

Brodhead Park Riverbank Restoration Project: 60% Design Basis Report



Prepared for



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1. Introduction

This Basis of Design Report, which is revised from an earlier draft authored by SWCA Environmental Consultants (SWCA) and Wildscape Engineering (Wildscape), supports the proposed 60% restoration design for the proposed Brodhead Park Riverbank Restoration Project (the Project) led by One Truckee River (OTR) in collaboration with the City of Reno. The vision for the Project is to improve ecological conditions of the riverbank at Brodhead Memorial Park (Brodhead Park, or park) in Reno, Nevada and to cultivate local residents' connection to and stewardship of the Truckee River. As a pilot project, this effort is aimed at building momentum for future urban riverbank restoration projects along the Truckee River. The recommended goals and outcomes of this Project are focused on the specific needs for the park's riverbank and further inform OTR's overall coordinated Vegetation Management Master Planning effort that was funded by Bureau of Reclamation and administrated by Nevada Land Trust. A Project vision statement, goals, and objectives are detailed in Section 2.

Brodhead Park is owned by the City of Reno and managed by its Parks and Recreation Department. OTR hired Wildscape to advance the conceptual restoration engineering design and plans for the riverbank, specifically to address several critical issues facing the Truckee River, including impaired water quality (turbidity and temperature), erosion, and wildlife habitat needs and to improve outdoor community experience. The scope of this design includes restoration of the riparian zone (riverbank) along the south side of the river between the Kuenzli Street and Wells Avenue bridges, which is referred to as the Project area, but does not include the 0.2-acre island that occurs at the downstream end of the park (Figure 1).

The conceptual and intermediate phase of the design process are gathering stakeholder input through close coordination with agencies, such as the City of Reno and the Carson-Truckee Water Conservancy District (CTWCD), and the following diverse groups:

- OTR Technical Working Group (TWG) members (engaged with the overall Vegetation Management Master Planning)
- Local neighborhood including homeowners and renters
- Public safety and human service outreach teams
- River users, including recreational users and unhoused individuals

This input, along with guidance from local codes and regulations, formulated the design strategies that are presented in this Basis of Design Report to address the management needs and opportunities of the Project. The designs will be further advanced based on agency and stakeholder input, permitting constraints, and feasibility considerations.

Lessons learned through the proposed Project have far-reaching implications and benefits for future restoration projects along the mainstem of the Truckee River within Nevada. The proposed Project will improve ecological function and resilience along the Truckee River by targeting the riverbank at the park and clearly defining river access from the paved path to the water's edge, increasing access to the river and stabilizing the riverbank. The focused riverbank work will support previous improvements to the park, like the collaborative OTR effort in 2020 that installed a Portland Loo in the park, and future improvements to the natural and built environment.

The Project design under OTR's Urban Restoration effort complements: 1) OTR's Truckee River Water Trail efforts, which proposes more public facilities, additional put-in/take-out and water access points for paddlers and pedestrians, and trail signage; 2) the Downtown Reno Partnership's 1-mile Makeover, which proposes improvements to the built environment along the Truckee River Corridor from Lake Street to John Champion Park; and 3) The City of Reno Truckee River planning process and recently paved path improvements. This Project will coordinate closely with these three efforts to ensure that Project's plans are compatible with, and further leverage, these other proposed projects.



Figure 1. Project location.

Background and Project History

The restoration planning effort within the park is a pilot project, which directly complements the OTR's Vegetation Management Master Planning effort that has developed a [Framework Vegetation Management and Restoration Plan](#) (Framework Plan) for the urban reach of the Truckee River, within the Reno-Sparks urban core of Nevada (OTR 2022). In conjunction with development of the Framework Plan, OTR developed support tools (a regulatory matrix, web map tool, vegetation management strategies planning tool) to assist in development of implementation-level restoration plans. This Project will be the first of many implementation-level plans and will complement the ongoing master planning effort, including any updated or revised versions of the Framework Plan.

The Project area presented an opportunity to address several critical issues facing the Truckee River, including impaired water quality (turbidity and temperature), erosion, and wildlife habitat needs, and to improve outdoor community experience. The OTR Vegetation Management Master Planning Steering Committee and the City of Reno selected the Project area because it is where a variety of human activity takes place, making it a fitting location to test and learn from management solutions. This section of the Truckee River along Brodhead Park is becoming a proving ground site for piloting collaborative OTR projects for the Truckee River. It is : 1) a demonstration site for OTR's prioritized effort to increase public restrooms along the river with the first "Portland Loo" installed at the park in 2020 and now includes staff from Reno Initiative For Shelter and Equality (RISE) to care for the Loo; 2) a place where different human service outreach efforts to connect unhoused river users with needed services was conducted including from the 2021/22 Washoe County's River Stewards program managed by Karma Box Project that maintained an outreach team to strengthen relationships with people experiencing homelessness through collaborative litter clean-ups with incentives for participants; and 3) an area included in OTR's collaborative effort with the National Park Service and River Network to engage local community leaders in river stewardship and improvements through a Truckee River Community Advisory Team.

The City of Reno is a key Project partner and Milestone I and II has involved the following City of Reno Departments in developing the 30% and 60% design:

- City of Reno Parks and Recreation
- City of Reno Public Works
- City of Reno Utility Services
- City of Reno Clean and Safe Team
- City of Reno Police Department

The departments listed above will continue to be involved through development of the 90% and 100% designs, implementation, and management.

Note: input from the City of Reno Fire Department was gained in the 30% design.

The Project has been designed to meet multiple objectives through several proposed and progressive milestones. The 60% restoration design described herein is the second of the following proposed milestones:

- **Milestone I: The 30% Restoration Design milestone (2021 – 2022)** was to develop a 30% (conceptual) restoration design and the draft Design Basis Report 1) in coordination with OTR and City of Reno and with guidance from the CTWCD, 2) with solicitation of agency input on design ideas and permitting requirements, and 3) through public input on river access and desired uses of the Project area. The 30% restoration design milestone also included preliminary construction resource planning efforts to help identify sources for labor and materials (including some from OTR's partners) to streamline implementation efforts and costs.
- **Milestone II: The 60% Restoration Design milestone (January to December 2023 with funding from the Truckee River Fund)** began with a topographic survey of the Project area and included development of the 60% restoration design and a refined cost estimate to take the Project

through final design and construction. The associated design report (this document) also provides clarity on the agency permits/approvals needed and further refines sources for materials for implementation. During Milestone II, the plant list needed to implement the project was refined based on input during Milestone I and availability of plant materials through coordination with the Washoe State Tree Nursery. With funding from River Network, a community-led research project began in January 2023 focused on building a Truckee River Community Advisory Team with the goal of expanding and deepening connections with individuals living and working near the park. The advisory team's focus is to provide perspective about residents' priorities relating to the river. The advisory team will provide more input and possible community support as the Project advances forward.

- **Milestone III: The Nonprofit Engagement milestone (proposed work under OTR's Partnership Council in Fall of 2023)** will continue to connect and expand relationships with other local nonprofits to: 1) build a system of support where local nonprofits target some of their program activities at the park and its riverbank; 2) build out a timeline, outreach strategy, and a variety of specific activities for local resident volunteers to engage with the Project's implementation and support ongoing care after implementation; and 3) develop a proposal for ongoing coordination of volunteers who can provide support to the park and its riverbank, can be a committed base of local residents and river users that are invested in the riverbank and park improvements, and can enjoy the park's renewed recreation opportunities.
- **Milestone IV: The 90% and 100% Design, Permitting, and Construction milestone (2024)** will 1) develop the 90% and final restoration design plans and specifications, 2) complete project permitting, and 3) cover restoration implementation, including mobilization, site preparation, slope stabilization and bioengineering treatments, plant materials, and labor for installation. Project installation will be collaborative, using government, other non-profit, and private resources available in the area when needed and available. The estimated cost and required materials will depend on design elements, permitting requirements, amount of materials/labor provided through in-kind support, and the outcomes of the 90% Restoration Design milestone.
- **Milestone V: The Public Involvement milestone (future)** will focus on the implementation of public outreach and involvement work defined in Milestone III.

Purpose

The proposed 60% restoration design (provided in Attachment 1) reflects a vision for the riverbank at the park that evolved through collaborative discussions among multiple City of Reno departments mentioned above, OTR, and the Carson-Truckee Water Conservation District. Additional agencies and nonprofits involved with OTR Vegetation Management Master Planning partners, and local residents and river users input will be gained before moving to 90% design. The vision and guidance from Project collaborators were integral to developing the proposed goals and objectives for restoration described below.

Vision

The vision for restoration along the riverbank at the park reflects an integration of ecological and community goals. Both the City of Reno and OTR have expressed that the success of the Project relies on effectively addressing both ecological and social challenges and opportunities, which is captured in the following proposed **vision statement**:

The riverbank restoration project at Brodhead Park will engage the local neighborhood and river users to create an invested stakeholder base to participate in planning, implementing, and ongoing care of the Project that will address critical issues facing the Truckee River (impaired water quality, erosion, wildlife habitat needs) and improve the outdoor community experience. The Project will create more controlled access to the water's edge from the paved path for river users. Project work will support future improvements to the space that could include more designed public gathering spaces, where everyone can enjoy the outdoors and feel an

intimate connection to the Truckee River. The Project design will maintain existing flood conveyance and improve riverbank stability.

Project Goals, Objectives, and Metrics

Through collaborative efforts, including meetings and interviews with stakeholders, OTR and the City of Reno, identified the following Project goals to achieve the Project vision. The objectives provided in Table 1 are strategies to achieve the Project goals. These objectives align with the community and ecological goals or attributes outlined in the Society for Ecological Restoration's (SER's) [*International Principals and Standards for the Practice of Ecological Restoration*](#) (SER 2019). **Note: Some of the objectives are suggestions and might not be achievable through the Brodhead Park Riverbank Restoration Project alone and instead may be long-term objectives that are achieved through supporting efforts.** Specific quantitative metrics are also provided in Table 1.

Ecological Goal

1. Increase ecological function and resilience of the riparian zone along the riverbank within the park and Truckee River aquatic habitat, while ensuring compatibility with flood conveyance and other regulatory constraints.

Community Goals

2. Increase the culture of respect for and connection to the Truckee River that develops an engaged and invested local stakeholder base who will take ownership of the riverbank and support the restoration improvements overtime.

Well-Being Goal

3. Provide opportunities for community physical and mental well-being through improved access to the water's edge, opportunities for recreation along the Truckee River, possible workforce development, and other activities.

Coordinated Vegetation Management Goal

4. Use lessons learned from the Project as a template to be applied at other urban locations along the river, building momentum for restoration to be completed along the entire urban reach of the Truckee River in Nevada.

Table 1: Project Goals, Objectives, and Metrics	
Goal 1 - Ecological: Increase ecological health and resilience of the riparian zone and aquatic habitat.	
<i>Objectives</i>	<i>Metrics</i>
Objective 1: Increase native vegetation cover along riverbanks.	<ul style="list-style-type: none"> • vegetation canopy cover (%) • native species richness
Objective 2: Increase presence of desirable ¹ plants.	<ul style="list-style-type: none"> • quantity of installed plants established (as determined through post-construction monitoring)
Objective 3: Maintain existing shade over the next 10 to 20 years.	<ul style="list-style-type: none"> • # of canopy trees protected • # of canopy trees established
Objective 4: Increase or maintain multistory canopy ² .	<ul style="list-style-type: none"> • canopy cover by canopy type (tree, shrub, groundcover)
Objective 5: Native vegetation displays evidence of natural recruitment within 5–10 years of implementation.	<ul style="list-style-type: none"> • evidence of natural recruitment (i.e., plants growing that were not seeded or planted) 5–10 years after construction
Objective 6: Establish self-sustaining (resilient) vegetation that does not require supplemental water beyond 2 years.	<ul style="list-style-type: none"> • area requiring supplemental water beyond 2 years, except for areas of vegetation replacement
Objective 7: Reduce prevalence of undesirable, non-native vegetation (tree of heaven and Siberian elm).	<ul style="list-style-type: none"> • quantity of undesirable trees
Objective 8: Reduce sediment delivery entering the river.	<ul style="list-style-type: none"> • erosion control treatment cover (including plant cover)
Objective 9: Add stabilized soil substrate back to riverbank slopes to mitigate for historic erosion.	<ul style="list-style-type: none"> • volume of supplemental soil added during Project implementation
Objective 10: Improve soil quality through soil supplementation and amendments.	<ul style="list-style-type: none"> • area of soil supplemented or amended
Objective 11: Develop a comprehensive adaptive management plan that identifies actions to address the most common, expected maintenance needs and identify resources to implement the adaptive management plan after construction.	<ul style="list-style-type: none"> • documentation of adaptive management implementation
Objective 12: Manage human access to the river (foot traffic and support desired uses along the river) to minimize physical impacts to restored areas.	<ul style="list-style-type: none"> • # of established boulder steps for erosion control added • photo documentation of vegetation established in previous undesignated trail locations

¹ Desirable plants include native species that are adapted to site conditions, provide ecosystem services, and do not pose a threat to other native vegetation in the restored area.

² To balance the objectives for multistory canopy and sightlines, trees greater than six feet tall and shrubs less than two feet tall were incorporated into the Project design.

Goal 2 - Community: Increase the culture of respect for and connection to the Truckee River that develops an engaged and invested local stakeholder base who will take ownership of the riverbank and support the restoration improvements over-time.	
<i>Objectives</i>	<i>Metrics</i>
Objective 13: Encourage use of Park by nearby residents and visitors for a variety of uses including recreation and family-oriented activities.	<ul style="list-style-type: none"> • # of people using the park • # of different ways Park is utilized by the local community
Objective 14: Support management of illegal camping by providing sightlines.	<ul style="list-style-type: none"> • documented maintenance of sightlines throughout the park (at established photo points), using a customized visual obstruction reading method
Objective 15: Support litter cleanup to reduce unwanted litter accumulating on the site and entering the river.	<ul style="list-style-type: none"> • # of animal-resistant garbage bins installed • volume of litter removed at the riverbank and the park through cleanup activities • # of volunteers involved with cleanups, plant care, and other park activities
Objective 17: Develop a system to continually coordinate community members to be involved with planning, implementing, and supporting ongoing care of the Project.	<ul style="list-style-type: none"> • # of individuals participating in community input and volunteer services at the park and riverbanks • total # of volunteer hours spent at the site and the monetary value of those volunteer hours (hours × \$31.80 the current estimated National Value)
Objective 18: Garner support from nonprofits to provide program activities to support building an engaged Project stakeholder group.	<ul style="list-style-type: none"> • # of nonprofits involved • # of program activities conducted at park and along its riverbank
Goal 3 – Well-being: Provide opportunities for community physical and mental well-being through improved access to the water’s edge, opportunities for recreation along the Truckee River, possible workforce development, and other activities.	
<i>Objectives</i>	<i>Metrics</i>
Objective 19: Provide expanded access to the water’s edge through modification of existing trails and addition of boulder steps for erosion control.	<ul style="list-style-type: none"> • # of boulder step access points added or formally established for use in the Project area
Objective 20: Explore opportunities to establish a workforce training program for underserved individuals to support river care and restoration while increasing economic opportunities for individuals transitioning from the shelter system to being housed.	<ul style="list-style-type: none"> • # of people served • # of hours of work completed along the Truckee River through the program
Objective 21: Support mixed used retail in the surrounding neighborhood and on the north bank of the river to increase the number and variety of businesses where residents can seek services (e.g., coffee shops, restaurants, and retail).	<ul style="list-style-type: none"> • # of services available in walking distance (within 0.5-mile radius) of the park • change in services available in the area
Objective 22: Create opportunities for residents and visitors to come to the park. Coordinate community events to occur at the park to build social cohesion.	<ul style="list-style-type: none"> • # of events that take place • # of participants at each event
Goal 4 – Coordinated Vegetation Management: Use lessons learned from the Project as a template to be applied at other urban locations along the river, building momentum for restoration to be completed along the entire urban reach of the river in Nevada.	
<i>Objectives</i>	<i>Metrics</i>
Objective 23: Work through OTR’s overall coordinated Vegetation Management Master Planning effort to inform and engage with the Project and other future restoration efforts along the urban reach of the Truckee River in Nevada, including an understanding of all required permits.	<ul style="list-style-type: none"> • # of agencies (including, but not limited to City of Reno, Washoe County, City of Sparks, Reno-Sparks Indian Colony, and state agencies) to be given the opportunity to provide input on the restoration design • development of a comment matrix illustrating how TWG member input informed the restoration design
Objective 24: Inform and disseminate outcomes of the work with the TWG to support future project planning, including revision of the Framework Plan and support tools, which is currently a living document.	<ul style="list-style-type: none"> • # of future projects informed by outcome

Site History and Watershed

Limited site history information is available for Brodhead Park. Historical aerial photographs from 1953 (and as far back as 1939) show an irrigation diversion upstream of the property and an irrigation ditch running through the property near the current alignment of the man-made berm (Figure 2). The upstream half of what is now park was cleared of vegetation. By 1966 the irrigation ditch had been removed, and thick vegetation is present in later aerial photographs. Washoe County Assessor records for the parcel (012-015-09) indicate that the property was granted to the City of Reno in 1967. The park was named after William Brodhead, the former Assistant Chief of Police for the Reno Police Department. Brodhead Park is a Land and Water Conservation Fund Park and therefore has deed restrictions that support its continued use as a park.



Figure 2. Brodhead Park in 1953.

Background information about the Truckee River is provided in Attachment 2. The Truckee River channel within the Project reach was likely a multi-channel system forming a large meadow system (i.e., Truckee Meadows) prior to Euro-American modification. Many reaches of the Truckee River have incised over time, reducing the channel's connection with its floodplain, particularly in the urban encroachment areas such as the Project reach.

The Project reach is within a larger 1.5-mile area (from Lake Street in Reno to Fisherman's Park in Sparks) is where people are often illegally camping along the riverbank. This, with other activities, has affected much of urban reach of the Truckee River. The larger area is further affected by commercial and industrial uses including the Waste Management regional transfer station, the Interstate 580 highway interchange over the river, and Truckee Meadows Water Authority's Glendale Water Treatment Plant. The 1.5-mile area has five river-side parks (Brodhead Park, John Champion, Fisherman's, Fisherman's I, and Fisherman's II).

This area is also characterized by a lack of public infrastructure along the Truckee River. Outdoor recreational opportunities are available along most of the Truckee River corridor, but public facilities, such as restrooms, are scarce. The 2050 Regional Transportation Plan also identifies two bridges (Wells Avenue and Sutro Street) as needing sidewalk, bike, and pedestrian improvements (Regional Transportation Commission 2021). The U.S. Census Bureau's American Community Survey reports that this area of Washoe County has the highest percentage of citizens that spend 30% or more of their household income on rent (Nevada Tomorrow 2022).

