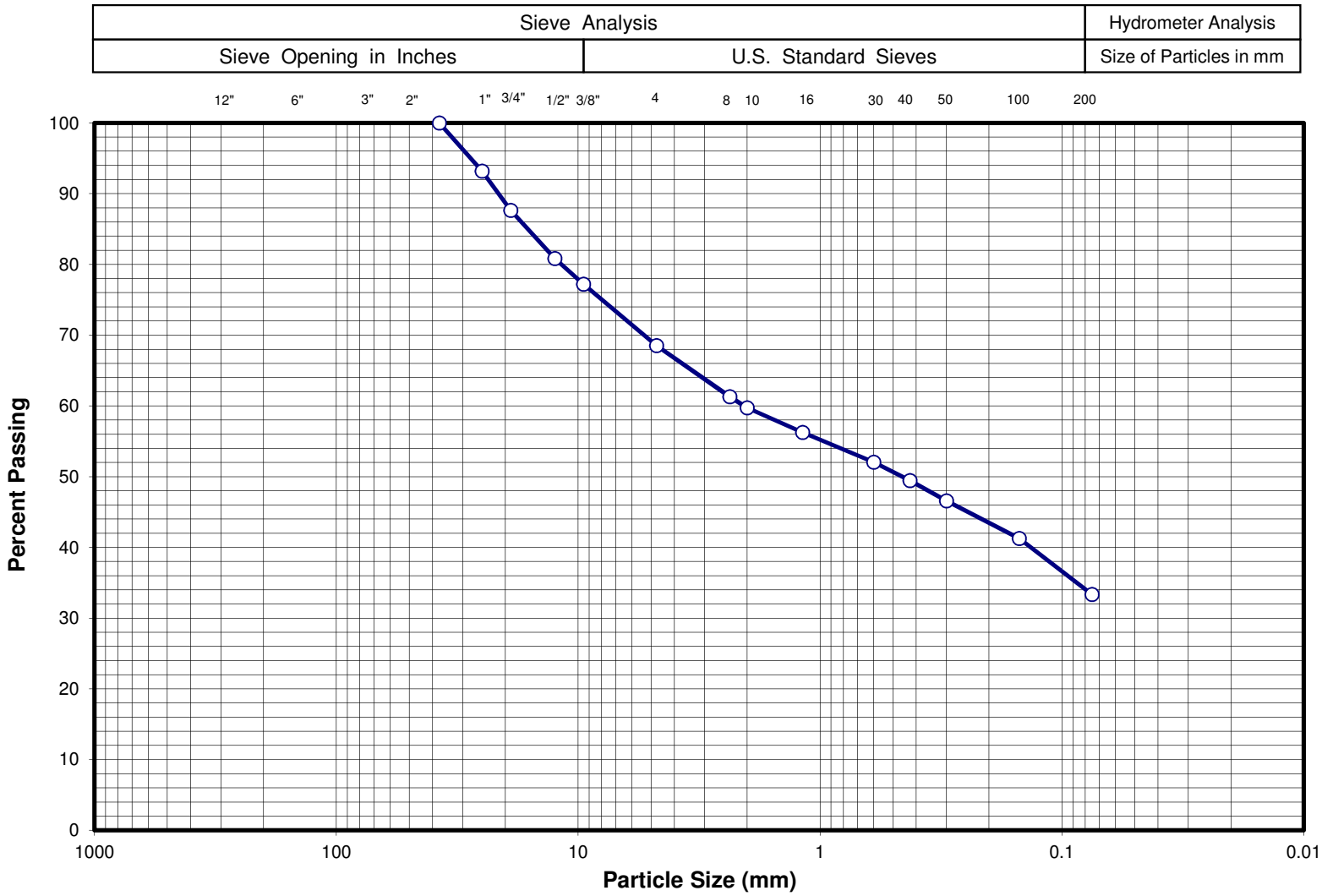
Gravel (%)	24	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	40	PL	NP	Sample ID:	P-30
Fines (%)	36	PI	NP	Sample Depth (ft.):	2 to 5
Sample Description:	SAND, silty with gravel (SM)				

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SIEVE ANALYSIS

Drawn By:	SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-125

Revised 08/25/2017



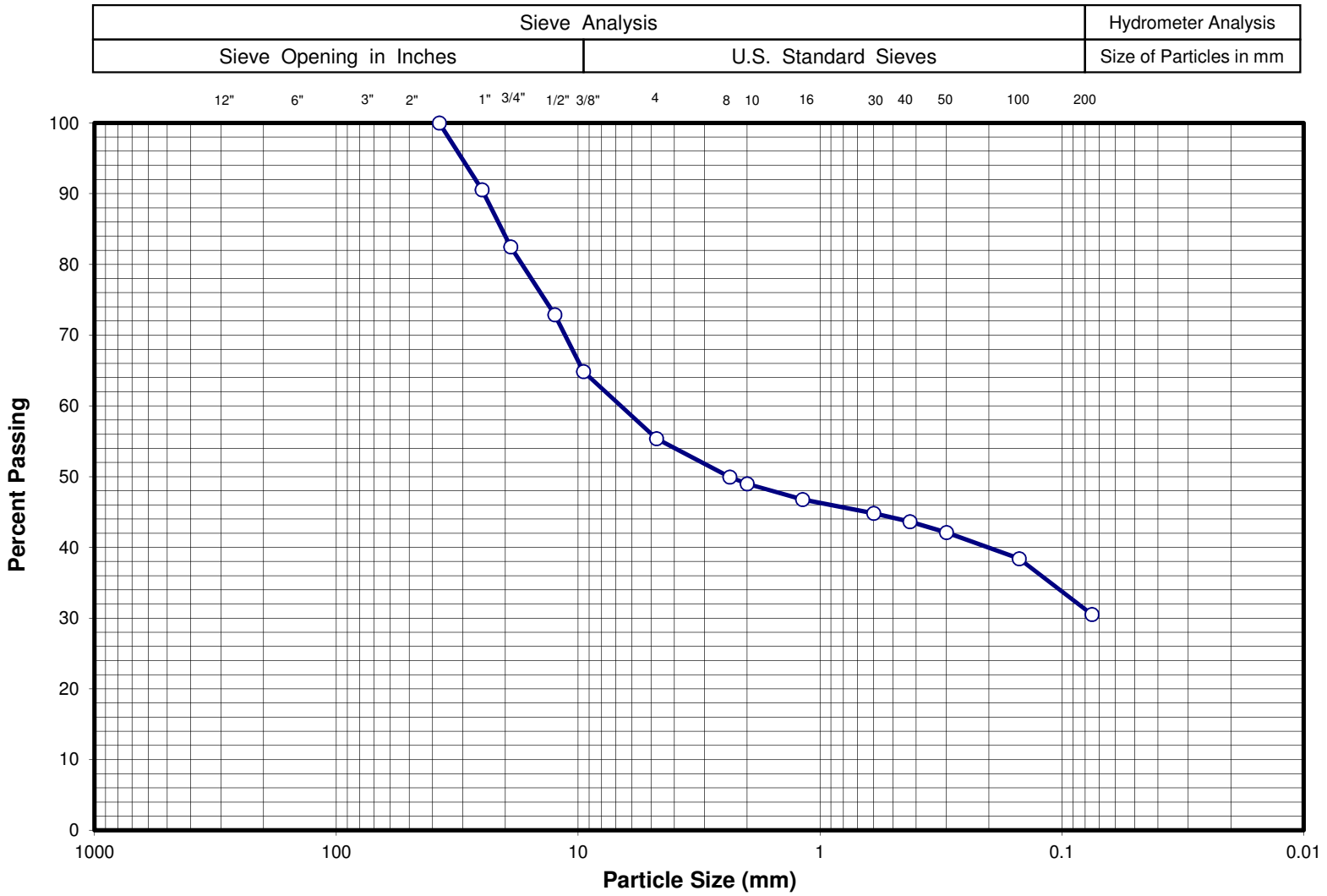
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	93
¾ "	88
½"	81
⅜"	77
#4	69
#10	60
#40	49
#200	33

Gravel (%)	31	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	36	PL	17	Sample ID:	P-30
Fines (%)	33	PI	5	Sample Depth (ft.):	3.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-126



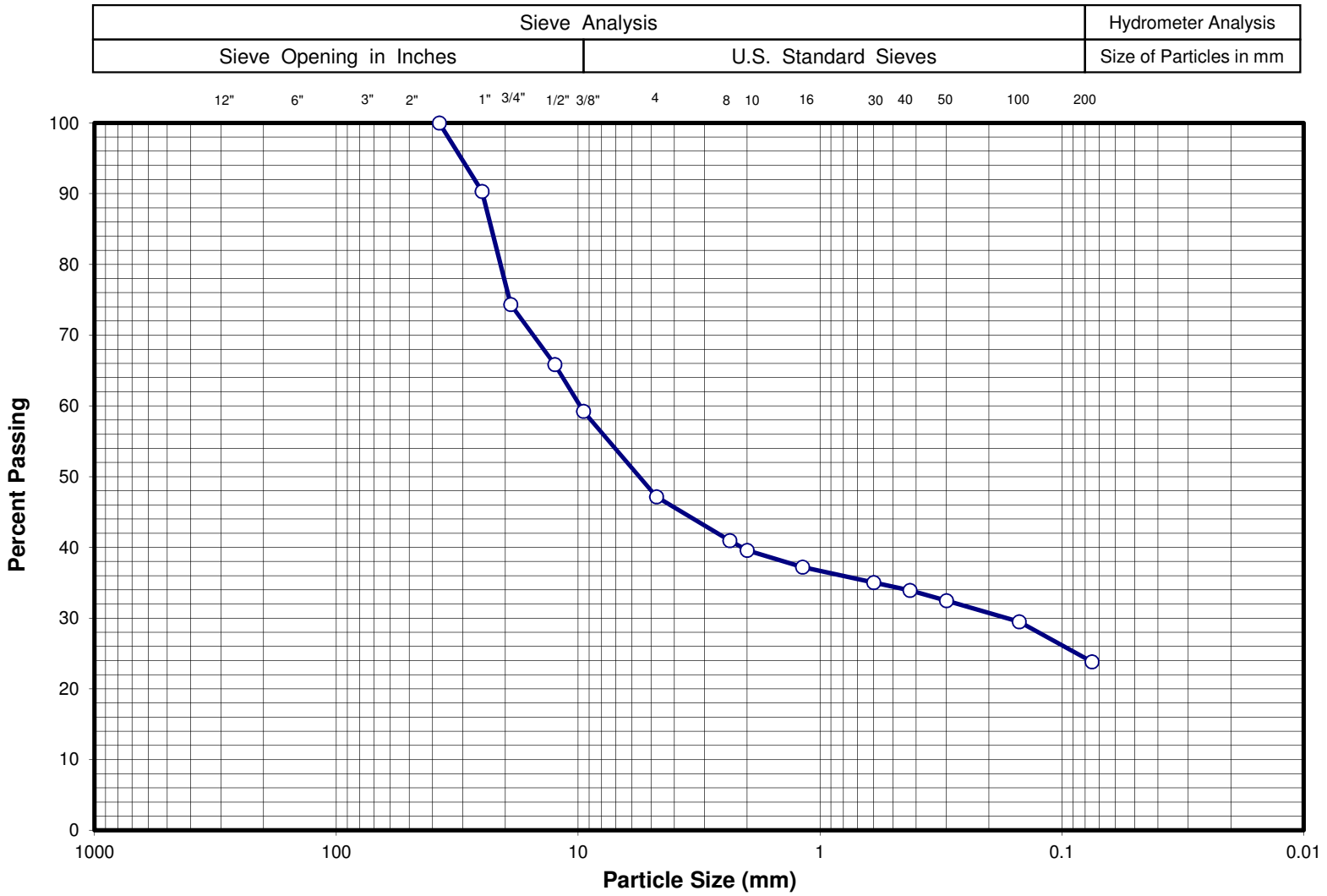
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	91
¾ "	82
½"	73
⅜"	65
#4	55
#10	49
#40	44
#200	31

Gravel (%)	45	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	24	PL	16	Sample ID:	P-30
Fines (%)	31	PI	5	Sample Depth (ft.):	5.0
Sample Description:	GRAVEL, clayey, slity with sand (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-127



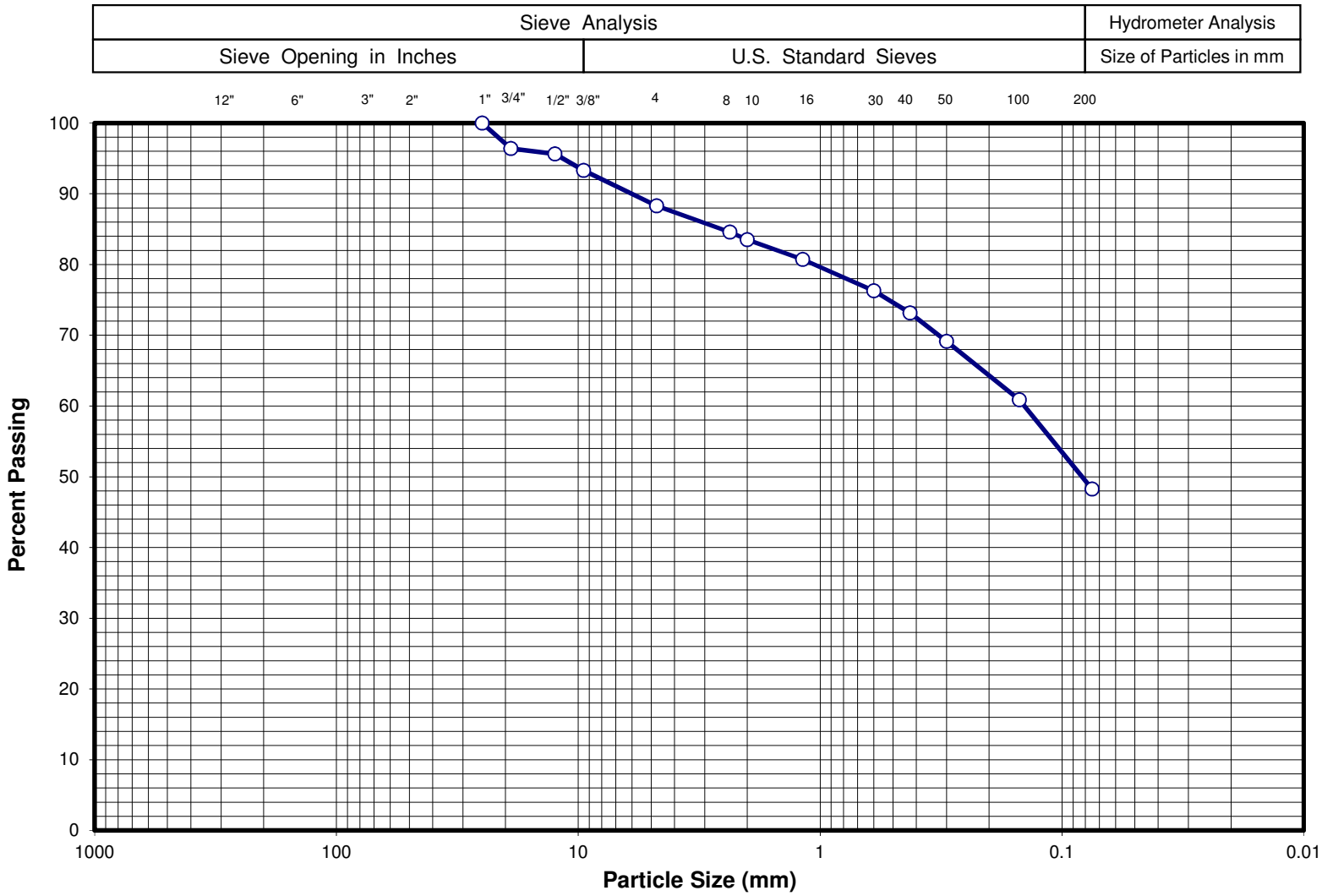
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	90
¾ "	74
½"	66
⅜"	59
#4	47
#10	40
#40	34
#200	24

Gravel (%)	53	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	23	PL	18	Sample ID:	P-30
Fines (%)	24	PI	3	Sample Depth (ft.):	7.0
Sample Description:	GRAVEL, silty with sand (GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-128



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	96
½"	96
⅜"	93
#4	88
#10	84
#40	73
#200	48

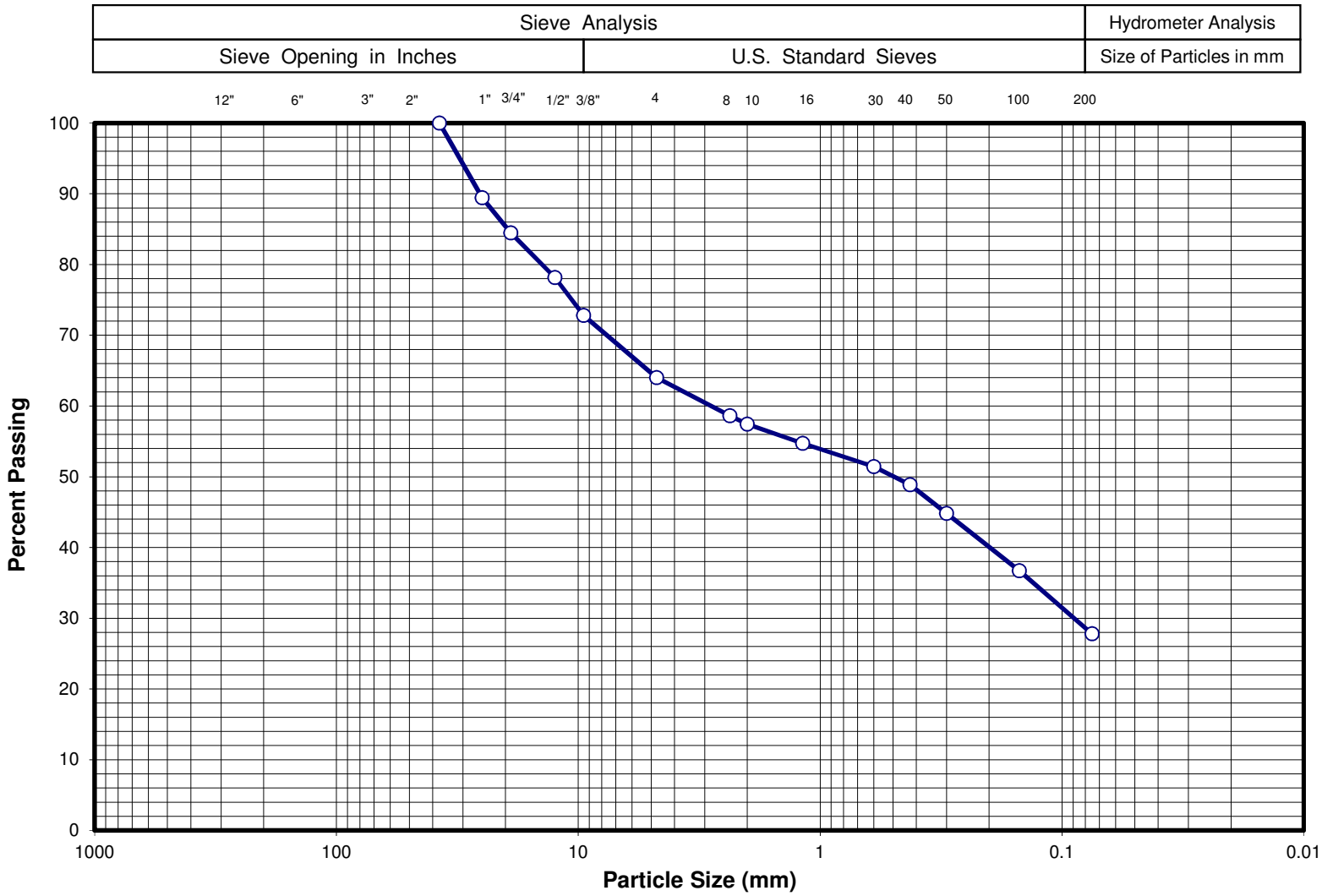
Gravel (%)	12	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	40	PL	17	Sample ID:	PW-31
Fines (%)	48	PI	5	Sample Depth (ft.):	2.0
Sample Description:	SAND, clayey, silty (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-129

Revised 08/25/2017



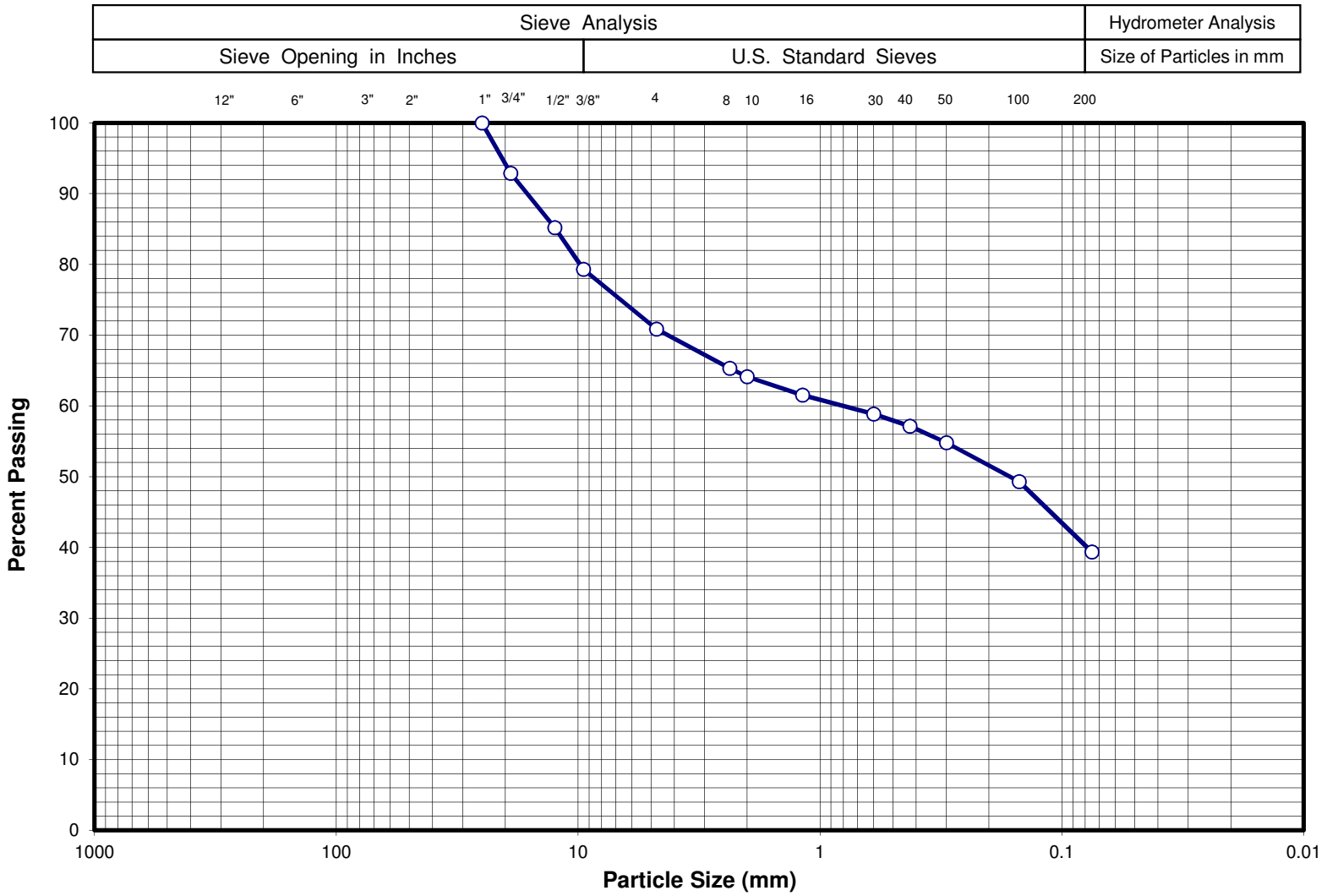
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	89
¾ "	84
½"	78
⅜"	73
#4	64
#10	57
#40	49
#200	28

Gravel (%)	36	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	36	PL	18	Sample ID:	PW-31
Fines (%)	28	PI	4	Sample Depth (ft.):	4.0
Sample Description:	SAND, clayey, silty with gravel and cobbles (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-130



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	93
½"	85
⅜"	79
#4	71
#10	64
#40	57
#200	39

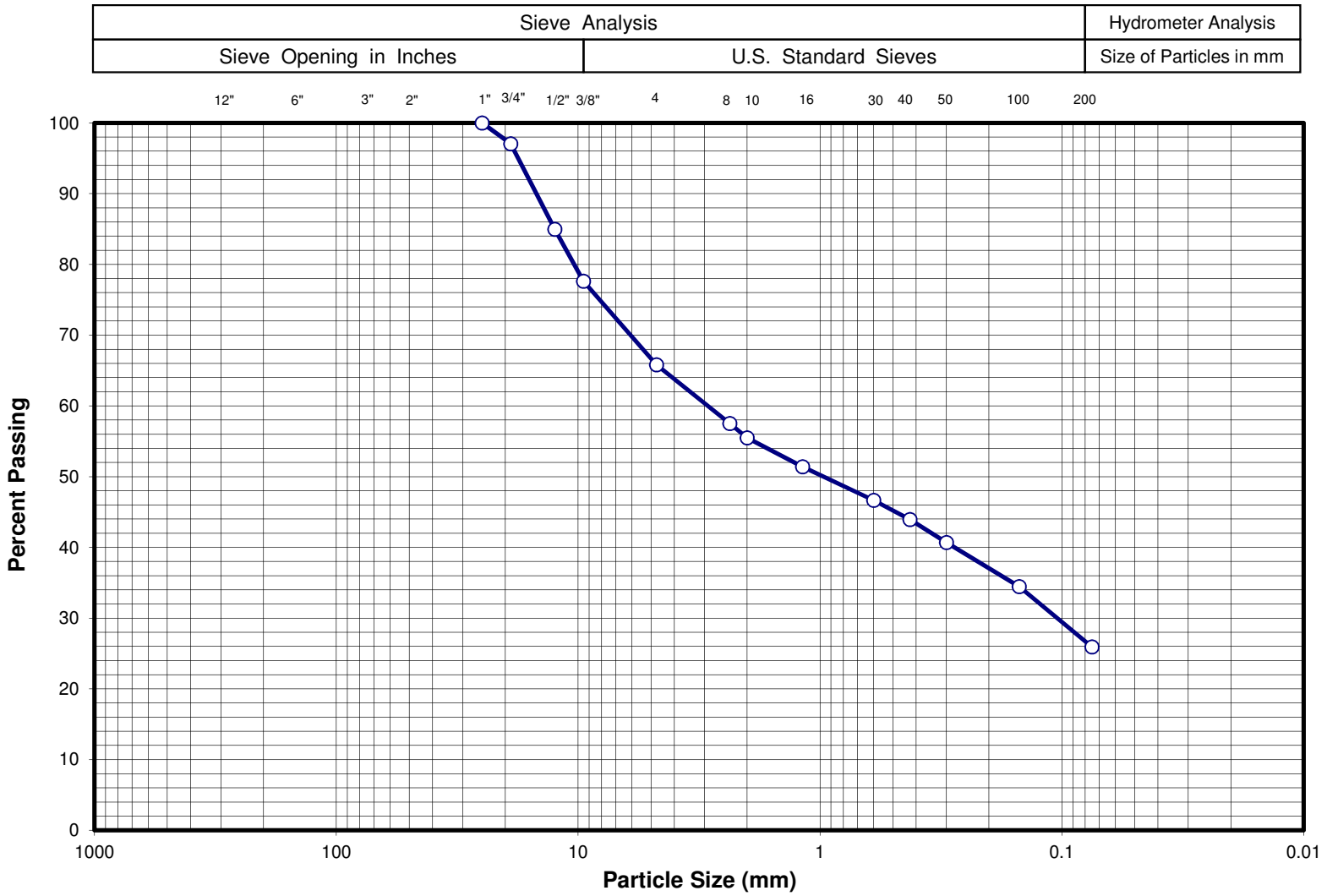
Gravel (%)	29	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	32	PL	16	Sample ID:	PW-31
Fines (%)	39	PI	6	Sample Depth (ft.):	7.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-131

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	97
½"	85
⅜"	78
#4	66
#10	55
#40	44
#200	26

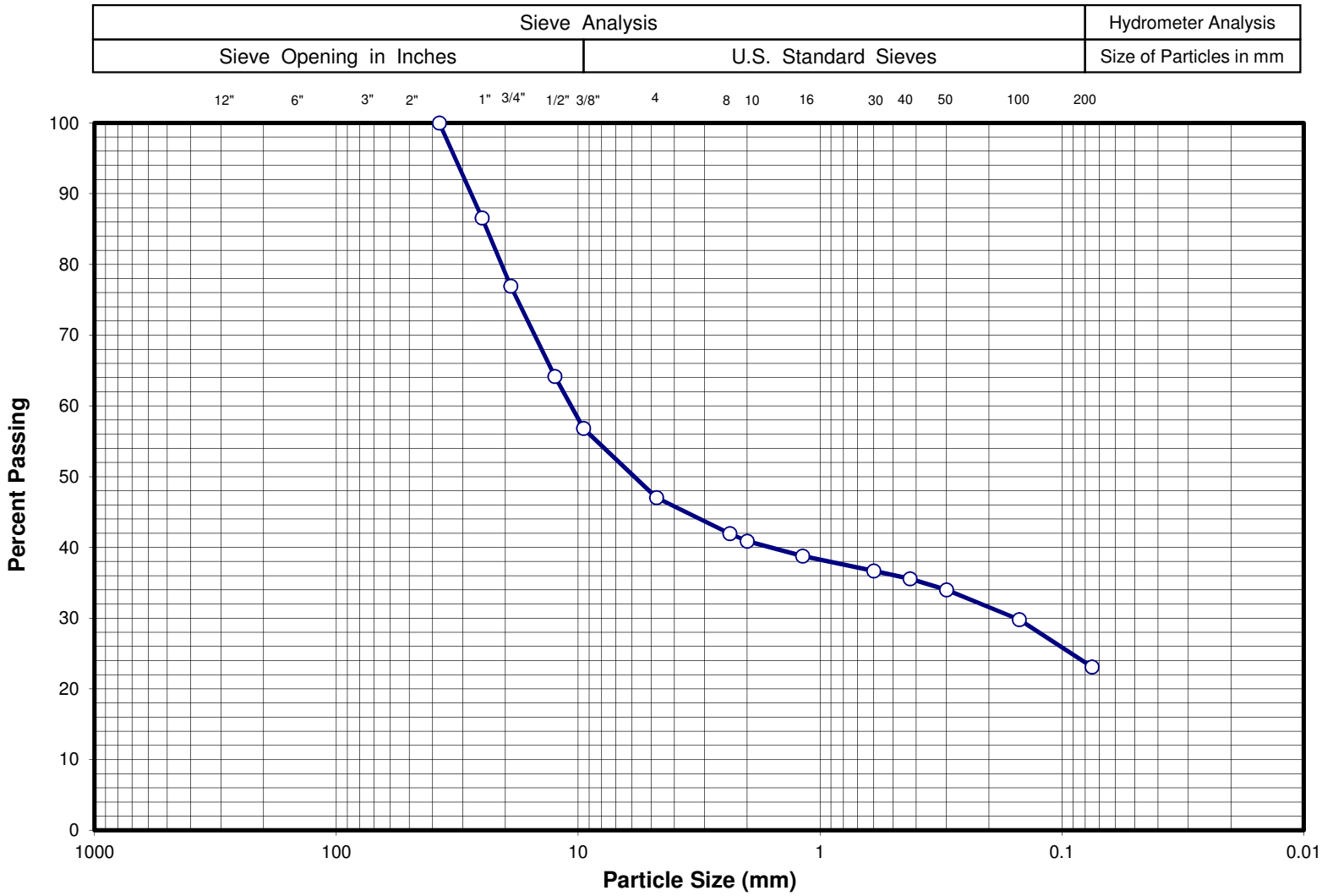
Gravel (%)	34	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	40	PL	18	Sample ID:	W-32
Fines (%)	26	PI	4	Sample Depth (ft.):	12.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-132

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	87
¾ "	77
½"	64
⅜"	57
#4	47
#10	41
#40	36
#200	23