2. Data Collection, Analysis and Results

Data Review and Site Assessment

Wildscape conducted a desktop review of existing data, including a detailed review of aerial imagery and bathymetric LiDAR data provided by Washoe County. This LiDAR data was collected on December 5, 2014, and included default and ground (including bathymetric returns) and was used to inform the assessment of site conditions.

Multiple field assessments of the Project area were conducted in February 2022, May 2022, and June 2023 with a focus on the riverbank north of the paved trail to document current vegetation, soil, and bank slope conditions. This information was collected to inform the engineering design and planting plans. Areas of concern due to severe erosion, steep or unstable slopes, and exposed tree roots were identified. Management opportunities, such as trail access points, stable slopes, and mature and healthy trees were also noted.

Topographic Survey

U.S. Geomatics conducted a professional land survey of Brodhead Park on June 14, 2023 when the Truckee River gage at Reno (U.S. Geological Survey gage #10348000) measured a discharge of 2,000 cubic feet per second (cfs) at noon on the day of the survey. During the survey U.S. Geomatics located existing boundary monuments within the park to establish the true position of existing property lines and street right-of-ways. Surveyors located all existing features, structures, surface utilities, and grade breaks within the Project area (Attachment 3). The ordinary high water mark (OHWM) as delineated in prior surveys (Records of Survey 1167) was used as a basis for property lines along the river. A digital topographic model of the Project area suitable for engineering design was developed.

Based on the survey, an overlap of the Project design with the City of Reno right-of-way for Kuenzli Street was identified on the southwest corner of the Project area. A City of Reno encroachment permit will be required for work in this area (see Section 4).

Hydrology and Hydraulics

An existing and vetted hydraulic model for the Truckee River including specific hydrology input was provided by the CTWCD. Hydrology provided for the current design analysis is the 14,000 cfs discharge hydrograph used in the CTWCD mixed 1-dimensional/2-dimensional HEC-RAS model (Figure 3), which is the current estimate of the 100-year flood event (0.01 annual exceedance probability). This 100-year event is being used to test the proposed treatment measures to ensure the measures are stable and effective and do not cause a measurable increase in water-surface elevations. The CTWCD HEC-RAS model for the Project reach is a one-dimensional model. Review of the model parameters was conducted by the Wildscape senior water resource engineer and no obvious adjustments were required for analysis of the proposed treatments.

Maximum velocities for the 14,000-cfs event range from about 9 to 15 feet per second (fps) in the Project reach (near the channel thalweg). On the right (south) bank, velocities range from about 3 to 5 fps. A plot of the maximum velocity distribution for the study reach is shown in Figure 3.

The following summarizes the hydrology and hydraulic data used to develop 30% and 60% designs.

Bank Conditions and Topography

The Project reach between Kuenzli Street and the bridge crossing of South Wells Avenue is approximately 1,200 feet long, and the average bank-to-bank width of the Truckee River over the Project reach is about 130 feet. The average channel thalweg slope is fairly flat at 0.003 (i.e., 0.3%), and right bank slopes in the Project reach range from 25% to 50% (i.e., 4:1 to 2:1). When the new South Wells bridge was installed (assumed to be set well above the 100-year water-surface elevation), the Old Wells Street Bridge was left in place and is likely causing a backwater area where velocities are slowed. If the old bridge were to be removed, the water surface elevation would likely be lowered and there would be an increase in the upstream velocity (Figure 4).

As introduced above, the river is significantly incised and disconnected from its floodplain with the exception of the large active right (south) bank bar that has developed near the downstream end, likely as a result of the old bridge backwater area and is functioning as a localized inset floodplain. In the Project reach, many of the steep banks have been fortified with rounded, native boulders mixed in with intermittent large pieces of concrete debris. Several bank areas display signs of accelerated erosion with noticeable gullies and rills and exposed tree roots from a combination of fast-moving flood waters, concentrated areas of site runoff and heavily used earthen access trails. Rounded river boulders that currently armor several of the banks are not typically used for riprap slope revetment given that they can be less stable and more easily “washed out” along their smooth surface than angular rocks. An upper earthen bank between the Kuenzli Street bridge and the Portland Loo above the paved trail is also very steep (~1:1 slope) and actively eroding.

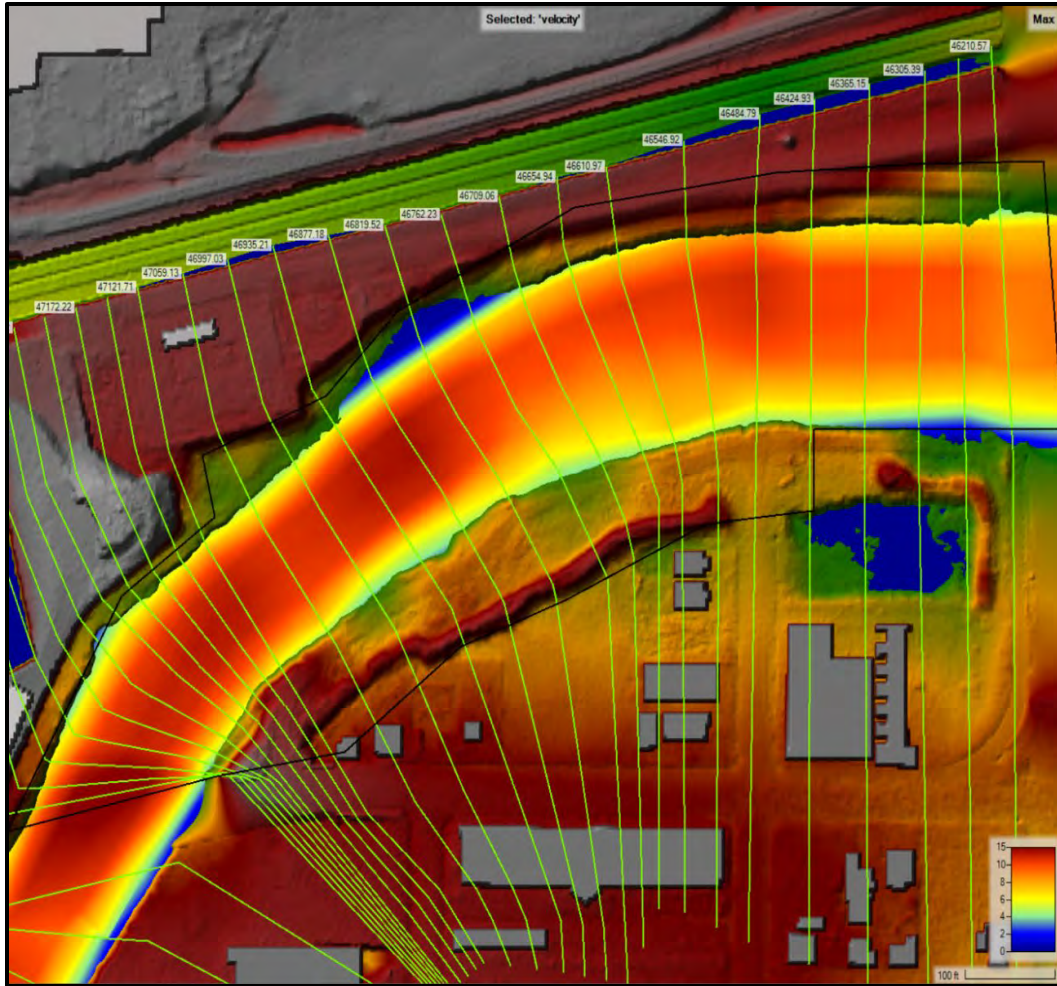


Figure 3. 14,000-cfs velocity distribution (in fps) within the Brodhead Reach (Source: CTWCD Hydraulic Model).

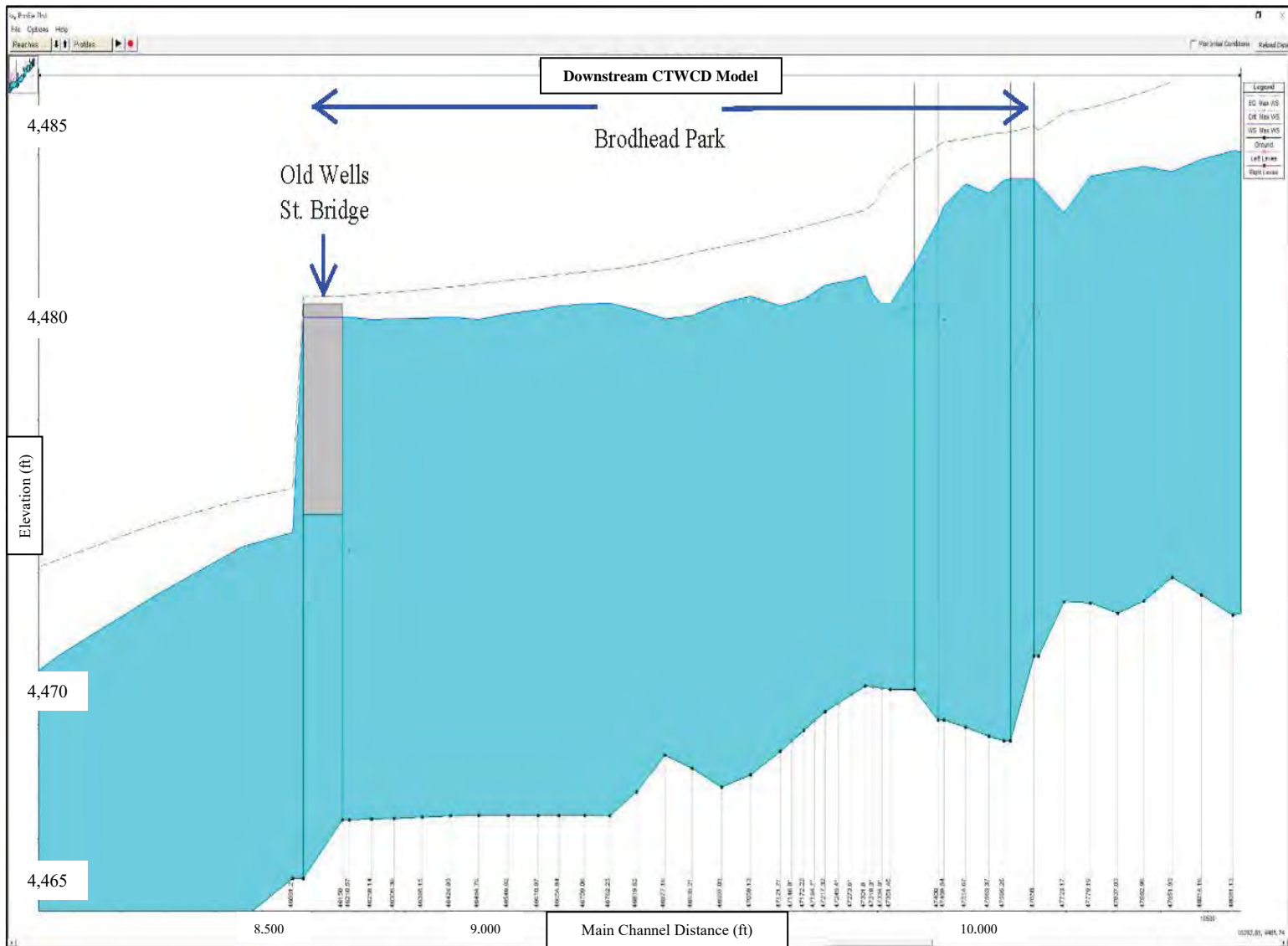


Figure 4. Longitudinal profile of Truckee River through the Project area.

Existing Vegetation

A reconnaissance-level survey of woody vegetation was conducted in February 2022 during the site assessment. This vegetation survey primarily focused on identifying sites for vegetation enhancement, including sites dominated by undesired species or sites with low vegetation cover or diversity. Existing vegetation within the Project area was mapped at the patch level, as shown in Figure 5. Trees in the park were also mapped and measured by City of Reno Forester, Matt Basile and recorded using TreeKeeper software. Additional revegetation planning assessments were conducted in June 2023 by Botanical and Erosion Control Specialist, Julie Etra of Western Botanical Services and Wildscape Restoration Ecologist, Dr. Susan Mortenson to identify specific areas for planting and suitable species.

Vegetation within the Project area is composed primarily of overstory trees (e.g., Fremont cottonwood [*Populus fremontii*], Siberian elm, and gray alder [*Alnus incana*]) with greater shrub cover (e.g., crack willow [*Salix fragilis*], and Wood's rose [*Rosa woodsii*]) near the water. Groundcover is mostly lacking because the riverbank and shoreline are compacted by foot traffic. Riparian tree establishment is limited to vegetative spread due to the channelization of the river and sediment dynamics (i.e., dominance of erosion over deposition). Most of the cottonwoods are older and deteriorating. Many cottonwood and willow trees have been damaged by beavers (*Castor canadensis*) although some tree trunks have been wrapped with hardware cloth for protection.

Noxious weeds as defined by the State of Nevada Department of Agriculture were not observed. The most significant invasive plant is the tree of heaven. Tree of heaven can inhibit growth of nearby plants by emitting chemicals in the soil and forms dense monocultures through vegetative reproduction (DiTomaso et al. 2013). Tree of heaven appears to be a newer invasive plant along the riverbank at the park, based on the lack of large trees. The City of Reno uses a cut stump treatment, but re-treatment is almost always required (M. Basile, pers. com.). Siberian elms are also abundant and will be removed using similar methods where their removal will not cause further bank destabilization (M. Basile, pers. com.). The City of Reno plans to treat and remove some of the tree of heaven and Siberian elms in 2023 and 2024, and the contractor selected for this project will treat the remainder of invasive plants based on field direction. Due to slope instability, roots are not planned for removal and some invasive trees may be left to help stabilize the slope while native plants establish.

In November 2023, field work and mapping for an aquatic resources delineation of the Project area that included delineation of the OHWM was conducted by Dr. Mortenson, a certified wetland delineator. The delineated OHWM generally matched the OHWM provided by the Professional Land Survey that was used to define the 60% design Project boundary (Figure 6, Attachment 3). Additional wetlands other than the Truckee River were not documented in the Project area which agrees with the US Fish and Wildlife Service National Wetlands Inventory Data (USFWS 2023).

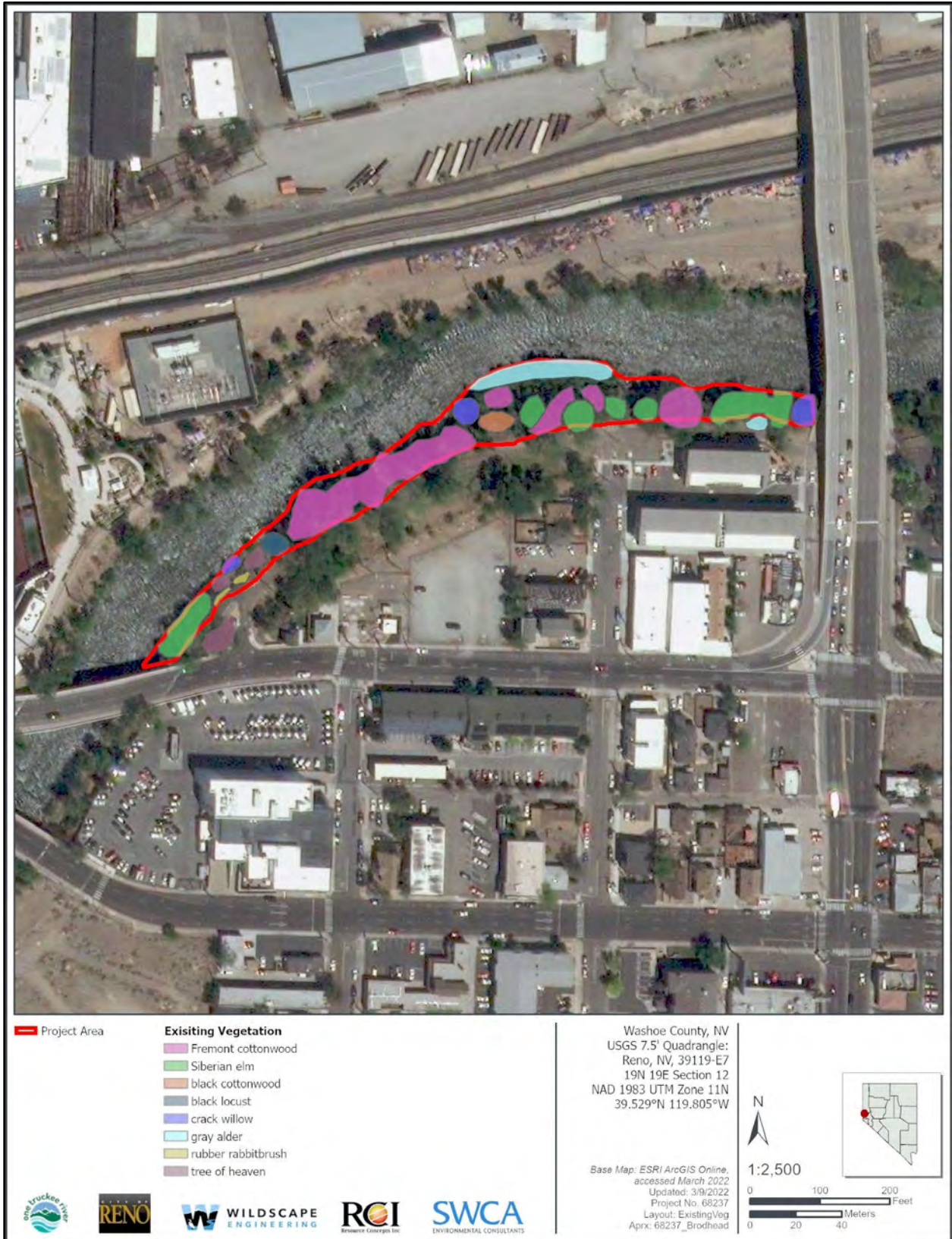


Figure 5. Dominant plants in vegetation patches as mapped in February 2022.

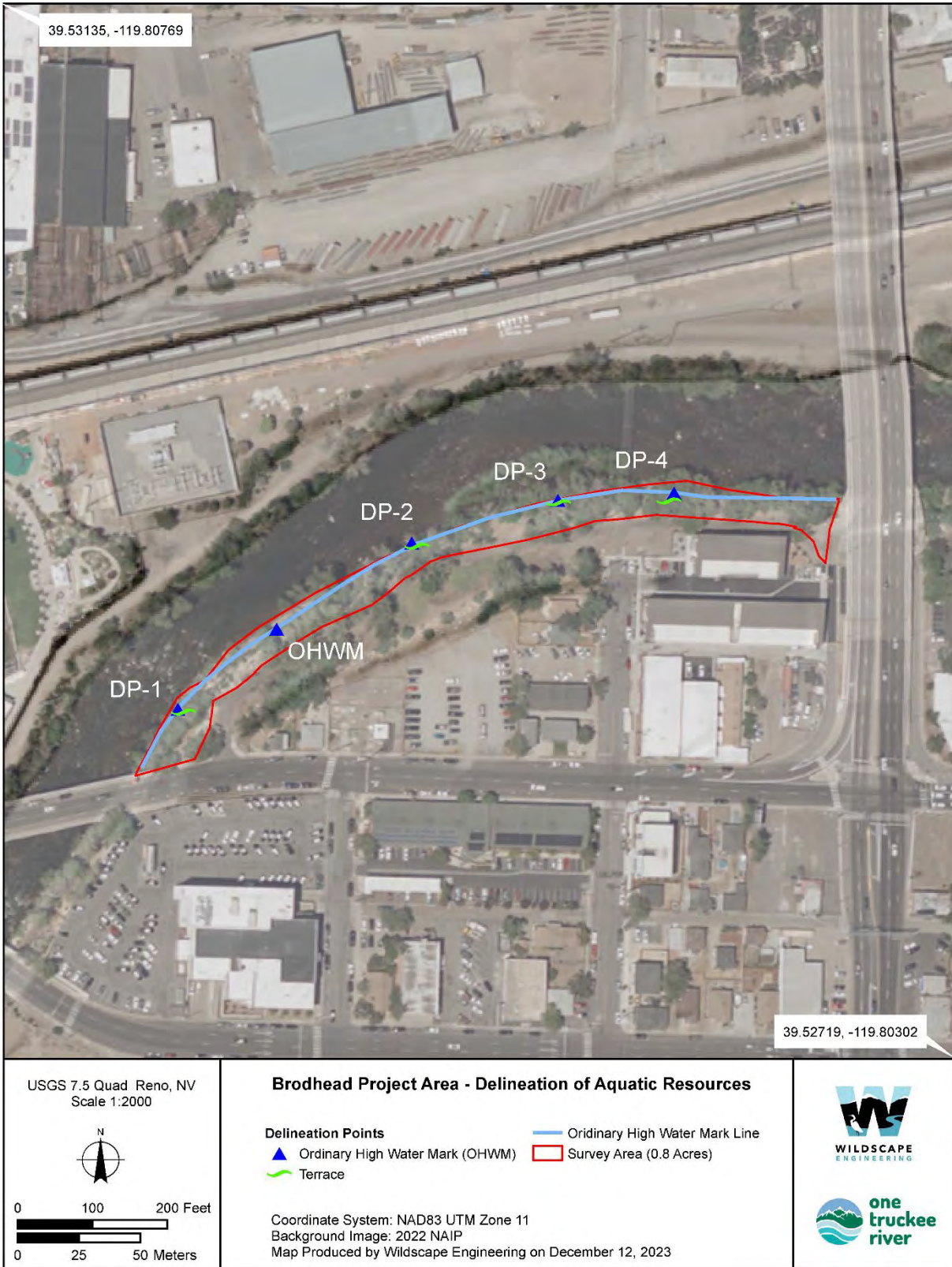


Figure 6. Ordinary high water mark as delineated in November 2023 compared with Project area.

Soil Conditions

A reconnaissance-level pedestrian survey of soil conditions revealed that most of the riverbank within the Project area is steep (25% to 50% slopes) and highly eroded; however, soil conditions within the area are variable. The site is generally characterized by exposed slopes with high densities of rock fragments. Most locations had rock fragment densities ranging from 40% to 90%, with most rocks being cobble- to boulder-sized, ranging from 0.5 to 4 feet in diameter. A few locations along the riverbank contained rock densities of 20%–30%. Soil textures along the riverbank ranged from sandy loam to loamy sand.

The area between the paved river path and the shoulder of the riverbank is comparatively flat with gentle slopes. While the majority of these areas are flat, they are relatively unvegetated and have few rock fragments (10% or less). It appears that “decomposed granite” may have been applied to the surface in the past, as the soil texture is coarse sand to sandy loam along the surface. Note: After the field surveys were completed, the City of Reno has since applied wood mulch to the flat, upland areas between the riverbank and paved trail, and planted cottonwood saplings near the water’s edge.

Community Outreach and Stakeholder Engagement

Community outreach and stakeholder engagement for the Project conceptual restoration design included the events listed below. Details on the outcomes of these meetings are provided in Section 3.6.

- Kick-off meeting with consultants and agencies
- Meeting with Reno Police Department
- Community outreach event at IMBIB Brewery
- City of Reno implementation planning meeting
- Conceptual design meeting with City of Reno

OTR, with support from SWCA, Truckee Meadows Park Foundation’s AmeriCorps Program, and National Park Service conducted a community outreach and stakeholder engagement activity. The purpose of these meetings was to actively involve relevant stakeholders in the conceptual restoration design process and solicit public input on use of the Project area and desired outcomes from park enhancements. Highlights from those meetings are summarized below.

Agency Kick-off Meeting

An on-site agency kick-off meeting was held at Brodhead Park on November 12, 2021, and included representatives from City of Reno Parks and Recreation, OTR, the CTWCD, SWCA, and Wildscape. The meeting was an opportunity to introduce Project team members, discuss the Project background and view the site as a group, so that high level desired outcomes could be identified and discussed. In depth discussions also focused on permitting considerations, jurisdictional constraints (especially constraints related to the 14,000-cfs conveyance zone), and management challenges and opportunities. The outcomes of that meeting have directly guided the engineering design and basis of design report provided here.

Meeting with Public Safety and Human Service Outreach Representative

An on-site meeting with public safety and human services outreach was held at Brodhead Park on January 26, 2022, and included representatives from OTR, Reno Police Department (RPD), Karma Box Project, and SWCA. The purpose of this meeting was to gain clarity on what type of vegetation and management of it would support efforts to increase public safety and human service outreach in the Project area from the RPD and Karma Box Project. This meeting was also intended to start building a relationship with RPD and human service outreach teams to support future collaboration. The meeting afforded an in-depth discussion of public safety needs and best practices. Standards developed for Crime Prevention through Environmental Design (CPED) were discussed such as specific guidelines for vegetation and other park features that can support public safety:

- Minimize opportunities to hide by avoiding vegetation between the heights of two feet and six feet.
- Walkways should be direct and follow natural pathways, avoiding blind corners.
- Maintain sightlines and minimize areas out of the public eye.

Maintenance of sightlines through vegetation management was emphasized. RPD expressed their genuine support for the Project and their desire to see it be successful and further identified other park improvements (outside of restoration) that would encourage positive behaviors and appropriate park use.

Community Outreach Event at IMBIB Brewery

A community outreach event was held on May 15, 2022, at IMBIB Brewery near Brodhead Park, in Reno, Nevada. The event was aimed at identifying members of the local neighborhood and community who have an interest in the park and to begin building relationships with individuals who could become invested stakeholders in the Project in the future. The meeting was attended by nine people, including three members of the local neighborhood, two members of the City of Reno Park and Recreation Commission, one Karma Box Project employee, and three Reno citizens (who live outside of neighborhood). Public input included the following: identification of what the Truckee River means to each individual and personal stories from the river; general input on OTR's coordinated vegetation management planning effort; specific suggestions on the restoration design plans; and input on desired improvements to the Truckee River corridor. The public had questions about plans for implementation, including funding sources, as well as concerns about restoration design being adequate to withstand a large flood. Specific suggestions for the restoration design and the park improvements included: input on boulder steps for erosion control locations and "hangout" areas near the river, community art installations and markers, needs for safety, requests for more community events, and requests for interpretive signage to describe the restoration.

City of Reno Implementation Planning Meeting

The City of Reno hosted an interdepartmental meeting on June 29, 2022, to discuss Park Restoration plans (including implementation planning) and OTR's greater coordinated vegetation management planning effort. The meeting included City of Reno Public Works, Parks and Recreation, Urban Forestry, Clean and Safe Team, Fire Department, Police Department, as well as OTR and SWCA. Through the meeting, City of Reno staff identified strategies to improve the Framework Plan (OTR 2022). Staff also identified potential maintenance concerns for Brodhead Park and the river in general, including concerns with; litter/dumping, encampments, a need for on-going site maintenance, and crime and safety. CPED strategies were referenced as being part of potential methods to address crime and safety. Other solutions included: controlled access to the river edge, boulder placement, activation of the space, outreach and events, encourage recreational use, maintenance of sightlines through willow and plant trimming, and increased staff to complete plant maintenance work. The group discussed potential implementation resources that could be provided by the City of Reno to support the Project.

Conceptual Design Meeting with City of Reno

A conceptual design meeting was held at Brodhead Park on August 30, 2022, to discuss the draft conceptual restoration design and to solicit input from the City of Reno on design plans and possible improvements. The meeting included City of Reno Public Works, Public Utilities, Parks and Recreation, Clean and Safe Team, Fire Department, RPD, as well as representatives from OTR, SWCA, and Wildscape. The discussion included opportunities for collaboration on stakeholder outreach (especially with nearby developers), stump/log inventory (to inform restoration planning), and plant propagation with the City of Reno nursery. There were specific suggestions for: 1) plant materials that will be compatible with maintenance and needs for sightlines, including management of thicket-forming willows that do not support line-of-sight; 2) engineering and erosion control, including stormwater outfalls that need to be identified, 3) strategies to address human dynamics, and 4) irrigation and maintenance. Those suggestions were integrated into the 60% designs.

60% Design Kickoff Meeting with City of Reno and CTWCD

A meeting to kick-off the 60% design phase was held at the Park on July 25, 2023. Representatives from CTWCD, RPD, City of Reno Parks and Recreation, City of Reno Public Works, City of Reno Utilities Services, Nevada Division of Forestry, OTR, and Wildscape attended. Topics of discussion included a review of Project goals and objectives, review of 30% design components, and potential additions or modifications to be incorporated into 60% design. A walk-through of the Project area was conducted to discuss individual elements of the design.

3. Regulatory Constraints and Required Permits

Several regulatory constraints are being considered and addressed through the Project, to ensure the Project meets the regulatory requirements and aligns with applicable guidance documents that were described in Appendix A of the Framework Plan (OTR 2022). The permits and regulatory requirements are outlined in three categories: 1) regulatory guidance that is pertinent to the Project, 2) permits or approvals that are needed for project implementation, and 3) permits that were deemed unnecessary based on Project design components. This 60% design will be provided to regulatory agencies for review to gain feedback and ensure that all necessary permits will be obtained.

Applicable Regulatory Guidance

- **Municipal codes and ordinances.** The Project is located on public land owned by the City of Reno within Washoe County, Nevada. The Project will be subject to City of Reno and Washoe County Codes and Ordinances.
- **Guidance and plan documents.** Relevant guidance documents include the following: City of Reno - Master Plan Conservation Plan (City of Reno 2008); [City of Reno – Parks, Recreation and Open Space Master Plan](#) (City of Reno 2023); One Truckee River Management Plan (OTR 2016); Truckee River Flood Management Authority Flood Protection Plan (2015); City of Reno Integrated Vegetation Management Plan (RCI 2019); and the City of Reno Public Works Vegetation Management Plan (RCI 2017).

Required Permits and Approvals

- **National Environmental Policy Act (NEPA):** Because funding for implementation was originally sourced from a federal agency, the Project must comply with the NEPA. An analysis of environmental impacts must be conducted to understand the potential for impacts and the NEPA process required. Documentation including a project description, need for proposed actions, coordination with U.S. agencies, and efforts to involve the public will be required to allow the funding agency and lead federal agency, Nevada Department of Transportation (NDOT), to determine if the Project falls under a Categorical Exclusion and does not require preparation of Environmental Assessment or Environmental Impact Statement. Close coordination with NDOT and the Washoe Regional Transportation Commission will be required.
- **Flood Conveyance and CTWCD Approval:** The *Martis Creek Lake Operations and Maintenance Manual* (U.S. Army Corps of Engineers [USACE] 1973) (known as the “Martis Creek Agreement”) sets forth the specific parameters for Truckee River channel conveyance capacity maintenance from the Nevada-California state line downstream to the Glendale Avenue Bridge. Under this agreement, the CTWCD maintains the 14,000-cfs conveyance capacity in the Truckee River based upon assurances from Washoe County and the City of Reno that they would maintain their reaches of the river. Much of the Project area lies within the 14,000-cfs conveyance zone and would therefore be subject to the requirements of the Martis Creek Agreement. Depending on the type of activities proposed within the

14,000-cfs inundation zone, USACE Section 408 permitting may be required. Section 408 permitting is a time-consuming and often expensive process, in many cases requiring up to two years.

This Project design proposes to only include design features that will not trigger Section 408 permitting but will require coordination with and approval from CTWCD. The Project is focused on controlling and mitigating bank erosion and will not result in changes to the river channel's capacity. To ensure 14,000-cfs conveyance, the CTWCD also reviews planting plans (for new construction or projects that require permits). Based on guidance from the CTWCD, vegetation that is, in most cases, compatible within the 14,000-cfs zone (and may not require a permit for restoration) includes the following: healthy trees that are already established in the flood channel; establishment of young, healthy trees when they are replacing dead or declining trees; low-lying vegetation; herbaceous vegetation; shrubs that bend over when under moving water and do not capture material (e.g., coyote willow [*Salix exigua*]); and shrubs that lose foliage and that do not get big and woody/stiff (i.e., do not collect debris/grass). The CTWCD supports removal of dead, woody vegetation (which is potential debris that has potential to restrict conveyance) and replacing it with healthy, compatible vegetation. For example, removal of one or more dead trees could be replaced with one or more healthy trees.

- **City of Reno Excavation and Encroachment Permit.** Due to the overlap of the Project Area with the City of Reno right-of-way for Kuenzli Street (see Topographic Survey Section), an Excavation and Encroachment (EAE) Permit will be required. The contractor will be required to be licensed and bonded. Based on email conversations in August 2023, the City of Reno will work with OTR to issue a no-fee EAE permit.
- **Nevada Division of Environmental Protection (NDEP) Construction Stormwater Permit.** The selected contractor will be required to obtain a Construction Stormwater Permit because the project would discharge to Waters of the U.S. and will disturb 1.5 acres. A [Stormwater Pollution Prevention Plan](#) (SWPPP) will need to be developed prior to permit application. As of August 2023, the permit application fee is \$300.
- **NDEP Working in Waterway Permit.** The Working in Waterways Temporary Permit, administered by NDEP, covers temporary working in surface waters of the State such as channel clearing and minor repairs to intake structures. The permits require the establishment and use of appropriate best management practices to minimize water quality impacts. Although this project will not require work in the channel, due to the proximity of work near the Truckee River, the design team recommends that the selected contractor obtain a Working in Waterways permit to ensure compliance with regulations. As of August 2023, the permit application fee is \$350.
- **Washoe County Dust Control Permit.** A Washoe County Dust Control Permit is required for dust-generating activities greater than 1 acre in size. The permit requires fugitive dust emissions be minimized through required control measures determined by the County's Air Quality Management Division. Applications must be submitted by the contractor 10 business days prior to work commencing on a project. As of August 2023, permit application fees are estimated to be \$618.

Permits Not Required Based on 60% Design Elements

All proposed restoration activities will take place upslope of the OHWM and outside of Waters of the United States that are subject to Clean Water Act (CWA) requirements and associated permits (CWA Section 404 and 401). The project is outside of Nevada state lands and will not require state lands authorization.

4. Conceptual and 60% Design Development

Design Approach

The design approach applied for the park's riverbank has been one of close collaboration with multiple City of Reno departments, OTR, SWCA, and Wildscape with critical input from CTWCD, public safety officials, human service outreach representative, and the public. The success of this Project relies on identifying restoration approaches that are scientifically sound and ecologically appropriate but that also work within the complex human dynamics of the park and its riverbank. Ongoing community outreach will guide the design and implementation, to build an invested stakeholder base to care for the riverbank as restoration is implemented, monitored, and maintained.

Note: The following sections and the 60% restoration design (Attachment 1 and Attachment 4) are being proposed and recommended by Wildscape; however, the selection and approval of design elements and vegetation species is ultimately up to the City of Reno and OTR, with final approval being required by permitting and regulatory agencies.

Design Opportunities and Constraints

The Project area contains several design constraints that must be worked within and management opportunities that can be addressed by the design. One consideration is flow velocities. With velocities in the range of 3 fps on the upper portions of the right bank, biotechnical treatments that mitigate for erosion and improve the riparian condition will be effective, however closer to the active channel or floodway where velocities increase significantly to 9–15 fps under the 100-year event, more robust treatments are required.

In addition to designing for the anticipated flow velocities and shear forces given the urban setting and need to maintain flood conveyance within the 14,000-cfs conveyance zone, all new treatments must not encroach beyond the existing or previously disturbed bank profile/condition or have the potential to raise flood water surface heights. Therefore, a more strategic approach to planting of riparian woody vegetation (especially willows and cottonwoods per the stipulations listed in Section 4) must be taken to prevent negative impacts. These approaches include avoiding planting thicket-forming willows (narrowleaf willow) that create dense vegetation cover that does not support line-of sight and maintaining a 1:1 Fremont cottonwood replacement ratio to limit the amount of introduced floodplain debris that may reduce flow conveyance at bridge crossings.

There are existing utilities that must also be avoided and protected, including two large power poles with overhead lines that cross the river and a subsurface utility that crosses the river. Stormwater outlets will need to be accommodated. The large right bank bar that is functioning as a localized inset floodplain is not to be modified given CTWCD may need to remove or reduce its size dependent on its future influence on the flood conveyance area.

Using as much on-site native material as possible to reduce the need for import or off haul of materials was also taken into consideration during design development. Owl and bat boxes are also included in the designs to improve wildlife habitat.

60% Designs

The design concepts from the 30% designs were carried forward in the 60% designs with no major changes. A block or rock retaining wall is proposed in the area southwest of the Portland Loo above the 14,000-cfs conveyance zone that is currently the location of a stand of tree of heaven that will be removed. Where banks remain in relatively good condition or where disturbance brings a high risk of further aggravated erosion (Figure 7), no active measures are proposed. Where more bank stabilization is needed, new or enhanced planted rock slope protection (RSP) is proposed to incorporate riparian vegetation within the revetment. There are several areas along the paved path (outside of the 14,000-cfs conveyance zone) where the grade can be raised and native shrubs and logs installed to redirect pedestrians to more stabilized river access points.