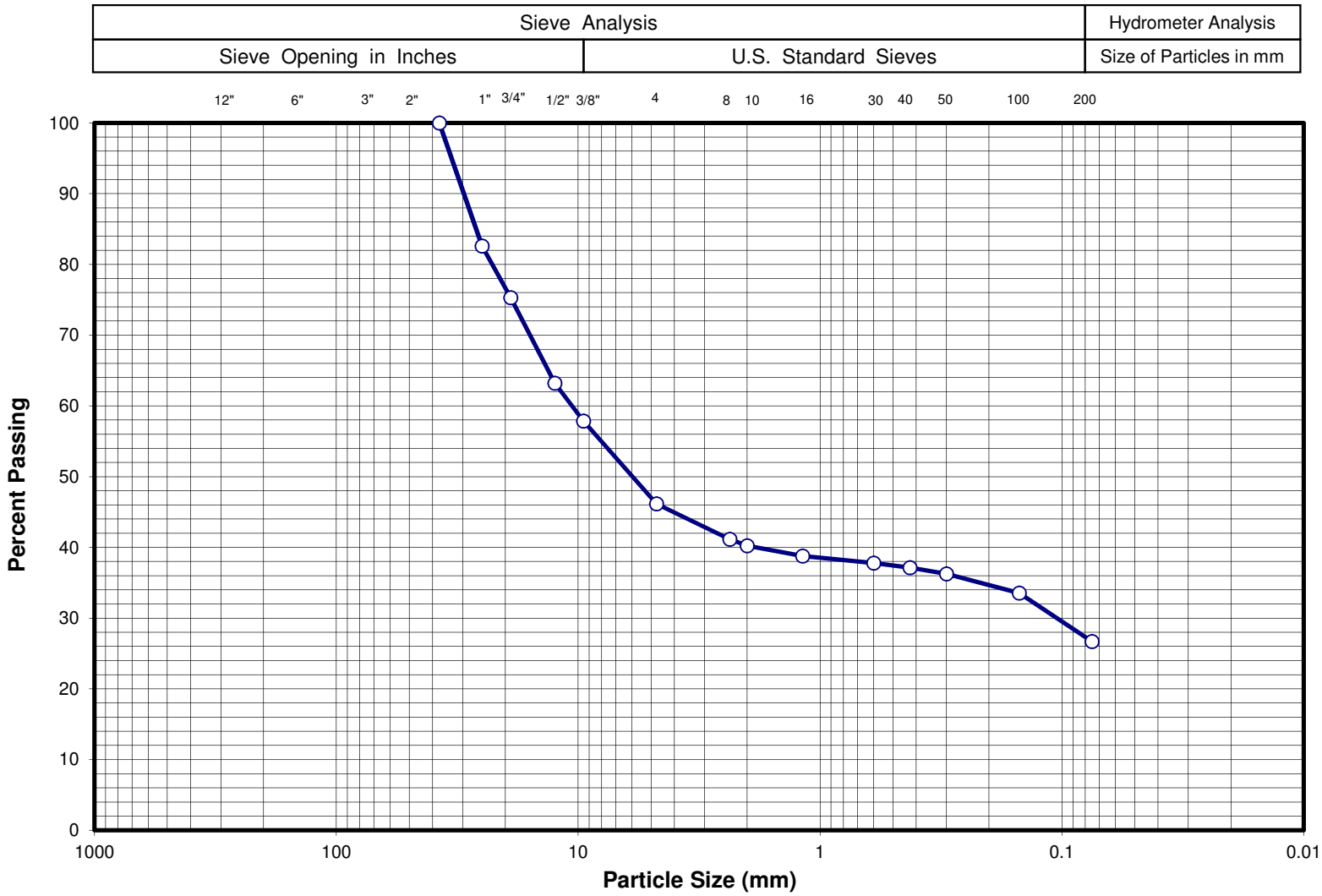
Gravel (%)	53	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	24	PL	17	Sample ID:	W-32
Fines (%)	23	PI	4	Sample Depth (ft.):	27.0
Sample Description:	GRAVEL, clayey, silty with sand and cobbles (GC-GM)				

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Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-133

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	83
¾ "	75
½"	63
⅜"	58
#4	46
#10	40
#40	37
#200	27

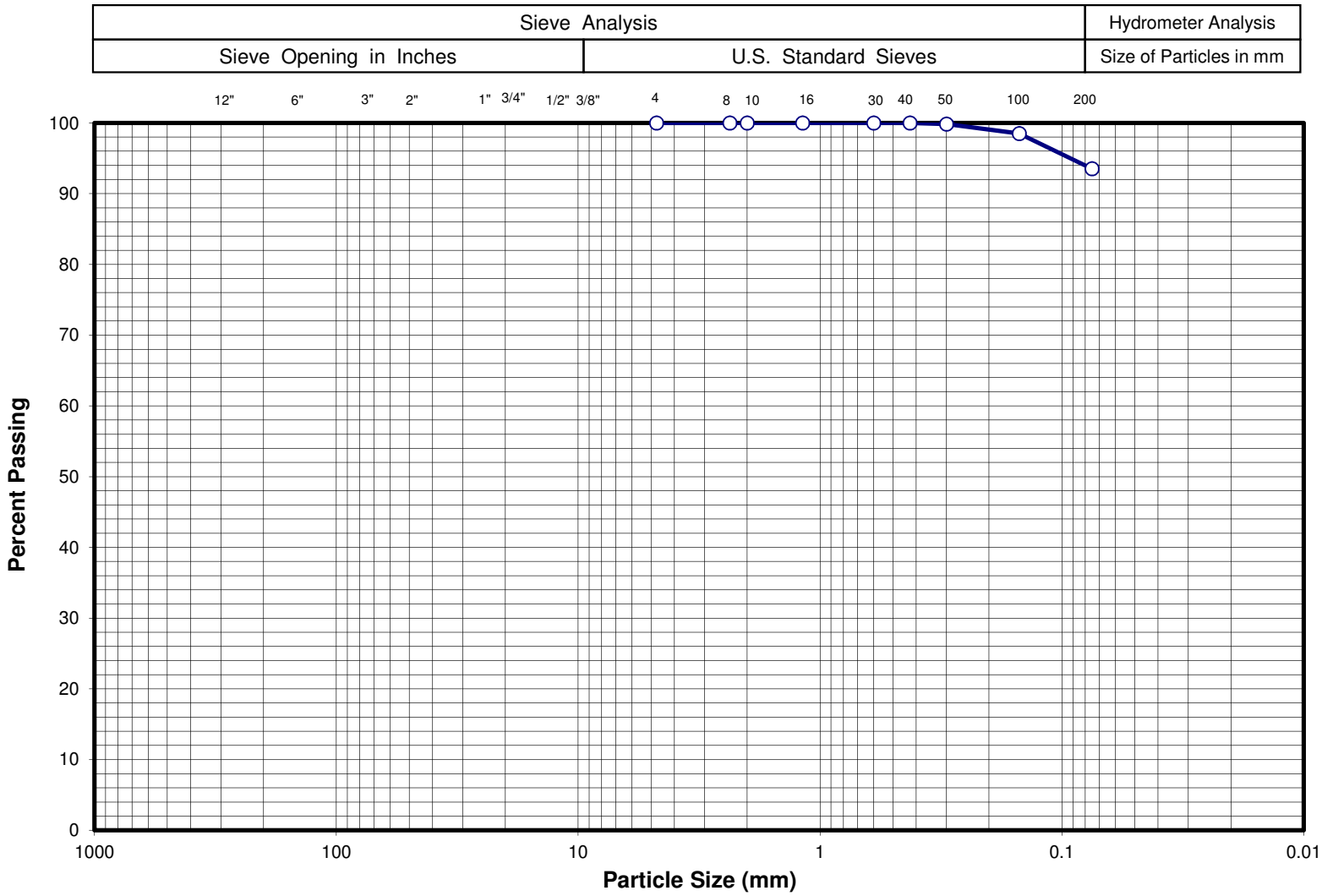
Gravel (%)	54	LL	23	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	19	PL	18	Sample ID:	W-32
Fines (%)	27	PI	5	Sample Depth (ft.):	37.0
Sample Description:	GRAVEL, clayey, silty with sand, cobbles and boulders (GC-GM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-134

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	100
#200	94

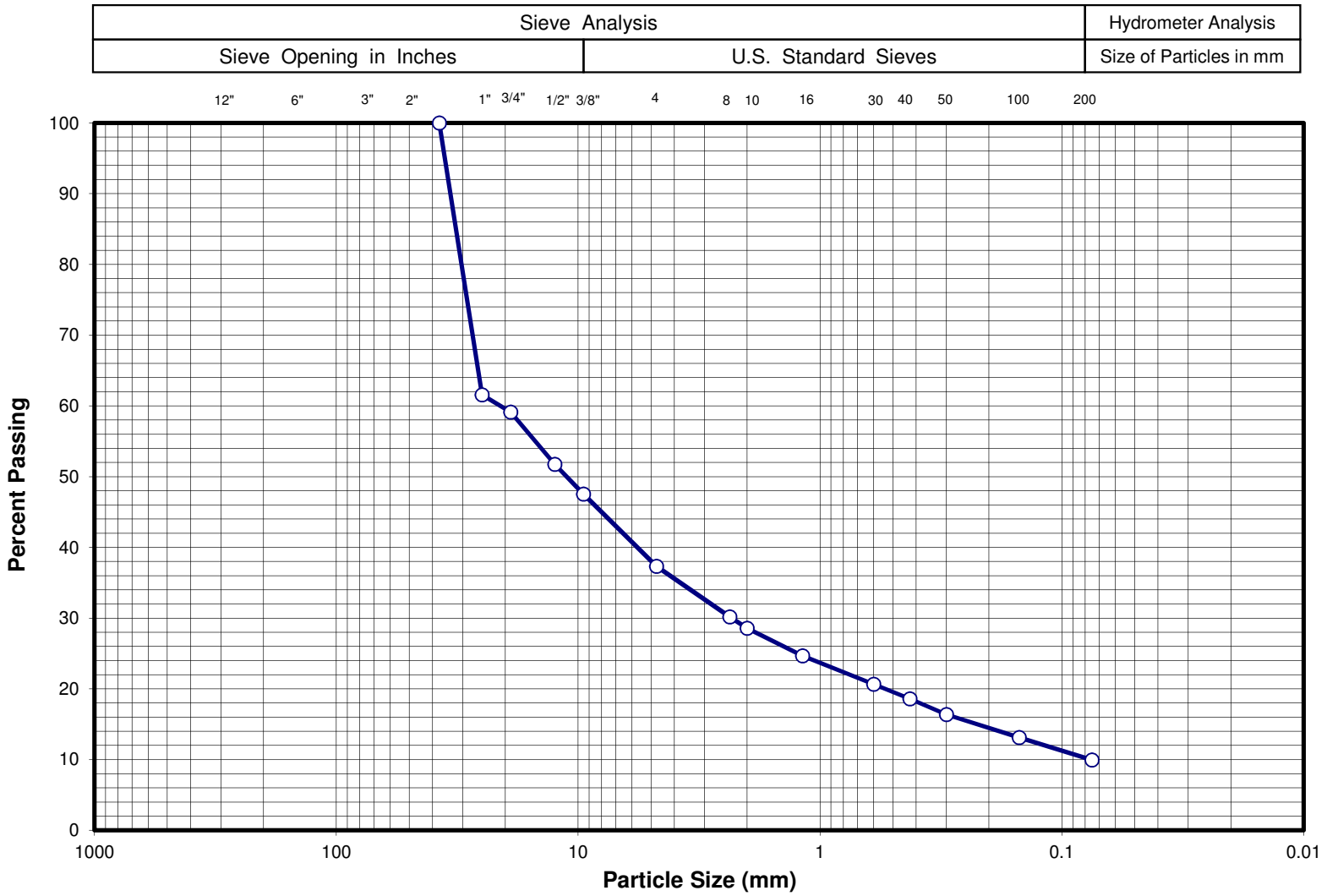
Gravel (%)	0	LL	33	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	6	PL	20	Sample ID:	W-32
Fines (%)	94	PI	13	Sample Depth (ft.):	57.0
Sample Description:	CLAY (CL)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-135

Revised 08/25/2017



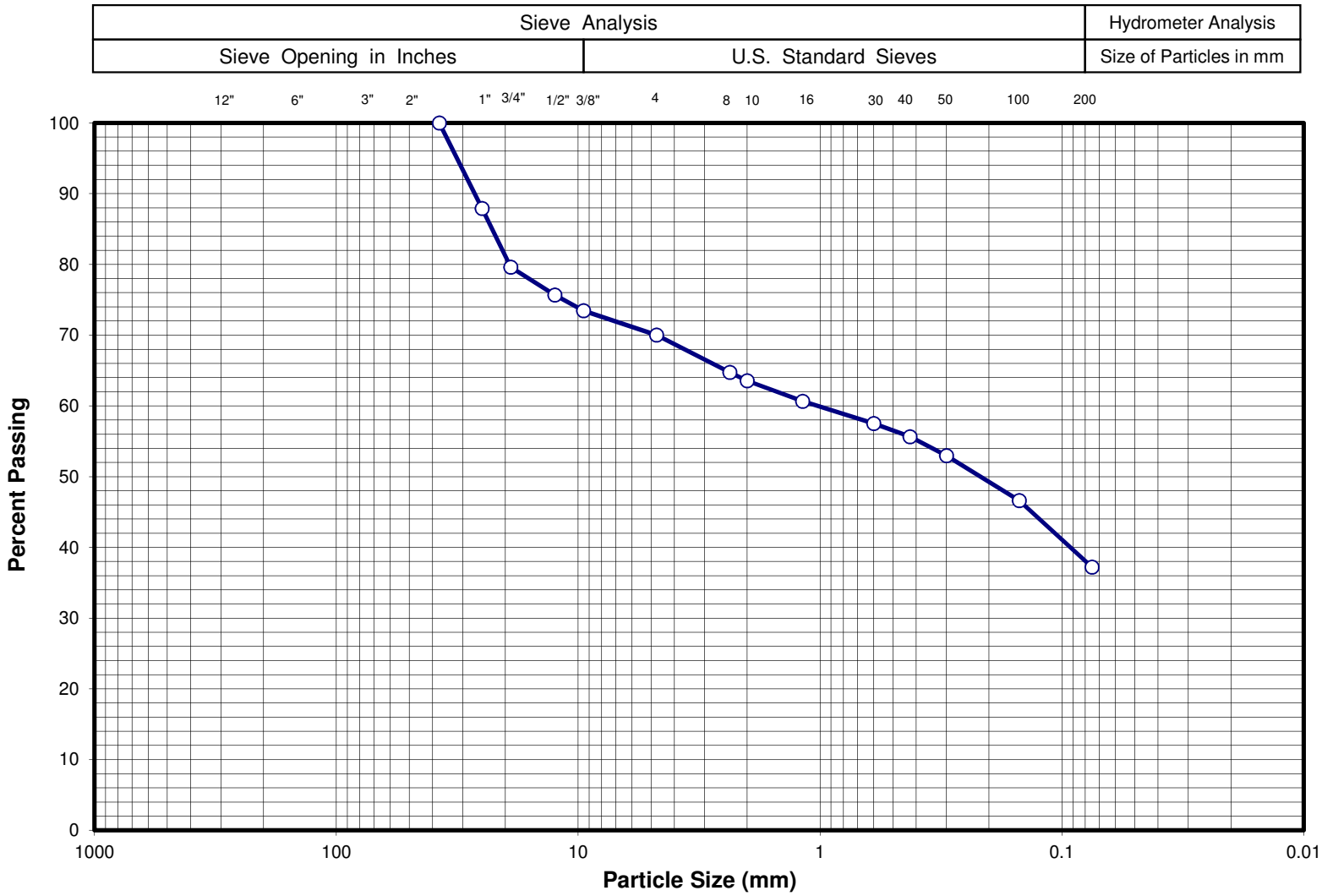
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	62
¾ "	59
½"	52
⅜"	48
#4	37
#10	29
#40	19
#200	10

Gravel (%)	63	LL	NV	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	27	PL	NP	Sample ID:	W-32
Fines (%)	10	PI	NP	Sample Depth (ft.):	77.0
Sample Description:	GRAVEL with silt and sand, cobbles and boulders (GP-GM)				

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SIEVE ANALYSIS

Drawn By:	KD	Project No.:	216-417
Checked By:	SR	Figure No.:	B-136



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	88
¾ "	80
½"	76
⅜"	73
#4	70
#10	64
#40	56
#200	37

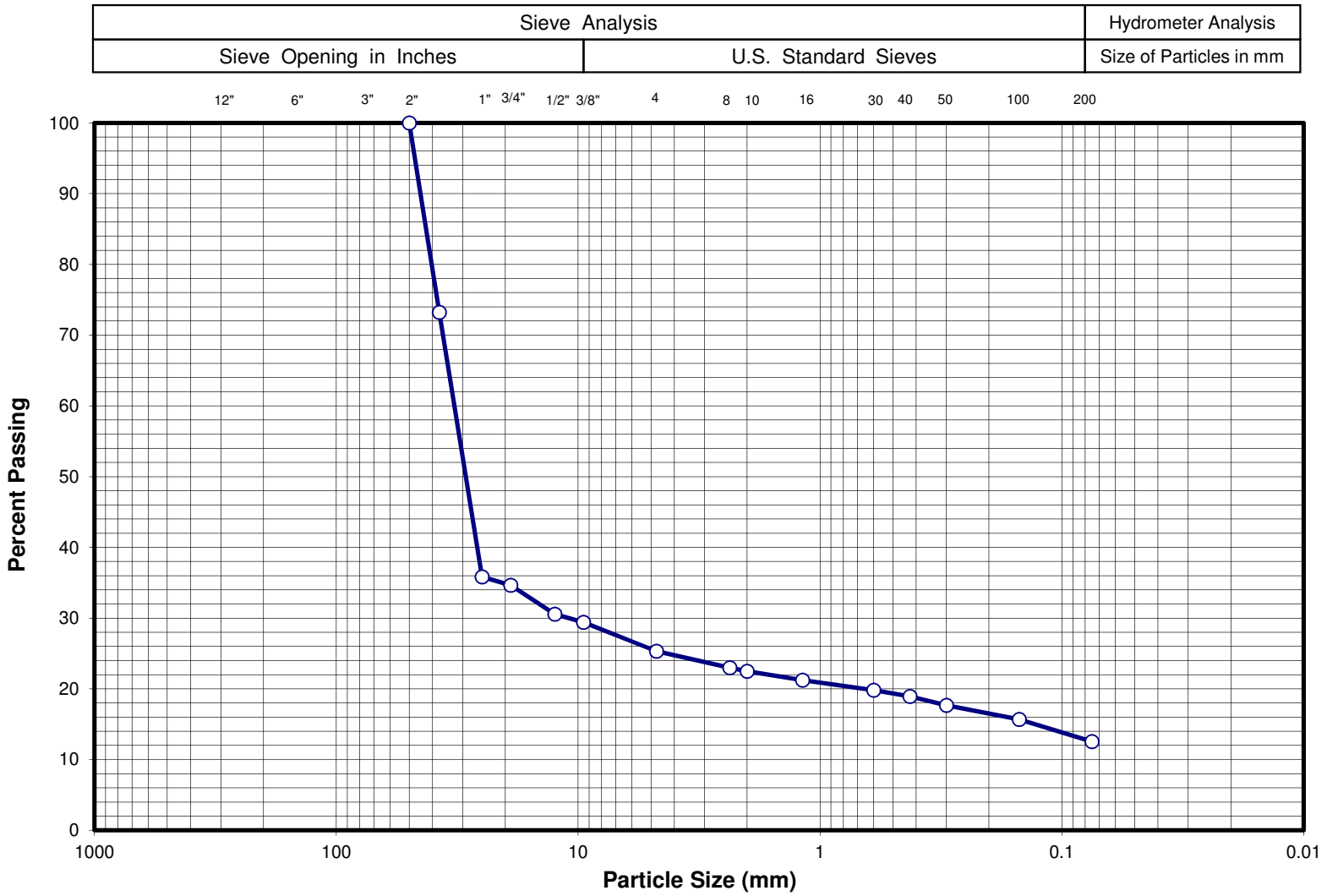
Gravel (%)	30	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	33	PL	16	Sample ID:	W-33
Fines (%)	37	PI	6	Sample Depth (ft.):	7.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-137

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	73
1"	36
¾ "	35
½"	31
⅜"	29
#4	25
#10	22
#40	19
#200	13

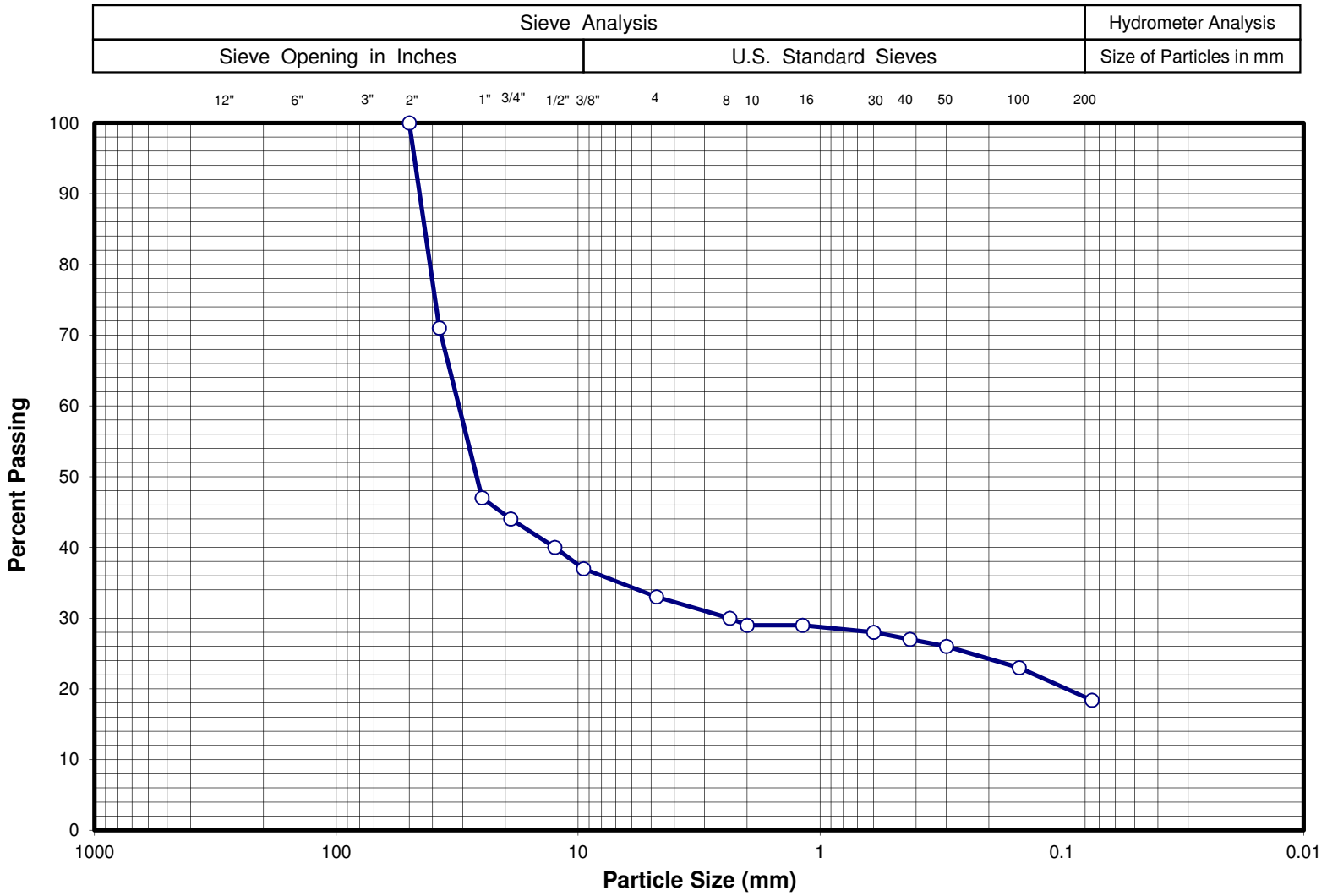
Gravel (%)	75	LL	-	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	12	PL	-	Sample ID:	W-33
Fines (%)	13	PI	-	Sample Depth (ft.):	17.0
Sample Description:	GRAVEL clayey to silty with cobbles				

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Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-138

Revised 08/25/2017



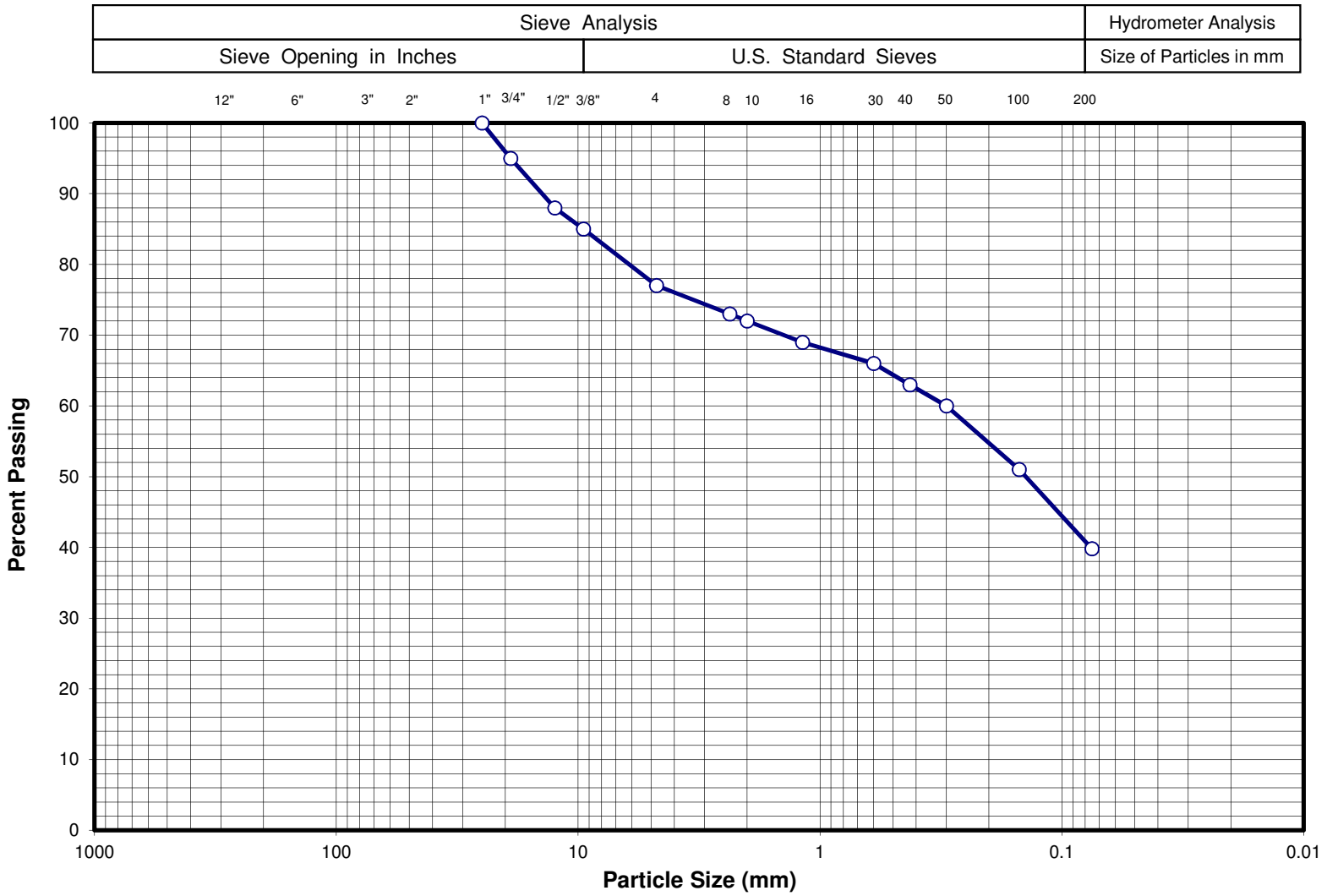
Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	71
1"	47
¾ "	44
½"	40
⅜"	37
#4	33
#10	29
#40	27
#200	18

Gravel (%)	67	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	15	PL	17	Sample ID:	W-33
Fines (%)	18	PI	5	Sample Depth (ft.):	27.0
Sample Description:	GRAVEL, clayey, silty with sand and cobbles (GC-GM)				

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Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-139



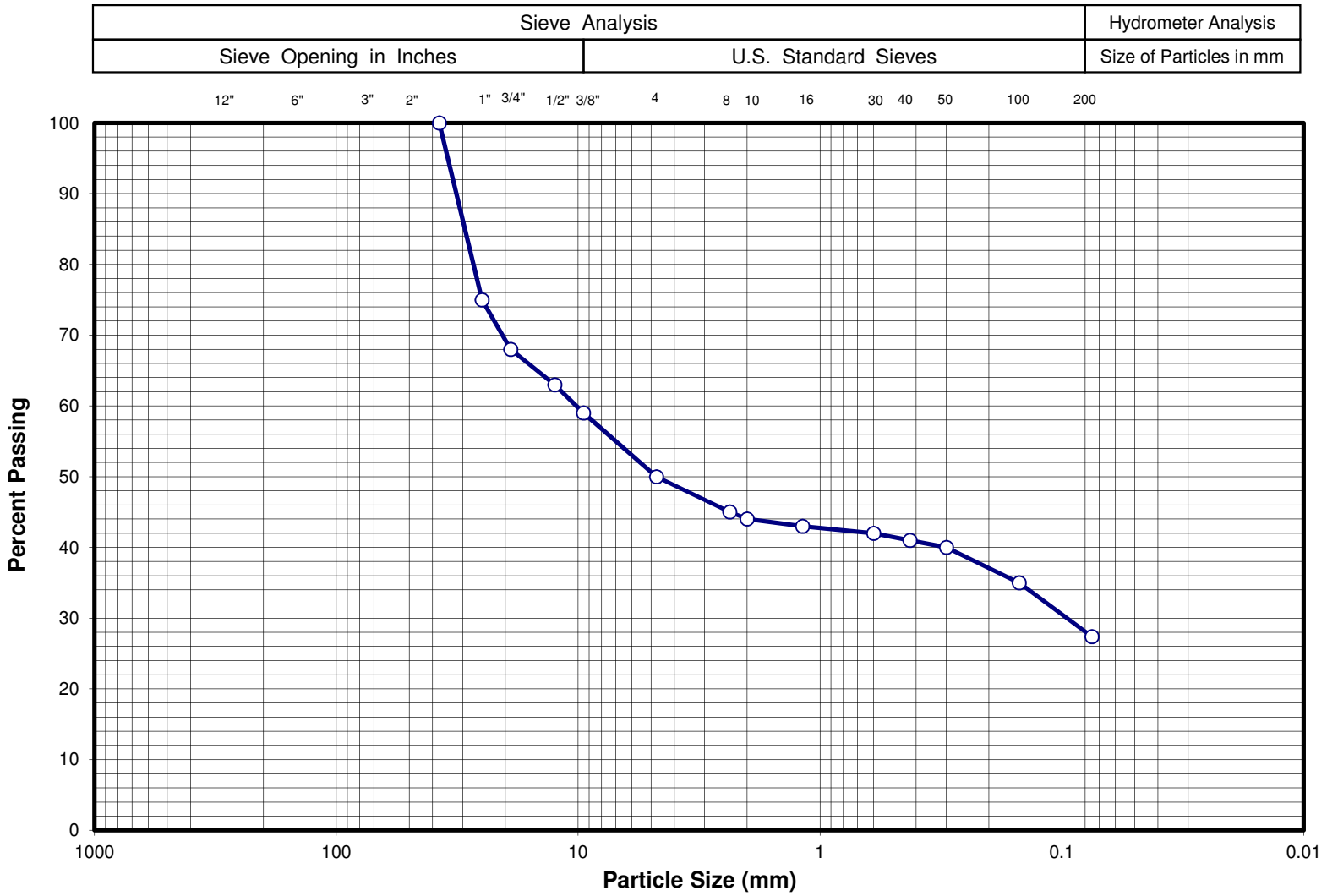
Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	95
½"	88
⅜"	85
#4	77
#10	72
#40	63
#200	40

Gravel (%)	23	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	37	PL	17	Sample ID:	W-34
Fines (%)	40	PI	5	Sample Depth (ft.):	4.0
Sample Description:	SAND, clayey, silty with gravel (SC-SM)				

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SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-140



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	75
¾ "	68
½"	63
⅜"	59
#4	50
#10	44
#40	41
#200	27

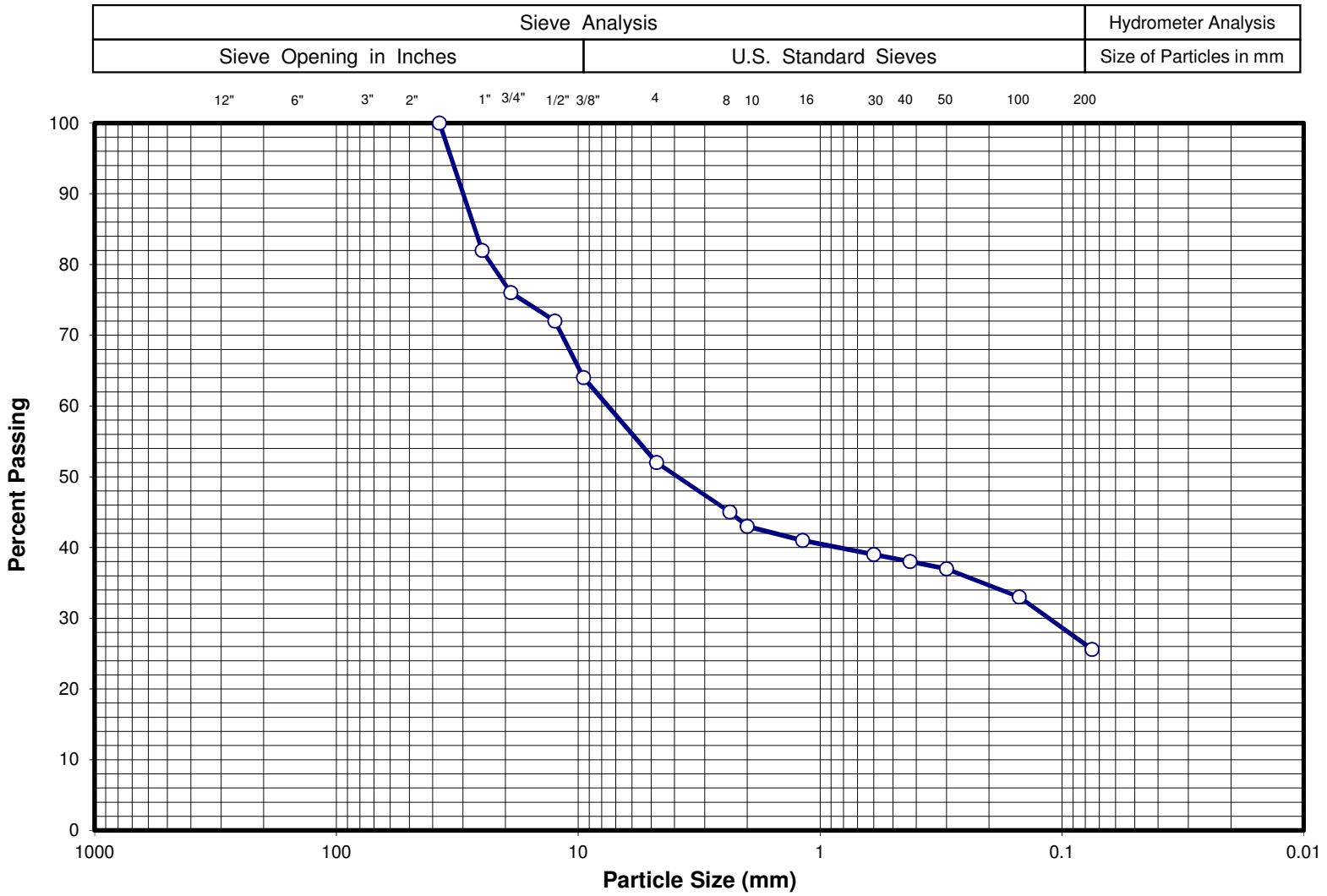
Gravel (%)	50	LL	22	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	23	PL	18	Sample ID:	W-34
Fines (%)	27	PI	4	Sample Depth (ft.):	8.0
Sample Description:	GRAVEL, clayey, silty with sand (GC-GM)				