The 60% designs in Attachment 1 highlight the proposed treatment areas by location and reference treatment details. Agency and stakeholder comments on the 30% designs were incorporated into 60% designs. Reno Utilities Services provided valuable feedback and specifications to protect existing utilities, which were integrated into the 60% Design. The primary changes from the 30% to 60% designs include:

- Extending and replacing damaged utility pipes,
- Constructing a concrete collar at pipe outlet,
- Placing Class 300 riprap bedding on pipe's top and Class 150+ riprap below it for buffer and protection,
- Adding one foot of gravel shoulder buffer to the paved trail to increase safety for pedestrians and cyclists and to minimize erosion at the edge of the path,
- Addition of a river overlook with pavers,
- Details of proposed rock slope protection,
- Refined planting plan ready for contract grow, and
- Specifications for planting.

Six boulder step erosion control measures are proposed between Kuenzli Street Bridge and the S. Wells Bridge. One of the proposed boulder step paths will be selected for use as a put in/take out point with input from kayakers and rafters. The proposed boulder steps for erosion control are steep and will not be Americans with Disabilities Act (ADA) accessible, so a river overlook is currently proposed above the 14,000-cfs conveyance zone along the paved river path to provide an alternative viewing point.

Angular riprap is commonly used as a method to discourage human use. Angular fractured rock commonly has sharp edges and can be a safety concern (in some cases), creating a hindrance to pedestrian access and river rescue operations. Including vegetation or sub-rounded boulders, minimizing fractured rock cover, and using other bank stabilization methods are strategies to maintain riparian function while encouraging human use (where desired). Two types of RSP (RSP 1 and RSP 2) are proposed for along the riverbank that differ in the density and size of rock with higher density rock placement in the lower elevations below the 14,000-cfs conveyance zone for RSP 1 (see detail in Attachment 1). Boulders in RSP 1 will be 2 to 3 feet in diameter with spacing for plants at a maximum of 1.5-feet to 2-feet in diameter. Boulders in RSP 2 will be 1 to 2-feet diameter with spacing between boulders at 3 to 4-feet to allow more space for plants. Boulders will be keyed in individually with planting occurring simultaneously.



Figure 7. Rocked bank with trees near Kuenzli Bridge remain stable (photo left). Large trees and root systems hold the slope on the downstream end of project (photo right).

Vegetation Enhancement

Removal of non-native, invasive plants will be required prior to implementing any of the proposed revegetation treatments. The City of Reno Urban Forester will be responsible for identifying the species and specific trees to be removed, as well as best practices for removal. Tree of heaven is capable of sending up root sprouts 50 feet from the original plant, and total removal of adult plants requires excavating the entire root system with a weed wrench or similar tool (DiTomaso et al. 2013). The recommended method for control of tree of heaven is the cut-stump herbicide application where the stem is cut to ground level and painted with an EPA aquatic-registered herbicide (imazapyr) with oil adjuvant and indicator dye in late summer or early fall (DiTomaso 2013). Herbicide must be applied within 5 minutes of the stump being cut. To ensure that plantings are not impacted by the residual activity of herbicide, cut stump treatment should be implemented at least 3 months prior to planting, ideally in late summer 2023.

Siberian elm reproduces primarily by seed but can resprout from root material. Where trees are dense, the Urban Forester recommends removing Siberian elms to create opportunities for other trees. The biggest Siberian elms can be left until new vegetation is better established. For large patches of Siberian elm, removal using large equipment during winter months is recommended followed by monitoring for root sprouts (U.S. Forest Service 2014). Disturbed areas should be restored and planted with desirable species soon after removal of invasive plants. Tree stumps should not be removed if the slope will destabilize before native plants have established.

Many of the soils within the Project area are rocky, eroded, exposed, and potentially nutrient-depleted. These conditions may limit growth of existing vegetation or newly planted vegetation. Soil manipulation and supplement, erosion control, and amendments are needed to address soil limitations to establish and maintain desirable vegetation. Additions of supplemental soil will be required in many cases to provide sufficient fine-grained substrate for establishment of seedlings or larger potted plants. Some soil may be moved from

excavations where logs or rock are keyed in. Supplemental soil should be of similar texture and pH as the existing fine grained soil matrix or slightly finer. Soil testing should be conducted during the 90% design phase to allow for soil and soil supplements to be specified for each planting area. Inoculation of mycorrhizae will be introduced on the Project area to enhance establishment of natural soil microbial communities and processes. Organic supplements (e.g., clean mulch) may be added to provide some organic matter and to increase the water-holding capacity of the sandy soils. Inorganic fertilizers are not recommended for restoration, as excess nutrients can cause water quality issues in the river and favor establishment of weed species over desirable species.

For the conceptual design the technique compatibility tool developed through the Framework Plan for this reach of the Truckee River (OTR 2022) was used to select plants that are compatible with one or more of the following jurisdictional constraints and vegetation management opportunities: City of Reno, within 14,000-cfs zone, manage foot traffic, support management of periodic encampments, erosion mitigation, provide shade, and wetland riparian habitat. The resulting plant list was then refined to remove 1) non-native plants based on goals and objectives of the Project, 2) obligate wetland species that would not survive without irrigation at elevations where restoration is being proposed, and 3) remove species with ecological requirements inconsistent with the park (e.g., adapted to higher elevations, different soil types). This effort resulted in 58 potential species including 10 forbs, 16 graminoids, 26 subshrubs or shrubs, and 6 trees.

Based on the range of elevations above the Truckee River where planting is proposed, three planting zones were developed based on elevation above base flow and recommendations by Hoag and Fripp (2002). Species were parsed into planting zones using wetland status as defined by USACE (2018), inundation and drought tolerances as defined by the Natural Resources Conservation Service (2022), and Dr. Susan Mortenson's professional knowledge. Planting zones include:

- The **overbank planting zone** is proposed for elevations up to 5 feet above the ordinary high water mark (OHWM; approximately 4,470 feet NAVD 88) and consists of facultative wetland plants or facultative plants with high inundation tolerance.
- The **transitional planting zone** is proposed for elevations 5–8 feet above the OHWM and includes facultative and facultative upland plants with low drought tolerance.
- The **upland planting zone** is proposed for areas greater than 8 feet above the OHWM and consists of facultative upland plants with medium to high drought tolerance and upland plants.

Additional refinement of the plants specified for this Project based on expert opinion of Julie Etra (Western Botanical Services), Matt Basile (City of Reno Forester), and Ryan Sharrer (City of Reno Horticulturalist) and availability for a contract to grow plants from the Washoe State Tree Nursery resulted in 7 forbs, 3 grasses, 10 subshrubs or shrubs, 1 vine, and 5 trees (Table 2). Erosion control treatment areas were numbered, and the area of planting was specified for each species (see Sheet R-2 of Attachment 1). Field direction will be required to ensure the placement of species carefully considers sightlines and litter removal, to ensure any willow tree plantings are compatible with human dynamics in the Project area.

American beavers have caused significant damage to existing vegetation, particularly large Fremont cottonwoods, at Park and are a potential threat to any newly planted vegetation. California ground squirrels (*Otospermophilus beecheyi*) are also abundant in the park and damage vegetation through burrowing and consuming plant material. Methods to protect plants from wildlife damage including installing wire-mesh cages around plants and measures to reduce California ground squirrel populations are needed to help ensure the survival of desirable vegetation. Due to the high density of seed predators, seeding is not recommended.

Container plants are the preferred plant material for the riverbank. Four-foot-tall cages constructed from 2 × 4-inch wire mesh supported by 0.5-inch-wide, 4-foot-tall rebar will be installed around select woody plants

(willows and cottonwoods) to protect plants from beavers and trampling. Integrity of plant cages will need to be monitored for potential damage from floods, animals, or humans.

Based on expert opinion, research, and discussions, OTR decided that chemical and physical treatments to deter California ground squirrels from eating the plants along the riverbank will not be effective. Instead, we are prescribing: 1) replacement of open garbage cans with animal-resistant cans, 2) communication with local churches and non-profits who leave food donations along the river to ensure their donation is left with someone to receive it instead of it becoming food for the squirrels or request they drop off their donation to a nonprofit that receives those types of donations like Catholic Charities, and 3) coordination with NDOW and contractor to trap and remove squirrels before and after construction.

Table 2. Characteristics and Quantities of Plants Specified for Installation

Species	Common Name	Planting Zone	Container Size	Growth Form	Spacing	Maximum Height (ft)
<i>Alnus incana</i> *	gray alder	Overbank	T-pot	Tree	12	15
<i>Cornus sericea</i> *	redosier dogwood	Overbank	T-pot	Shrub	6	12
<i>Rubus parviflorus</i>	thimbleberry	Overbank/Transitional	T-pot	Subshrub	6	4
<i>Salix laevigata</i> *	red willow	Overbank	T-pot	Tree	12	45
<i>Amelanchier alnifolia</i> *	Saskatoon serviceberry	Transitional	T-pot	Shrub	6	10
<i>Asclepias speciosa</i>	showy milkweed	Transitional/Upland	D-pot	Forb	2	6
<i>Clematis ligusticifolia</i> *	western white clematis	Transitional	D-pot	Vine	8	1
<i>Populus fremontii</i>	Fremont cottonwood	Transitional	T-pot	Tree	12	50
<i>Prunus virginiana</i>	chokecherry	Transitional	T-pot	Tree	12	15
<i>Ribes aureum</i> *	golden currant	Transitional	T-pot	Shrub	6	10
<i>Rosa woodsii</i> *	Wood's rose	Transitional	T-pot	Shrub	6	5
<i>Sambucus nigra</i> ssp. <i>cerulea</i> *	black elderberry	Transitional	T-pot	Shrub	6	23
<i>Achillea millefolium</i> *	common yarrow	Upland	D-pot	Forb	2	3
<i>Achnatherum hymenoides</i>	Indian ricegrass	Upland	D-pot	Grass	4	2
<i>Ericameria nauseosa</i>	rubber rabbitbrush	Upland	T-pot	Shrub	6	3
<i>Eriogonum heracleoides</i>	parsnipflower buckwheat	Upland	D-pot	Forb	2	2
<i>Eriogonum robustum</i>	granite buckwheat	Upland	D-pot	Forb	2	1
<i>Eriogonum umbellatum</i>	sulfur flower buckwheat	Upland	D-pot	Subshrub	8	1
<i>Leymus cinereus</i>	Great Basin wildrye	Upland	D-pot	Grass	4	5
<i>Lupinus argenteus</i>	silvery lupine	Upland	D-pot	Forb	2	1.5
<i>Penstemon eatonii</i>	firecracker penstemon	Upland	D-pot	Forb	2	4
<i>Penstemon palmeri</i>	Palmer's penstemon	Upland	D-pot	Forb	2	3.5
<i>Penstemon strictus</i>	Rocky Mountain penstemon	Upland	D-pot	Forb	2	2
<i>Pinus jeffreyi</i>	Jeffrey pine	Upland	T-pot	Tree	12	40
<i>Prunus andersonii</i>	desert peach	Upland	T-pot	Shrub	6	6
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	Upland	D-pot	Grass	4	1.5
<i>Salvia dorrii</i>	purple sage	Upland	T-pot	Shrub	6	2.5

Boulder Steps for Erosion Control

An important aspect of establishing and maintaining restored vegetation is ensuring plants are protected from future disturbance, including controlling human access along the riverbank and to the river by clearly defining locations for pedestrian foot traffic. The 60% designs in Attachment 1 identify six proposed boulder step locations, where park users may access the river. The proposed boulder steps for erosion control will be constructed to mitigate erosion and engineered to withstand high velocity flows. Therefore, the boulder steps will provide bank stabilization, in addition to pedestrian access. Most locations identified for boulder steps follow existing, undesignated trails. Other undesignated, existing trail locations will be blocked, decommissioned, and stabilized using native shrubs or buried logs to redirect users to these new boulder steps.

Strategies to Promote Desired Behaviors

The Framework Plan (OTR 2022) provides several suggested approaches for promoting desired behaviors in public spaces along the river. OTR is collaborating with the City of Reno and other partners to identify the best strategies to promote desired use of the riverbank and to ensure restored vegetation remains protected from human disturbance. As described above, controlled access via boulder steps for erosion control will be important to support the protection of riverbank vegetation. A number of other possible strategies considered include: continued community engagement and outreach throughout the Project planning and implementation; public outreach to educate the public about the importance of maintaining restored vegetation; public involvement in the implementation and ongoing care to create a sense of ownership of the riverbank and the park; fencing; signage; maintenance of sightlines through strategic vegetation removal and planting; creating rock-covered surfaces in areas where management of encampments is frequent; planting low prickly plants to dissuade pedestrian or other access in unauthorized areas; provide litter clean-up and restoration focused sheltered employment and job training opportunities for underserved individuals and unhoused river users; continued engagement of volunteers; and organizing community events at the park to provide more reasons for a variety of people to visit the area.

Access and Staging

The proposed construction staging area will be determined through conversations with City of Reno staff. The paved trail through the park will need to be temporarily closed with a detour established before construction can begin.

Construction Resources

Following the 60% design development, plant materials will be reserved from the Washoe State Tree Nursery and logs will be provided and stored by Nevada Division of Forestry NDF and the City of Reno. Most materials will be provided by the selected contractor. Water will be provided by the City of Reno.

Monitoring and Adaptive Management

Monitoring will be conducted twice yearly for the first 3 years and will include plant survival, plant health, weed mapping, repeat photography, and sightline estimation. Twice annual monitoring to identify and remove tree of heaven, Siberian elm, purple loosestrife (*Lythrum salicaria*), perennial pepperweed (*Lepidium latifolium*), and other non-native, invasive plants will be needed, especially 2–3 years following disturbance. Early detection and treatment of weeds following construction disturbance is vital to Project success. It is expected that plant maintenance will be required (especially in the first 2 years after implementation), including supplemental water to establish vegetation, weed

control, and replanting. OTR will work to support another nonprofit to manage an active and dedicated group of volunteers to provide supplemental support for care of the Project.

To support ecological and community goals, the management and maintenance of the Project will be divided into areas where the selected contractor and community members and/or a workforce with oversight will be responsible. The contractor will maintain 17% of plants and will warranty areas where rock slope protection is installed or steep areas that are more likely to contribute sediment to the Truckee River (planting areas 2, 3, 4, 6, 7, 8, 9, 10, 11, and 12 as shown in Sheet R-1 of Attachment 1). Community members and/or a workforce with nonprofit oversight will maintain 83% of plants in areas where rock slope protection is not needed, primarily flat areas along the paved trail (revegetation areas 1, 5, and 13).

Plant survival is most important on the steep riverbanks to reduce erosion and sediment transport to the Truckee River. The designs and bid documents will require that the contractor warranty 80% plant survival rate for each planting area for the 2-year period after planting. If plant mortality exceeds 80% during this period within any planting area, the contractor will be required to replace the plants. The community area will strive for a 50% plant survival rate in the flatter areas.

A benefit of the Project is that it provides an opportunity to establish vegetation that is adapted to site conditions and that aligns with the maintenance needs of the park. An effective design ensures that the cost and burden of ongoing maintenance decreases over time, after vegetation establishes. Maintenance needs will be greatest during the growing season after construction. Plants will require supplemental water immediately after installation and over the first two growing seasons. Supplemental water should be applied monthly during fall and winter and weekly during spring and summer. If temperatures exceed 100 degrees Fahrenheit for more than 5 days, twice weekly irrigation will be required.

The water source for the existing irrigation system managed by the City of Reno on the south side of the paved path will be used for irrigation. The pros and cons of providing supplemental water through hand watering via a water buffalo or similar or establishing a more permanent irrigation system sourced from the existing irrigation system are provided in Table 3. The permanent irrigation system would likely consist of sprinkler heads protected by cages to discourage tampering. An irrigation plan will be developed with the 90% designs. The Wildscape Team recommends that the selected contractor decide how to provide irrigation for their planting areas since they will be responsible for the plant warranty. If temporary irrigation is selected, permanent irrigation could be installed at the end of the warranty period if it appears that some plants may require watering during dry periods.

Table 3. Pros and Cons of Temporary and Permanent Irrigation

	Temporary Irrigation	Permanent Irrigation
Pros	<ul style="list-style-type: none"> Inexpensive install Encourages regular inspections of plant health Can provide only as much water as needed for each plant 	<ul style="list-style-type: none"> Capability to provide more regular irrigation Automatic, less labor-intensive
Cons	<ul style="list-style-type: none"> Labor intensive Higher cost of operation 	<ul style="list-style-type: none"> Expensive install Requires regular maintenance

Non-Profit Engagement

OTR is working to connect and expand relationships with local non-profits in the non-profit engagement milestone. The goal of this effort will be to 1) build a system of support where local nonprofits target some of their program activities at the park and its riverbank, 2) buildout a timeline, outreach strategy, and a variety of specific activities for local resident volunteers to engage with the Project's implementation and support on-going care after implementation, and 3) develop a proposal for ongoing coordination of volunteers to provide support to Park and its riverbank, creating a committed base of local residents and river users who are invested in the riverbank and park improvements and can enjoy the park's renewed recreation opportunities. The work defined in this effort is being implemented by OTR through Milestone III, the public involvement milestone.

Future Project needs will include ongoing monitoring and maintenance to ensure restored vegetation is maintained. A close collaboration of organizations, agencies, and supplemental volunteer support with adequate funding will likely be needed to ensure the Project is successful.

Literature Cited

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ATTACHMENTS

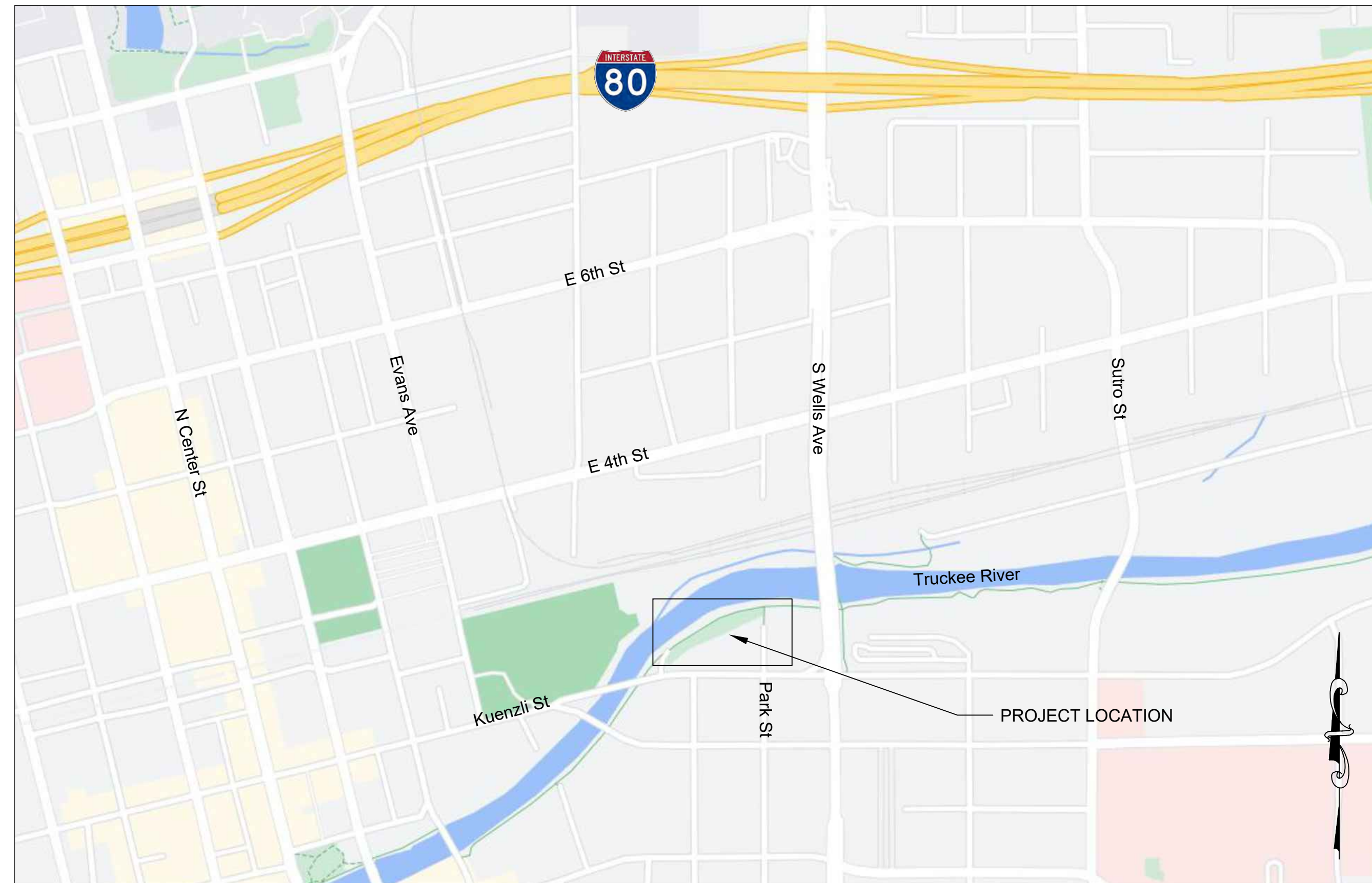
Attachment 1 – Brodhead Park Riverbank Restoration 60%
Designs

Brodhead Park Riverbank Restoration

CITY OF RENO, WASHOE COUNTY, NV



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www.wildscape-engineering.com



VICINITY MAP
1"=500'



SITE MAP
1"=100'

APPROVED:

TBD, TBD

DESIGNED:

CAROL Y. BEAHAN, P.E., WILDSCAPE ENGINEERING, INC.

**Brodhead Park
Riverbank Restoration**
Reno, NV 89502

Title Sheet

Designed: CYB	Drawn: JA	Checked: CYB
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File Date: 10/13/2023

REVISIONS:

No.	Date	Description

Notes:

Sheet Scale: AS SHOWN

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G-1

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GENERAL NOTES

- CONSTRUCTION SHALL TAKE PLACE FROM 8:00 AM TO 5:00 PM MONDAY THROUGH FRIDAY. NO WORK TO BE CONDUCTED WEEKENDS OR HOLIDAYS UNLESS OTHERWISE APPROVED ON A CASE BY CASE BASIS.
- THE LOCATION AND EXTENT OF EXISTING UNDERGROUND UTILITIES IN THE PROJECT AREA ARE SHOWN BASED ON AVAILABLE RECORDS AND SHALL BE CONSIDERED APPROXIMATE AND NOT NECESSARILY COMPLETE.
- THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT (USA) AT 811/1-800-642-2444 OR <https://www.usanorth811.org> AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK TO ENSURE UTILITY AVOIDANCE.**
- CONTRACTOR SHALL CONTROL ACCESS, AND MAINTAIN ALL SIGNS, BARRICADES, OR OTHER DEVICES NECESSARY TO CONTROL TRAFFIC THROUGH THE CONSTRUCTION AREA AND MAINTAIN PUBLIC SAFETY IN ACCORDANCE WITH THESE PLANS, THE STANDARD SPECIFICATIONS, FEDERAL HIGHWAY ADMINISTRATION (FHWA) MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) 2003 EDITION.
- NO GRADING OR LAND DISTURBANCE WITH RESPECT TO THE PROJECT WILL OCCUR AFTER OCTOBER 15 UNLESS PRIOR APPROVAL IS OBTAINED FROM THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP)
- THE CONTRACTOR SHALL MAINTAIN A SET OF AS-BUILT PLANS ONSITE SHOWING "AS-CONSTRUCTED" CHANGES MADE TO DATE. UPON COMPLETION OF THE PROJECT CONTRACTOR SHALL PROVIDE FINAL AS-BUILT PLANS TO ONE TRUCKEE RIVER (OTR) AND THE CITY OF RENO.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING ALL TEMPORARY EROSION CONTROL MEASURES RELEVANT TO THIS PROJECT. THE EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP).
- IN CASE PORTLAND LOO NOT OPERATIONAL OR AVAILABLE, PROVIDE AND MAINTAIN TEMPORARY TOILET FACILITIES IN ACCORDANCE WITH STATE HEALTH DEPARTMENT, AND CITY OF RENO REQUIREMENTS. DO NOT LOCATE TEMPORARY TOILET FACILITIES ADJACENT TO A NATURAL WATER SOURCE, IN A WETLAND OR RIPARIAN AREA, OR IN A LOCATION TO CAUSE A PUBLIC HEALTH HAZARD, CONTAMINATION OR NUISANCE. AT COMPLETION OF WORK, REMOVE TOILET FROM PROJECT SITE.
- SOURCE FOR CONSTRUCTION WATER IS IRRIGATION VALVE BOX ON SOUTH SIDE OF PAVED TRAIL.
- CONSTRUCT REQUIRED SUBGRADE PRIOR TO PLACEMENT OF STRUCTURES OR FILL.
- ALL RIPARIAN AND LANDSCAPED AREAS SHALL BE GRADED TO NATURAL SHAPES THAT TRANSITION SMOOTHLY TO ADJACENT FEATURES AND GRADES.

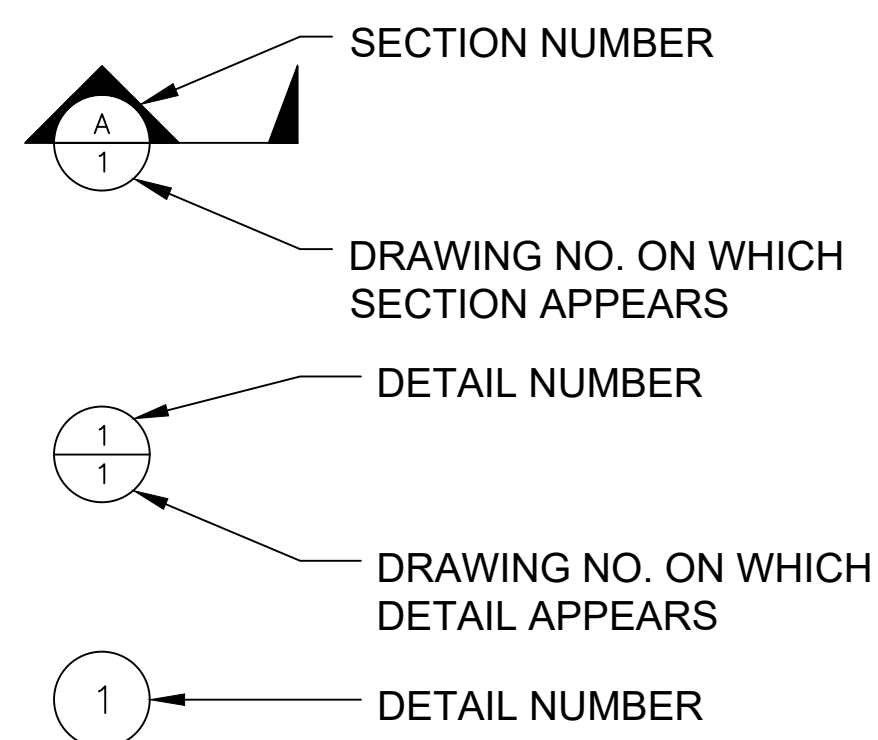
- THE CONTRACTOR SHALL ONLY USE DESIGNATED SITES FOR STORAGE OF EQUIPMENT AND MATERIALS AS SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE SECURITY OF ALL EQUIPMENT AND MATERIALS.
- THE CONTRACTOR SHALL OBTAIN NECESSARY PERMITS INCLUDING THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) CONSTRUCTION STORMWATER PERMIT, NDEP WORKING IN WATERWAYS PERMIT, WASHOE COUNTY DUST CONTROL PERMIT, AND CITY OF RENO ENCROACHMENT PERMIT. FEES MAY BE WAIVED FOR CITY OF RENO ENCROACHMENT PERMIT.
- NO TREES OR RIPARIAN VEGETATION SHALL BE REMOVED UNLESS NOTED TO BE REMOVED IN THE PLANS OR SPECIFICATIONS, OR AS DIRECTLY SPECIFIED ON-SITE BY THE ENGINEER. TREES CONFLICTING WITH GRADING WILL BE LIMBED OR REMOVED UPON CITY OF RENO APPROVAL.
- EQUIPMENT DELIVERY, SUPPLY DELIVERY AND SERVICE/FUELING VEHICLES WILL ONLY ENTER AND EXIT SITE WORK AREAS VIA THE APPROVED CONSTRUCTION ACCESS POINT(S) DURING NORMAL WORKING HOURS.
- THE CONTRACTOR SHALL CLEANUP SPILLS IMMEDIATELY AND NOTIFY APPROPRIATE AGENCIES OF SPILLS AND CLEANUP PROCEDURES. REFUELING AREAS AND ANY EQUIPMENT REPAIR OR SIMILAR ACTIVITY WILL ONLY TAKE PLACE IN DESIGNATED STAGING AREAS.
- PRIOR TO PROJECT IMPLEMENTATION ONE TRUCKEE RIVER AND THE CITY OF RENO WILL NOTIFY THE PUBLIC REGARDING ANY TEMPORARY CLOSURE OF THE PARK OR PATHWAY. IMMEDIATELY PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL INSTALL FENCING AND ADEQUATE SIGNAGE TO INDICATE THAT THE TRAIL IS TEMPORARILY CLOSED UNTIL CONSTRUCTION IS COMPLETE.
- A TOTAL OF (X) TREES 14" DIAMETER OR LARGER ARE EXPECTED TO BE REMOVED IN ORDER TO ACCOMMODATE CONSTRUCTION AS SHOWN ON SHEET C-X.
- OFFHAUL AND PROPERLY DISPOSE OF ALL EXCESS MATERIAL NOT INCORPORATED AS BACKFILL OR INTO PRESCRIBED ONSITE TREATMENTS.
- CONTRACTOR SHALL WARRANT AN 80% SURVIVAL RATE WITHIN PLANTING AREAS 2, 3, 4, 6, 7, 8, 9, 10, 11, AND 12 FOR TWO YEARS FROM THE TIME OF PLANTING AGAINST DEFECTS INCLUDING MORTALITY AND POOR GROWTH. FAILURE TO MEET THE SURVIVAL WARRANTY WILL RESULT IN REPLANTING AT THE CONTRACTOR'S EXPENSE.

ABBREVIATIONS

AC	ASPHALT CONCRETE
AB	AGGREGATE BASE
APPROX/~	APPROXIMATELY
CDFW	CA DEPARTMENT OF FISH AND WILDLIFE
CFS	CUBIC FEET PER SECOND
CL	CENTERLINE
CONC	CONCRETE
DBH	DIAMETER BREAST HEIGHT
DIAM	DIAMETER
EG	EXISTING GRADE
EX	EXISTING
EL	ELEVATION
FT	FEET
INV	INVERT
LB	LEFT BANK
LG	LARGE
LOD	LIMIT OF DISTURBANCE
MAX/MIN	MAXIMUM/MINIMUM
N	NEW
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
OHWM	ORDINARY HIGH WATER MARK
OTR	ONE TRUCKEE RIVER
PR	PROPOSED GRADE
PVC	POLYVINYL CHLORIDE
RB	RIGHT BANK
RC	RELATIVE COMPACTION
RCP	REINFORCED CONCRETE PIPE
RSP	ROCK SLOPE PROTECTION
SF	SQUARE FOOT
STA	STATION
TBD	TO BE DETERMINED
TYP	TYPICAL
VERT	VERTICAL
W/	WITH
WSE	WATER SURFACE ELEVATION
#	NUMBER
%	PERCENT
'	FEET
"	INCHES
@	AT
3:1	HORIZONTAL TO VERTICAL SLOPE

CONTACT THE ENGINEER FOR SYMBOLS OR ABBREVIATIONS NOT SHOWN

DRAWING SYMBOLS

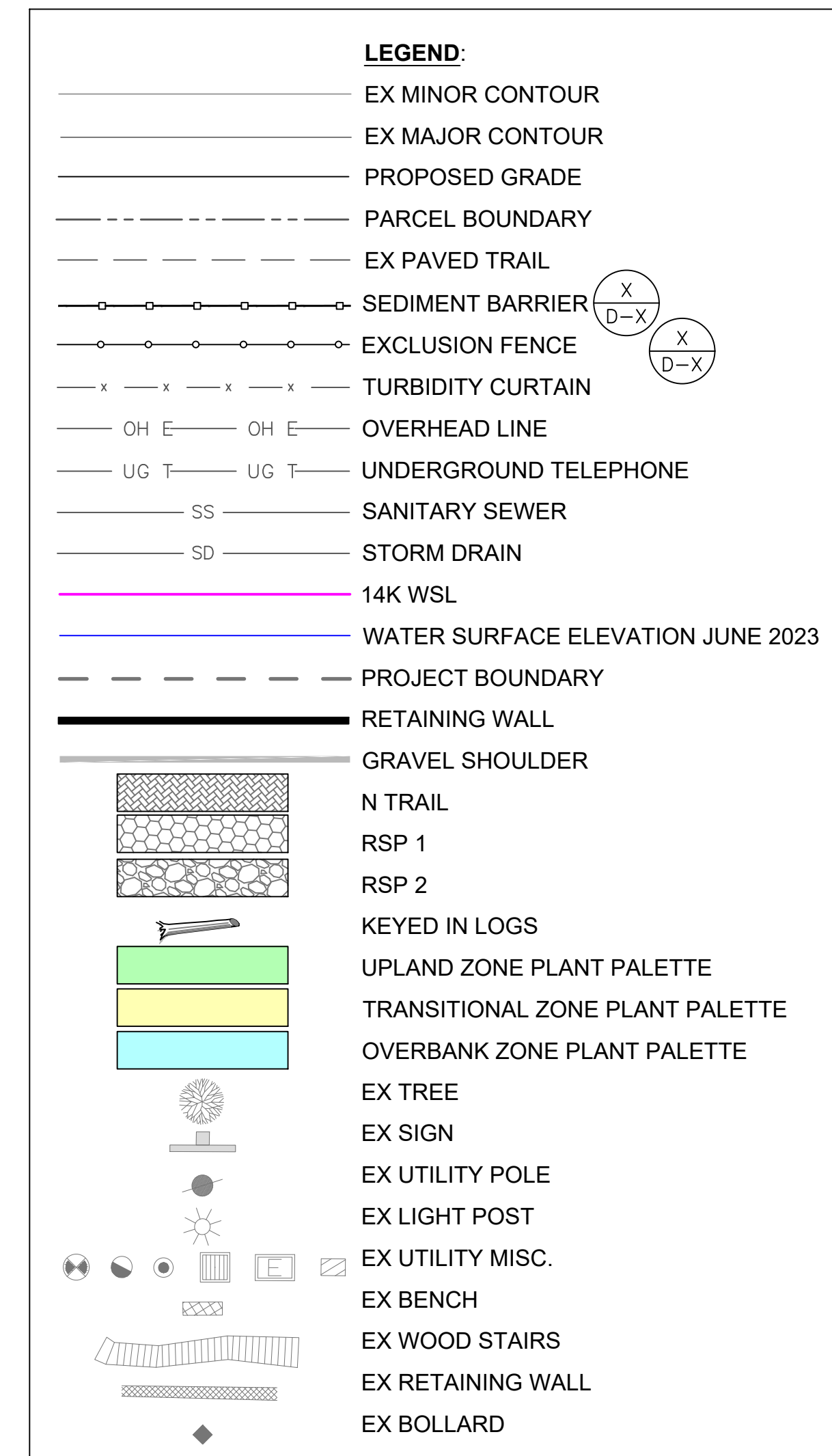


UTILITIES:

CABLE TELEVISION: **CHARTER COMMUNICATIONS:** 888.369.2408
 NATURAL GAS: **NV ENERGY:** 775.834.4444
 ELECTRIC: **NV ENERGY:** 775.834.4444
 SEWER AND STORM DRAIN: **CITY OF RENO SEWER SERVICE:** 775.334.2095
 WATER: **TRUCKEE MEADOWS WATER AUTHORITY:** 775.834.8080
 TELEPHONE: **ATT:** 800.288.2020

TOPOGRAPHY AND AERIAL IMAGE SOURCE AND CONTROL:

TOPOGRAPHY SOURCE - US GEOMATICS TOPOGRAPHIC SURVEY (JUNE 2023)
 HORIZONTAL CONTROL - NAD83 WEST US FEET (1984)
 VERTICAL CONTROL - NAVD88 (GEOID99)
 AERIAL IMAGE - BING 2021



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**Brodhead Park
 Riverbank Restoration**
 Reno, NV 89502