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Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-141

Revised 08/25/2017



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	82
¾ "	76
½"	72
⅜"	64
#4	52
#10	43
#40	38
#200	26

Gravel (%)	48	LL	21	Project Name:	South Bridge, Glenwood Springs SH 82 Site
Sand (%)	26	PL	17	Sample ID:	W-34
Fines (%)	26	PI	4	Sample Depth (ft.):	14.0
Sample Description:	GRAVEL, clayey, silty with sand, cobbles and boulders (GC-GM)				

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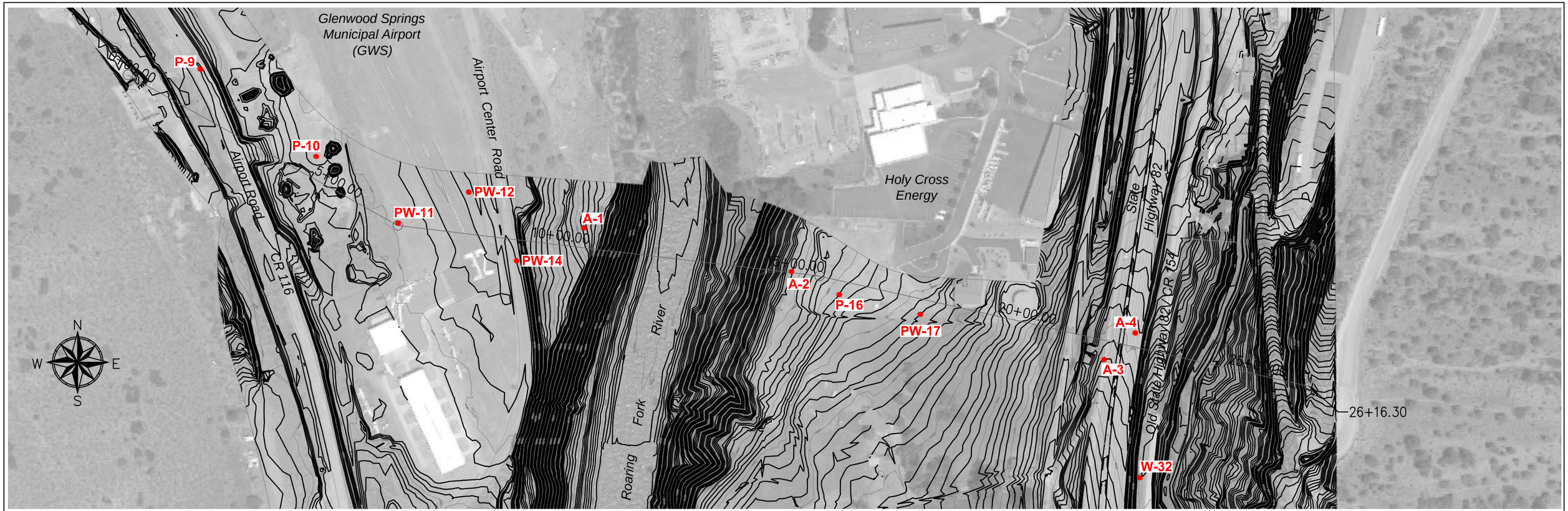
SIEVE ANALYSIS

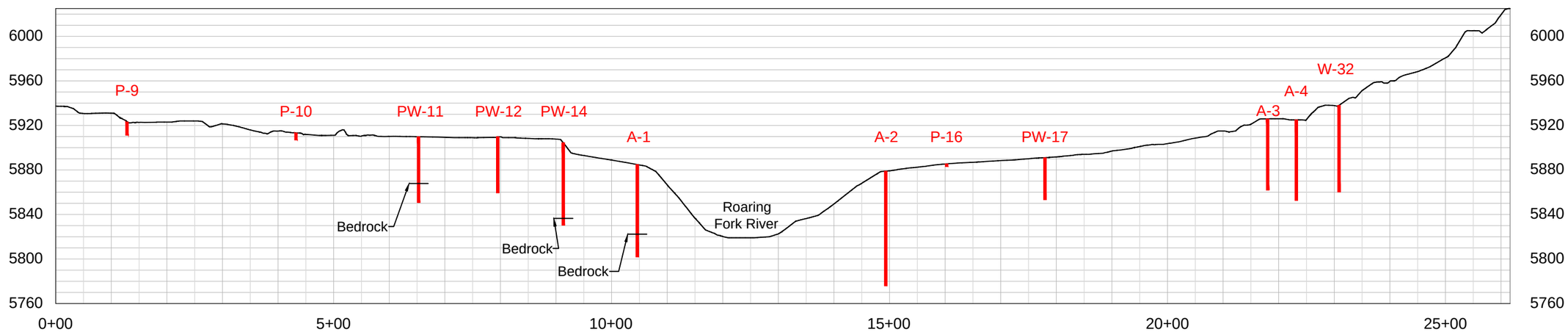
Drawn By:	KD/SW	Project No.:	216-417
Checked By:	SR	Figure No.:	B-142

Revised 08/25/2017

APPENDIX C

Valley Profile and Preliminary Engineering Geology Sheets





SCALE
H: 1"=200'
V: 1"=100'

LEGEND

- P-9 Indicates approximate location of pavement test hole
- PW-17 Indicates approximate location of pavement and wall test hole
- W-32 Indicates approximate location of wall test hole
- A-2 Indicates approximate location of abutment test hole

NOTES:

Topography base map and Test Holes were located and surveyed by Jacobs after the time of drilling; drawing files used were dated 1/30/2018 and 2/20/2018.

Yeh and Associates, Inc.
Consulting Engineers & Scientists

DRAWN BY: JRM	DATE: 03/27/2018
CHECKED BY: SWR	DATE: 04/23/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
SCALE: 1"=200'	

0 100 200 400

PROJECT: Draft South Bridge Investigation
Glenwood Springs, Colorado

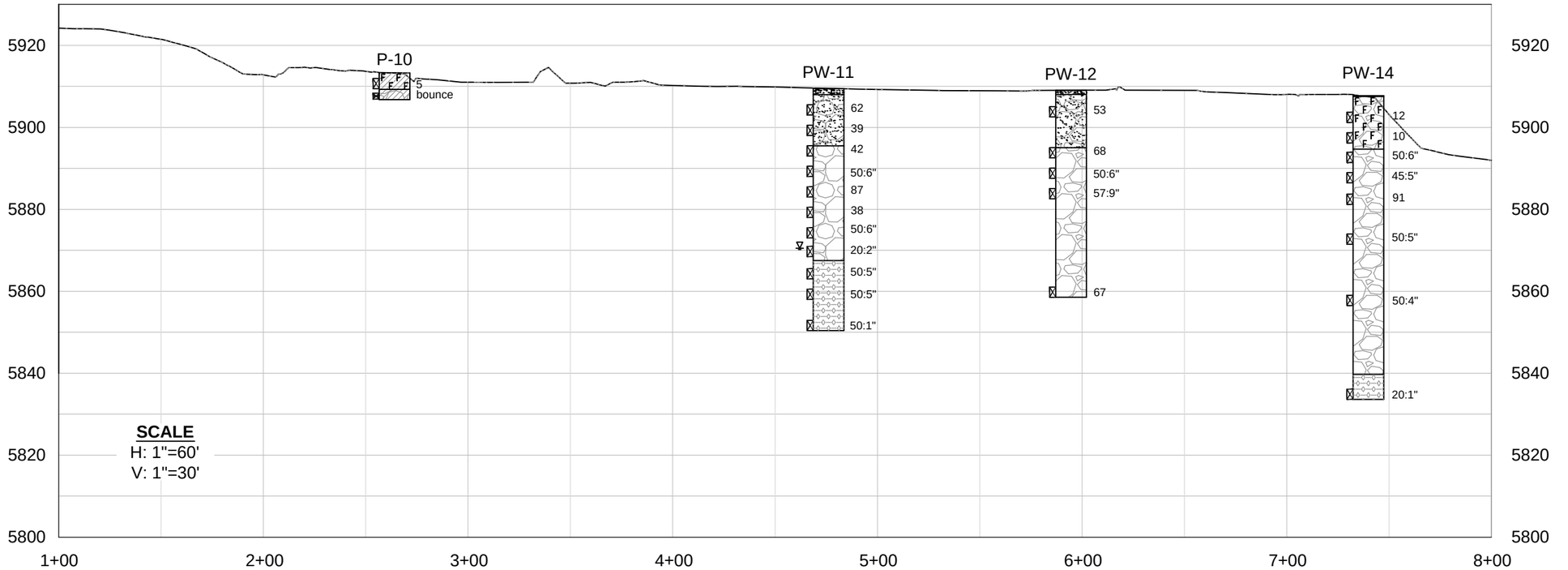
Preliminary
Valley Wide Plan and Profile
Airport Road to State Highway 82

FIGURE C-1



Airport Tunnel Site
Scale: 1" = 60'





LEGEND: Soil Lithology

- Asphalt
- Fill CLAY
- Fill SAND
- Fill GRAVEL
- GRAVEL, clayey with sand, cobbles, and boulders
- GRAVEL, with silt and sand cobbles and boulders
- GRAVEL, with silt, sand, cobbles and boulders

LEGEND: Rock Lithology

- Evaporite / Shale

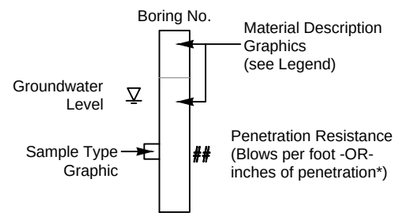
LEGEND: Geology Symbols

- Indicates Split Spoon sample method
- Indicates Modified California sample method
- Indicates approximate location of groundwater during drilling on October 31, 2017.

LEGEND: Map Symbols

- P-10 — Indicates approximate location of pavement test hole
- PW-14 — Indicates approximate location of pavement and wall test hole

TYPICAL BOREHOLE LOG



*e.g. A value of 50:4" indicates that 50 blows were applied to the sampler with a penetration of 4 inches. A value of 99:10" indicates that 49 blows were applied to the sampler in the first 6 inches, and 50 blows were applied in the final 4 inches of penetration. The word "bounce" indicates that sampler made no penetration on hard rock.

NOTES:

1. Topography base map and Test Holes were located and surveyed by Jacobs after the time of drilling; drawing files used were dated 1/30/2018 and 2/20/2018.

2. For detailed information, see Geotechnical Report prepared by Yeh & Associates.

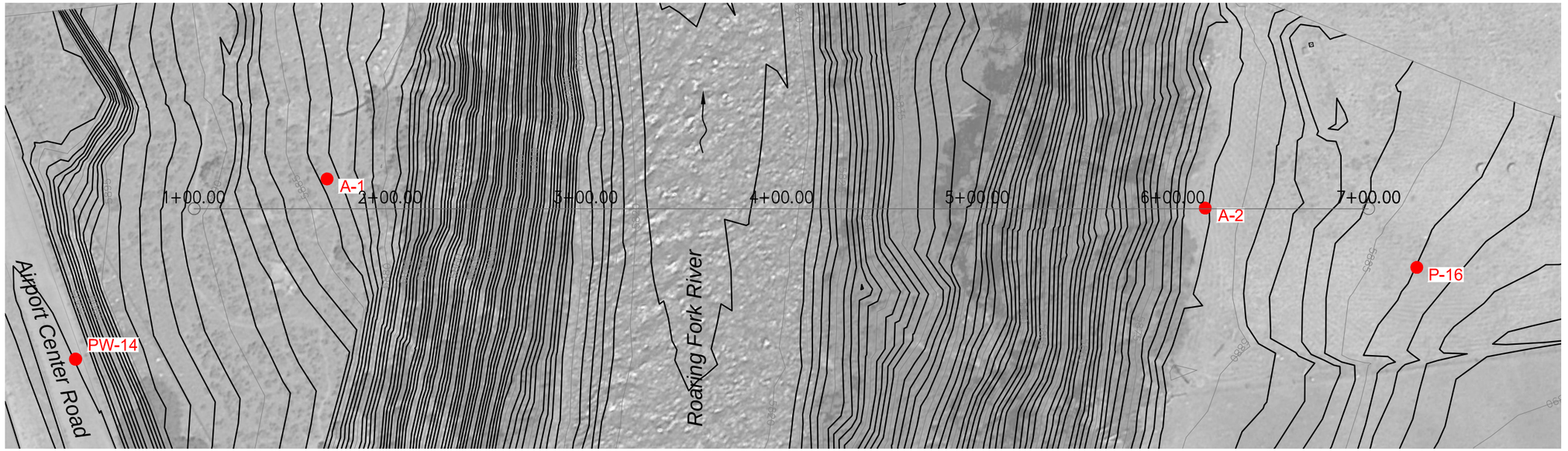
Yeh and Associates, Inc.
Consulting Engineers & Scientists

DRAWN BY: JRM	DATE: 03/27/2018
CHECKED BY: SWR	DATE: 04/23/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
SCALE: 1"=60'	
0 30 60 120	

PROJECT: Draft South Bridge Investigation
Glenwood Springs, Colorado

Preliminary Engineering Geology
Airport Tunnel Site

FIGURE C-2



LEGEND: Soil Lithology

- SAND, clayey with gravel
- GRAVEL, with silt, sand, cobbles and boulders
- GRAVEL, with silt, sand, cobbles and boulders
- GRAVEL, with silt, sand, cobbles and boulders

LEGEND: Rock Lithology

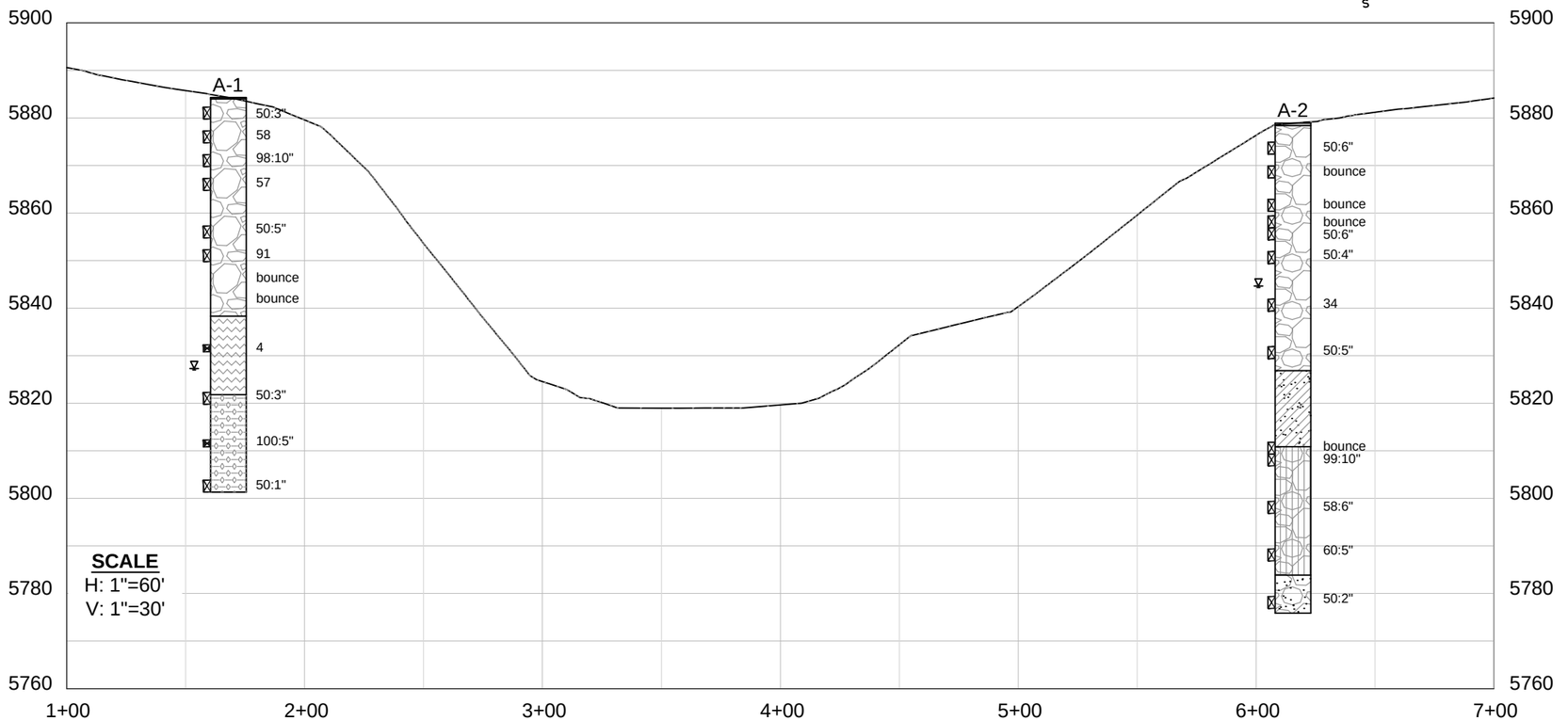
- Weathered Bedrock
- Evaporite / Shale

LEGEND: Geology Symbols

- Indicates Split Spoon sample method
- Indicates Modified California sample method
- Indicates approximate location of groundwater during drilling on April 9, 2018.

South Bridge Site

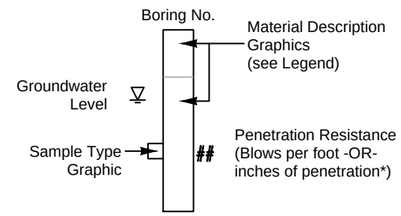
Scale: 1" = 60'



LEGEND: Map Symbols

- A-2 Indicates approximate location of abutment test hole
- P-16 Indicates approximate location of pavement test hole
- PW-14 Indicates approximate location of pavement and wall test hole

TYPICAL BOREHOLE LOG



*e.g. A value of 50:4" indicates that 50 blows were applied to the sampler with a penetration of 4 inches. A value of 99:10" indicates that 49 blows were applied to the sampler in the first 6 inches, and 50 blows were applied in the final 4 inches of penetration. The word "bounce" indicates that sampler made no penetration on hard rock.

NOTES:

1. Topography base map and Test Holes were located and surveyed by Jacobs after the time of drilling; drawing files used were dated 1/30/2018 and 2/20/2018.

2. Profiles for Test Holes PW-14 and P-16 can be found on Figures C-2 and C-1, respectively.

3. For detailed information, see Geotechnical Report prepared by Yeh & Associates.

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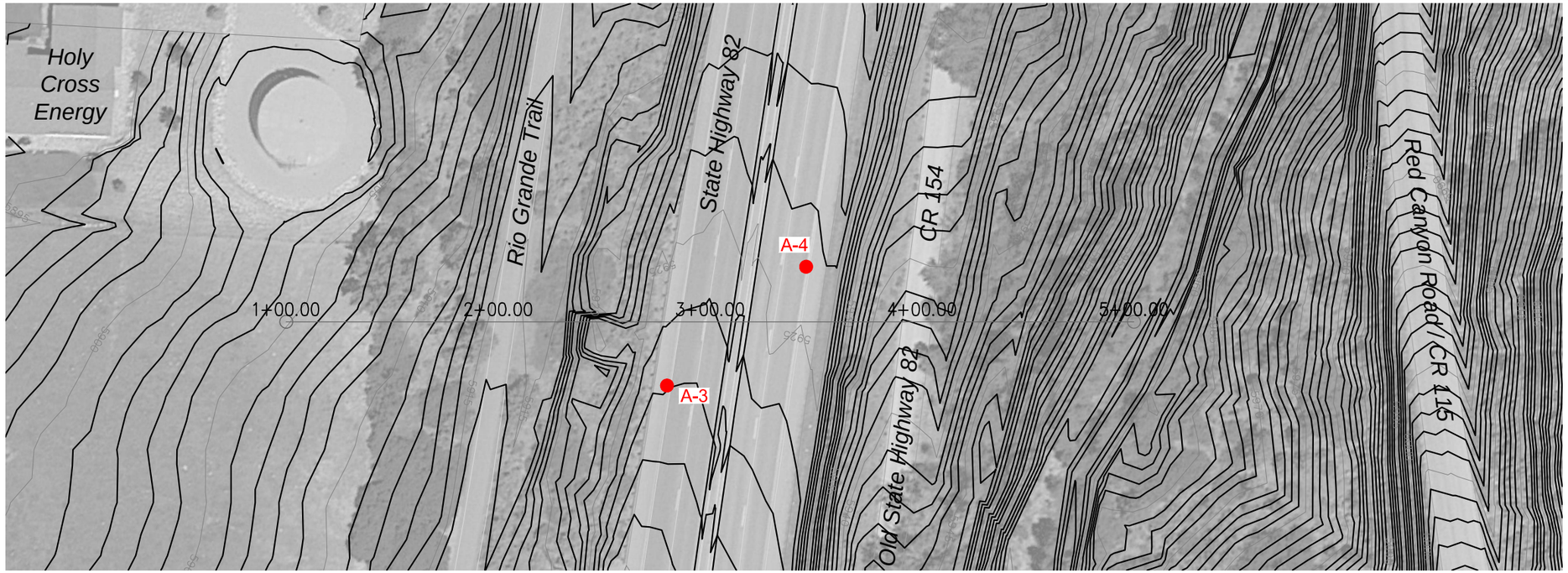
DRAWN BY: JRM	DATE: 03/27/2018
CHECKED BY: SWR	DATE: 04/23/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
SCALE: 1"=60'	

0 30 60 120

PROJECT: Draft South Bridge Investigation
Glenwood Springs, Colorado

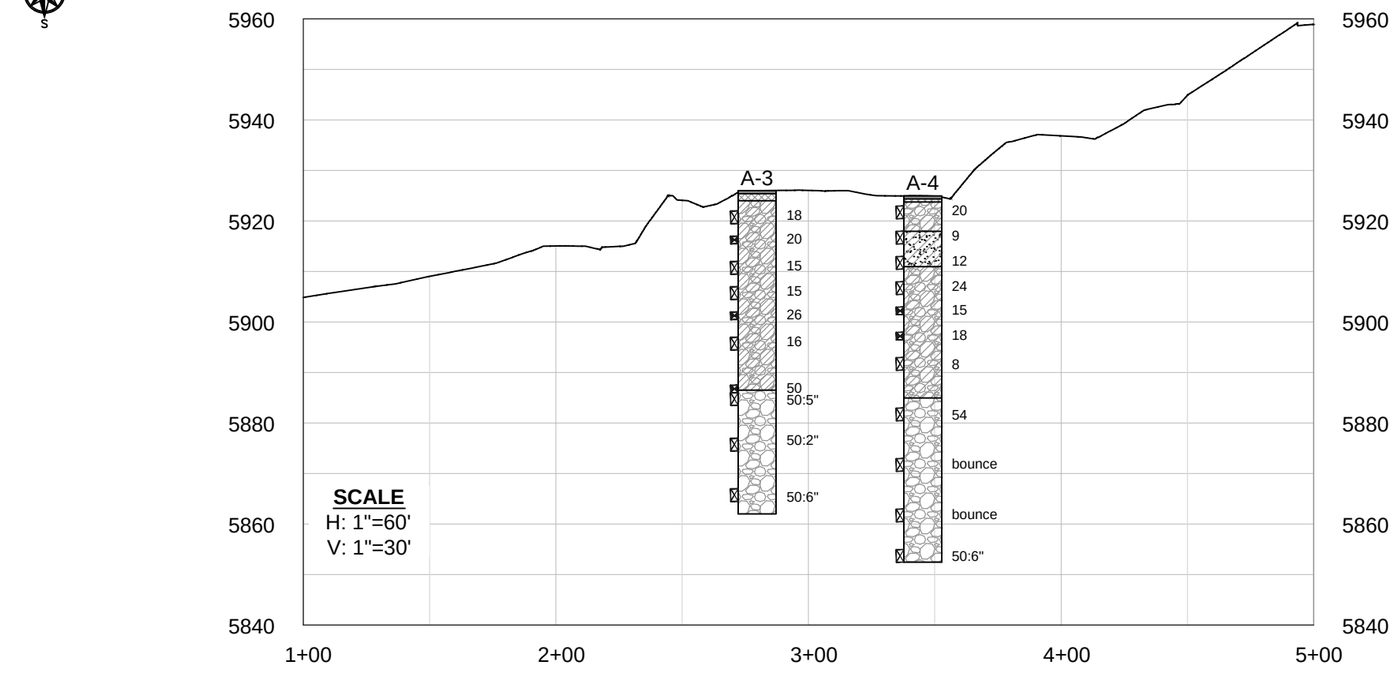
Preliminary Engineering Geology South Bridge Site

FIGURE C-3



State Highway 82

Scale: 1" = 60'



LEGEND: Soil Lithology

- Asphalt
- Base Course
- SAND, clayey
- GRAVEL, clayey, silty, with sand,cobbles and boulders
- GRAVEL, silty with sand, cobbles, and boulders

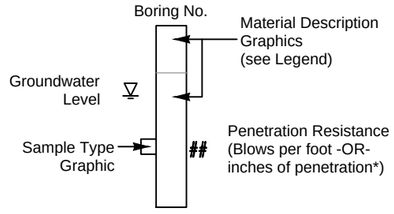
LEGEND: Geology Symbols

- Indicates Split Spoon sample method
- Indicates Modified California sample method

LEGEND: Map Symbols

A-3 Indicates approximate location of abutment test hole

TYPICAL BOREHOLE LOG



*e.g. A value of 50:4" indicates that 50 blows were applied to the sampler with a penetration of 4 inches. A value of 99:10" indicates that 49 blows were applied to the sampler in the first 6 inches, and 50 blows were applied in the final 4 inches of penetration. The word "bounce" indicates that sampler made no penetration on hard rock.

NOTES:

1. Topography base map and Test Holes were located and surveyed by Jacobs after the time of drilling; drawing files used were dated 1/30/2018 and 2/20/2018.

2. For detailed information, see Geotechnical Report prepared by Yeh & Associates.

Yeh and Associates, Inc.
Consulting Engineers & Scientists

DRAWN BY: JRM	DATE: 03/27/2018
CHECKED BY: SWR	DATE: 04/23/2018
DESIGNED FOR: Jacobs Engineering	
PROJECT NUMBER: 216-417	
SCALE: 1"=60'	
0 30 60 120	

PROJECT: Draft South Bridge Investigation
Glenwood Springs, Colorado

Preliminary Engineering Geology State Highway 82

FIGURE C-4

APPENDIX D

Traffic Calculations

South Bridge Yeh No. 216-417

Airport Road Traffic Loading

2017 Weekday Traffic Volumes

Given: (Based on 3 day Counts E/O 4 Mile Road)

2019 ADT =	1,897					
# Lanes =	2					
% Trucks	3.7	2.30%	SU	1.40%	Comb	(Assumed from SH 82)
20-Year Factor	2.62	(Assumed, twice value for SH 82)				

Number of Trucks per day

1,897 X 0.037 = **70** **trucks per day** **M-E Input to design program**

South Bridge Yeh No. 216-417

Airport Road Traffic Loading

2017 Weekday Traffic Volumes

Given: (Based on 3 day Counts E/O 4 Mile Road)

2017 ADT =	1,704				
# Lanes =	2				
% Trucks	3.7	2.30%	SU	1.40%	Comb (Assumed from SH 82)
20-Year Factor	2.62	(Assumed, twice value for SH 82)			

Annual Growth Factor = 1.055

Year	ADT Volume		
2017	1,704		
2018	1,798		
2019	1,897		
2020	2,001		
2021	2,111		
2022	2,227		
2023	2,350		
2024	2,479		
2025	2,615		
2026	2,759		
2027	2,911		
2028	3,071		
2029	3,240		
2030	3,418		
2031	3,606		
2032	3,804		
2033	4,013		
2034	4,234		
2035	4,467		
2036	4,713		
2037	4,972		
2038	5,245		
2039	**5,534**	**5531**	ADT
2040	5,838	20-Year Volume	
2041	6,159		
2042	6,498		
2043	6,855		
2044	7,232		
2045	7,630		
2046	8,050		
2047	8,493		
2048	8,960	30-Year Volume	
2049	**9,453**	**9453**	ADT

Design ESAL Calculations

(ESAL Initial + ESAL 20-Year) / 2 = Design ESAL Value

(1,897 + 5,534)/2 = 3,715 ADT 20-Year HMA

(1,897 + 9,453)/2 = 5,675 ADT 30-Year PCCP

ESAL Load = # of Vehicles X Vehicle Factor X 365 days X 20 Yrs

20-Year ESAL Calculations	% volume	**Design** Volume	**Vehicle ESAL** Factor	**20-Year ESAL** Load
Cars	0.963	3578	0.003	78352
Single Unit Trucks	0.023	85	0.249	155322
Combination Trucks	0.014	52	1.087	412727
		Total HMA 20-Year ESAL Loading =		646401
		Times Lane Correction Factor =		0.6
		HMA 20-Year Design ESAL Loading =		**387840**

30-Year ESAL Calculations	% volume	**Design** Volume	**Vehicle ESAL** Factor	**30-Year ESAL** Load
Cars	0.963	3578	0.003	117529
Single Unit Trucks	0.023	85	0.285	266667
Combination Trucks	0.014	52	1.692	963662
		Total HMA 30-Year ESAL Loading =		1347857
		Times Lane Correction Factor =		0.6
		PCCP 30-Year Design ESAL Loading =		**808714**

Location: AIRPORT RD E/O 4 MILE RD
Date Range: 6/27/2017 - 7/3/2017
Site Code: 01

	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	6/27/2017			6/28/2017			6/29/2017			6/30/2017			7/1/2017			7/2/2017			7/3/2017					
Time	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	2	2	4	5	1	6	1	0	1	-	-	-	-	-	-	-	-	-	-	-	-	3	1	4
1:00 AM	3	2	5	1	0	1	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	2	1	4
2:00 AM	1	1	2	1	0	1	3	0	3	-	-	-	-	-	-	-	-	-	-	-	-	2	0	2
3:00 AM	0	3	3	1	3	4	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	1	3	4
4:00 AM	1	5	6	2	4	6	1	6	7	-	-	-	-	-	-	-	-	-	-	-	-	1	5	6
5:00 AM	4	26	30	9	27	36	12	29	41	-	-	-	-	-	-	-	-	-	-	-	-	8	27	36
6:00 AM	34	46	80	34	49	83	29	47	76	-	-	-	-	-	-	-	-	-	-	-	-	32	47	80
7:00 AM	42	84	126	42	92	134	44	80	124	-	-	-	-	-	-	-	-	-	-	-	-	43	85	128
8:00 AM	34	66	100	43	63	106	36	73	109	-	-	-	-	-	-	-	-	-	-	-	-	38	67	105
9:00 AM	43	62	105	53	58	111	35	61	96	-	-	-	-	-	-	-	-	-	-	-	-	44	60	104
10:00 AM	31	36	67	40	49	89	37	41	78	-	-	-	-	-	-	-	-	-	-	-	-	36	42	78
11:00 AM	59	55	114	35	49	84	51	47	98	-	-	-	-	-	-	-	-	-	-	-	-	48	50	99
12:00 PM	51	46	97	54	61	115	35	49	84	-	-	-	-	-	-	-	-	-	-	-	-	47	52	99
1:00 PM	40	40	80	54	34	88	53	39	92	-	-	-	-	-	-	-	-	-	-	-	-	49	38	87
2:00 PM	50	41	91	41	59	100	49	50	99	-	-	-	-	-	-	-	-	-	-	-	-	47	50	97
3:00 PM	52	49	101	53	45	98	70	54	124	-	-	-	-	-	-	-	-	-	-	-	-	58	49	108
4:00 PM	65	60	125	61	48	109	65	54	119	-	-	-	-	-	-	-	-	-	-	-	-	64	54	118
5:00 PM	84	59	143	90	66	156	71	53	124	-	-	-	-	-	-	-	-	-	-	-	-	82	59	141
6:00 PM	73	50	123	81	71	152	62	39	101	-	-	-	-	-	-	-	-	-	-	-	-	72	53	125
7:00 PM	71	33	104	44	35	79	55	34	89	-	-	-	-	-	-	-	-	-	-	-	-	57	34	91
8:00 PM	41	27	68	45	29	74	37	19	56	-	-	-	-	-	-	-	-	-	-	-	-	41	25	66
9:00 PM	38	43	81	44	18	62	53	32	85	-	-	-	-	-	-	-	-	-	-	-	-	45	31	76
10:00 PM	19	9	28	22	10	32	17	10	27	-	-	-	-	-	-	-	-	-	-	-	-	19	10	29
11:00 PM	13	5	18	12	5	17	16	9	25	-	-	-	-	-	-	-	-	-	-	-	-	14	6	20
Total	**851**	**850**	**1,701**	**867**	**876**	**1,743**	**837**	**830**	**1,667**	-	-	-	-	-	-	-	-	-	-	-	-	**852**	**852**	**1,704**
Percent	**50%**	**50%**	-	**50%**	**50%**	-	**50%**	**50%**	-	-	-	-	-	-	-	-	-	-	-	-	-	**50%**	**50%**	-

1. Mid-week average includes data between Tuesday and Thursday.

Mark Skaggs:425-250-0777
mark.skaggs@idaxdata.com



Stations | AADT | Future Traffic | ESAL

Found 6 Short Duration stations and 1 Continuous Count stations. Click the magnifying glass icon in front of a station to see count data below.