Notes

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Reno, NV 89502

Sheet Index

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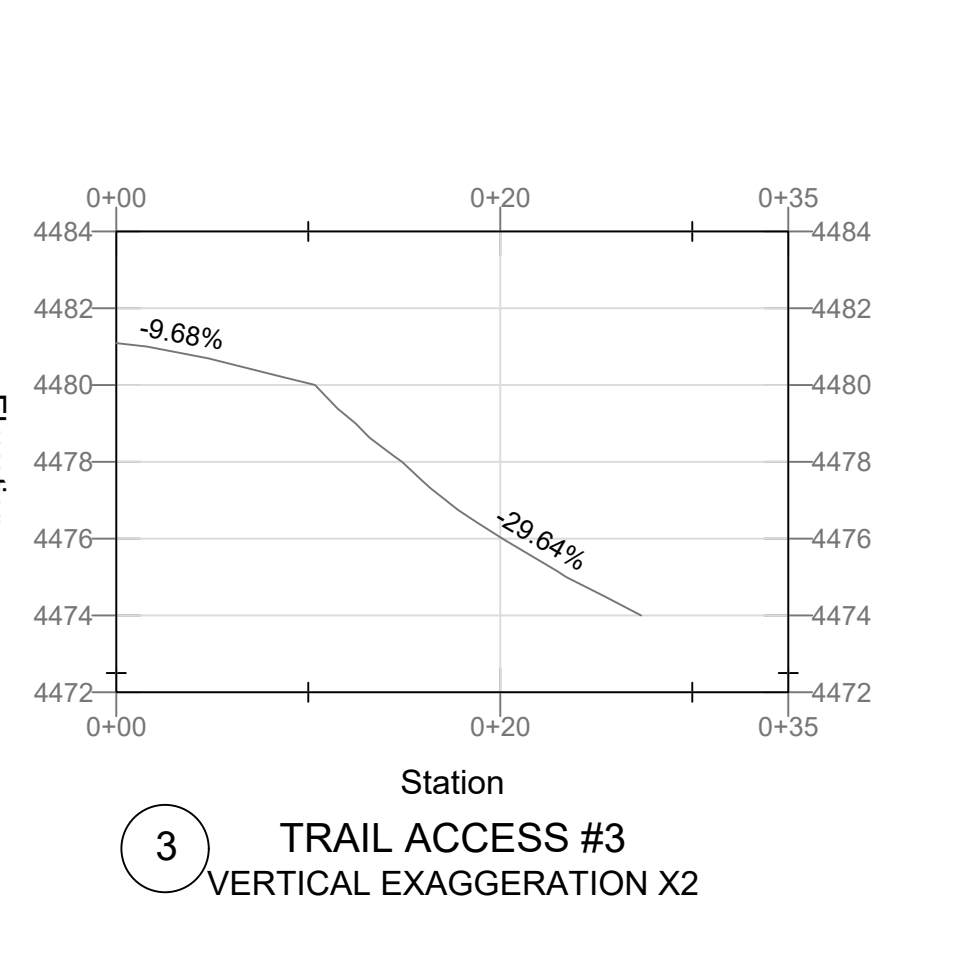
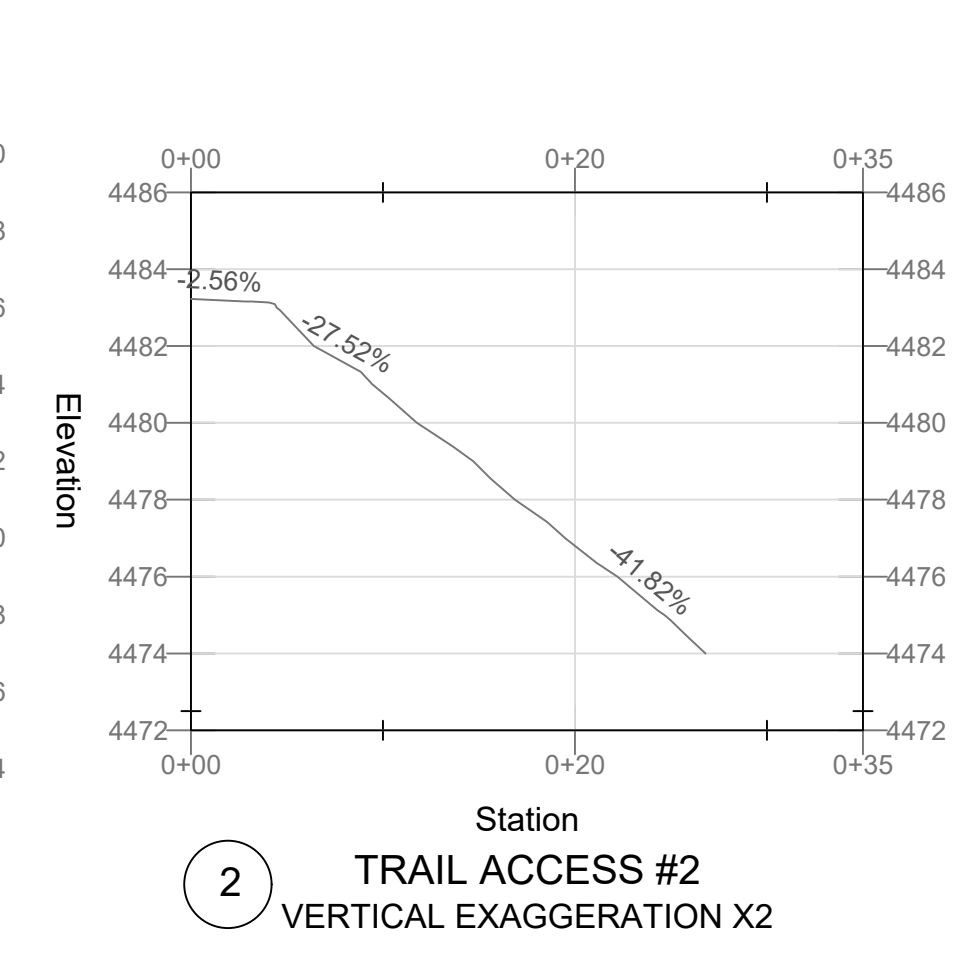
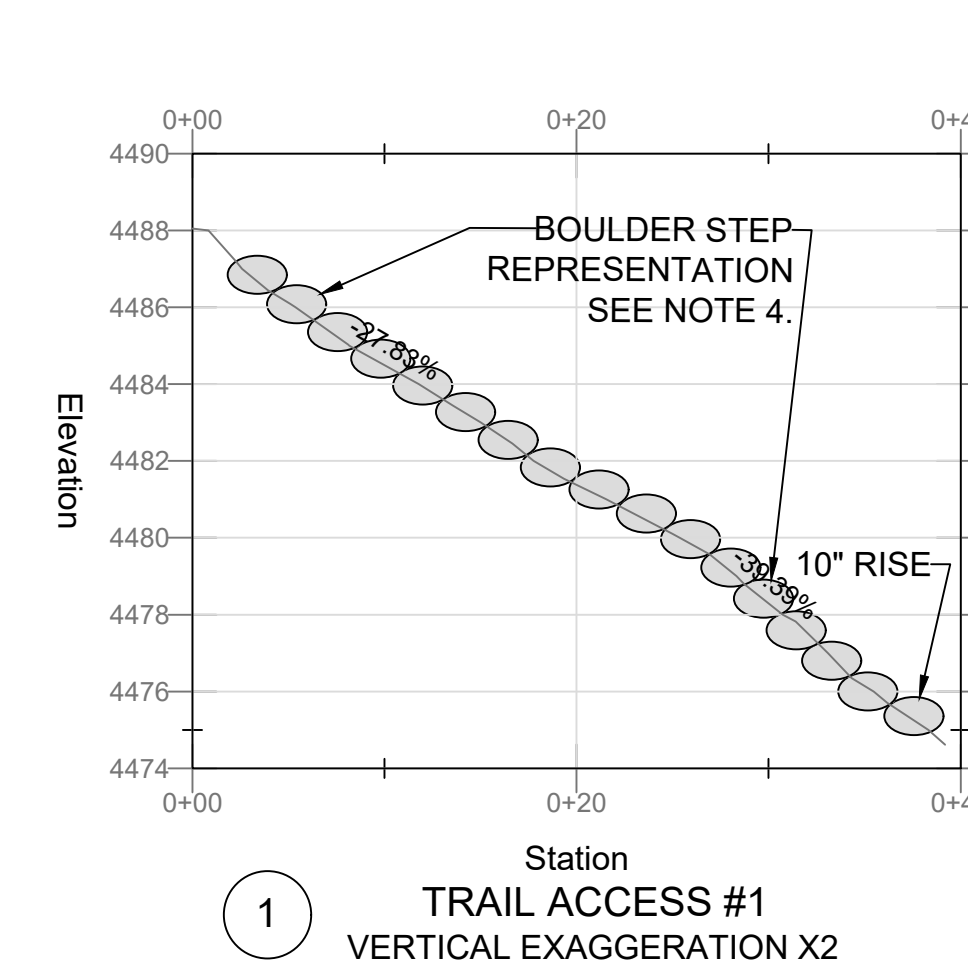
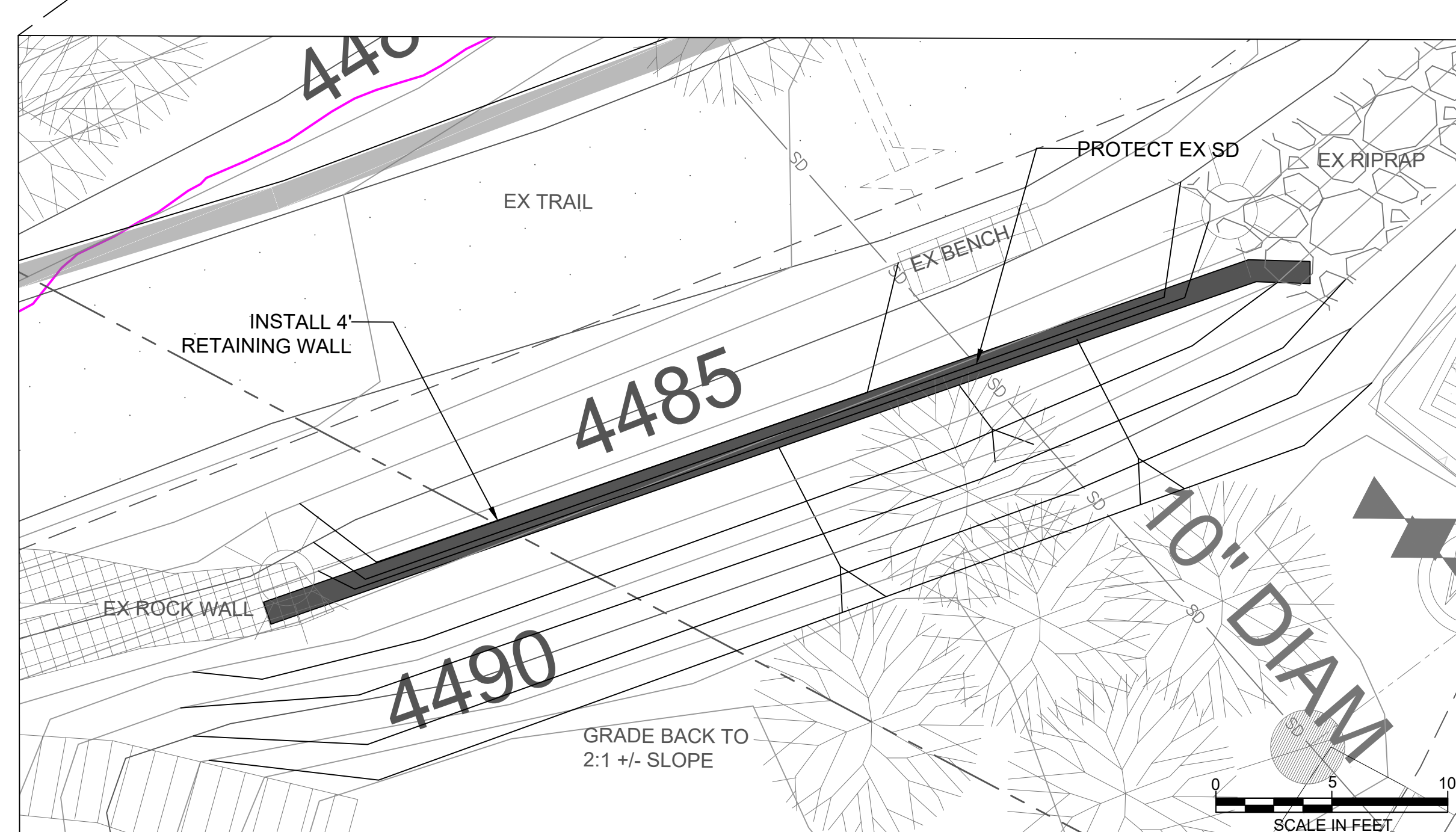
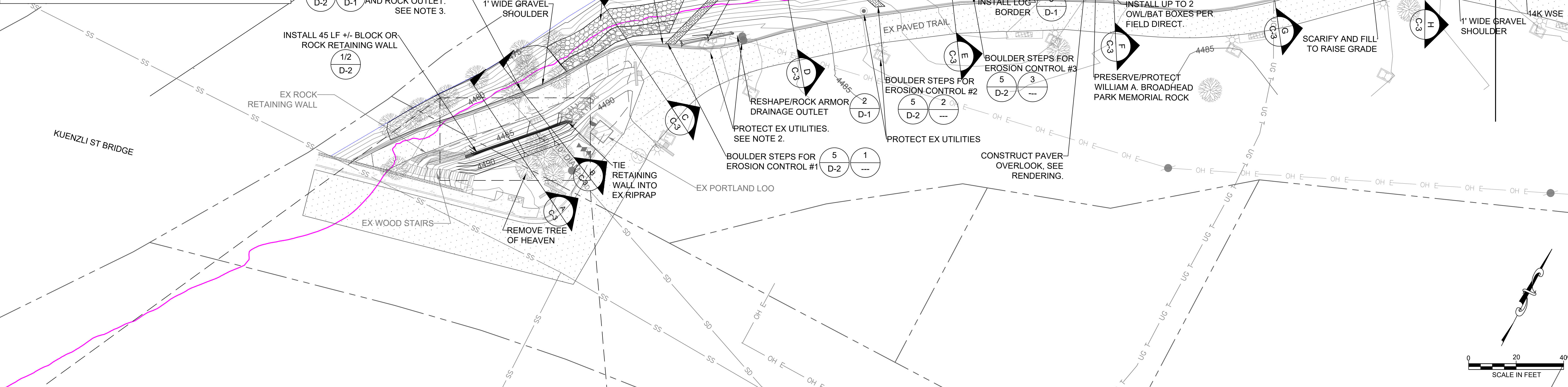


NUMBER	NAME	SHEET TITLE
1	G-1	TITLE SHEET
2	G-2	GENERAL NOTES
3	G-3	SHEET INDEX
4	C-1	PLAN AND PROFILE
5	C-2	PLAN AND PROFILE
6	C-3	SECTIONS
7	C-4	STAGING AND ACCESS
8	R-1	PLANTING PLAN
9	R-2	PLANTING DETAILS
10	D-1	MISC. DETAILS
11	D-2	MISC. DETAILS

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LEGEND:

- EX MINOR CONTOUR
- EX MAJOR CONTOUR
- PROPOSED GRADE
- PARCEL BOUNDARY
- EX PAVED TRAIL
- OH E OH E OVERHEAD LINE
- UG T UG T UNDERGROUND TELEPHONE
- SS SANITARY SEWER
- SD STORM DRAIN
- 14K WSL
- WATER SURFACE ELEVATION JUNE 2023
- PROJECT BOUNDARY
- RETAINING WALL
- GRAVEL SHOULDER
- N TRAIL
- RSP 1
- RSP 2
- SOIL AND BIODEGRADABLE NETTING
- FILL
- PRESERVE/INSTALL COTTONWOODS
- SHADE TOLERANT PLANTS
- KEYED IN LOGS



NOTES:

- EXISTING CONDITIONS SHOWN ARE BASED ON US GEOMATICS JUNE 2023 TOPOGRAPHIC SURVEY.
- NO LARGE TREES TO BE PLANTED UNDER EXISTING POWER LINES.
- CLEAN CUT DAMAGED PIPE SECTION. ATTACH 10" PVC PIPE SECTION TO OUTLET 3' MIN. FROM EOP.
- BOULDER STEP REPRESENTATION ON TRAIL ACCESS #1 DETAIL AND ALL OTHER TRAIL ACCESS DETAILS WILL BE FURTHER DEVELOPED AT 90% BASED ON TRAIL ALIGNMENT UPDATES BY DESIGN WORKSHOP.

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CITY OF RENO

one truckee river

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Improvement Plan

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No.	Date	Description

Notes:

Sheet Scale: AS SHOWN

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Broadhead Park
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Improvement Plan

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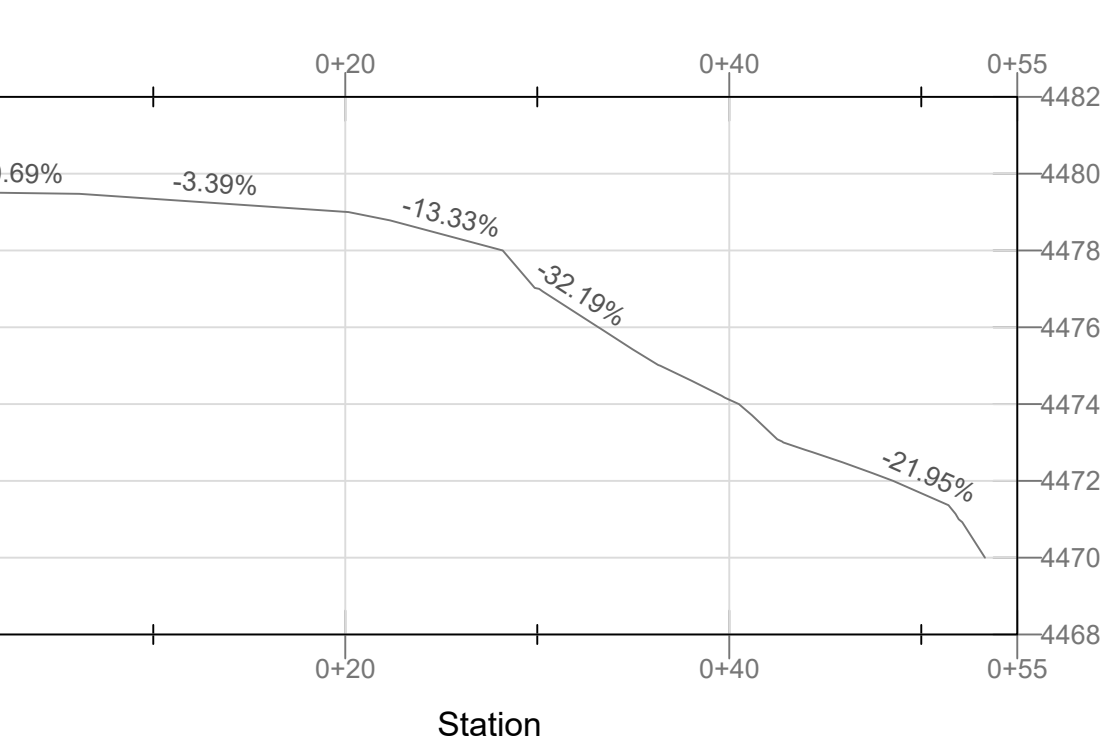
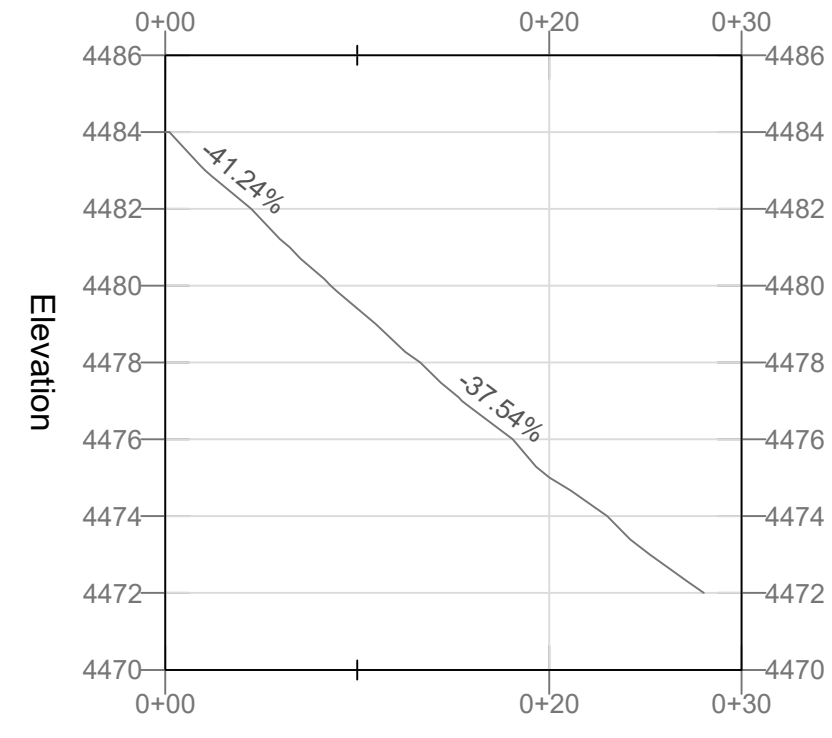
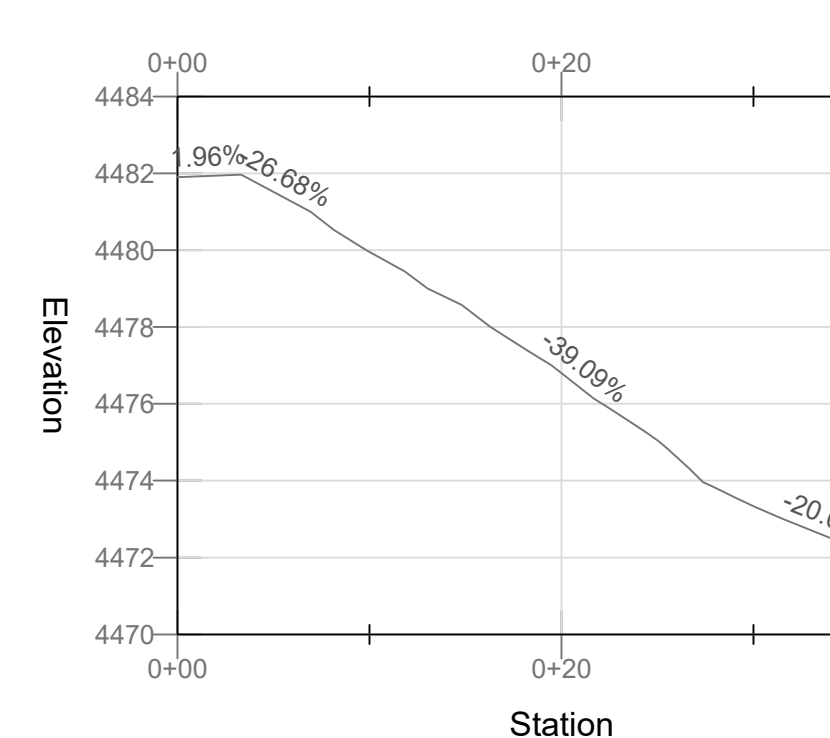
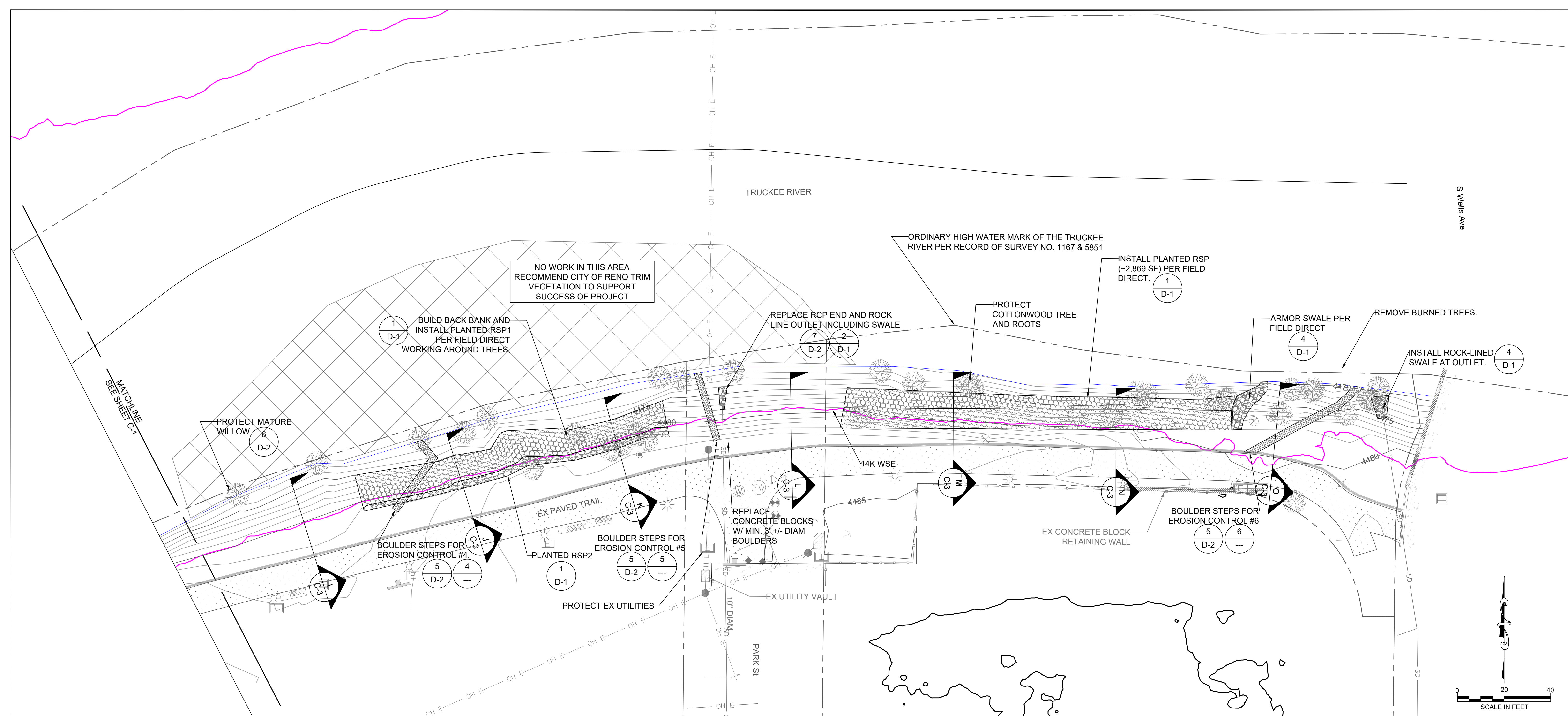
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- NOTES:
- EXISTING CONDITIONS SHOWN ARE BASED ON US GEOMATICS JUNE 2023 TOPOGRAPHIC SURVEY.
 - NO LARGE TREES TO BE PLANTED UNDER EXISTING POWER LINES.
 - CLEAN CUT DAMAGED PIPE SECTION. ATTACH 10" PVC PIPE SECTION TO OUTLET 3' MIN. FROM EOP

LEGEND:

- EX MINOR CONTOUR
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**Broadhead Park
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 Reno, NV 89502