Export to Excel

Station ID	Route	Start	End	County	City	Description
203837	082A	0	0.02	Garfield	Glenwood Springs	ON SH 82 SW/O I-70, GLENWOOD SPRINGS
103498	082A	0.02	0.07	Garfield	Glenwood Springs	ON SH 82 SW/O SH 6, 6TH ST & LAUREL ST, GLENWOOD SPRINGS
103499	082A	0.07	0.176	Garfield	Glenwood Springs	ON SH 82, 6TH ST E/O SH 6, 6TH ST & LAUREL ST, GLENWOOD SPRINGS
103500	082A	0.176	1.405	Garfield	Glenwood Springs	ON SH 82, GRAND AVE S/O 6TH ST, GLENWOOD SPRINGS
103503	082A	1.405	2.194	Garfield	Glenwood Springs	ON SH 82, GLEN AVE SE/O SOUTH GRAND AVE & 23RD ST, GLENWOOD SPRINGS
000214	082A	2.194	7.824	Garfield	Glenwood Springs	ON SH 82, GLEN AVE S/O BLAKE AVE, GLENWOOD SPRINGS
103508	082A	7.824	11.699	Garfield		ON SH 82 W/O SH 133, CARBONDALE

Stations | AADT | Future Traffic | ESAL

Found 6 Short Duration stations and 1 Continuous Count stations. Click the magnifying glass icon in front of a station to see count data below.

Build Year: 2019 Design Life (yrs): 20 Lanes: 4 Rigid pavement: ☐

Export to Excel

Route	Start	End	Length	AADT	Year	20 Year Factor	Single Trucks	Combined Trucks	Projected AADT	Projected Single Trucks	Projected Combined Trucks	18 Kip ESALs
082A	0	0.02	0.019	27,000	2016	1.11	650	430	30,416	732	484	2,488,624
082A	0.02	0.07	0.074	24,000	2016	1.04	580	380	25,104	607	397	2,111,899
082A	0.07	0.176	0.117	28,000	2016	1.11	730	420	31,542	822	473	2,530,299
082A	0.176	1.405	1.428	27,000	2016	1.11	760	410	30,416	856	462	2,507,561
082A	1.405	2.194	0.784	27,000	2016	1.12	680	380	30,726	774	432	2,337,920
082A	2.194	7.824	5.549	25,000	2016	1.31	580	350	33,913	787	475	2,356,631
082A	7.824	11.699	3.879	19,000	2016	1.08	590	290	20,748	644	317	1,784,931

Stations | AADT | Future Traffic | ESAL

Found 6 Short Duration stations and 1 Continuous Count stations. Click the magnifying glass icon in front of a station to see count data below.

Build Year: 2019 Design Life (yrs): 20 Lanes: 4 Rigid pavement: ☑

Export to Excel

Route	Start	End	Length	AADT	Year	20 Year Factor	Single Trucks	Combined Trucks	Projected AADT	Projected Single Trucks	Projected Combined Trucks	18 Kip ESALs
082A	0	0.02	0.019	27,000	2016	1.11	650	430	30,416	732	484	3,486,685
082A	0.02	0.07	0.074	24,000	2016	1.04	580	380	25,104	607	397	2,957,130
082A	0.07	0.176	0.117	28,000	2016	1.11	730	420	31,542	822	473	3,517,202
082A	0.176	1.405	1.428	27,000	2016	1.11	760	410	30,416	856	462	3,476,970
082A	1.405	2.194	0.784	27,000	2016	1.12	680	380	30,726	774	432	3,238,738
082A	2.194	7.824	5.549	25,000	2016	1.31	580	350	33,913	787	475	3,274,805
082A	7.824	11.699	3.879	19,000	2016	1.08	590	290	20,748	644	317	2,464,656

2018 CDOT Pavement M-E Design Manual Inputs

SH 82 – 2019 % Trucks = 787 Single Units & 475 Combination Units 1,262 / 33,913 = 3.7%

Percent Single Units = 787 / 1,262 = 62 % => **Cluster 1** Manual Sec. 3.1.6.2

20-Year Growth Factor = 1.31 => **Annual Growth Factor = 1.37** Manual Equation 3-1

APPENDIX E

Pavement Designs

Airport Road

File Name: C:\Users\blaforce\Documents\M-E Templates and HML Files\Asphalt XML files\Airport Road.dgpx

Design Inputs

Design Life: 20 years
Design Type: FLEXIBLE

Base construction: March, 2019
Pavement construction: June, 2019
Traffic opening: September, 2019

Climate Data Sources (Lat/Lon): 39.433, -107.383

Design Structure

Layer type	Material Type	Thickness (in)
Flexible	R3 SX(100) PG 64-28	2.0
Flexible	R3 SX(75) PG 58-28 United	4.0
NonStabilized	Aggregate Base	6.0
Subgrade	A-2-4	12.0
Subgrade	A-6	Semi-infinite

Volumetric at Construction:	
Effective binder content (%)	10.7
Air voids (%)	5.7

Traffic

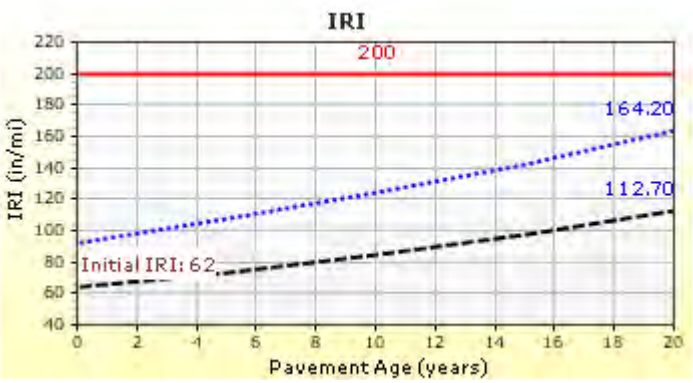
Age (year)	Heavy Trucks (cumulative)
2019 (initial)	70
2029 (10 years)	163,216
2039 (20 years)	350,223

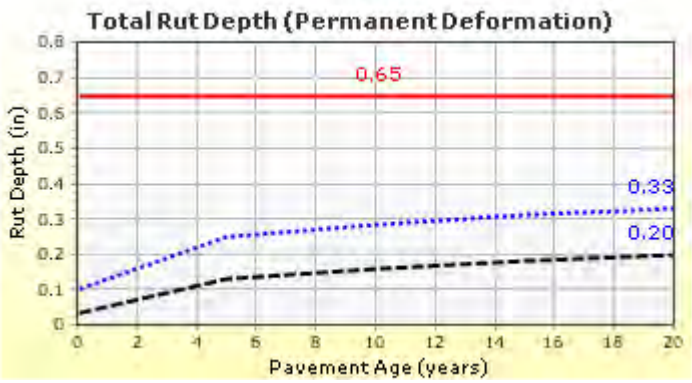
Design Outputs

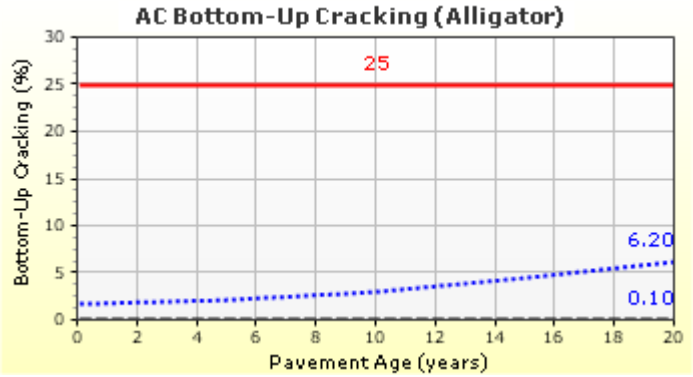
Distress Prediction Summary

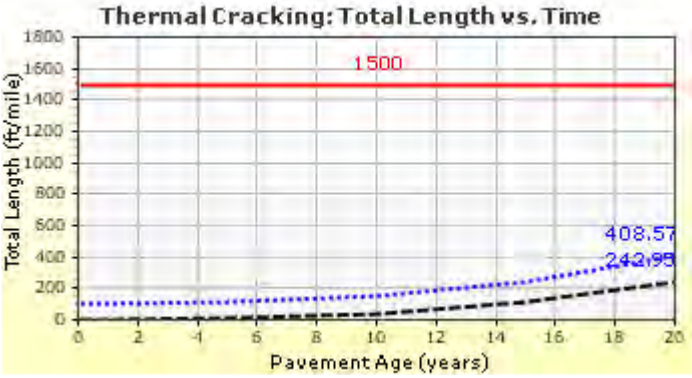
Distress Type	Distress @ Specified Reliability		Reliability (%)		Criterion Satisfied?
	Target	Predicted	Target	Achieved	
Terminal IRI (in/mile)	200.00	164.22	95.00	99.73	Pass
Permanent deformation - total pavement (in)	0.65	0.33	95.00	100.00	Pass
AC bottom-up fatigue cracking (% lane area)	25.00	6.20	95.00	100.00	Pass
AC thermal cracking (ft/mile)	1500.00	408.57	95.00	100.00	Pass
AC top-down fatigue cracking (ft/mile)	2500.00	656.44	95.00	100.00	Pass
Permanent deformation - AC only (in)	0.50	0.22	95.00	100.00	Pass

Distress Charts







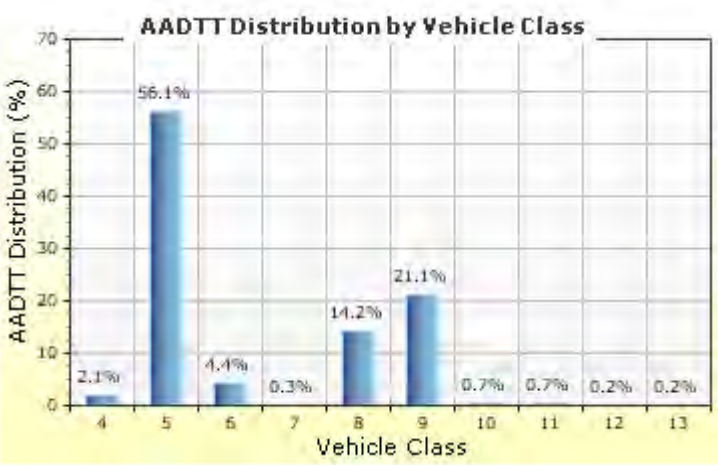


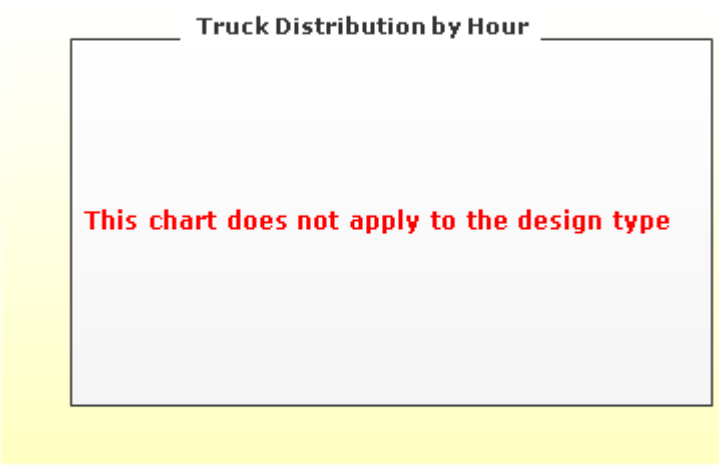


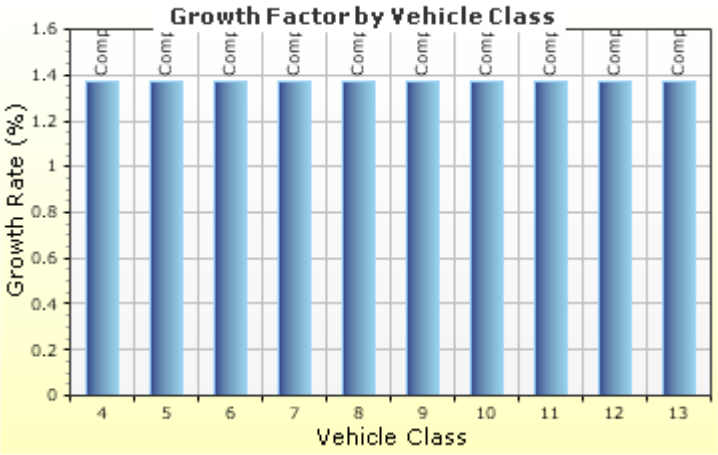
Traffic Inputs

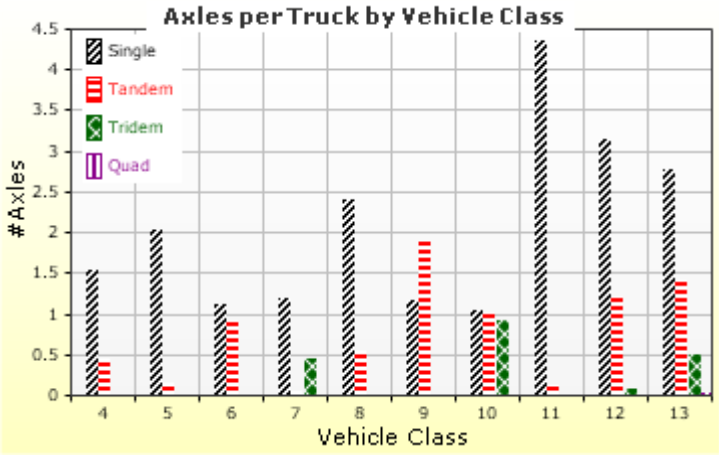
Graphical Representation of Traffic Inputs

Initial two-way AADTT:	70	Percent of trucks in design direction (%):	60.0
Number of lanes in design direction:	1	Percent of trucks in design lane (%):	100.0
		Operational speed (mph)	40.0

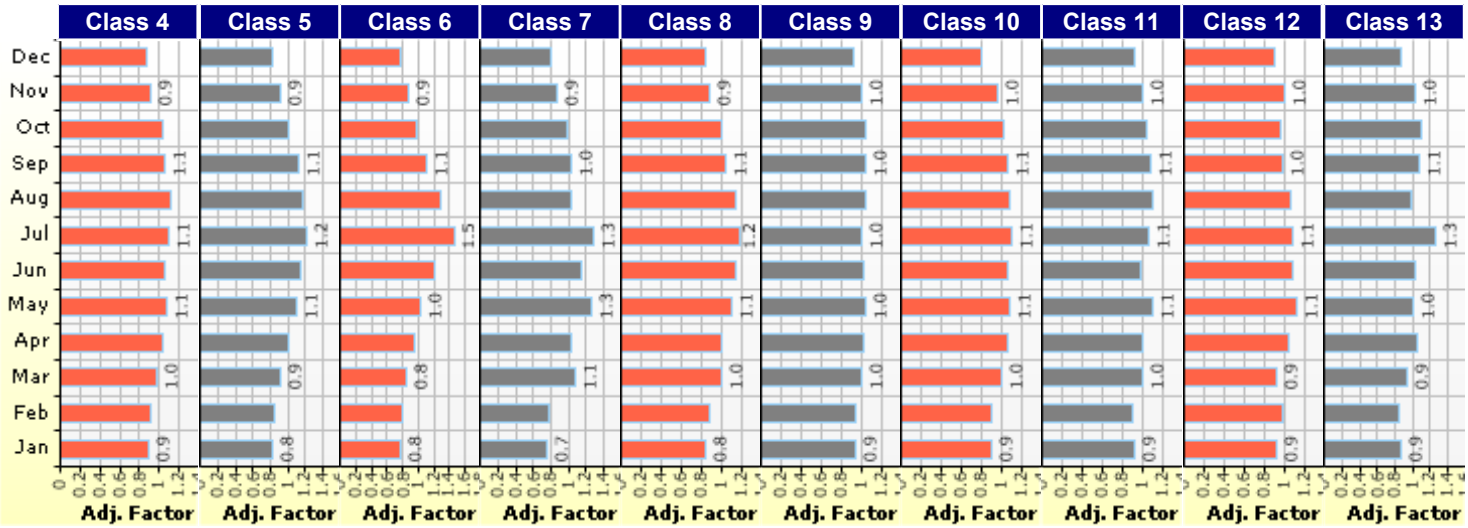








Traffic Volume Monthly Adjustment Factors



Tabular Representation of Traffic Inputs

Volume Monthly Adjustment Factors

Level 3: Default MAF

Month	Vehicle Class									
	4	5	6	7	8	9	10	11	12	13
January	0.9	0.8	0.8	0.7	0.8	0.9	0.9	0.9	0.9	0.9
February	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	0.8
March	1.0	0.9	0.8	1.1	1.0	1.0	1.0	1.0	0.9	0.9
April	1.0	1.0	0.9	1.0	1.0	1.0	1.1	1.0	1.0	1.1
May	1.1	1.1	1.0	1.3	1.1	1.0	1.1	1.1	1.1	1.0
June	1.1	1.1	1.2	1.1	1.1	1.0	1.1	1.0	1.1	1.0
July	1.1	1.2	1.5	1.3	1.2	1.0	1.1	1.1	1.1	1.3
August	1.1	1.2	1.3	1.0	1.1	1.0	1.1	1.1	1.1	1.0
September	1.1	1.1	1.1	1.0	1.1	1.0	1.1	1.1	1.0	1.1
October	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.1
November	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0
December	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.9	0.9

Distributions by Vehicle Class

Truck Distribution by Hour does not apply

Vehicle Class	AADTT Distribution (%) (Level 3)	Growth Factor	
		Rate (%)	Function
Class 4	2.1%	1.37%	Compound
Class 5	56.1%	1.37%	Compound
Class 6	4.4%	1.37%	Compound
Class 7	0.3%	1.37%	Compound
Class 8	14.2%	1.37%	Compound
Class 9	21.1%	1.37%	Compound
Class 10	0.7%	1.37%	Compound
Class 11	0.7%	1.37%	Compound
Class 12	0.2%	1.37%	Compound
Class 13	0.2%	1.37%	Compound

Axle Configuration

Traffic Wander	
Mean wheel location (in)	18.0
Traffic wander standard deviation (in)	10.0
Design lane width (ft)	12.0

Axle Configuration	
Average axle width (ft)	8.5
Dual tire spacing (in)	12.0
Tire pressure (psi)	120.0

Average Axle Spacing	
Tandem axle spacing (in)	51.6
Tridem axle spacing (in)	49.2
Quad axle spacing (in)	49.2

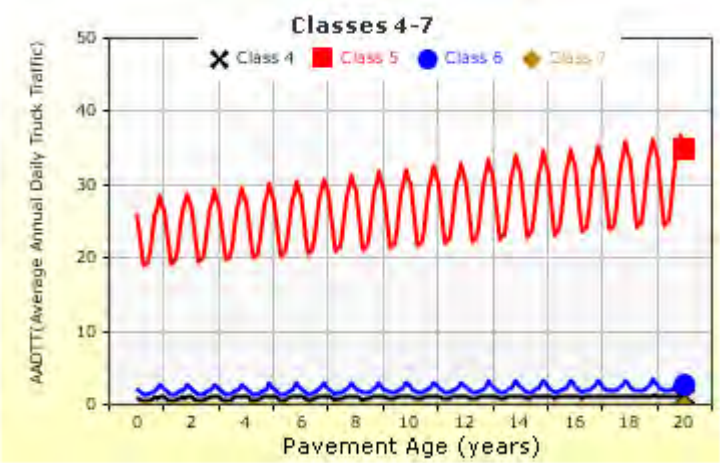
Wheelbase does not apply

Number of Axles per Truck

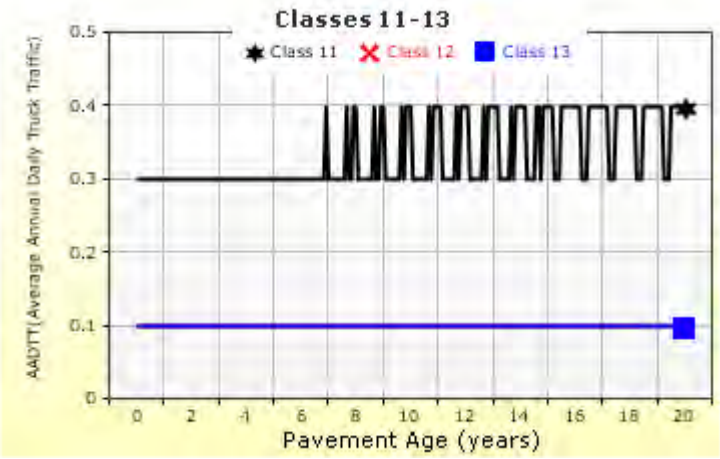
Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.53	0.45	0	0
Class 5	2.02	0.16	0.02	0
Class 6	1.12	0.93	0	0
Class 7	1.19	0.07	0.45	0.02
Class 8	2.41	0.56	0.02	0
Class 9	1.16	1.88	0.01	0
Class 10	1.05	1.01	0.93	0.02
Class 11	4.35	0.13	0	0
Class 12	3.15	1.22	0.09	0
Class 13	2.77	1.4	0.51	0.04

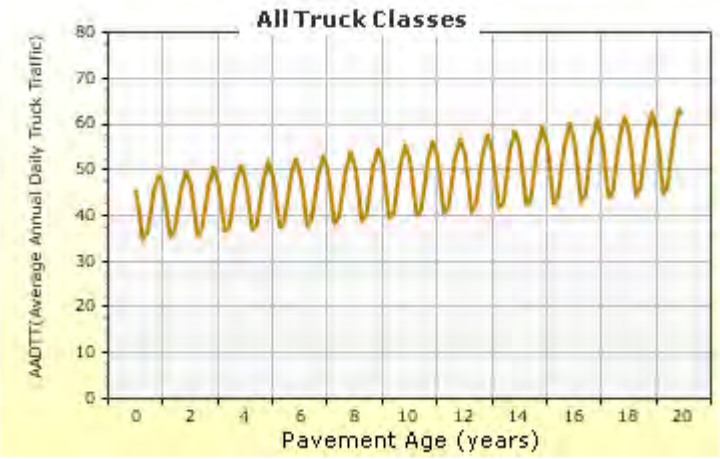
AADTT (Average Annual Daily Truck Traffic) Growth

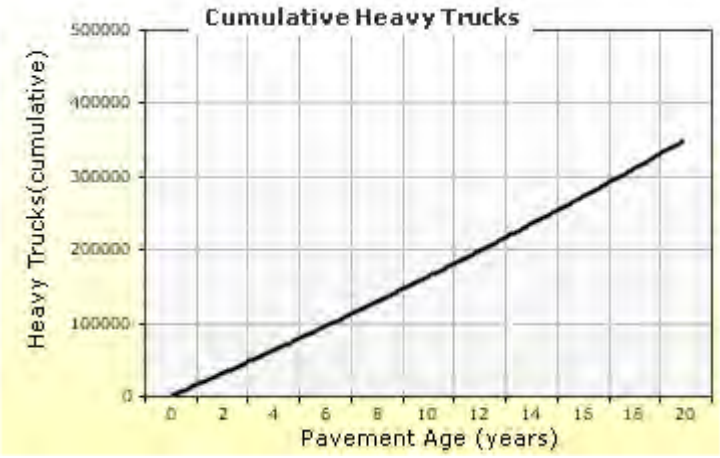
*** Traffic cap is not enforced**







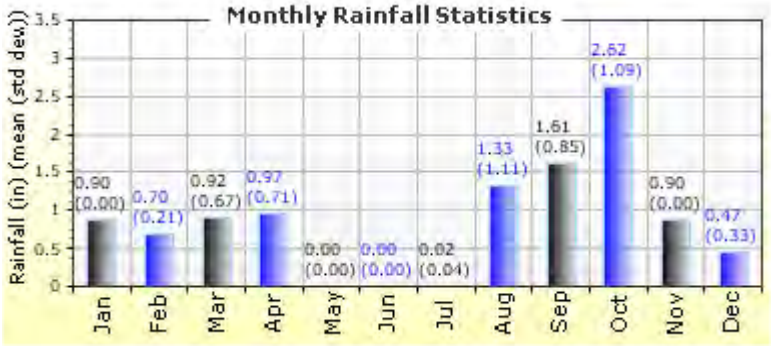




Climate Inputs

Climate Data Sources:

Climate Station Cities:	Location (lat lon elevation(ft))
GLENWOOD SPRINGS,	39.43300 -107.38300 10604

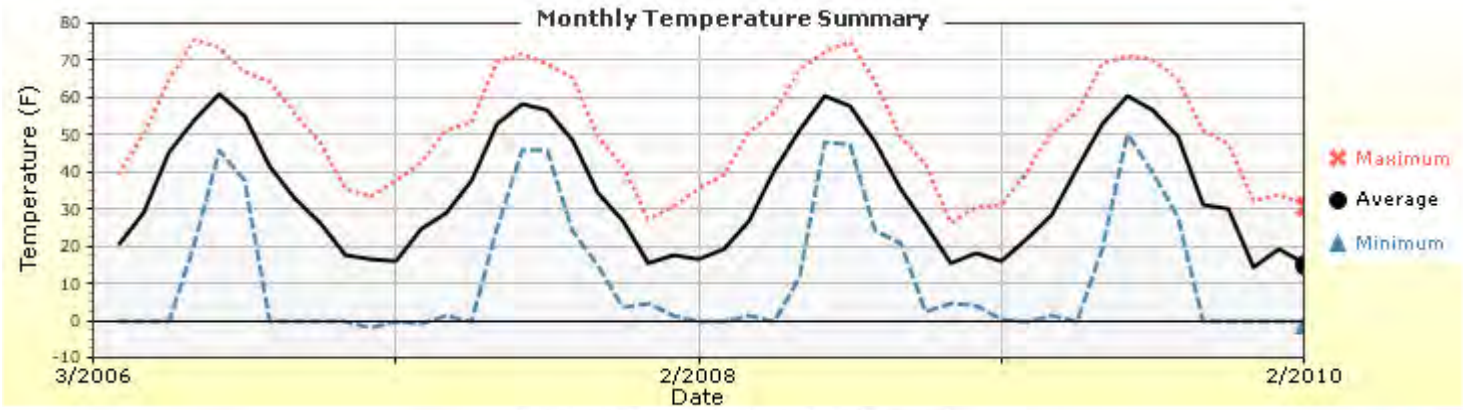


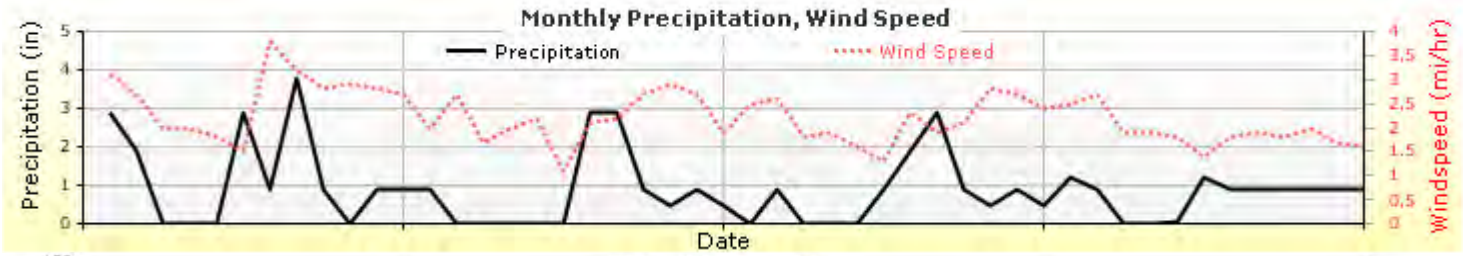
Annual Statistics:

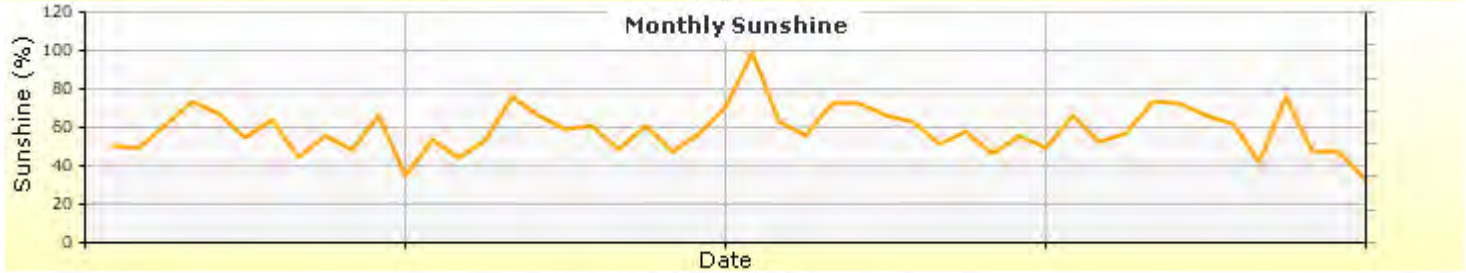
Mean annual air temperature (°F)	35.47
Mean annual precipitation (in)	10.54
Freezing index (°F - days)	2027.27
Average annual number of freeze/thaw cycles:	61.26

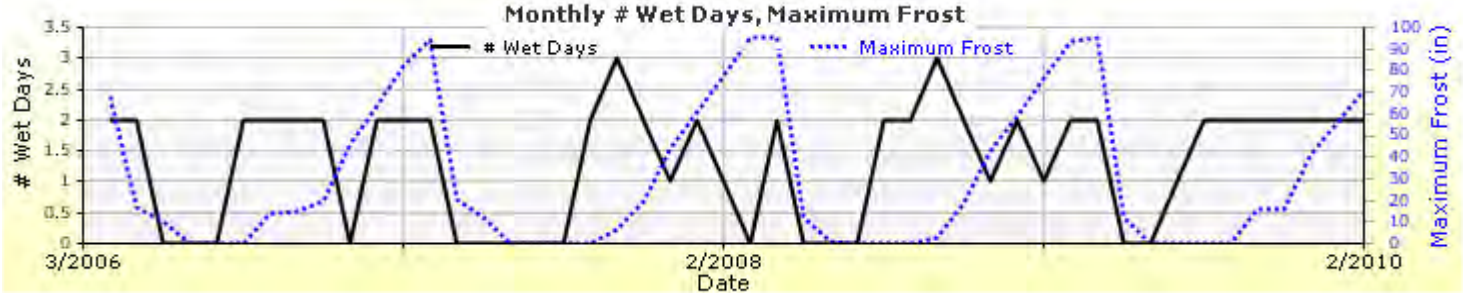
Water table depth (ft)	10.00

Monthly Climate Summary:

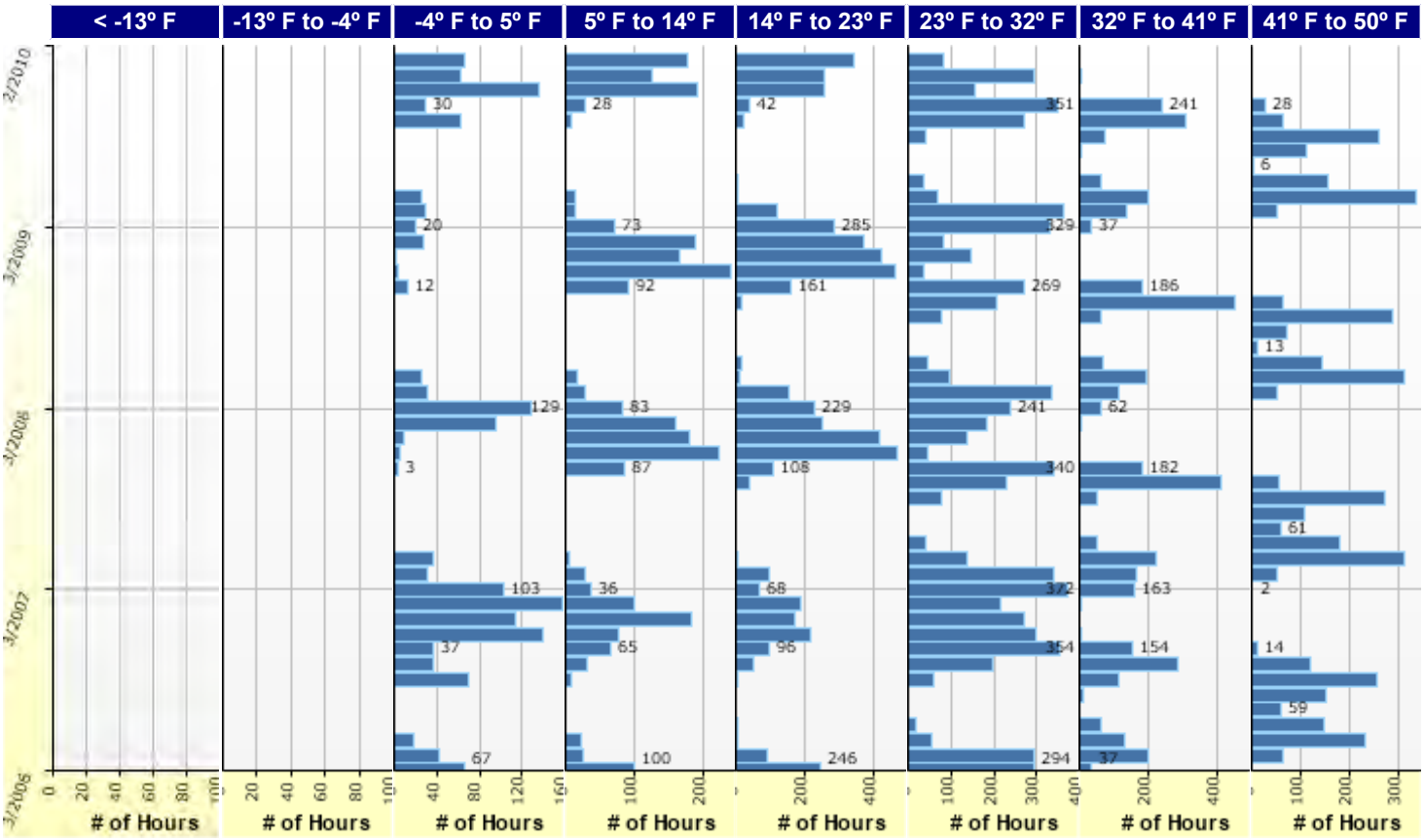


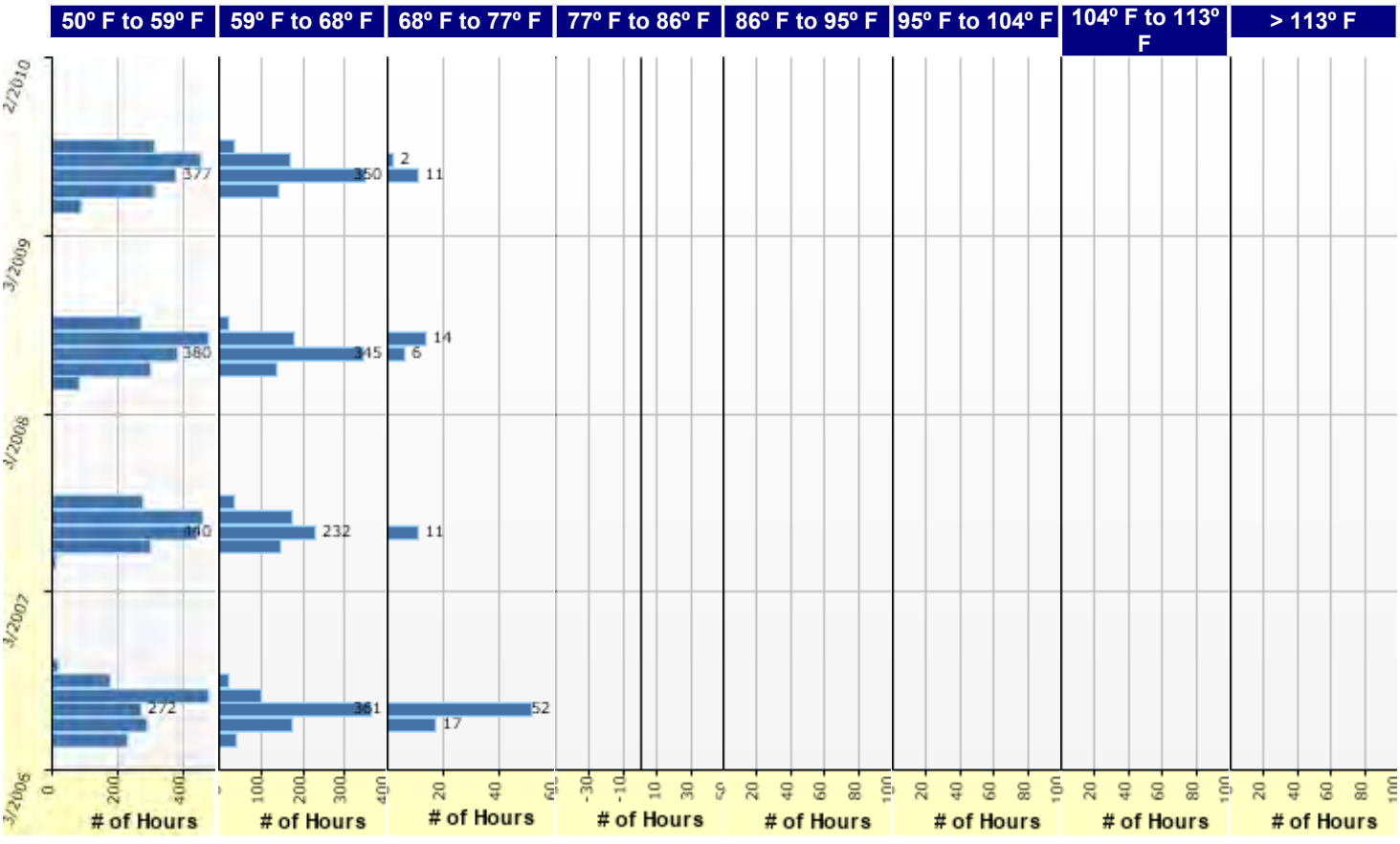






Hourly Air Temperature Distribution by Month:





Design Properties

HMA Design Properties

Use Multilayer Rutting Model	False
Using G* based model (not nationally calibrated)	False
Is NCHRP 1-37A HMA Rutting Model Coefficients	True
Endurance Limit	-
Use Reflective Cracking	True

Structure - ICM Properties	
AC surface shortwave absorptivity	0.85

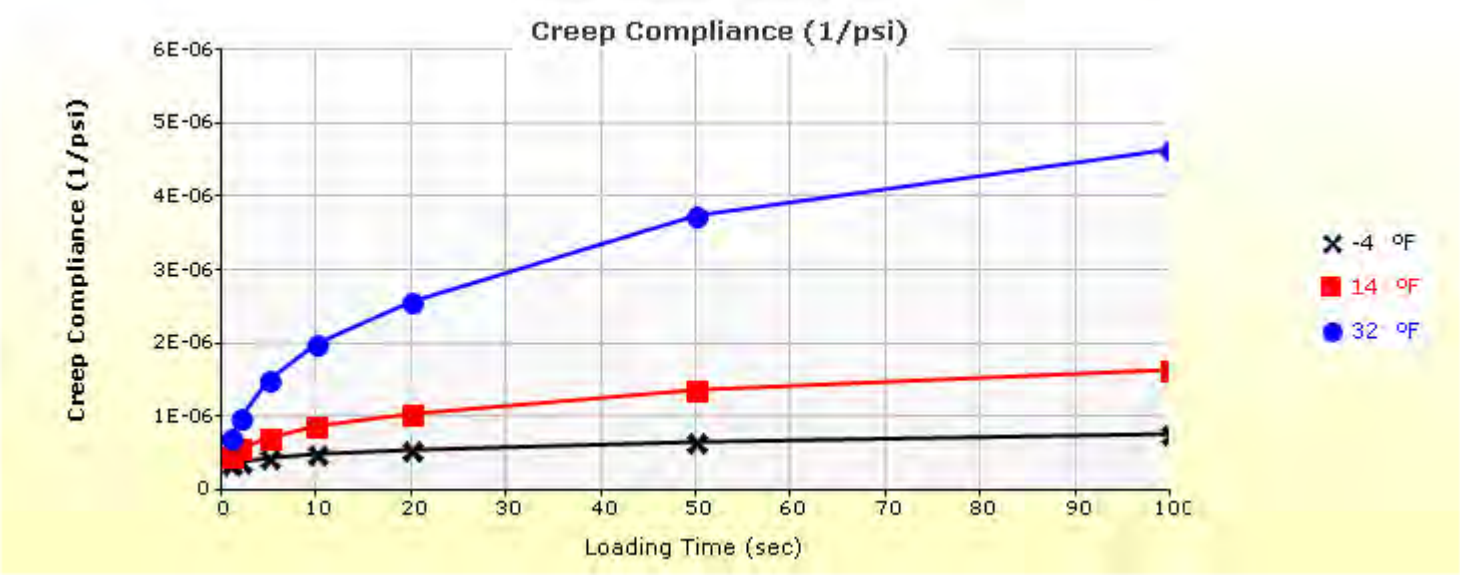
Layer Name	Layer Type	Interface Friction
Layer 1 Flexible : R3 SX(100) PG 64-28	Flexible (1)	1.00
Layer 2 Flexible : R3 SX(75) PG 58-28 United	Flexible (1)	1.00
Layer 3 Non-stabilized Base : Aggregate Base	Non-stabilized Base (4)	1.00
Layer 4 Subgrade : A-2-4	Subgrade (5)	1.00
Layer 5 Subgrade : A-6	Subgrade (5)	-

Thermal Cracking (Input Level: 1)

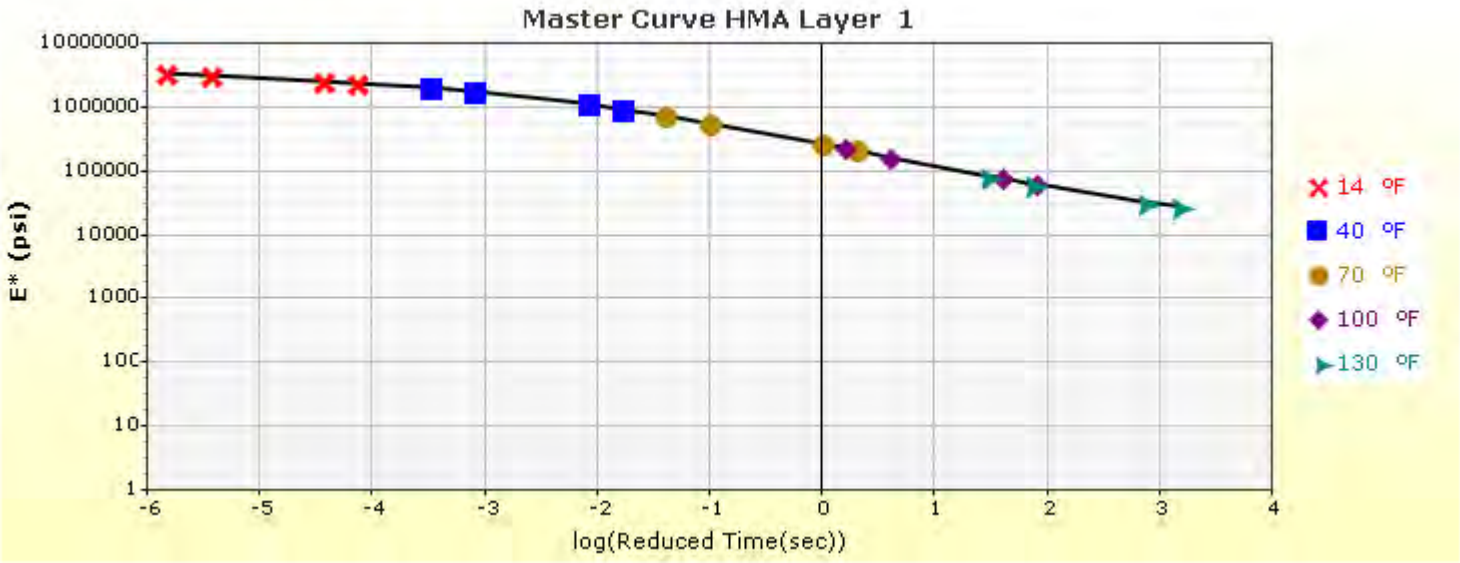
Indirect tensile strength at 14 ºF (psi)	519.00

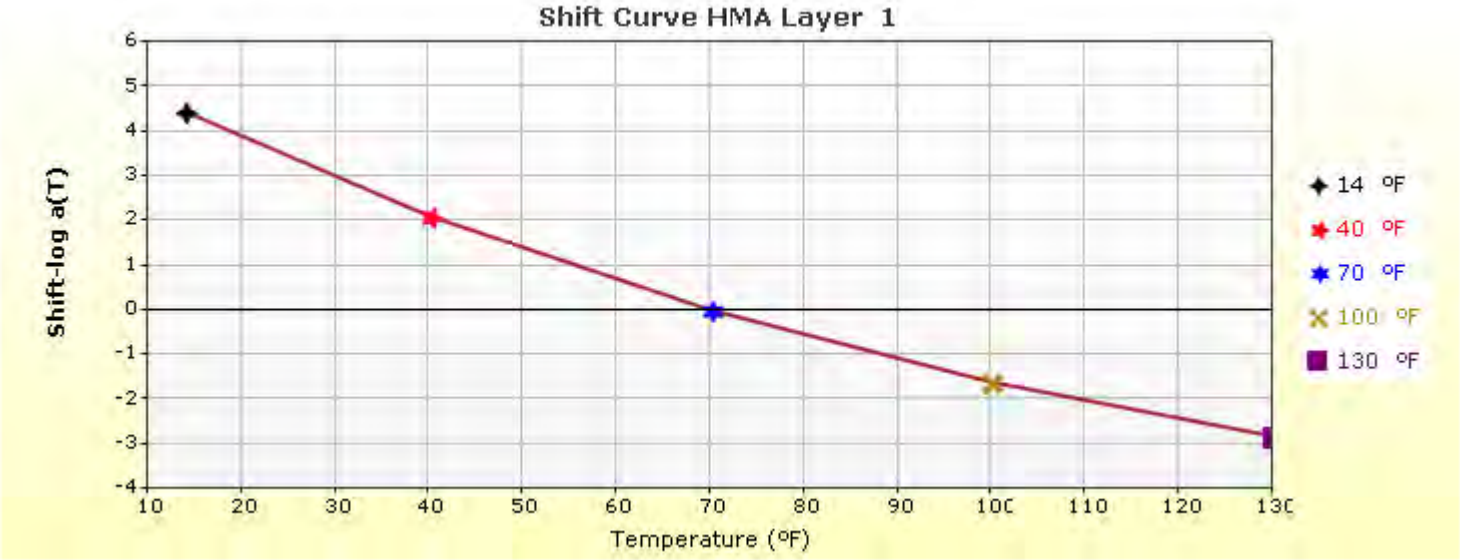
Thermal Contraction	
Is thermal contraction calculated?	True
Mix coefficient of thermal contraction (in/in/ºF)	-
Aggregate coefficient of thermal contraction (in/in/ºF)	5.0e-006
Voids in Mineral Aggregate (%)	16.4

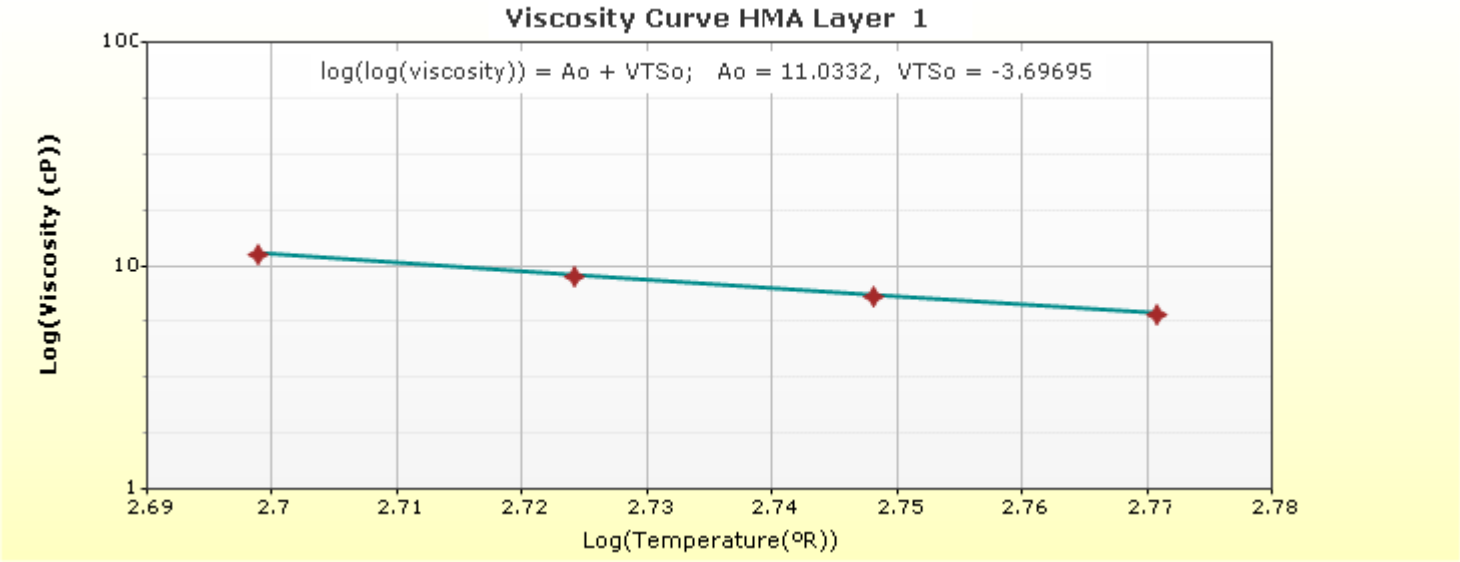
	Creep Compliance (1/psi)		
Loading time (sec)	-4 ºF	14 ºF	32 ºF
1	3.61e-007	4.73e-007	7.12e-007
2	4.04e-007	5.74e-007	9.97e-007
5	4.51e-007	7.35e-007	1.52e-006
10	5.11e-007	8.78e-007	1.99e-006
20	5.67e-007	1.04e-006	2.59e-006
50	6.57e-007	1.37e-006	3.75e-006
100	7.68e-007	1.66e-006	4.66e-006



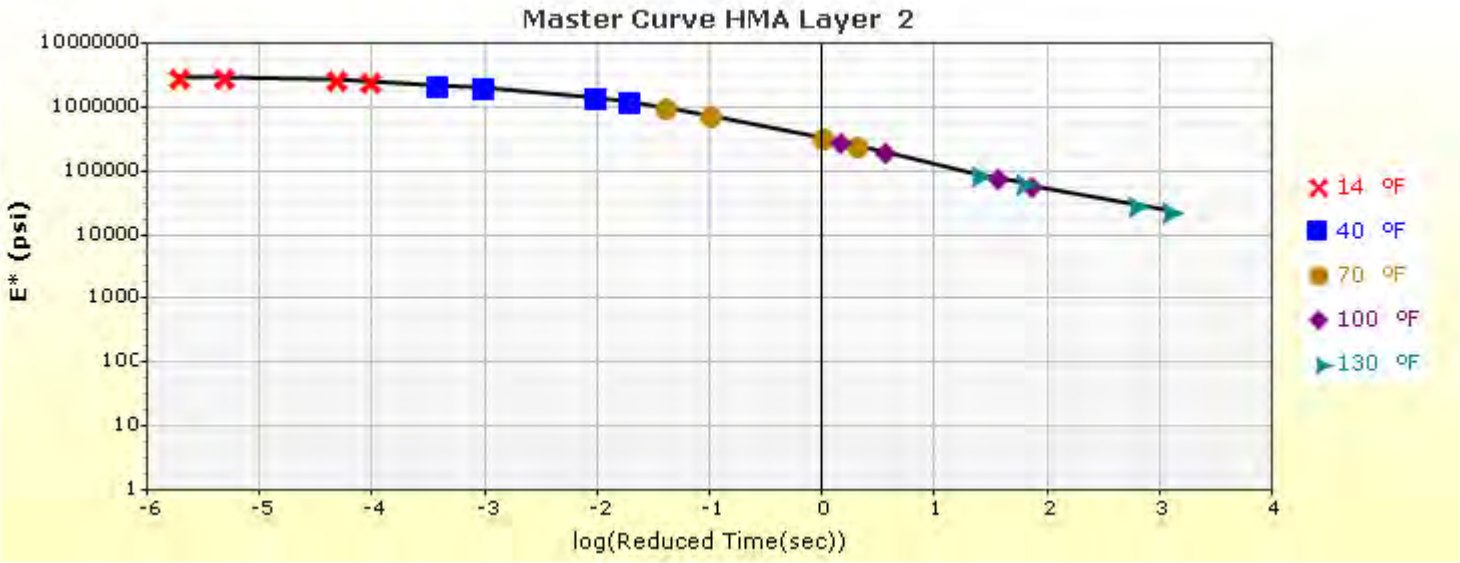
HMA Layer 1: Layer 1 Flexible : R3 SX(100) PG 64-28

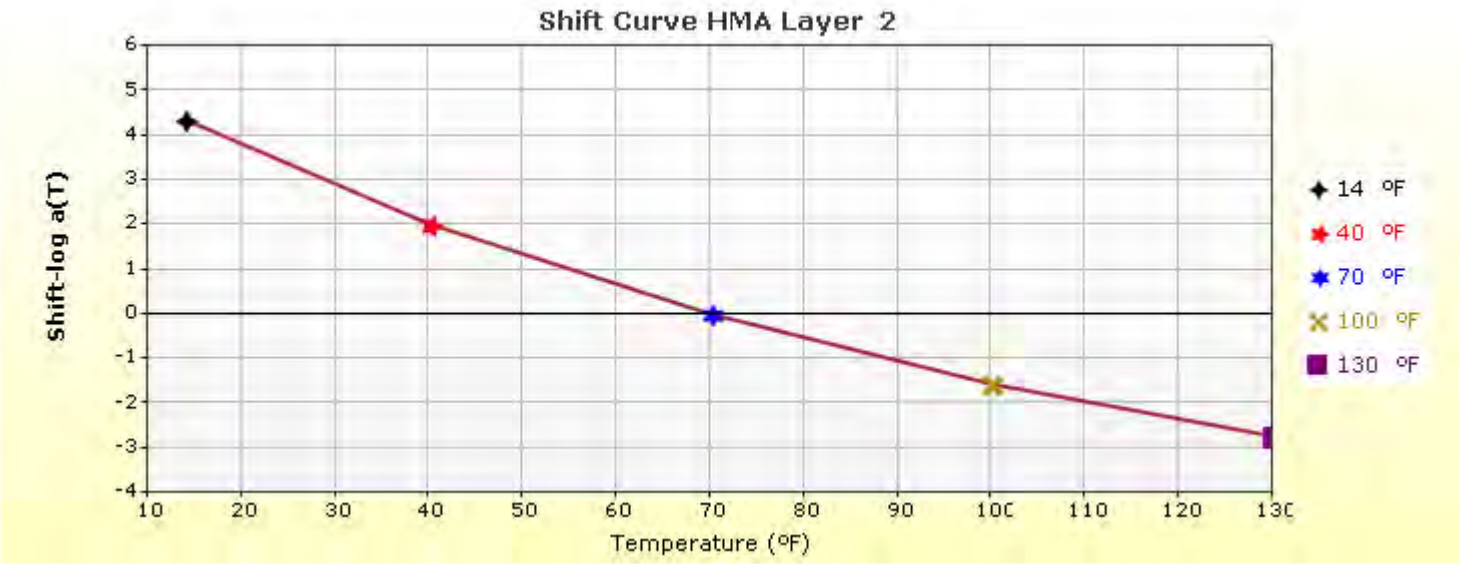


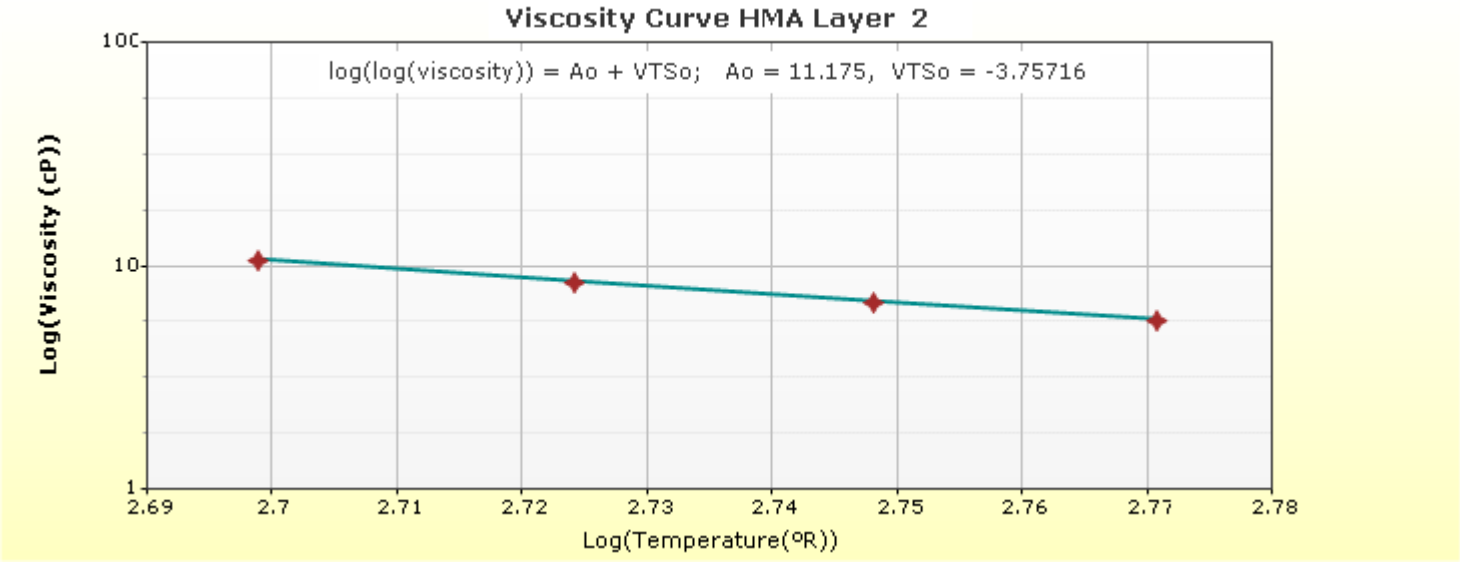




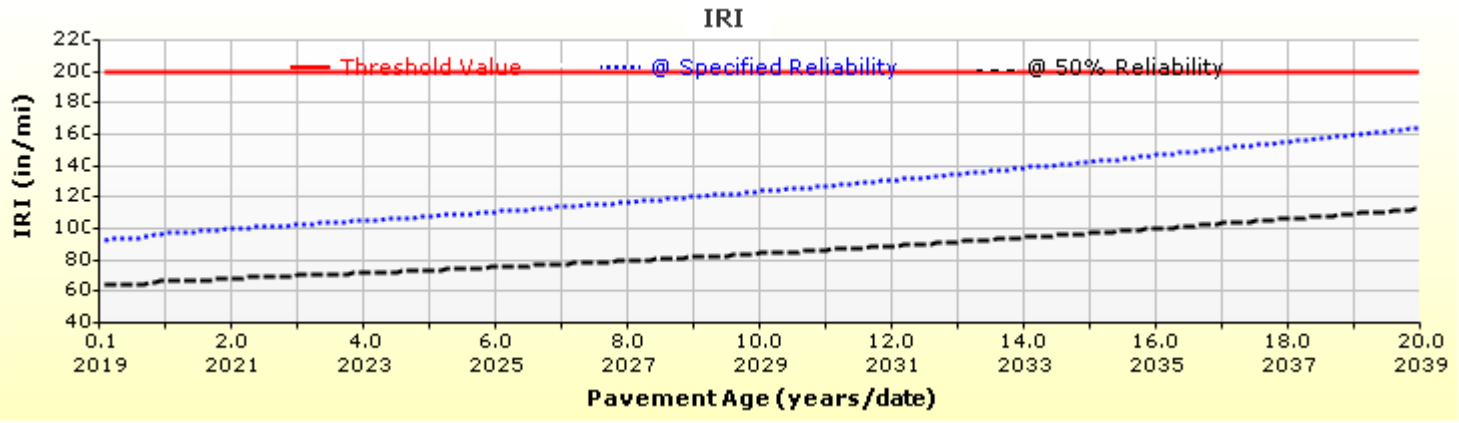
HMA Layer 2: Layer 2 Flexible : R3 SX(75) PG 58-28 United

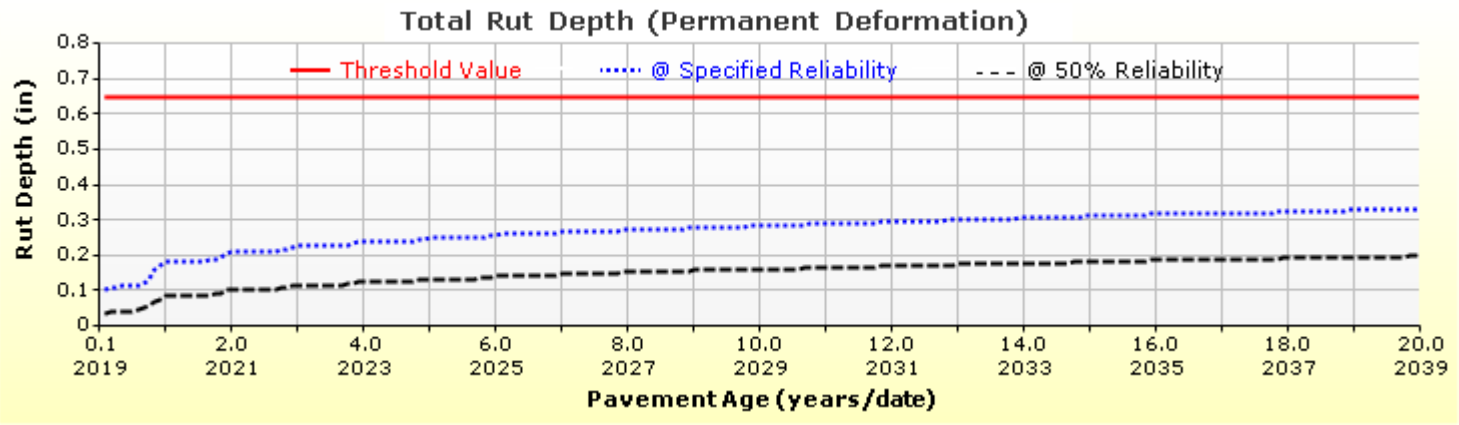


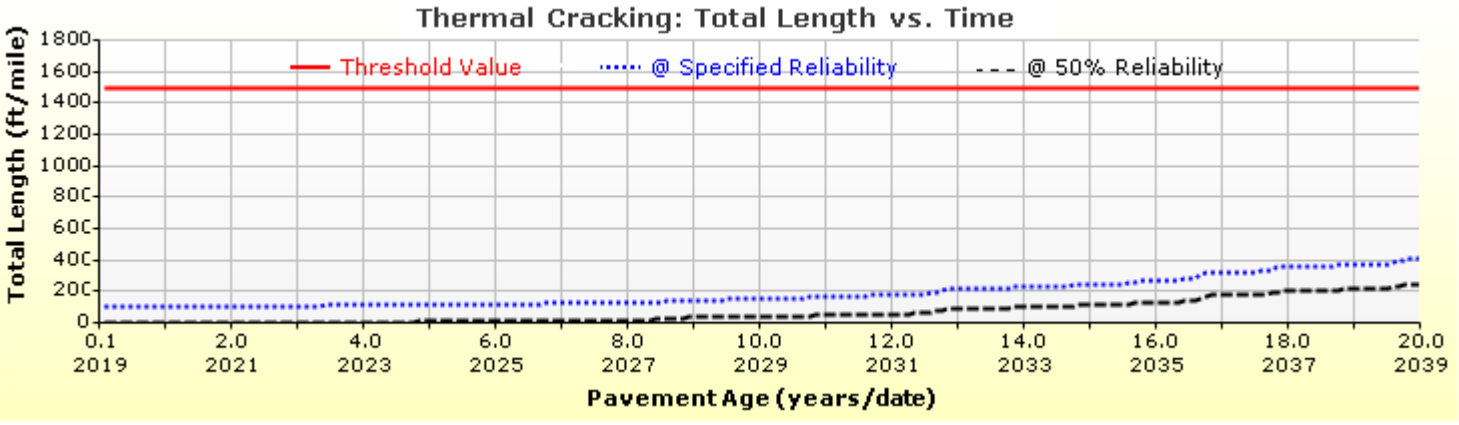


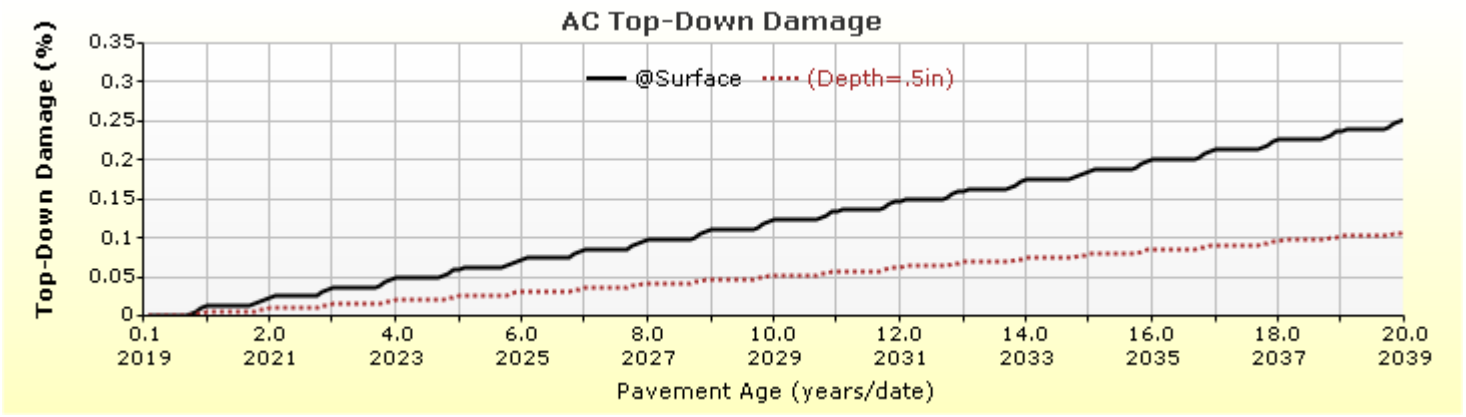


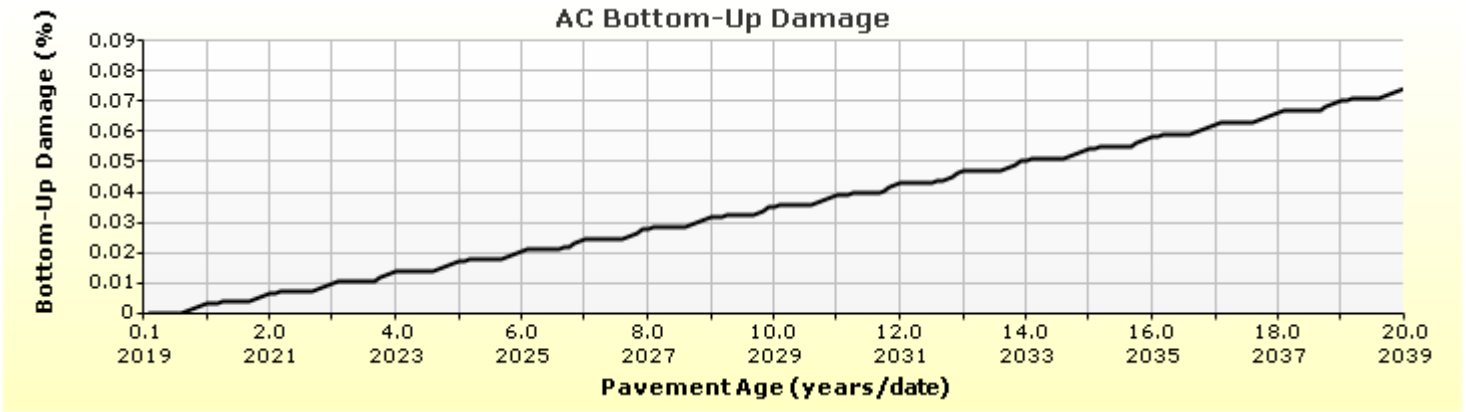
Analysis Output Charts

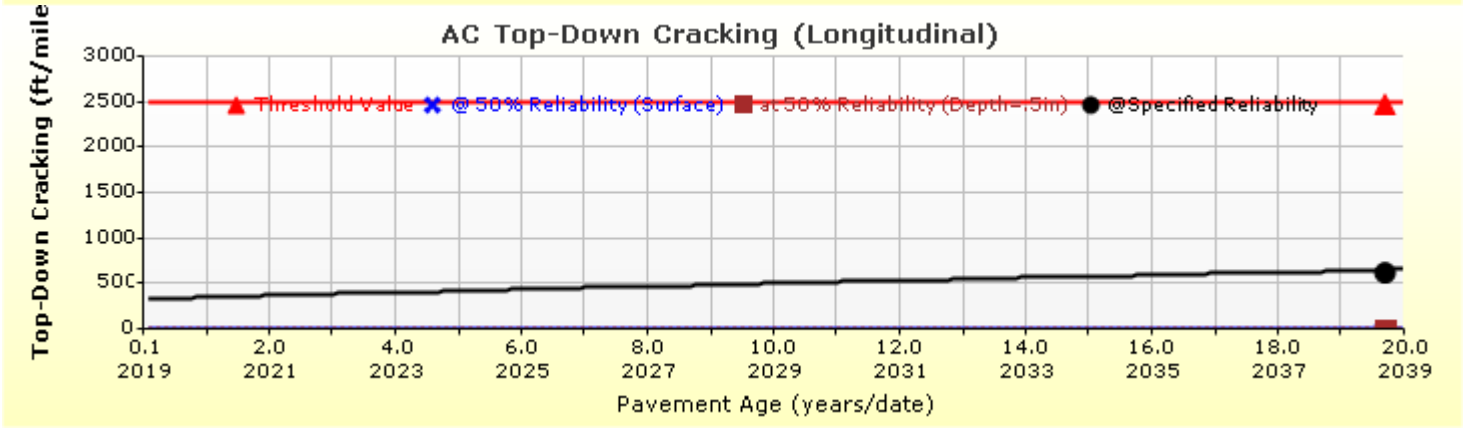


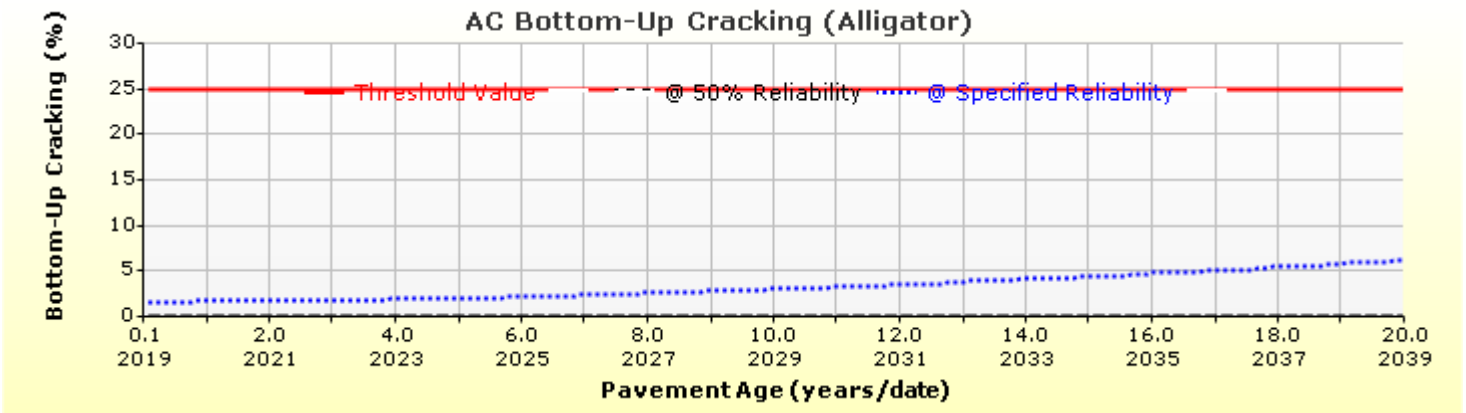


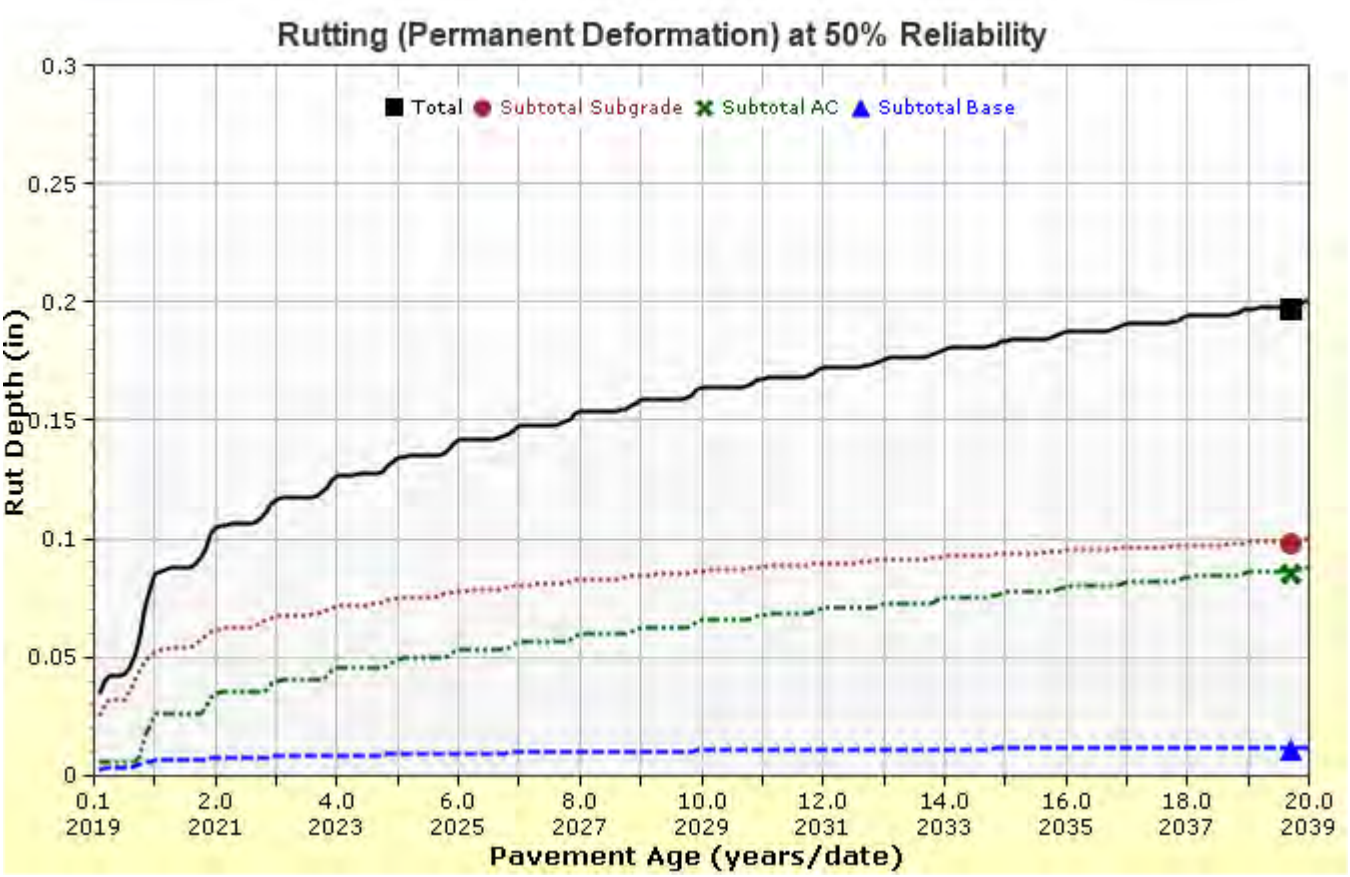


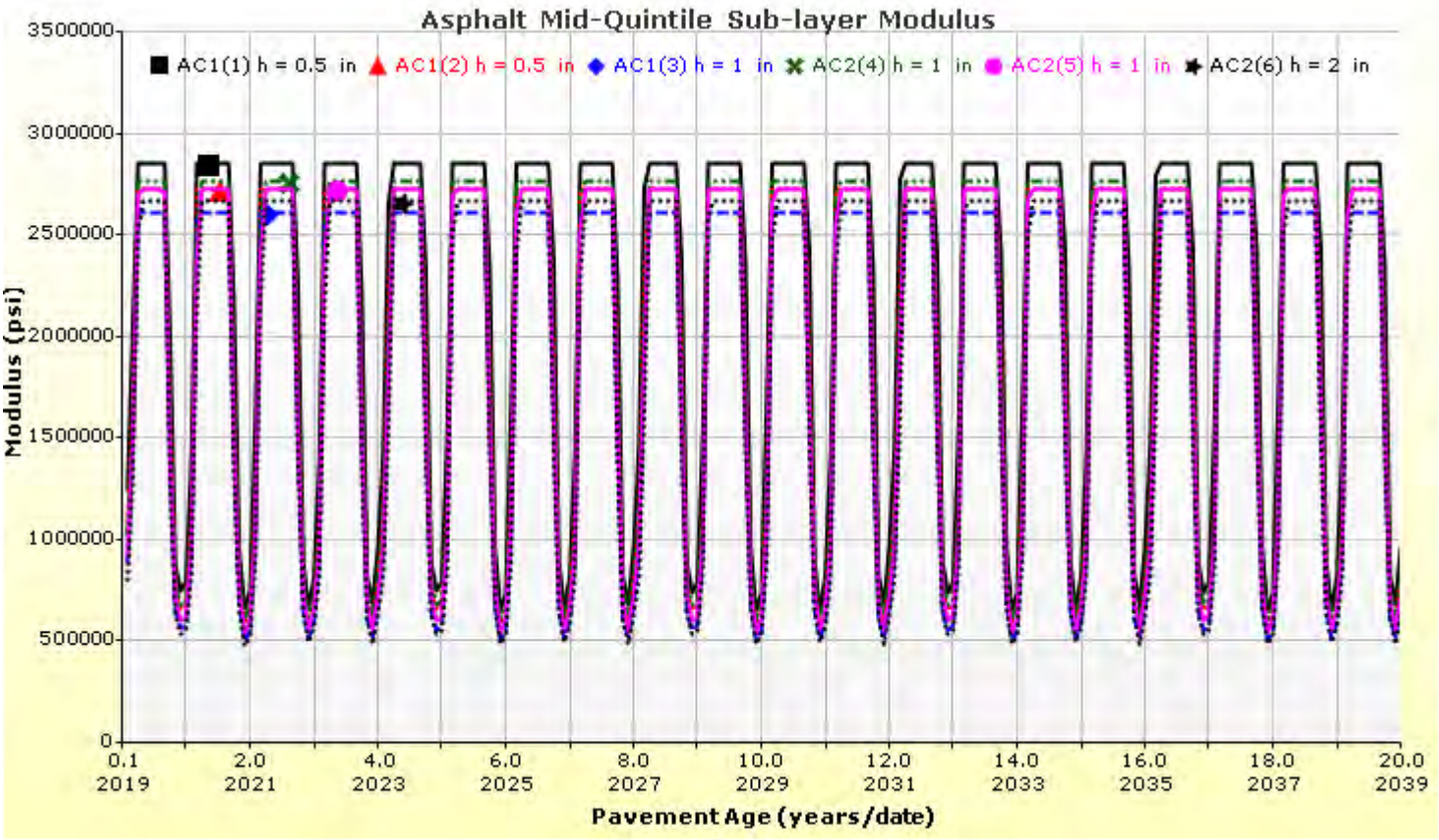

AC Top-Down Damage
Top-Down Damage (%)
@Surface
(Depth=.5in)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)

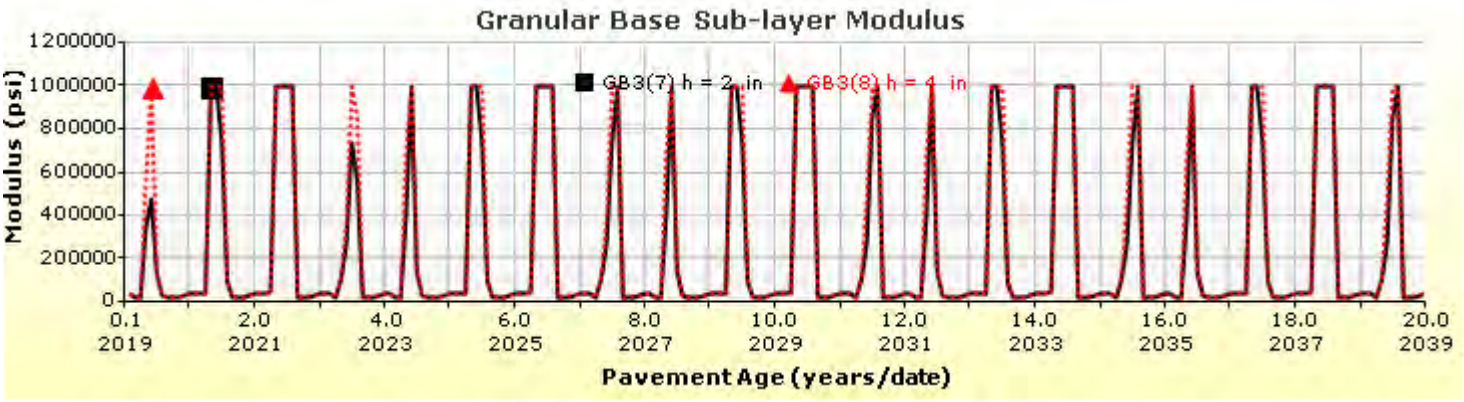

AC Bottom-Up Damage
Bottom-Up Damage (%)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)

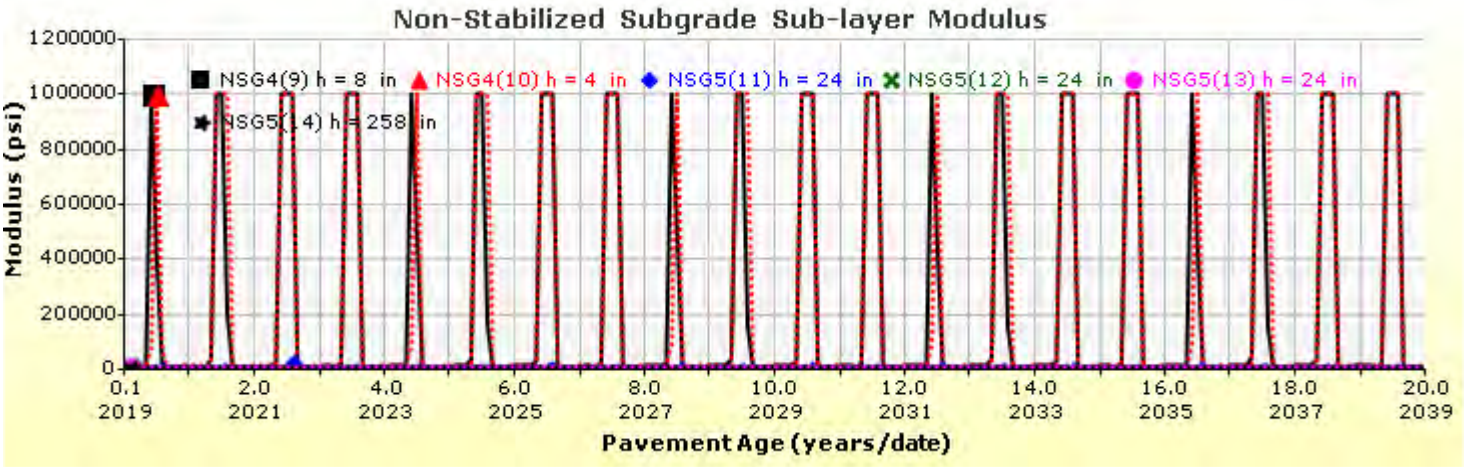

AC Top-Down Cracking (Longitudinal)
Top-Down Cracking (ft/mile
Threshold Value
@ 50% Reliability (Surface)
@ 50% Reliability (Depth=.5in)
@Specified Reliability
3000
2500
2000
1500
1000
500
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)


AC Bottom-Up Cracking (Alligator)
Bottom-Up Cracking (%)
Threshold Value
@ 50% Reliability
@ Specified Reliability
30
25
20
15
10
5
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)


Rutting (Permanent Deformation) at 50% Reliability
Total
Subtotal Subgrade
Subtotal AC
Subtotal Base
Rut Depth (in)
0.3
0.25
0.2
0.15
0.1
0.05
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)


Asphalt Mid-Quintile Sub-layer Modulus
AC1(1) h = 0.5 in
AC1(2) h = 0.5 in
AC1(3) h = 1 in
AC2(4) h = 1 in
AC2(5) h = 1 in
AC2(6) h = 2 in
Modulus (psi)
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)


Granular Base Sub-layer Modulus
GB3(7) h = 2 in
GB3(8) h = 4 in
Modulus (psi)
1200000
1000000
800000
600000
400000
200000
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)


Non-Stabilized Subgrade Sub-layer Modulus
NSG4(9) h = 8 in
NSG4(10) h = 4 in
NSG5(11) h = 24 in
NSG5(12) h = 24 in
NSG5(13) h = 24 in
NSG5(14) h = 258 in
Modulus (psi)
1200000
1000000
800000
600000
400000
200000
0
0.1
2019
2.0
2021
4.0
2023
6.0
2025
8.0
2027
10.0
2029
12.0
2031
14.0
2033
16.0
2035
18.0
2037
20.0
2039
Pavement Age (years/date)

Layer Information

Layer 1 Flexible : R3 SX(100) PG 64-28

Asphalt		
Thickness (in)	2.0	
Unit weight (pcf)	145.0	
Poisson's ratio	Is Calculated?	True
	Ratio	-
	Parameter A	-1.63
	Parameter B	3.84E-06

Asphalt Dynamic Modulus (Input Level: 1)

T (ºF)	0.5 Hz	1 Hz	10 Hz	25 Hz
14	1687360	2134249	2493389	2608869
40	697463	1127680	1612900	1802220
70	173403	334774	616373	765125
100	54259	93163	175106	227742
130	27890	38645	60413	74657

Asphalt Binder

Temperature (ºF)	Binder Gstar (Pa)	Phase angle (deg)
147.2	2442	68
158	1164	70
168.8	587	72

General Info

Name	Value
Reference temperature (ºF)	70
Effective binder content (%)	10.7
Air voids (%)	5.7
Thermal conductivity (BTU/hr-ft-ºF)	0.67
Heat capacity (BTU/lb-ºF)	0.23

Identifiers

Field	Value
Display name/identifier	R3 SX(100) PG 64-28
Description of object	Mix ID # FS1959-8
Author	CDOT
Date Created	4/3/2013 12:00:00 AM
Approver	CDOT
Date approved	4/3/2013 12:00:00 AM
State	Colorado
District	
County	
Highway	
Direction of Travel	
From station (miles)	
To station (miles)	
Province	
User defined field 1	SX
User defined field 2	
User defined field 3	
Revision Number	0

Layer 2 Flexible : R3 SX(75) PG 58-28 United

Asphalt		
Thickness (in)	4.0	
Unit weight (pcf)	145.0	
Poisson's ratio	Is Calculated?	True
	Ratio	-
	Parameter A	-1.63
	Parameter B	3.84E-06

Asphalt Dynamic Modulus (Input Level: 1)

T (ºF)	0.5 Hz	1 Hz	10 Hz	25 Hz
14	2067099	2488999	2785899	2873299
40	930800	1472800	2008399	2196999
70	207600	439600	838700	1039200
100	52500	101200	215300	291900
130	24100	35400	60900	78900

Asphalt Binder

Temperature (ºF)	Binder Gstar (Pa)	Phase angle (deg)
147.2	1661	85
158	776	87
168.8	384	89

General Info

Name	Value
Reference temperature (ºF)	70
Effective binder content (%)	10.7
Air voids (%)	5.5
Thermal conductivity (BTU/hr-ft-ºF)	0.67
Heat capacity (BTU/lb-ºF)	0.23

Identifiers

Field	Value
Display name/identifier	R3 SX(75) PG 58-28 United
Description of object	Mix ID # FS1918-9
Author	CDOT
Date Created	4/3/2013 12:00:00 AM
Approver	CDOT
Date approved	4/3/2013 12:00:00 AM
State	Colorado
District	
County	
Highway	
Direction of Travel	
From station (miles)	
To station (miles)	
Province	
User defined field 1	SX
User defined field 2	
User defined field 3	
Revision Number	0

Layer 3 Non-stabilized Base : Aggregate Base

Unbound	
Layer thickness (in)	6.0
Poisson's ratio	0.35
Coefficient of lateral earth pressure (k0)	0.5

Modulus (Input Level: 3)

Analysis Type:	Modify input values by temperature/moisture
Method:	Resilient Modulus (psi)

Resilient Modulus (psi)
25000.0

Use Correction factor for NDT modulus?	-
NDT Correction Factor:	-

Identifiers

Field	Value
Display name/identifier	Aggregate Base
Description of object	Default material
Author	AASHTO
Date Created	1/1/2011 12:00:00 AM
Approver	
Date approved	1/1/2011 12:00:00 AM
State	
District	
County	
Highway	
Direction of Travel	
From station (miles)	
To station (miles)	
Province	
User defined field 1	
User defined field 2	
User defined field 3	
Revision Number	7

Sieve

Liquid Limit	6.0
Plasticity Index	1.0
Is layer compacted?	True

	Is User Defined?	Value
Maximum dry unit weight (pcf)	False	127.7
Saturated hydraulic conductivity (ft/hr)	False	5.054e-02
Specific gravity of solids	False	2.7
Water Content (%)	False	7.4

User-defined Soil Water Characteristic Curve (SWCC)	
Is User Defined?	False
af	7.2555
bf	1.3328
cf	0.8242
hr	117.4000

Sieve Size	% Passing
0.001mm	
0.002mm	
0.020mm	
#200	8.7
#100	
#80	12.9
#60	
#50	
#40	20.0
#30	
#20	
#16	
#10	33.8
#8	
#4	44.7
3/8-in.	57.2
1/2-in.	63.1
3/4-in.	72.7
1-in.	78.8
1 1/2-in.	85.8
2-in.	91.6
2 1/2-in.	
3-in.	
3 1/2-in.	97.6

Layer 4 Subgrade : A-2-4

Unbound	
Layer thickness (in)	12.0
Poisson's ratio	0.35
Coefficient of lateral earth pressure (k0)	0.5

Modulus (Input Level: 3)

Analysis Type:	Modify input values by temperature/moisture
Method:	Resilient Modulus (psi)

Resilient Modulus (psi)
10615.0

Use Correction factor for NDT modulus?	-
NDT Correction Factor:	-

Identifiers

Field	Value
Display name/identifier	A-2-4
Description of object	Default material
Author	AASHTO
Date Created	1/1/2011 12:00:00 AM
Approver	
Date approved	1/1/2011 12:00:00 AM
State	
District	
County	
Highway	
Direction of Travel	
From station (miles)	
To station (miles)	
Province	
User defined field 1	
User defined field 2	
User defined field 3	
Revision Number	0

Sieve

Liquid Limit	14.0
Plasticity Index	2.0
Is layer compacted?	True

	Is User Defined?	Value
Maximum dry unit weight (pcf)	False	124.6
Saturated hydraulic conductivity (ft/hr)	False	5.852e-04
Specific gravity of solids	False	2.7
Water Content (%)	False	9

User-defined Soil Water Characteristic Curve (SWCC)	
Is User Defined?	False
af	9.5043
bf	0.6439
cf	3.0636
hr	189.6000

Sieve Size	% Passing
0.001mm	
0.002mm	
0.020mm	
#200	22.4
#100	
#80	42.3
#60	
#50	
#40	67.2
#30	
#20	
#16	
#10	82.5
#8	
#4	87.2
3/8-in.	91.6
1/2-in.	93.5
3/4-in.	95.9
1-in.	97.2
1 1/2-in.	98.5
2-in.	99.0
2 1/2-in.	
3-in.	
3 1/2-in.	99.6

Layer 5 Subgrade : A-6

Unbound	
Layer thickness (in)	Semi-infinite
Poisson's ratio	0.35
Coefficient of lateral earth pressure (k0)	0.5

Modulus (Input Level: 3)

Analysis Type:	Modify input values by temperature/moisture
Method:	Resilient Modulus (psi)

Resilient Modulus (psi)
9000.0

Use Correction factor for NDT modulus?	-
NDT Correction Factor:	-

Identifiers

Field	Value
Display name/identifier	A-6
Description of object	Default material
Author	AASHTO
Date Created	1/1/2011 12:00:00 AM
Approver	
Date approved	1/1/2011 12:00:00 AM
State	
District	
County	
Highway	
Direction of Travel	
From station (miles)	
To station (miles)	
Province	
User defined field 1	
User defined field 2	
User defined field 3	
Revision Number	0

Sieve

Liquid Limit	33.0
Plasticity Index	16.0
Is layer compacted?	False

	Is User Defined?	Value
Maximum dry unit weight (pcf)	False	107.9
Saturated hydraulic conductivity (ft/hr)	False	1.95e-05
Specific gravity of solids	False	2.7
Water Content (%)	False	17.1

User-defined Soil Water Characteristic Curve (SWCC)	
Is User Defined?	False
af	108.4091
bf	0.6801
cf	0.2161
hr	500.0000

Sieve Size	% Passing
0.001mm	
0.002mm	
0.020mm	
#200	63.2
#100	
#80	73.5
#60	
#50	
#40	82.4
#30	
#20	
#16	
#10	90.2
#8	
#4	93.5
3/8-in.	96.4
1/2-in.	97.4
3/4-in.	98.4
1-in.	99.0
1 1/2-in.	99.5
2-in.	99.8
2 1/2-in.	
3-in.	
3 1/2-in.	100.0

Calibration Coefficients

AC Fatigue

$$N_f = 0.00432 * C * \beta_{f1} k_1 \left(\frac{1}{\varepsilon_1}\right)^{k_2 \beta_{f2}} \left(\frac{1}{E}\right)^{k_3 \beta_{f3}}$$

$$C = 10^M$$

$$M = 4.84\left(\frac{V_b}{V_a + V_b} - 0.69\right)$$

k1: 0.007566
k2: 3.9492
k3: 1.281
Bf1: 130.3674
Bf2: 1
Bf3: 1.217799

AC Rutting

$$\frac{\varepsilon_p}{\varepsilon_r} = k_z \beta_{r1} 10^{k_1} T^{k_2 \beta_{r2}} N^{k_3 B_{r3}}$$

$$k_z = (C_1 + C_2 * depth) * 0.328196^{depth}$$

$$C_1 = -0.1039 * H_\alpha^2 + 2.4868 * H_\alpha - 17.342$$

$$C_2 = 0.0172 * H_\alpha^2 - 1.7331 * H_\alpha + 27.428$$

Where:

$$H_{ac} = total\ AC\ thickness(in)$$

$\varepsilon_p = plastic\ strain\left({}^{in}/_{in}\right)$
$\varepsilon_r = resilient\ strain\left({}^{in}/_{in}\right)$
$T = layer\ temperature(^{\circ}F)$
$N = number\ of\ load\ repetitions$

AC Rutting Standard Deviation	0.1414*Pow(RUT,0.25)+0.001	
AC Layer	K1:-3.35412 K2:1.5606 K3:0.3791	Br1:4.3 Br2:1 Br3:1

Thermal Fracture

$$C_f = 400 * N\left(\frac{\log C / h_{ac}}{\sigma}\right)$$

$$\Delta C = (k * \beta t)^{n+1} * A * \Delta K^n$$

$$A = 10^{(4.389 - 2.52 * \log(E * \sigma_m * n))}$$

$C_f = observed\ amount\ of\ thermal\ cracking(ft/500ft)$
$k = refression\ coefficient\ determined\ through\ field\ calibration$
$N() = standard\ normal\ distribution\ evaluated\ at()$
$\sigma = standard\ deviation\ of\ the \log\ of\ the\ depth\ of\ cracks\ in\ the\ pavments$
$C = crack\ depth(in)$
$h_{ac} = thickness\ of\ asphalt\ layer(in)$
$\Delta C = Change\ in\ the\ crack\ depth\ due\ to\ a\ cooling\ cycle$
$\Delta K = Change\ in\ the\ stress\ intensity\ factor\ due\ to\ a\ cooling\ cycle$
$A, n = Fracture\ parameters\ for\ the\ asphalt\ mixture$
$E = mixture\ stiffness$
$\sigma_M = Undamaged\ mixture\ tensile\ strength$
$\beta_t = Calibration\ parameter$

Level 1 K: 6.3	Level 1 Standard Deviation: 0.1468 * THERMAL + 65.027
Level 2 K: 0.5	Level 2 Standard Deviation: 0.2841 *THERMAL + 55.462
Level 3 K: 6.3	Level 3 Standard Deviation: 0.3972 * THERMAL + 20.422

CSM Fatigue

$$N_f = 10^{\left(\frac{k_1 \beta_{c1} \left(\frac{\sigma_s}{M_r}\right)}{k_2 \beta_{c2}}\right)}$$

$N_f = number\ of\ repetitions\ to\ fatigue\ cracking$
$\sigma_s = Tensile\ stress(psi)$
$M_r = modulus\ of\ rupture(psi)$

k1: 1	k2: 1	Bc1: 1	Bc2:1

Subgrade Rutting

$$\delta_a(N) = \beta_{s_1} k_1 \varepsilon_v h \left(\frac{\varepsilon_0}{\varepsilon_r}\right) \left| e^{-\left(\frac{\rho}{N}\right)^{\beta}} \right|$$

$\delta_a = permanent\ deformation\ for\ the\ layer$
$N = number\ of\ repetitions$
$\varepsilon_v = average\ veritcal\ strain(in/in)$
$\varepsilon_0, \beta, \rho = material\ properties$
$\varepsilon_r = resilient\ strain(in/in)$

Granular		Fine	
k1: 2.03	Bs1: 0.22	k1: 1.35	Bs1: 0.37
Standard Deviation (BASERUT) 0.0104*Pow(BASERUT,0.67)+0.001		Standard Deviation (BASERUT) 0.0663*Pow(SUBRUT,0.5)+0.001	

AC Cracking

AC Top Down Cracking

$$FC_{top} = \left(\frac{C_4}{1 + e^{(C_1 - C_2 * log_{10}(Damage))}}\right) * 10.56$$

c1: 7	c2: 3.5	c3: 0	c4: 1000

AC Cracking Top Standard Deviation

200 + 2300/(1+exp(1.072-2.1654*LOG10(TOP+0.0001)))

AC Bottom Up Cracking

$$FC = \left(\frac{6000}{1 + e^{(C_1 * C_1' + C_2 * C_2' log_{10}(D * 100))}}\right) * \left(\frac{1}{60}\right)$$

$$C_2' = -2.40874 - 39.748 * (1 + h_{ac})^{-2.856}$$

$$C_1' = -2 * C_2'$$

c1: 0.021	c2: 2.35	c3: 6000

AC Cracking Bottom Standard Deviation

1+15/(1+exp(-3.1472-4.1349*LOG10(BOTTOM+0.0001)))

CSM Cracking

$$FC_{ctb} = C_1 + \frac{C_2}{1 + e^{C_3 - C_4(Damage)}}$$

C1: 1	C2: 1	C3: 0	C4: 1000

CSM Standard Deviation

CTB*1

IRI Flexible Pavements

C1 - Rutting
C2 - Fatigue Crack
C3 - Transverse Crack
C4 - Site Factors

C1: 50	C2: 0.55	C3: 0.0111	C4: 0.02

Airport Road at South Bridge PCCP 7.0 1.0

File Name: C:\Users\blaforce\Documents\M-E Templates and HML Files\Traffic XML Files\Airport Road at South Bridge PCCP 7.0 1.0.dgpx

Design Inputs

Design Life: 30 years
Design Type: JPCP

Existing construction: -
Pavement construction: March, 2017
Traffic opening: August, 2017

Climate Data Sources (Lat/Lon): 39.433, -107.383

Design Structure

Layer type	Material Type	Thickness (in)
PCC	R5 Level 1 Lawson	7.0
NonStabilized	A-1-a	6.0
Subgrade	A-2-4	10.0
Subgrade	A-6	Semi-infinite

Joint Design:	
Joint spacing (ft)	15.0
Dowel diameter (in)	1.00
Slab width (ft)	12.0

Traffic

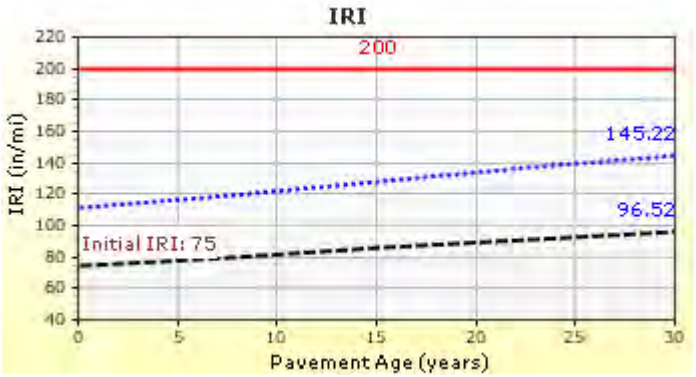
Age (year)	Heavy Trucks (cumulative)
2017 (initial)	70
2032 (15 years)	253,540
2047 (30 years)	564,489

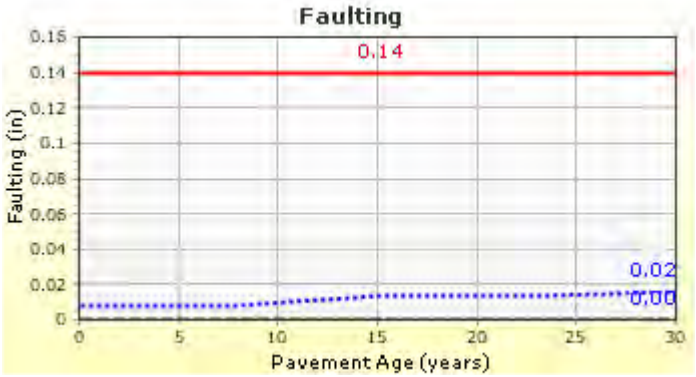
Design Outputs

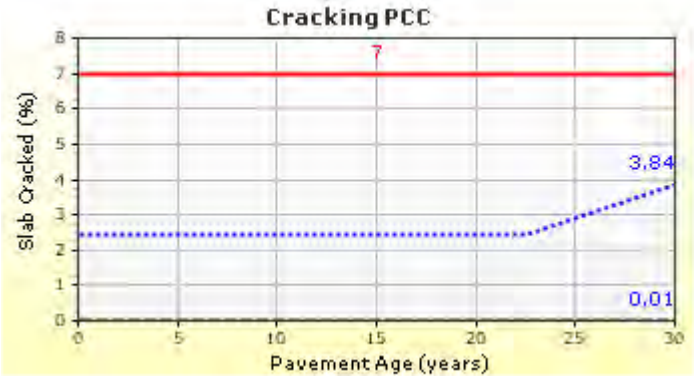
Distress Prediction Summary

Distress Type	Distress @ Specified Reliability		Reliability (%)		Criterion Satisfied?
	Target	Predicted	Target	Achieved	
Terminal IRI (in/mile)	200.00	145.22	95.00	99.98	Pass
Mean joint faulting (in)	0.14	0.02	95.00	100.00	Pass
JPCP transverse cracking (percent slabs)	7.00	3.84	95.00	99.86	Pass

Distress Charts









SH 82 at South Bridge 2-6-6-12 A-4

File Name: C:\Users\blaforce\Documents\M-E Templates and HML Files\Traffic XML Files\SH 82 at South Bridge 2-6-6-12 A-4.dgpx

Design Inputs

Design Life: 20 years
Design Type: FLEXIBLE

Base construction: March, 2019
Pavement construction: June, 2019
Traffic opening: September, 2019

Climate Data Sources (Lat/Lon): 39.433, -107.383

Design Structure

Layer type	Material Type	Thickness (in)
Flexible	R3 SX(100) PG 64-28	2.0
Flexible	R3 SX(75) PG 58-28 United	6.0
NonStabilized	Aggregate Base	6.0
Subgrade	A-2-4	12.0
Subgrade	A-4	Semi-infinite

Volumetric at Construction:	
Effective binder content (%)	10.7
Air voids (%)	5.7

Traffic

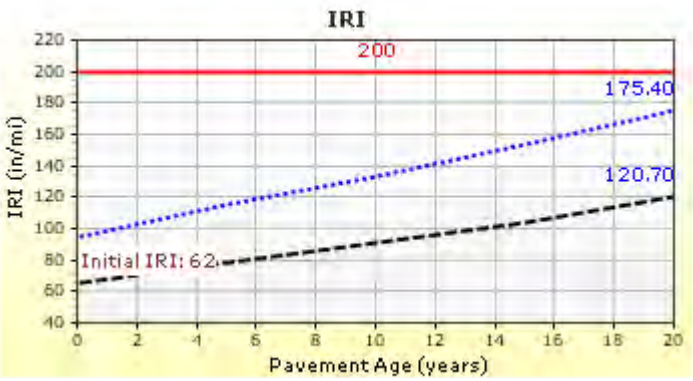
Age (year)	Heavy Trucks (cumulative)
2019 (initial)	1,262
2029 (10 years)	2,206,920
2039 (20 years)	4,735,520

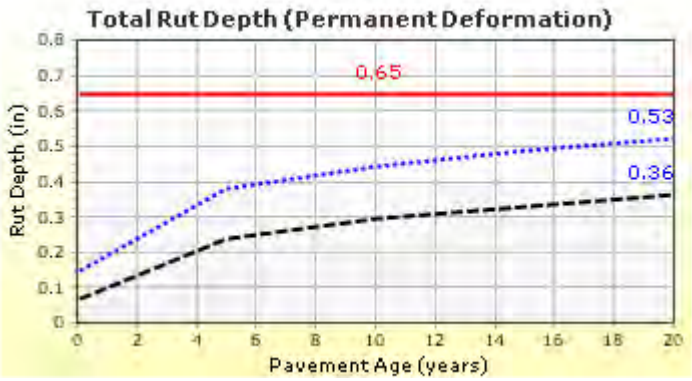
Design Outputs

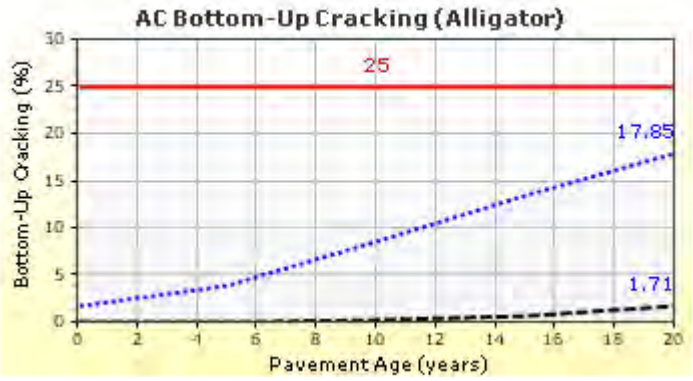
Distress Prediction Summary

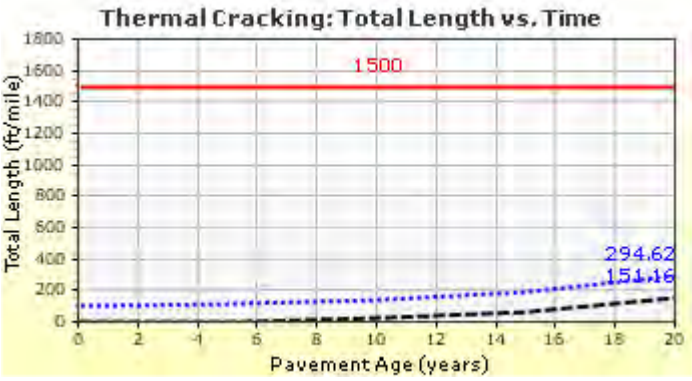
Distress Type	Distress @ Specified Reliability		Reliability (%)		Criterion Satisfied?
	Target	Predicted	Target	Achieved	
Terminal IRI (in/mile)	200.00	175.42	95.00	99.14	Pass
Permanent deformation - total pavement (in)	0.65	0.53	95.00	99.82	Pass
AC bottom-up fatigue cracking (% lane area)	25.00	17.85	95.00	99.12	Pass
AC thermal cracking (ft/mile)	1500.00	294.62	95.00	100.00	Pass
AC top-down fatigue cracking (ft/mile)	2500.00	519.28	95.00	100.00	Pass
Permanent deformation - AC only (in)	0.50	0.34	95.00	99.96	Pass

Distress Charts











SH 82 at South Bridge PCCP 8 1.25

File Name: C:\Users\blaforce\Documents\M-E Templates and HML Files\Traffic XML Files\SH 82 at South Bridge PCCP 8 1.25.dgpx

Design Inputs

Design Life: 30 years
Design Type: JPCP

Existing construction: -
Pavement construction: March, 2017
Traffic opening: August, 2017

Climate Data Sources (Lat/Lon): 39.433, -107.383

Design Structure

Layer type	Material Type	Thickness (in)
PCC	R5 Level 1 Lawson	8.0
NonStabilized	A-1-a	6.0
Subgrade	A-2-4	10.0
Subgrade	A-6	Semi-infinite

Joint Design:	
Joint spacing (ft)	15.0
Dowel diameter (in)	1.25
Slab width (ft)	12.0

Traffic

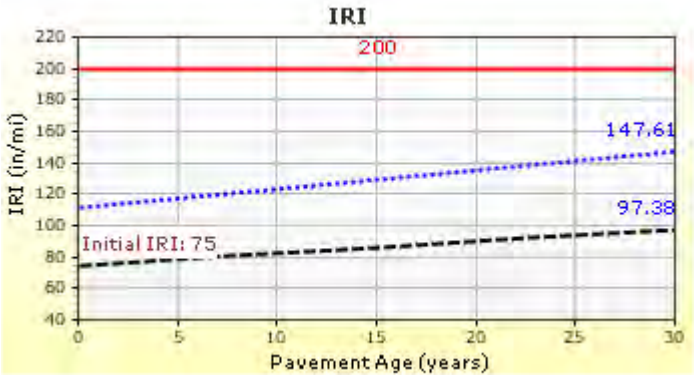
Age (year)	Heavy Trucks (cumulative)
2017 (initial)	1,262
2032 (15 years)	3,428,230
2047 (30 years)	7,632,700

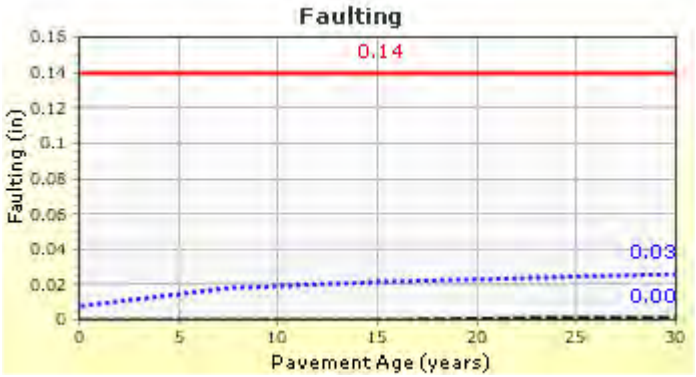
Design Outputs

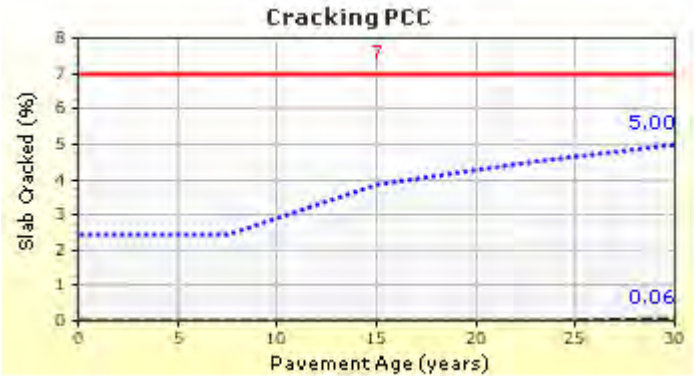
Distress Prediction Summary

Distress Type	Distress @ Specified Reliability		Reliability (%)		Criterion Satisfied?
	Target	Predicted	Target	Achieved	
Terminal IRI (in/mile)	200.00	147.61	95.00	99.96	Pass
Mean joint faulting (in)	0.14	0.03	95.00	100.00	Pass
JPCP transverse cracking (percent slabs)	7.00	5.00	95.00	98.96	Pass

Distress Charts









AIRPORT LEASE AND CONCESSION AGREEMENT

This LEASE AND CONCESSION AGREEMENT is made this 30th day of April, 2024, between THE CITY OF GLENWOOD SPRINGS, a Colorado home-rule municipality, (the "City"), and KGWS Sumers Airpark, Inc., a Colorado nonprofit corporation (the "Lessee").

RECITALS

A. The City owns and operates the GLENWOOD SPRINGS MUNICIPAL AIRPORT, located in Garfield County, State of Colorado, (the "Airport").

B. Lessee desires to lease a parcel of land on the Airport premises for the purpose of managing day-to-day airport operations, erecting new and/or managing existing aircraft hangars owned by Lessee and others for the storage of aircraft, making other improvements to the Airport premises, and maintaining all existing improvements and facilities currently owned and operated by the City.

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, the parties agree as follows:

1. PREMISES. The City hereby leases to Lessee the parcel of land and those improvements located thereon owned by the City commonly known as the Glenwood Springs Municipal Airport, Garfield County Colorado as more fully described on **Exhibit A** attached and made part hereof (the "Premises").

2. CONCESSION.

a. The City hereby grants to Lessee the right to use the Premises for the purposes of operating the Airport as a public airport in accordance with the Glenwood Springs Charter and Municipal Code and applicable state and federal laws, all as may be amended from time to time (the "Concession"). The City agrees that Lessee shall be entitled to all revenue generated by the operation of this Concession, provided however, Lessee shall remit a percentage of gross income as set forth in the chart below, from operation of the Concession (the "Consideration") to the City as consideration for such Concession and this Lease. The Consideration shall be paid in arrears annually on or before February 1st of each year of the Term. At the time the annual Consideration is paid, Lessee will also provide the City with financial statements for the immediately preceding year.

Percentage of Gross Income	Lease Year
1%	2024-2030
5%	2031-2035
7.5%	2036-2040
10%	2040-2044

b. Prior to the effective date of this Lease, the City spent $200,000 from its general fund to improve the Premises for Airport operations (the "General Fund Loan"). The parties agree that the General Fund Loan, plus interest at the rate of 3.5% per annum, will be repaid by Lessee on an annual basis in the amount of 50% of annual net fuel sales less credit card fees (the "Loan Payment"). Estimated Loan Payments based on projected fuel sales is set forth on **Exhibit B** to this Lease for illustrative purposes only. The Loan Payment shall be paid in arrears annually on or before February 1st of each year until the General Fund Loan has been paid in full.

3. TERM. Subject to all other provisions of this Agreement regarding termination reserved herein, the term of this Agreement shall commence on the 1st day of May, 2024, and end on the 30th day of April, 2044 (the "Initial Term"). In the event of an airport closure for the construction of a tunnel under the runway, the term of this Agreement shall toll for the period of such closure.

4. FIRST RIGHT OF REFUSAL TO RENEW AGREEMENT. Lessee shall have the first right of refusal to renew this Agreement twice, each for a period not to exceed ten years, on the condition that Lessee is not in default hereunder at the time of such renewal. To renew this Agreement under the first right of refusal, Lessee shall provide a minimum of six months written notice to the City prior to the expiration of the Initial Term or renewal term, as applicable, stating Lessee's desire to exercise its first right of refusal and the duration of the renewal term. The terms and conditions contained herein shall remain in full force and effect during any renewal of this Agreement unless otherwise agreed between the parties hereto.

5. LESSEE'S RIGHT TO REMOVE IMPROVEMENTS. Upon the termination of this Agreement, Lessee shall have the right to remove any improvements erected by Lessee on the premises during the Initial Term or any renewal. Lessee, upon removal of any improvements, shall restore the land to as good a condition as it was in prior to the erection of any improvements thereon. Lessee hereby agrees that removal of any and all improvements shall be completed on or

before sixty days from termination of this Agreement. Lessee hereby consents and agrees that any improvements remaining on the premises after the termination date of this Lease shall, at the option of the City, be deemed abandoned and owned by the City without any claim or right whatsoever in Lessee.

6. USE OF PREMISES. The leased premises and any and all improvements located thereupon shall be used solely for conducting the following activities:

a. Storage of aviation related equipment;

b. Non-Aviation storage as an incidental use on the condition the space is principally used for aviation purposes;

c. Subleasing of space for commercial and noncommercial aviation-related activities;

d. Establishment of a fixed-base operator;

e. Conduct of public events such as air shows.

f. Fuel sales.

7. CONSTRUCTION – IMPROVEMENTS. Lessee may make improvements (including signage) on the Premises in accordance with the Glenwood Springs Municipal Code, as may be amended from time to time.

8. OBLIGATIONS OF LESSEE.

a. Lessee agrees to operate the Airport in a professional manner.

b. Lessee shall be solely responsible for all costs or charges for utility and other services required or procured by the Lessee during the term of this Agreement.

c. Lessee agrees to maintain the demised premises in a neat, orderly, and safe condition, and free from waste, rubbish, snow or other hazards throughout the term of this Agreement.

d. Lessee shall not store or let stand any equipment or property belonging to the Lessee or under the Lessee's custody, on other City property outside the boundaries of the leased areas without prior consent of the City, except when such equipment or property is in the process of being loaded or unloaded.

e. Lessee agrees at its own expense to cause the premises and improvements and appurtenances thereto to be maintained in a presentable condition consistent with good

maintenance practices. This shall include, although not be limited to, the obligations of the Lessee to maintain the premises in a clean, neat, orderly, and safe condition at all times, which shall also include the obligation to perform maintenance on airport operations facilities including but not limited to the runway, taxiway, aprons, lights, and communications systems, as well as day-to-day mowing and snow removal on the premises. Should the Lessee fail to repair and maintain the leased premises in proper condition, the City shall notify the Lessee in writing. If the Lessee then fails to make such repair or maintenance, or in the case of a more complex repair, provide a remedial plan, within thirty days after the notice has been sent, the City may cause such repair or maintenance service to be made. Lessee agrees to pay all City's costs incurred thereby and reimburse the City therefore on demand. If said costs and expenses are not paid within thirty days after demand therefore, this Agreement shall be deemed to be in default and the City shall be entitled to all legal remedies provided hereunder, including termination of this Agreement.

f. Lessee shall exercise due and reasonable caution to prevent fire, accidents, hazards, or nuisances on the premises. Should the Lessee fail to remove or abate said hazard or nuisance after being notified to do so, the City may abate said hazard or nuisance and charge the cost thereof to the Lessee as provided in subparagraph e above.

g. Lessee agrees to keep the demised premises free of any mechanic's or materialmen's liens or other lien of any kind or nature for any work done, labor performed, or material furnished thereon at instance or occasion of the Lessee and the Lessee further agrees to indemnify and save the City harmless from and against any and all claims, demands, costs, and expenses of any nature whatsoever from any such work done, labor performed, or materials furnished.

h. Lessee shall obey all applicable rules, regulations, ordinances, and laws that may be from time to time promulgated by the City, State and Federal Government or agency thereof.

i. Lessee agrees to cause to be removed from the premises at its own expense all waste, garbage and rubbish and agrees to deposit the same in a manner that ensures its proper disposal.

j. Lessee agrees to reserve one seat on its board of directors for a City representative to be appointed by the City Council. The City representative shall have full and equal authority to all other board members' authorities.

9. INDEMNIFICATION AND HOLD HARMLESS. Lessee expressly agrees to defend, protect, indemnify, and hold harmless the City, its officers, agents and employees free and harmless from and against any and all claims, demands, damages, expenses, losses or liability of

any kind or nature whatsoever which the City, its officers, agents or employees may sustain or incur or which may be imposed upon them for injury to or death of persons or damages to property arising out of or resulting from the acts or omissions of the Lessee, its officers, agents, employees or guests in their use or misuse of the demised premises. Lessee agrees to defend at its own cost, expense and risk all claims or legal actions that may be instituted against either the Lessee or the City, which relate to or arise out of the occupancy or use of the demised premises, or any obligations contemplated, or other rights granted under this Agreement. Lessee agrees to pay any settlement entered into and satisfy any judgment that may be rendered against either the Lessee or the City as a result of any injuries or damages, including reasonable attorney fees, attributable to the Lessee, or its officers, agents, employees or licensees, which arise out of the occupancy or use of the demised premises.

10. CITY ORDINANCES. Lessee hereby acknowledges the applicability of the Glenwood Springs Charter and Municipal Code to this Agreement. Lessee hereby acknowledges notice of the terms, conditions and requirements presently contained therein and agrees, so far as said charter or code provision applies to persons such as Lessee herein, to comply with such provisions as now in effect or as it may be amended during the term of this Agreement or any renewal. Lessee further acknowledges the applicability and agrees to assist in the enforcement of the City of Glenwood Springs Airport Minimum Standards for Aeronautical Activities, attached hereto as **Exhibit C** (the "Minimum Standards"). From and after the Effective Date, Lessee may amend the Minimum Standards with the consent of the City, which consent shall not be unreasonably withheld.

11. INSURANCE. At all times while this Lease is in effect, the City shall maintain insurance on the Premises. As partial performance of the obligations assumed under paragraph 9, (INDEMNIFICATION AND HOLD HARMLESS) hereof, Lessee agrees to reimburse the City for all insurance costs attributable to the Premises. The above insurance policy or policies shall contain an endorsement which provides that the Lessee is named insured as it pertains to said leasehold.

Any insurance policies Lessee may elect to secure to provide the coverages which affect the leasehold premises shall require each insurer to notify the City by registered or certified mail of any modification, termination, or cancellation of any policy of insurance that affects the leasehold premises no less than thirty (30) days prior to the effective date of such modification, termination, or cancellation. Notice by the insurer shall be effective upon the receipt of said notice by the City. In addition to any other requirements of this Agreement, the Lessee shall notify the City of any modification which affects the leasehold premises, termination, or cancellation of any policy of insurance secured by the Lessee pursuant to this paragraph as soon as the Lessee learns of any such modification, termination, or cancellation.

Each of said policies shall stipulate that the policy provided coverage is not subordinate to nor contributing with any other insurance coverage held or maintained by the City. The procuring of such policy or policies of insurance shall not be construed to be a limitation upon the Lessee's liability or a waiver of performance on the Lessee's part of the indemnification and hold harmless provisions of this Agreement; and the Lessee understands and agrees that notwithstanding any policy or policies of insurance it remains the Lessee's obligation to protect, indemnify and hold harmless the City hereunder for the full and total amount of any damage, injuries, loss, expense, costs or liabilities caused by or in any manner connected with or attributed to the acts or omissions of the Lessee, its officers, agents, employees, licensees or the operations conducted by the Lessee, or the Lessee's use, misuse or neglect of the premises described herein.

12. PERMITS, LICENSES AND CERTIFICATES. Lessee shall obtain any and all permits, licenses and certificates which may be required in connection with the improvement and use of the demised premises and conduct of airport operations. Lessee shall comply with all applicable federal, state, and local laws and regulations and the Lessee shall keep in effect any and all licenses, permits, notices and certificates as are required.

13. ASSIGNMENT. Lessee shall not assign this Agreement, without prior written approval from the City. Lessee shall not sublease any part of the Premises without prior written approval of the City, which approval shall not be unreasonably withheld; provided, however, that Lessee may lease or sublease any hangars now or hereinafter located on the premises without prior approval from the City. All subleases shall be in a form approved by the City. Lessee shall reimburse the City for actual costs incurred to review any sublease. The City hereby agrees that this Agreement may be assigned as security for any hangar construction related loan required by Lessee, provided that such assignment permits Lessee to remain in possession except in the event of foreclosure. In the event of foreclosure or forfeiture by the holder of such security, the City consents to further assignment to any person, firm, or corporation which is fully competent and has the necessary facilities, experience, and financial resources to perform the obligations contained in this Agreement on the part of the Lessee to be performed, provided such proposed assignee shall expressly assume said obligations in writing.

14. RIGHT OF ENTRY AND INSPECTION. The City hereby reserves the right to enter into and upon the Premises and any improvements thereon owned by the City at all reasonable times and for all reasonable purposes with reasonable prior notice. The City or its designated representative shall have the right to exercise this right of inspection.

15. GOVERNMENTAL RESERVATIONS AND RESTRICTIONS.

a. There is hereby reserved to the City, its successors and assigns, for the use and benefit of the public, a right of flight for the passage of aircraft in the airspace above the surface of the premises hereby leased, together with the right to cause such noise as may be inherent in the operation of aircraft, now known or hereafter used for navigation of

or flight in the air, using said airspace or landing at, taking off from or operating on the airport.

b. The City reserves the right to take any action it considers necessary to protect the aerial approaches of the airport against obstructions together with the right to prevent the Lessee from erecting, or permitting to be erected, or maintaining any building or other structure on or adjacent to the airport which, in the opinion of the City, would limit the usefulness of the airport or constitute a hazard to aircraft.

c. The City reserves the right to close the airport or a portion thereof for the period deemed necessary by the City for the construction of a tunnel under the airport runway.

d. The City reserves the right to temporarily close the airport or portion thereof in connection with the construction or installation of public improvements that do not materially interfere with the operations of the airport and this agreement. The City will provide at least five days' notice to Lessee prior to start of such construction and temporary closure and use good faith efforts to reopen the airport or portion thereof as soon as practicable.

e. The City reserves the right to close the airport in the event of a declared local disaster emergency and, at the City's sole discretion, use it for aeronautical or nonaeronautical purposes. The duration of such closure shall not exceed the declaration of a local disaster emergency under state law and shall toll the term of this Agreement.

16. THE CITY'S RIGHT OF CANCELLATION. In addition to all other remedies reserved by the City, this Agreement shall be subject to cancellation by the City should one or more of the following events occur:

a. If the Lessee fails to pay when due the whole or any part of the Consideration and such default continues for sixty (60) days after the City has demanded payment in writing.

b. If the Lessee shall fail to perform or keep and observe any of the covenants and conditions contained in this contract to be performed, kept and observed by Lessee, and Lessee fails to correct any breach hereof after sixty (60) days written notice from the City or ten (10) days if the default constitutes a risk to the health or safety of others, then and in such event the City shall have the right at once to declare this contract terminated.

c. The City reserves the right to terminate this Agreement in the event City voters approve the closure of the Airport at a duly-held election pursuant to Section 13.2 of the City Charter.

17. LESSEE'S RIGHT OF CANCELLATION. In addition to all other remedies available to the Lessee, this Agreement shall be subject to cancellation by the Lessee should any one or more of the following events occur:

a. The permanent and complete abandonment of the airport as an aviation facility.

b. The issuance by any court of competent jurisdiction of an injunction in any way preventing or restricting the use of the airport and the remaining in force of such injunction for at least ninety days.

c. The breach by the City of any terms, conditions, and covenants of this Agreement to be kept, performed, and observed by the City and the failure to remedy such a breach for a period of thirty (30) days after written notice from the Lessee of the existence of such a breach.

18. SOUTH BRIDGE. Lesse acknowledges that the City intends to construct a bridge across the Roaring Fork River ("South Bridge") in a location that may interfere with the operations of the airport and require modification of this Agreement as follows:

a. Provided that construction of South Bridge does not require alteration of the Premises in a manner that materially interferes with the operations of or shorten the runway for the airport, the Parties agree to negotiate in good faith to amend Exhibit A to this agreement to accommodate the approved construction plans for the same.

b. Provided that the proposed location and construction of South Bridge does not materially interfere with the operations of or shorten the runway for the airport, Lessee agrees not to engage in opposition to any governmental regulatory processes relating the South Bridge, including but not limited to that occurring under the National Environmental Policy Act, 42 U.S.C. §§ 4321 *et seq*.

19. FORCE MAJEURE. If either party hereto shall be delayed or prevented from the performance of any act required hereunder by reason or act of God, flood, hurricane, tornado, earthquake, pandemic, strikes, or lockouts, which are beyond the control of the party obligated (financial inability excepted), performance of such act shall be excused for the period of the delay and the period of the performance of any such act shall be extended for a period equivalent to the period of such delays; provided, however, nothing in this clause shall excuse the Lessee from the prompt payment of rental or other charges required hereunder to be paid by Lessee except as may expressly be provided elsewhere in this Agreement.

20. DESTRUCTION OF PREMISES. Should the improvements to the demised premises be damaged or destroyed in whole or in part, by fire, earthquake or any other casualty at

any time during the term of this Agreement so that the same cannot be repaired within ninety working days to substantially the same condition it was in immediately prior to the happening of such casualty, then either the City or the Lessee may, within fifteen working days after the ninety working days after the happening of such casualty, terminate this Agreement as of the date of said casualty. Lessee shall proceed, within ninety (90) working days, with the restoration and reconstruction of the improvements on the demised premises to substantially the same condition in which they were in prior to the happening of the casualty. In no event shall the City be liable to the Lessee for any damages resulting to the Lessee from the happening of such fire or other casualty or from the repair or construction of the demised premises or from the termination of this Agreement as herein provided, nor shall the Lessee be released thereby from any of its obligations hereunder except as expressly stated in this clause.

21. COSTS OF SUSTAINING AN ACTION FOR BREACH OR DEFAULT. In the event either the City or the Lessee commences legal action against the other claiming a breach or default of this Agreement, the prevailing party in such litigation shall be entitled to recover from the other reasonable attorney fees and all costs connected with said litigation.

22. PARTIAL INVALIDITY. If any term, covenant, condition, or provision of this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions hereof shall remain in full force and effect and shall in no way be affected, impaired or invalidated thereby.

23. ABANDONMENT. If the Lessee shall abandon the premises or be dispossessed by process of law or otherwise, any personal property belonging to the Lessee and left on the premises after such abandonment or dispossession shall at the option of the City be deemed to have been transferred to the City; and the City shall have the right to remove and to dispose of the same without liability to account therefore to the Lessee or to any person claiming under the Lessee.

24. UNLAWFUL USE. Lessee agrees that no improvement shall be erected, placed upon, operated, or maintained on the demised premises, nor shall business be conducted or carried on therein in violation of the terms of this Agreement or any applicable law, statute, ordinance, regulation, rule, or order of any governmental agency having jurisdiction hereover.

25. BANKRUPTCY. Should the Lessee make an assignment for the benefit of creditors or should a voluntary or involuntary petition of bankruptcy or for reorganization or any arrangement be filed by or against the Lessee, or if the Lessee should become bankrupt or insolvent or if a receiver be appointed at the request of the Lessee's creditors (except as a receiver appointed at the request of the City) such action shall constitute a breach of this Agreement for which the City at its option, may terminate all rights of the Lessee or Lessee's successors in interest under this Agreement.

26. TAXES AND ASSESSMENTS. Lessee shall pay, before delinquency, all taxes, license fees, assessments, and other charges which are levied and assessed against and upon the premises, fixtures, equipment, or other property caused or suffered by the Lessee to be installed, located or placed upon the leased premises. The Lessee shall furnish the City with satisfactory evidence of these payments upon demand from the City. Lessee acknowledges that this Agreement may create a possessory interest subject to property taxation and that the Lessee may be subject to the payment of property taxes levied on such interest. Lessee agrees to assume and pay any such assessment.

27. MARGINAL CAPTIONS. The various headings and numbers herein and the grouping of the provisions of this Agreement into separate section, paragraphs and clauses are for the purpose of convenience only and shall not be considered a part thereof.

28. AMENDMENTS TO BE IN WRITING. This Lease sets forth all of the agreements and understandings of the parties and is not subject to modification except in writing, duly executed by the legally authorized representatives of each of the parties.

29. SUCCESSORS IN INTEREST. The covenants herein contained shall, subject to the provisions as to assignment, apply to and bind the heirs, successors, executors, administrators, and assigns of all the parties hereto; and all of the parties shall be jointly and severally liable hereunder.

30. WAIVER OF RIGHTS. The failure of the City to insist upon strict enforcement of any of the terms, conditions and covenants herein shall not be deemed a waiver of any rights or remedies that the City may have and shall not be deemed a waiver of any subsequent breach or default by Lessee of the terms, conditions and covenants herein contained.

31. NOTICES. All notices given or to be given, by either party to the other shall be given in writing and shall be addressed or delivered to the parties at the addresses hereinafter set forth or at such other addresses as the parties may by written notice hereafter designate. Notices to the City and the Lessee shall be addressed as follows:

To City:	To Lessee:
City of Glenwood Springs 101 8th Street Glenwood Springs, CO 81601	KGWS Sumers Airpark, Inc. P.O. Box 401 Glenwood Springs, CO 81601

32. HOLDOVER. In the event the Lessee shall hold over after the term granted herein, then such holding over shall be construed to be a tenancy from month-to-month only. Prepayment of rent beyond one month shall not be construed to alter or change the month-to-month status of any holdover tenancy. Lessee agrees to comply and abide with all other terms and conditions of this Agreement in the event Lessee holds over after the term provided in this Agreement expires.

33. TIME. Time is of the essence of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be duly executed, with all the formalities required by law on the respective dates set forth opposite their signatures to be effective the day and year first above written.

CITY OF GLENWOOD SPRINGS:

By: _____
Steve Boyd, City Manager

ATTEST:

_____
Ryan Muse, City Clerk

[Remainder of page intentionally left blank]

LESSEE:
KGWS Sumers Airpark, Inc.

By: Gregg P. Rippy
Title: President

STATE OF Colorado)
) ss
County of Garfield)

The foregoing was acknowledged before me this 29 day of May 2024, by Gregg P Rippy as President of KGWS Sumers Airpark Inc.

WITNESS my hand and official seal.

My commission expires: 02/28/2025

SEAN M THOMAS
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20014001267
MY COMMISSION EXPIRES FEBRUARY 28, 2025

Notary Public

EXHIBIT A

[to be added]

CITY PROPERTY RETAINED

AIRPORT LEASING LEASING AREA
(APPROX. 32.15 ACRES ±)

AIRPORT LEASING EXHIBIT

SCALE: 1" = 250'

FOR REVIEW PURPOSES ONLY

DATE: 04-29-2024

CITY OF GLENWOOD SPRINGS ENGINEERING

EXHIBIT B

Illustrative Loan Payments

		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Beginning Balance*		$214,245	$188,144	$159,449	$127,985	$93,569	$56,002	$15,080	$0	$0	$0
Add: Interest	3.5%	$7,499	$6,585	$5,581	$4,479	$3,275	$1,960	$528	$0	$0	$0
Less: Loan Repayment**	50%	$33,600	$35,280	$37,044	$38,896	$40,841	$42,883	$15,607	$0	$0	$0
Ending Balance		$188,144	$159,449	$127,985	$93,569	$56,002	$15,080	$0	$0	$0	$0

*Beginning balance assumes 3.5% interest accrued in 2022 and 2023

**Loan repayment is 50% of net fuel sales minus credit card fees; ends when outstanding balance is zero

Kumar & Associates, Inc.®
Geotechnical and Materials Engineers
and Environmental Scientists

5020 County Road 154
Glenwood Springs, CO 81601
phone: (970) 945-7988
fax: (970) 945-8454
email: kaglenwood@kumarusa.com
www.kumarusa.com

An Employee Owned Company

Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs, and Summit County, Colorado

June 11, 2024

City of Glenwood Springs
Attn: Matt Langhorst
101 West 8th Street
Glenwood Springs, Colorado 81601
matthew.langhorst@cogs.us

Project No. 24-7-230
PO NO. 00243150

Subject: Subsoil Study for Foundation Design, Proposed Shop Building and Police Impound Building, South Yard, Airport Road, Glenwood Springs, Colorado

Gentlemen:

As requested, Kumar & Associates, Inc. performed a subsoil study for design of foundations at the subject site. The study was conducted in general accordance with our agreement for geotechnical engineering services to City of Glenwood Springs dated March 21, 2024. The data obtained and our recommendations based on the proposed construction and subsurface conditions encountered are presented in this report.

Proposed Construction: The proposed shop building will be a metal structure with slab-on-grade floor about 80 feet by 125 feet in plan size and located on the site as shown on Figure 1. The police impound structure is planned to be a single-story masonry building with slab-on-grade floor located on the site as shown on Figure 1. Cut depths for both structures are expected to be minor, around 3 feet. Foundation loadings for this type of construction are assumed to be relatively light to moderate and typical of the proposed type of construction. An OWTS will be needed for the shop building.

If building conditions or foundation loadings are significantly different from those described above, we should be notified to re-evaluate the recommendations presented in this report.

Site Conditions: The south yard is developed with various buildings and facilities as shown on Figure 1. The two proposed building locations are vacant. The ground surface is graded relatively flat with a gentle slope down to the northeast. Vegetation consists of sparse weeds.

Subsurface Conditions: The subsurface conditions at the site were evaluated by excavating 3 exploratory pits in proposed building areas and 2 profile pits in the proposed OWTS area at the approximate locations shown on Figure 1. The logs of the pits are presented on Figure 2. The subsoils encountered, below milled asphalt or road base, generally consist of 1 to 2 feet of silty clayey sand underlain by dense, slightly silty sandy gravel and cobbles with scattered boulders. At Pit 3 located near the proposed impound building, mainly trash was encountered to the pit depth of 8 feet. The results of a USDA gradation analysis performed on a sample of gravel (minus 5-inch fraction) obtained from Profile Pit 1 are presented on Figure 4. No free water was observed in the pits at the time of excavation and the soils were slightly moist to moist.

Foundation Recommendations: Considering the subsoil conditions encountered in the exploratory pits and the nature of the proposed construction, we recommend spread footings placed on the undisturbed natural gravel soil designed for an allowable soil bearing pressure of 3,000 psf for support of the proposed buildings. The upper sand soils tend to compress after wetting and should be removed from footing areas to limit post-construction foundation settlement. Footings should be a minimum width of 16 inches for continuous walls and 2 feet for columns. The upper fill, silty sand soils and loose disturbed soils encountered within footing excavations should be removed and the footing bearing level extended down to the undisturbed natural gravel soils. We assume that the police impound building location will be moved to a relatively undisturbed soil area. Exterior footings should be provided with adequate cover above their bearing elevations for frost protection. Placement of footings at least 36 inches below the exterior grade is typically used in this area. Continuous foundation walls should be reinforced top and bottom to span local anomalies such as by assuming an unsupported length of at least 10 feet.

Floor Slabs: The natural on-site soils are suitable to support lightly to moderately loaded slab-on-grade construction. Existing fill should be removed. Slabs placed on compacted natural sand

soils can be designed for a subgrade modulus of 100 tcf. To reduce the effects of some differential movement, non-structural floor slabs should be separated from all bearing walls and columns with expansion joints which allow unrestrained vertical movement. Floor slab control joints should be used to reduce damage due to shrinkage cracking. The requirements for joint spacing and slab reinforcement should be established by the designer based on experience and the intended slab use. A minimum 4-inch layer of relatively well graded sand and gravel such as CDOT Class 6 base course should be placed beneath slabs for support. This material should consist of minus 1-inch aggregate with less than 50% passing the No. 4 sieve and less than 12% passing the No. 200 sieve.

All fill materials for support of floor slabs should be compacted to at least 95% of maximum standard Proctor density at a moisture content near optimum. Required fill can consist of the onsite granular soils devoid of vegetation, topsoil and oversized rock.

Underdrain System: It is our understanding that the proposed finished floor elevation at the lowest level is at or above the surrounding grade. Therefore, a foundation drain system is not required. It has been our experience in the area that local perched groundwater can develop during times of heavy precipitation or seasonal runoff. Frozen ground during spring runoff can create a perched condition. We recommend below-grade construction, such as retaining walls, be protected from wetting and hydrostatic pressure buildup by an underdrain and wall drain system.

If the finished floor elevation of the proposed structure is revised to have a floor level below the surrounding grade, we should be contacted to provide recommendations for an underdrain system. All earth retaining structures should be properly drained.

Surface Drainage: The following drainage precautions should be observed during construction and maintained at all times after each building has been completed:

1) Inundation of the foundation excavations and underslab areas should be avoided during construction.

2) Exterior backfill should be adjusted to near optimum moisture and compacted to at least 95% of the maximum standard Proctor density in pavement and slab areas and to at least 90% of the maximum standard Proctor density in landscape areas.
3) The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 6 inches in the first 10 feet in unpaved areas and a minimum slope of 2 inches in the first 10 feet in pavement and walkway areas.
4) Roof downspouts and drains should discharge well beyond the limits of all backfill.

Limitations: This study has been conducted in accordance with generally accepted geotechnical engineering principles and practices in this area at this time. We make no warranty either express or implied. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory pits excavated at the locations indicated on Figure 1 and to the depths shown on Figure 2, the proposed type of construction, and our experience in the area. Our services do not include determining the presence, prevention or possibility of mold or other biological contaminants (MOBC) developing in the future. If the client is concerned about MOBC, then a professional in this special field of practice should be consulted. Our findings include interpolation and extrapolation of the subsurface conditions identified at the exploratory pits and variations in the subsurface conditions may not become evident until excavation is performed. If conditions encountered during construction appear different from those described in this report, we should be notified at once so re-evaluation of the recommendations may be made.

This report has been prepared for the exclusive use by our client for design purposes. We are not responsible for technical interpretations by others of our information. As the project evolves, we should provide continued consultation and field services during construction to review and monitor the implementation of our recommendations, and to verify that the recommendations have been appropriately interpreted. Significant design changes may require additional analysis or modifications to the recommendations presented herein. We recommend on-site observation

of excavations and foundation bearing strata and testing of structural fill by a representative of the geotechnical engineer.

If you have any questions or if we may be of further assistance, please let us know.

Respectfully Submitted,

Kumar & Associates, Inc.

COLORADO REGISTERED STEVEN L. PAWLAK 15222 6/18/24 PROFESSIONAL ENGINEER

Steven L. Pawlak, P.E.

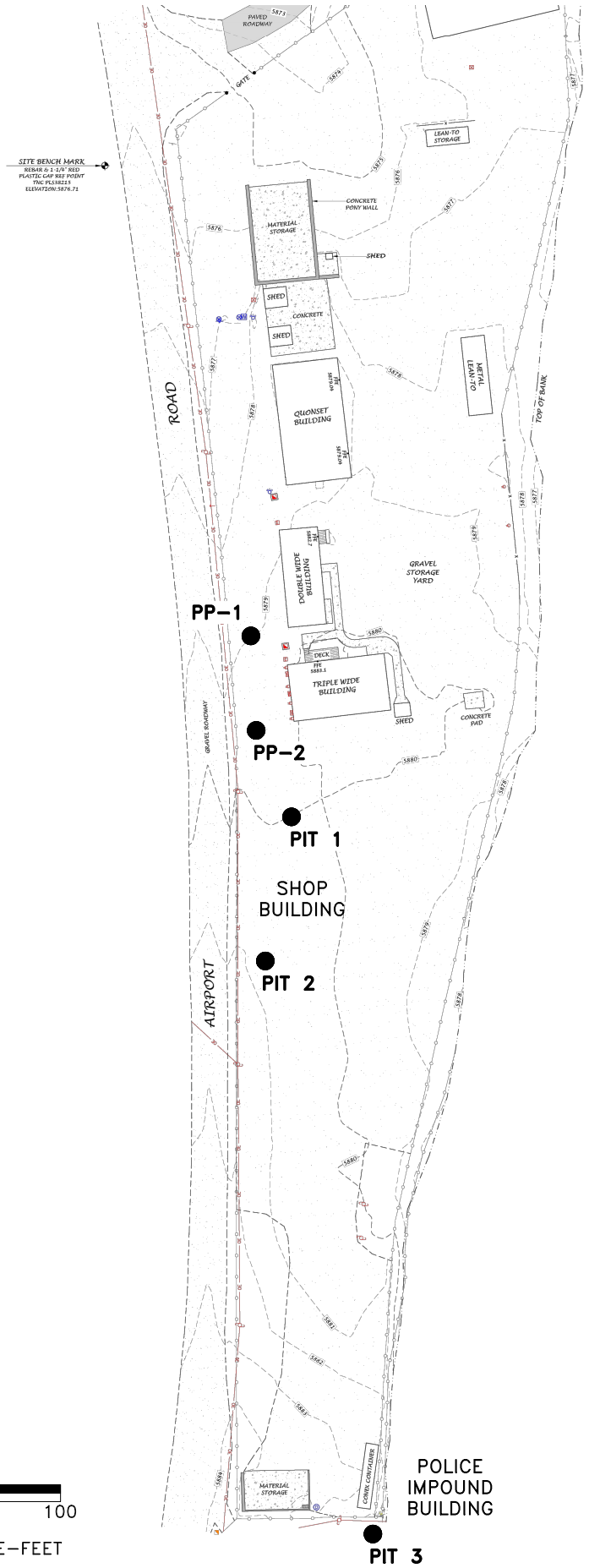
Reviewed by:

Daniel E. Hardin, P.E.

SLP/ljf

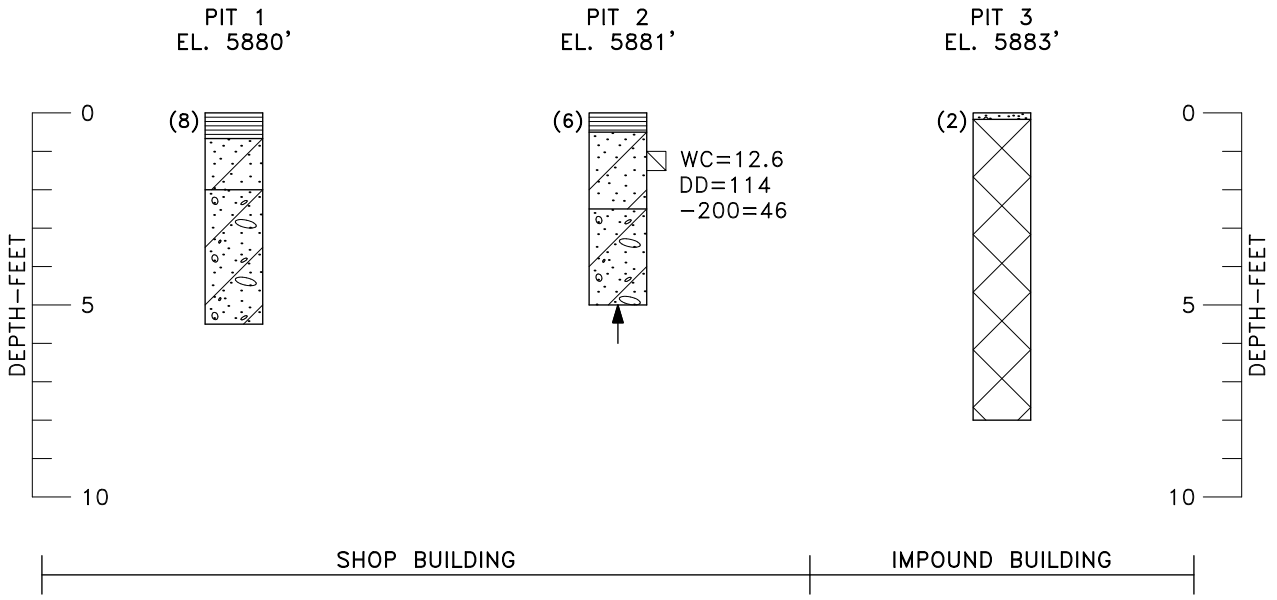
Attachments: Figure 1 – Location of Exploratory Pits
Figure 2 – Logs of Exploratory Pits
Figure 3 – Legend and Notes
Figure 4 – USDA Gradation Test Results
Table 1 – Summary of Laboratory Test Results

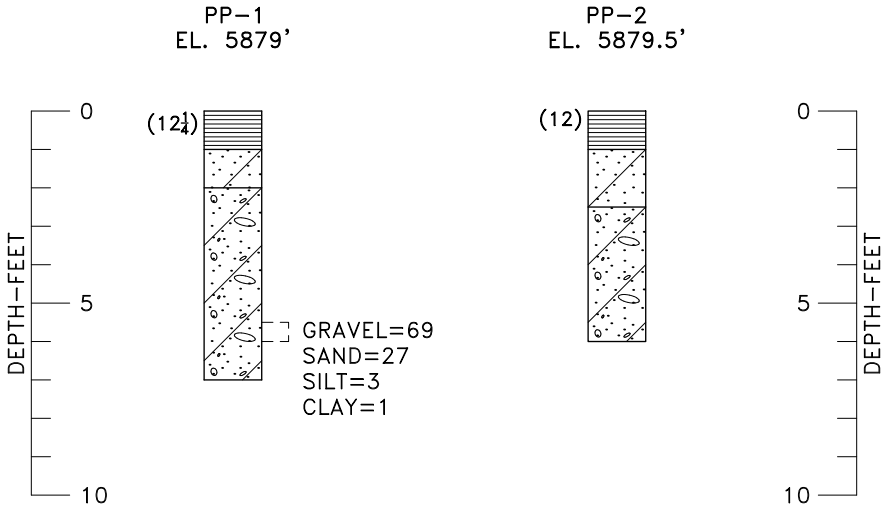
cc: City of Glenwood Springs - Jake Swindell (jake.swindell@cogs.us)



24–7–230	Kumar & Associates	LOCATION OF EXPLORATORY PITS	Fig. 1

June 11, 2024 - 10:23am
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24-7-230	Kumar & Associates	LOGS OF EXPLORATORY PITS	Fig. 2

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LEGEND

(8)  MILLED ASPHALT, THICKNESS IN INCHES SHOWN IN PARENTHESES TO LEFT OF THE LOG.

(2)  ROAD BASE, THICKNESS IN INCHES SHOWN IN PARENTHESES TO LEFT OF THE LOG.

 FILL: BLACK SILTY GRAVELLY SAND WITH PLASTIC, BOTTLES, ASH, BRICK FRAGMENTS AND OTHER DEBRIS.

 SAND (SM–SC); VERY SILTY, SLIGHTLY CLAYEY, SCATTERED GRAVEL, LOOSE TO MEDIUM DENSE, MOIST, BROWN.

 GRAVEL AND COBBLES (GM–GP); SLIGHTLY SILTY, SANDY, SCATTERED BOULDERS, DENSE, SLIGHTLY MOIST, BROWN, ROUNDED ROCK.

 HAND DRIVEN 2–INCH DIAMETER LINER SAMPLE.

 DISTURBED BULK SAMPLE.

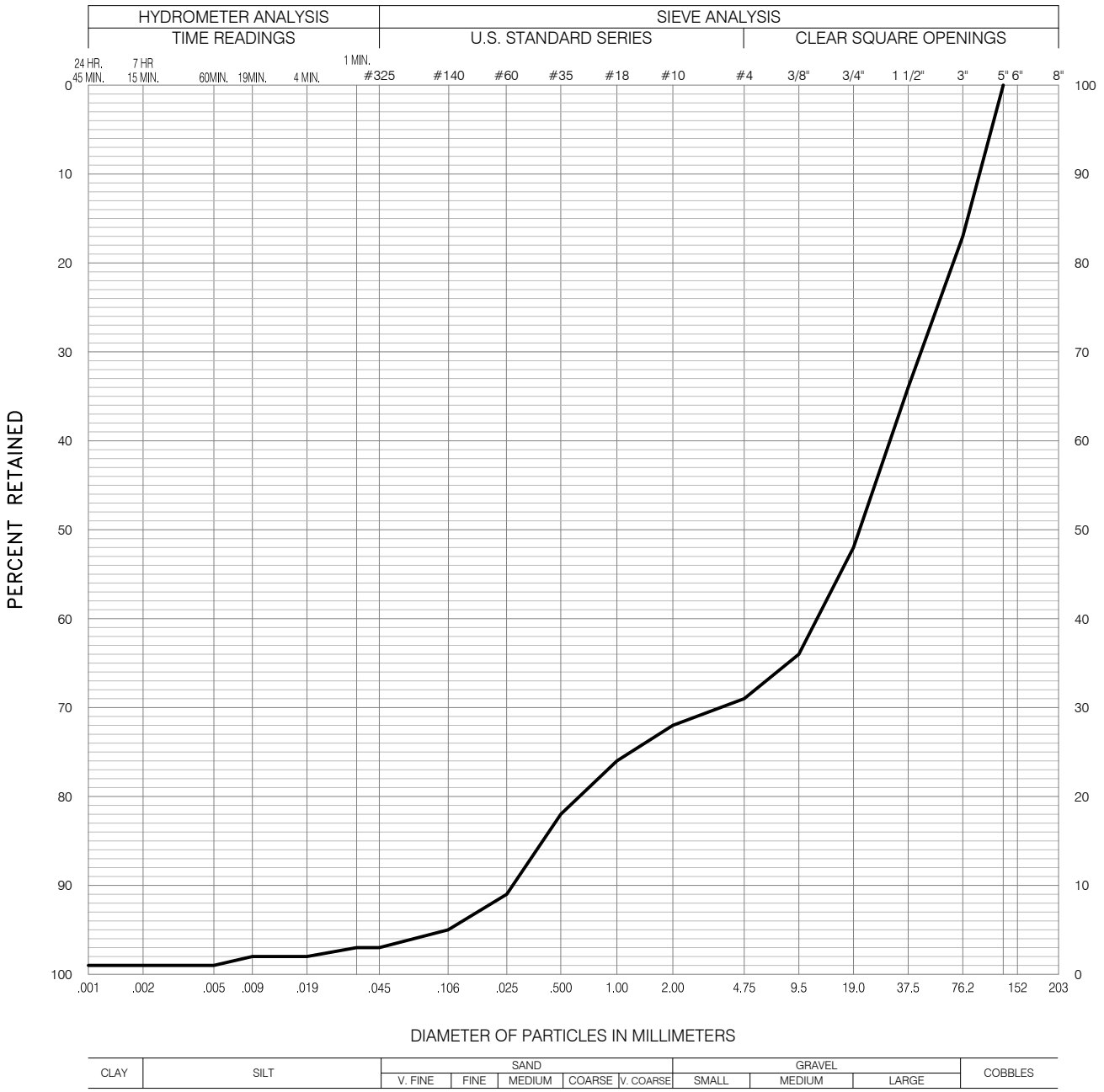
 PRACTICAL REFUSAL TO PIT EXCAVATION.

NOTES

1. THE EXPLORATORY PITS WERE EXCAVATED WITH A BACKHOE ON MAY 22, 2024.
2. THE LOCATIONS OF THE EXPLORATORY PITS WERE MEASURED APPROXIMATELY BY PACING FROM FEATURES SHOWN ON THE SITE PLAN PROVIDED.
3. THE ELEVATIONS OF THE EXPLORATORY PITS WERE OBTAINED BY INTERPOLATION BETWEEN CONTOURS ON THE SITE PLAN PROVIDED.
4. THE EXPLORATORY PIT LOCATIONS AND ELEVATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
5. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY PIT LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE TRANSITIONS MAY BE GRADUAL.
6. GROUNDWATER WAS NOT ENCOUNTERED IN THE PITS AT THE TIME OF EXCAVATION. PITS WERE BACKFILLED SUBSEQUENT TO SAMPLING.
7. LABORATORY TEST RESULTS:
   WC = WATER CONTENT (%) (ASTM D 2216);
   DD = DRY DENSITY (pcf) (ASTM D 2216);
   –200= PERCENTAGE PASSING NO. 200 SIEVE (ASTM D 1140);
   GRAVEL = PERCENT RETAINED ON NO. 10 SIEVE;
   SAND= PERCENT PASSING NO. 10 SIEVE AND RETAINED ON NO. 325 SIEVE
   SILT = PERCENT PASSING NO. 325 SIEVE TO PARTICLE SIZE .002MM;
   CLAY = PERCENT SMALLER THAN PARTICLE SIZE .002MM.

24–7–230	Kumar & Associates	LEGEND AND NOTES	Fig. 3

June 11, 2024 – 10:23am
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GRAVEL 69 % SAND 27 % SILT 3 % CLAY 1 %

USDA SOIL TYPE: Very Gravelly Sand FROM: PP-1 @ 5.5' - 6'

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24-7-230	Kumar & Associates	USDA GRADATION TEST RESULTS	Fig. 4

Kumar & Associates, Inc.®
Geotechnical and Materials Engineers
and Environmental Scientists

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

Project No. 24-7-230

SAMPLE LOCATION		NATURAL MOISTURE CONTENT	NATURAL DRY DENSITY	GRADATION			USDA SOIL TEXTURE				SOIL TYPE
PIT	DEPTH (ft)	(%)	(pcf)	GRAVEL (%)	SAND (%)	SILT&CLAY (%)	GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
2	1	12.6	114			46					Very Silty Clayey Sand
PP1	5½ - 6						69	27	3	1	Very Gravelly Sand

June 30, 2026

City of Glenwood Springs Engineering

Attn: Ryan Gordon, City Engineer
Re: GWS Airport Hangers – Structural Evaluation ***Project No. 26764***

Dear Sirs:

We are very pleased to present this structural evaluation of the Glenwood Springs Airport Hangars. It is our understanding that the City is weighing the feasibility of the structure's relocation to a nearby site to the north. For your consideration, the structural components were evaluated under current loading requirements, and recommended measures to bring them into compliance are presented. Below is general information, a description of the criteria and loading, assumptions, discussions on the various structural components, and a summary.

GENERAL INFORMATION

The structure footprint is approximately 54 feet in the east-west direction x 224 feet in the north-south direction. It houses ten hangers, each 40 feet wide x 36 feet deep, staggered with five on the east side and five on the west side.

Construction is of the early metal building type with cold formed steel roof purlins running north-south and hot-rolled steel frames with bent beams, running east-west to create the gabled roof sloping approximately 1:12. There are two rows of interior columns supporting the bents. Support at the eaves consists of a beam line running north-south with columns 40 feet on center. Lateral bracing consists of reinforcing steel rods in "X" bracing configuration at various bays at the interior column lines. Foundations consist of individual pads and round pedestals at each column.



DRAFT

CRITERIA AND LOADING

The primary concern is snow loading. Lateral bracing for wind and seismic is straightforward in this type of structure. The snow loading used for this evaluation is based on IBC 2021 per City of Glenwood Springs Title 060, Risk Category I, ground snow loading 40 pounds per square foot (psf), and ASCE 7 methodology. Note that while aircraft hangars are generally considered Risk Category II, for this facility we recommend designating as Category I which represents approximately 20% lower snow loadings. This is warranted due to the very low use by persons.

The resulting basic roof snow load for unheated/open buildings is 30 psf. Additionally, unbalanced snow loading is required by ASCE 7 to address increased demand in some members due to drifting effects in gabled roofs. The premise is that wind blowing perpendicular to the ridge will remove snow from the windward side which will deposit on the leeward side of the ridge. This unbalanced snow loading results in the windward side of the gable receiving only 9 psf but on the leeward side of the ridge, the upper 2/3 of the slope is subjected to 41 psf while the lower portion of the slope sees basic roof snow loading of 30 psf.

ASSUMPTIONS

The date of construction is not known to us. However, the appearance is consistent with structures pre-dating the 1990's when higher grades of steel came into common usage. Since material testing has not been conducted, we have used yield stresses of 33 ksi and 36 ksi for the roof purlins and hot rolled shapes respectively. These were the commonly used grades prior to the 1990's.

STRUCTURAL COMPONENTS

- **Roof Purlins**

  Purlins are 10-inch deep cee (known as CS) shapes, with 3 3/8-inch flanges and 5/8-inch lips formed from material approximately 0.080 inches in thickness. The purlins are placed approximately 3 feet 9 inches on center and single pieces span 20 feet between structural steel bents. The difference between this configuration and modern construction is that the purlins break over the bents instead of being lapped. This is an important distinction because when lapped and properly fastened, the purlins can be considered continuous over supports and they can be much more effective in carrying load.

  Under the basic roof snow load, the purlins are approximately 18% over allowable limits in bending stresses. When the unbalanced snow loading is applied to the upper 2/3 of the slope, the purlins are 52% over allowable stress in bending.

  Preliminary calculations for a retrofit to correct these over-stress conditions show that this can be accomplished by adding sections of purlin at the bent locations in order to create more effective continuous span conditions. The sections will be similar in shape and gage, approximately 8 feet in length, of the commonly available 50 ksi material, and fastened back to back to the existing purlins centered on the breaks over the bents.

- **Bent Beams**

  The bent beams are a hot rolled wide flange (WF) product but the shape is no longer in production. The shape is 12 1/8 inches deep and 4 inches wide with a flange thickness of approximately 5/16 inch. This shape falls between current W12x16 and W12x19. The bents, which support the purlins, are spaced 20 feet on center. Two separate lengths run from the eave beams over an

interior column and are welded together for moment transfer at the ridge location. Because the beam sections are continuous over the interior columns, which is efficient, there is compression on the bottom flange and tension on the top flange. This is common, but what is unusual is that there are no braces for the bottom flange.

Due to the lack of bracing on the bottom flange, allowable bending stresses are greatly reduced. Due to this condition, under the basic snow loading of 30 psf uniformly applied to the roof area, the bent beam bottom flanges are stressed to 4 times the allowable. Under the unbalanced snow load case, the bottom flanges are stressed to 4.6 times the allowable.

In order to meet the basic snow load requirement, bottom flange bracing will need to be added in the proximity of the interior columns. These are light angles welded to the edge of the bottom flange and fastened with self-tapping screws into the web of the purlins. Preliminarily, it is estimated that two on each side of each column would be needed, or approximately 8 braces per bent.

The above bracing would still leave the bottom flanges slightly over-stressed when analyzed for the unbalanced snow condition with the eave beams in existing condition. However, as will be discussed below, the eave beams will require reinforcement which will stiffen the eave beams and provide stiffer support for the bents. This stiffening will improve the stress level in the bents such that they will not require any reinforcement other than the bracing.

- **Eave Beams**

These beams run along the east and west edges of the structure, spanning between exterior columns that are 40 feet on center, and supporting the bent beams at one-third points along its span every 20 feet. The hot rolled section is no longer in production. The beams are 15 ¾ inches deep and 5 3/8 inches wide with a flange thickness of approximately 5/16 inch. These have only slightly thinner flanges than current production W16x26 sections. The top flange of the eave beams does not extend to the bottom of the roofing sheets, it is held low to accommodate an eave strut, which is a cold formed member with a sloped top flange to receive the roof sheets on a 1:12 slope. The angle clips that provide the connection between the bent beams and the eave beams are held down from the top flange. Because of these conditions, the top flange of the eave beams cannot be said to be braced.

For these 40-foot long simply-supported beams with this section, unbraced top flanges result in a significant reduction of allowable bending stresses in the top flange. Accordingly, these eave beam top flanges as currently framed are stressed to over 7 times the allowable.

In order to bring these eave beams within code stress levels, two primary improvements can be made. These are to provide flange bracing at 10 feet on center and the other is to provide moment continuity over the columns. Flange bracing can be accomplished by improving the bent beam support clips to effectively create full depth web stiffeners (the beams can then provide the bracing) and by adding connection clips and cold formed blocking back to the purlins at the mid span location. Moment continuity over the columns can easily be done since the building will be disassembled and re-erected at a new location so that there will both the opportunity and convenient access for welding. These continuity plates will be both above the top flange (requiring some coping of the eave strut) and between the column cap plate and the bottom of the beams (column bearing at foundation will need to be lowered to accommodate the added plate). The plates will be in the order of ½-inch x 4 inches x 2 feet and will be fillet welded to the beam flanges. In at least two locations near the building ends (north and south), the continuity plates will need to be longer to also reinforce the beams due to the way the stresses work out with the different span conditions. These continuity plates will also stiffen the eave beams and provide better support for the bent beams, improving their stress levels. Over the columns, bracing of the beam bottom flanges back to the first purlin should be provided. This can be accomplished by

connecting to the existing beam end plates with cold formed blocking or light structural steel shapes back to the first purlin and properly fastened to the roofing panels.

- **Columns**

  The interior columns supporting the bent beams are W8x18's and are approximately 15 feet tall. These are found to be adequate carrying 16.5 kips under uniform snow loading at 45% of allowable and 20.3 kips under unbalanced snow loading at 55% of allowable.

  The exterior columns supporting the eave beams are of the same section as the bent beams, which are not currently in production. These are approximately 12 ¼ inch deep and 4 inches wide with a flange thickness of 5/16 inch, falling between current production W12x16 and W12x19. The height of these columns is approximately 13 feet. These are found to be adequate carrying 11.4 kips under uniform snow loading at 56% of allowable and 11.8 kips under unbalanced snow loading at 57% allowable.

- **Lateral Bracing**

  For wind and seismic resistance in buildings of this type, rod or cable X bracing are commonly used. These are typically used in select roof bays and wall bays.

  In the hangar interior wall lines, rod X bracing is present in some of the wall bays. However, the bracing appears to be insufficient and it will likely be necessary to repair and supplement to provide adequate lateral stability.

  At the roof, there is no X-bracing. Roof paneling of this type commonly used in metal buildings is generally considered insufficiently rigid to provide diaphragm strength. Therefore, rod or cable X-bracing, which can be run below the purlins, will need to be added in various bays. Alternatively, upgraded roof paneling sufficiently rigid to provide shear capacity may be used if economical.

- **Components and Cladding**

This is to address the ability of the paneling, due to its properties and attachment, to resist normal (perpendicular to panel surface) wind pressures. These pressures are normally much higher than those applied to the overall structure due to effects of local geometry.

It is our understanding that the paneling will be replaced when re-location occurs due to practical considerations. The attachment of the new roof paneling to the purlins can be specified as needed for components and cladding pressures. Similarly for the wall panels, attachment can be specified as needed. For the wall panels, however, it will likely be necessary to add intermediate backing members framing between columns to provide adequate support for the panels.

- Foundations

  Foundations in the existing structure consist of round pedestals and presumably pads below grade. These occur at the column locations only. The size and adequacy of these foundations was not studied since new foundations will be provided at the new site. However, an engineered foundation system of this type can be used support the structure.

SUMMARY

The Hangar Structure has served well without visible damage and it is our estimation that it can continue to serve satisfactorily for quite some time as it exists at a new adjacent location. The analysis and recommendations here are within the context of current code requirements and we recommend their implementation for a sound structure with adequate safety and reserve capacity. A listing of these recommended improvements follows.

- Addition of 8-foot purlin sections for span continuity at structural steel (bent beams) supports where purlins break.
- Addition of bottom flange bracing at bent beams near interior columns (8 per bent)
- To brace top and bottom flanges of eave beams, improve the connections where these support bent beams (2 per eave beam), add a connection clip and blocking at mid span, and brace the top flange over the columns by connecting the existing beam end plates to roof panels with cold formed or light structural steel shapes and fasteners.
- Add moment continuity plates at eave beam top and bottom flanges over columns.
- Improve X-bracing at interior wall bays
- Add X-bracing at various roof frame bays or use roof paneling capable of shear transfer.

We would be happy to meet on site with you to discuss the above recommendations. And if needed, we can prepare preliminary drawings and details that can be used for pricing of these additional measures.

We are very grateful for the opportunity to assist you with the Airport Hangars project. Please feel free to contact us with any questions.

Respectfully submitted,
GLENWOOD STRUCTURAL AND CIVIL, INC.

Adolfo O. Gorra, M.S., P.E.
President

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