Cross Sections

Designed: JA
 Drawn: JA
 Checked: CYB

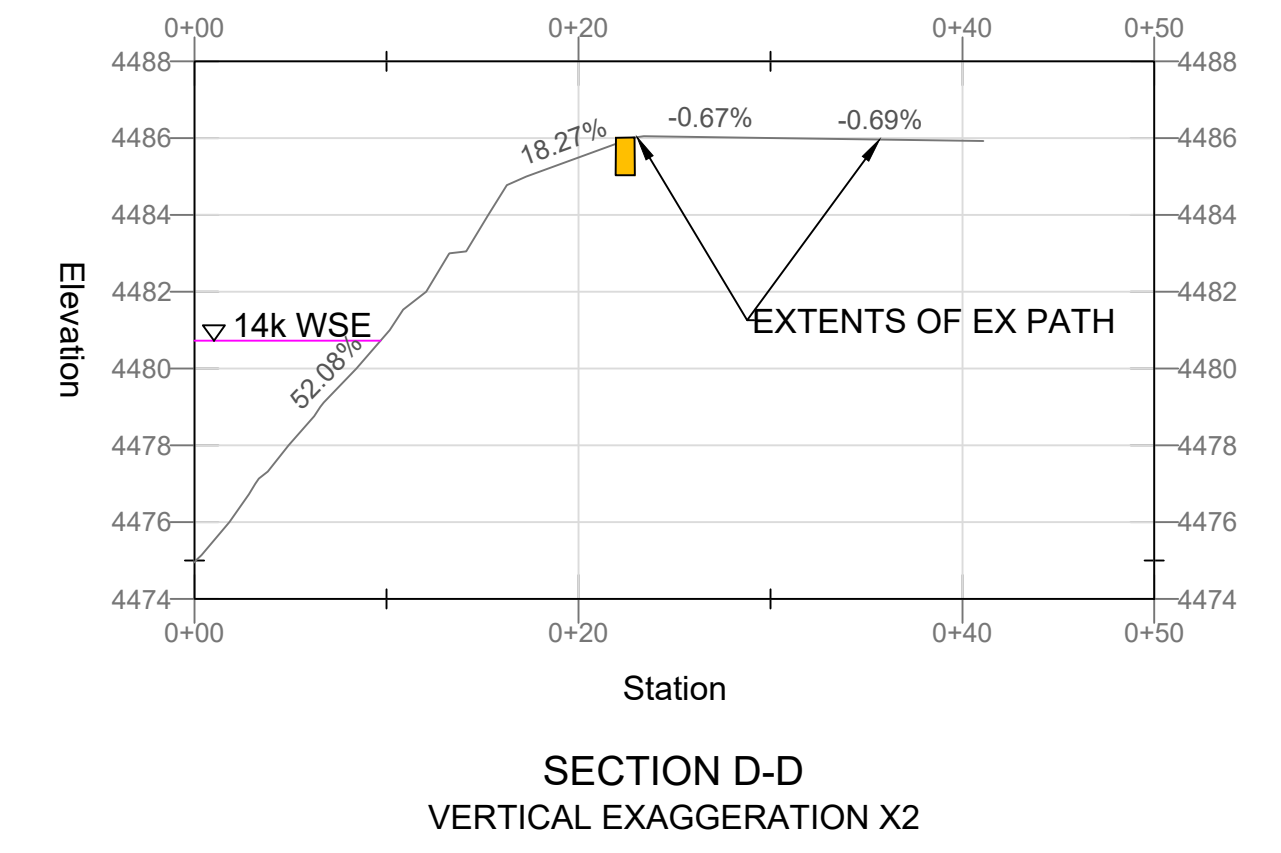
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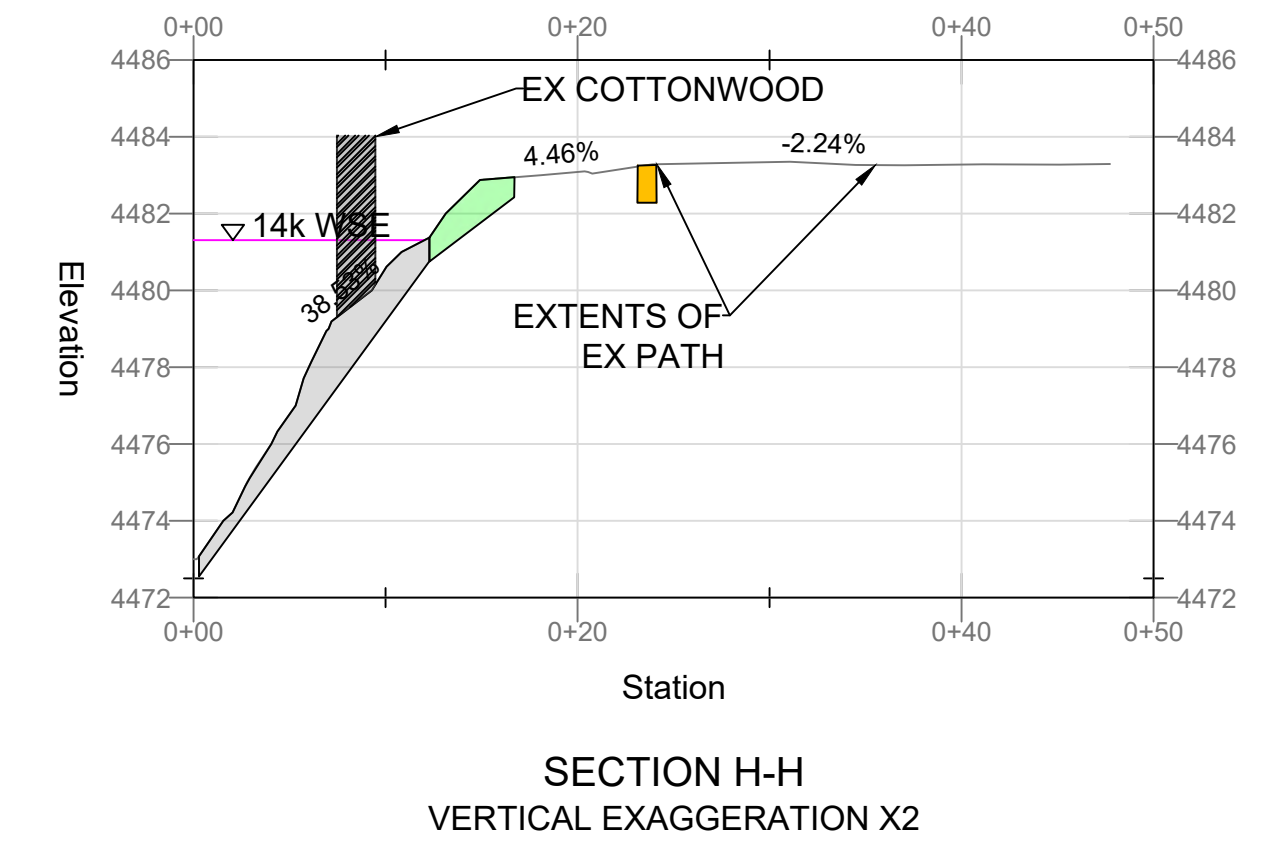
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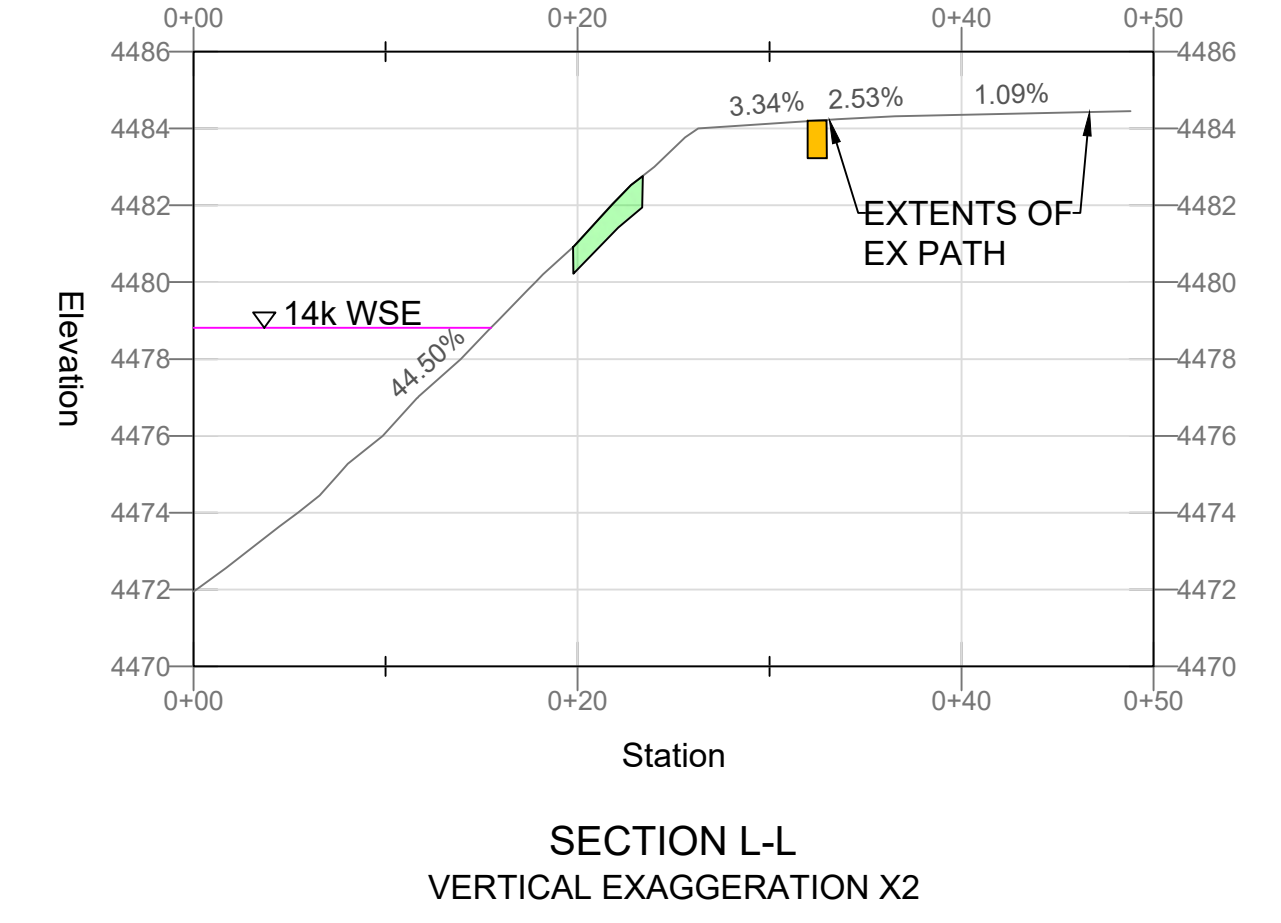
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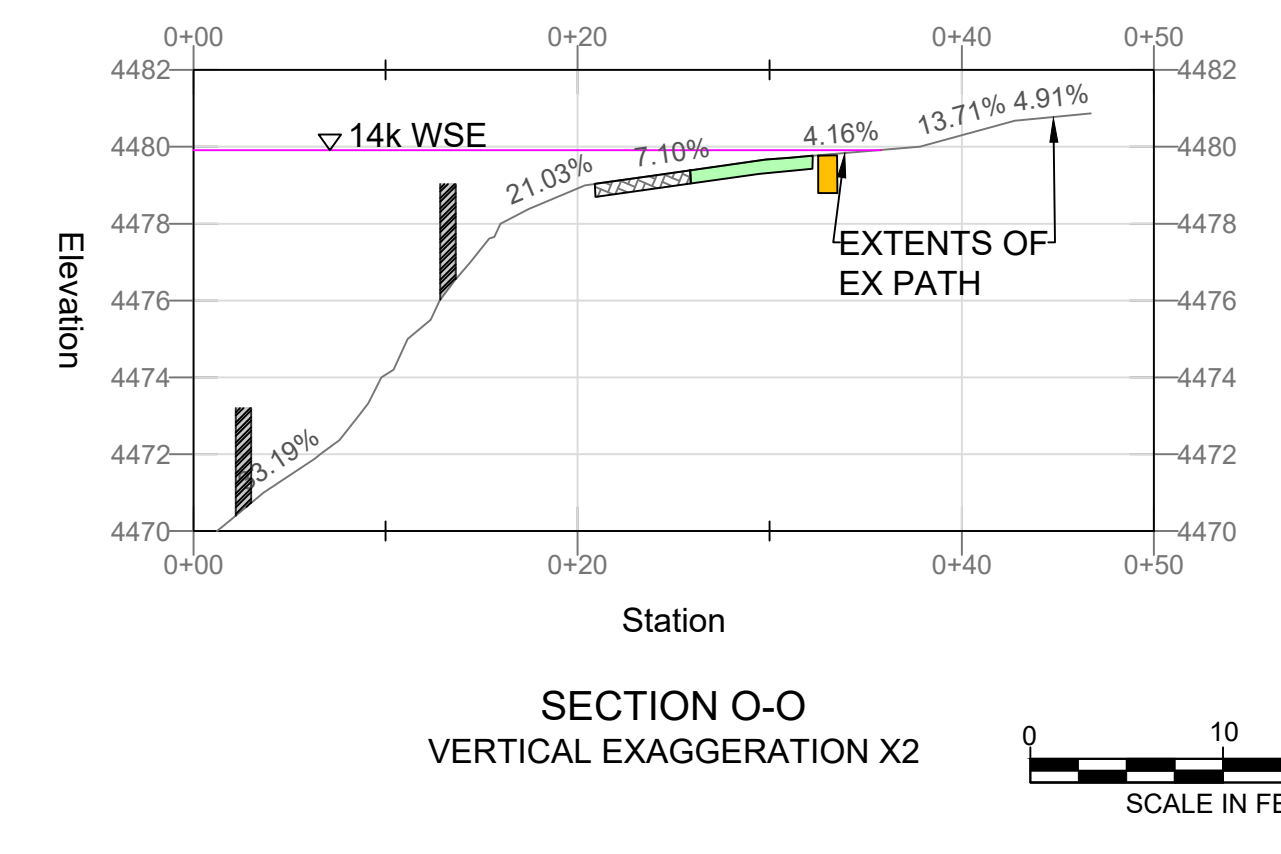
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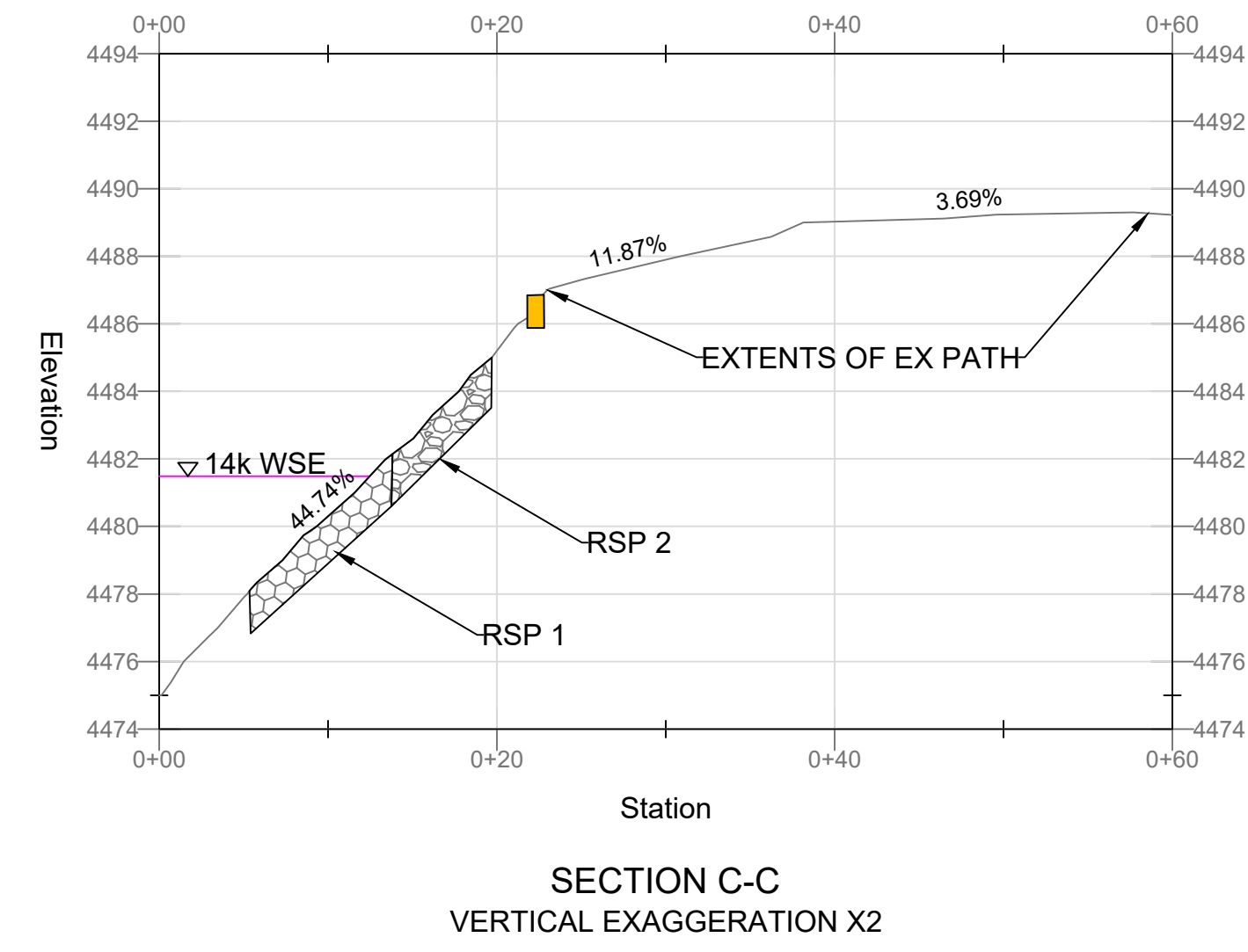
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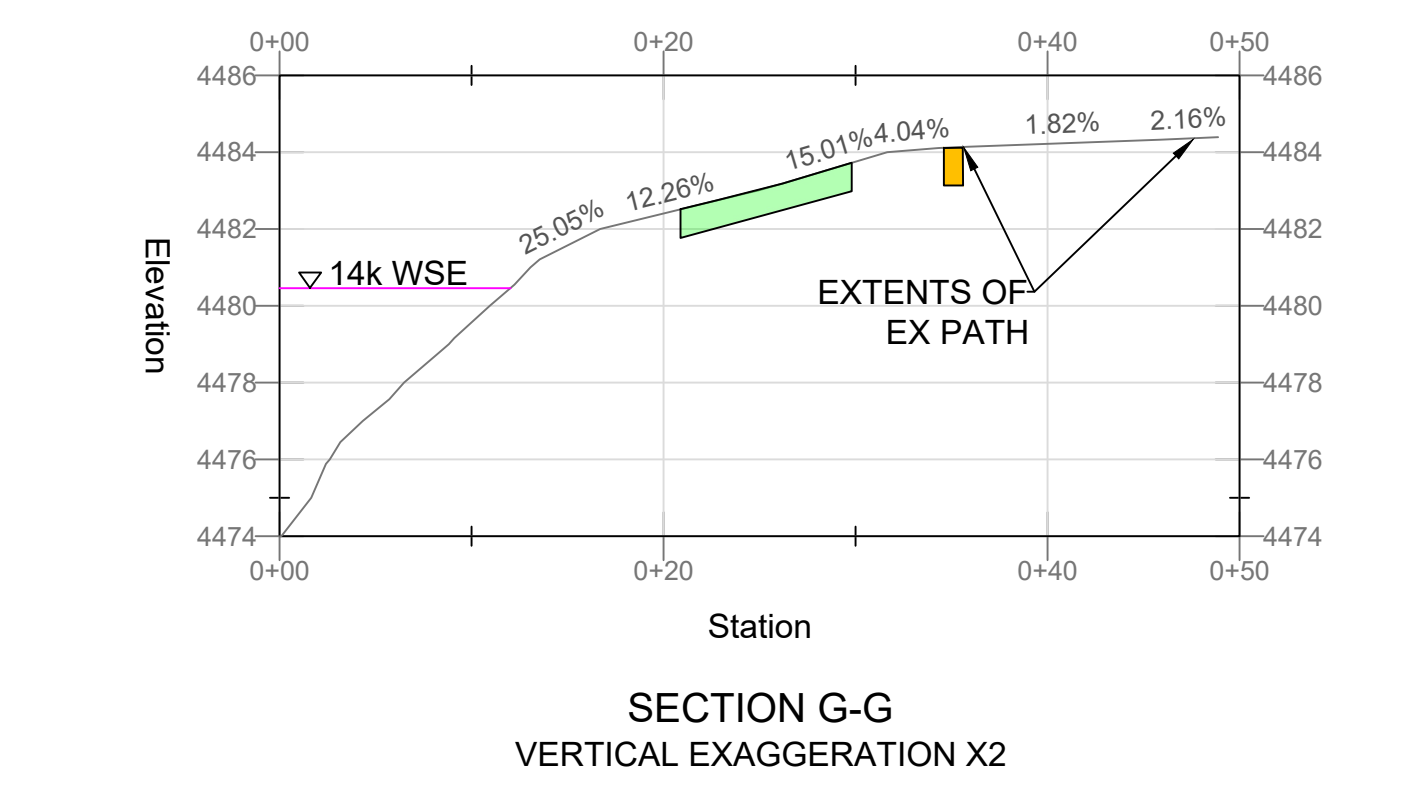
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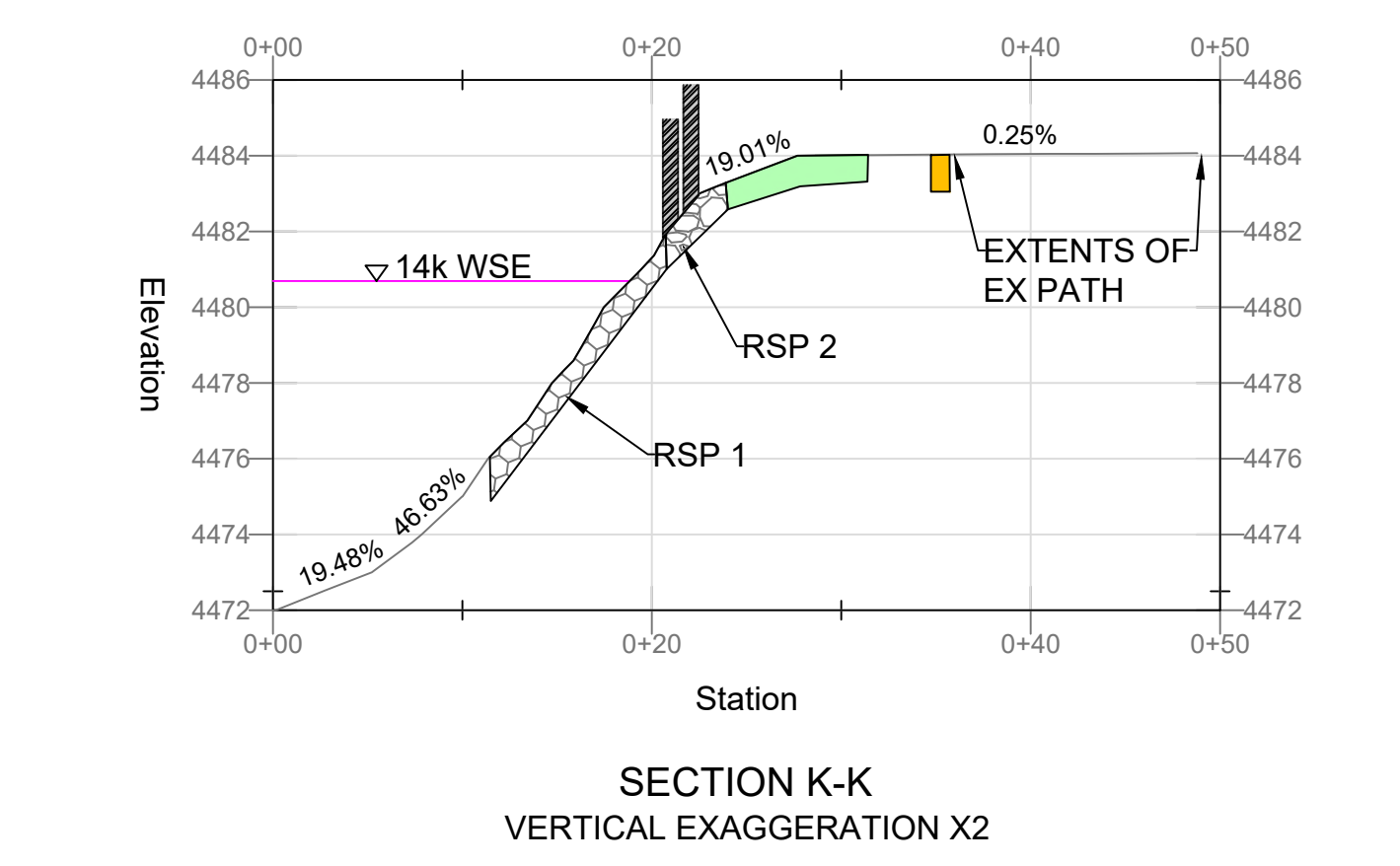
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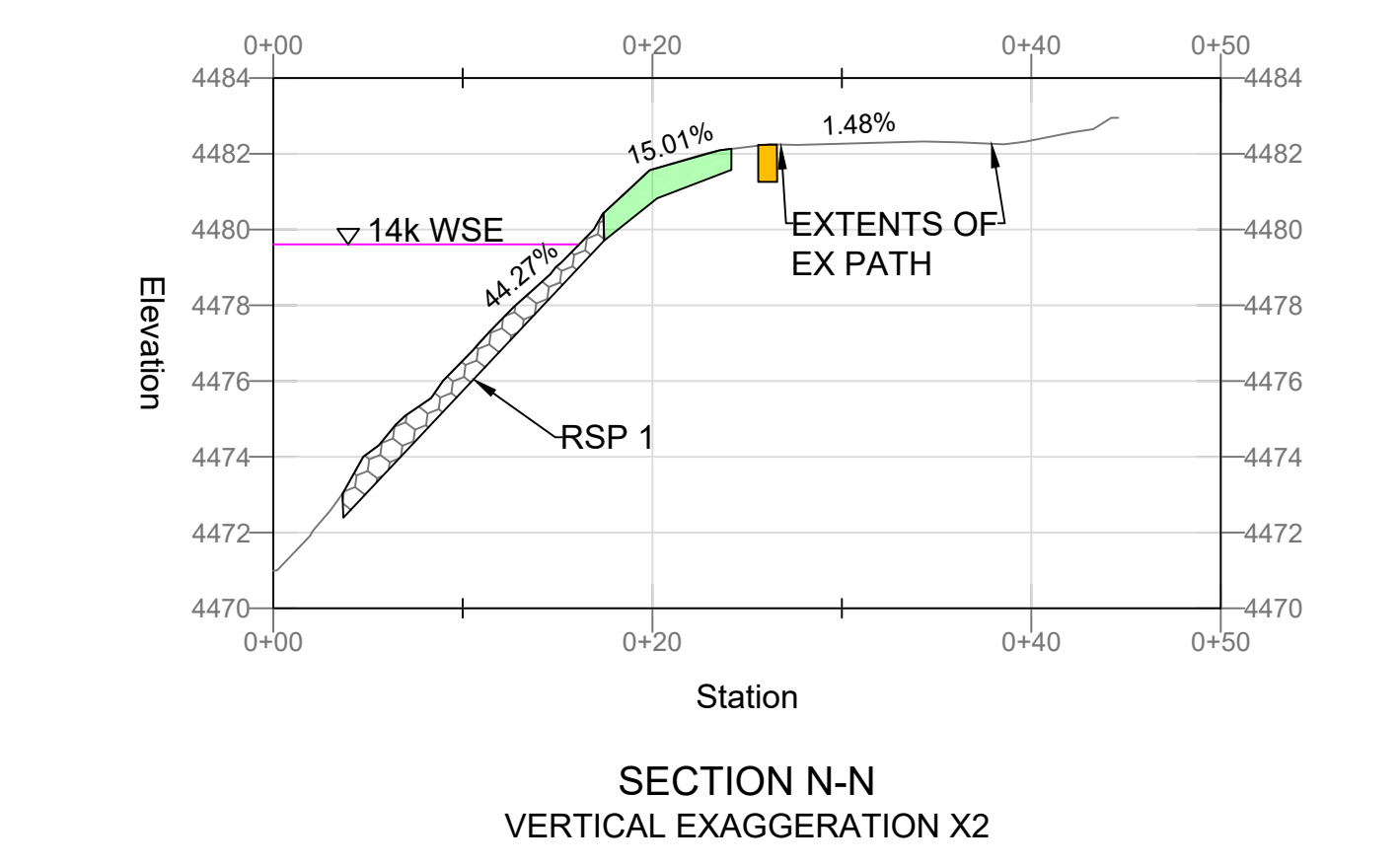
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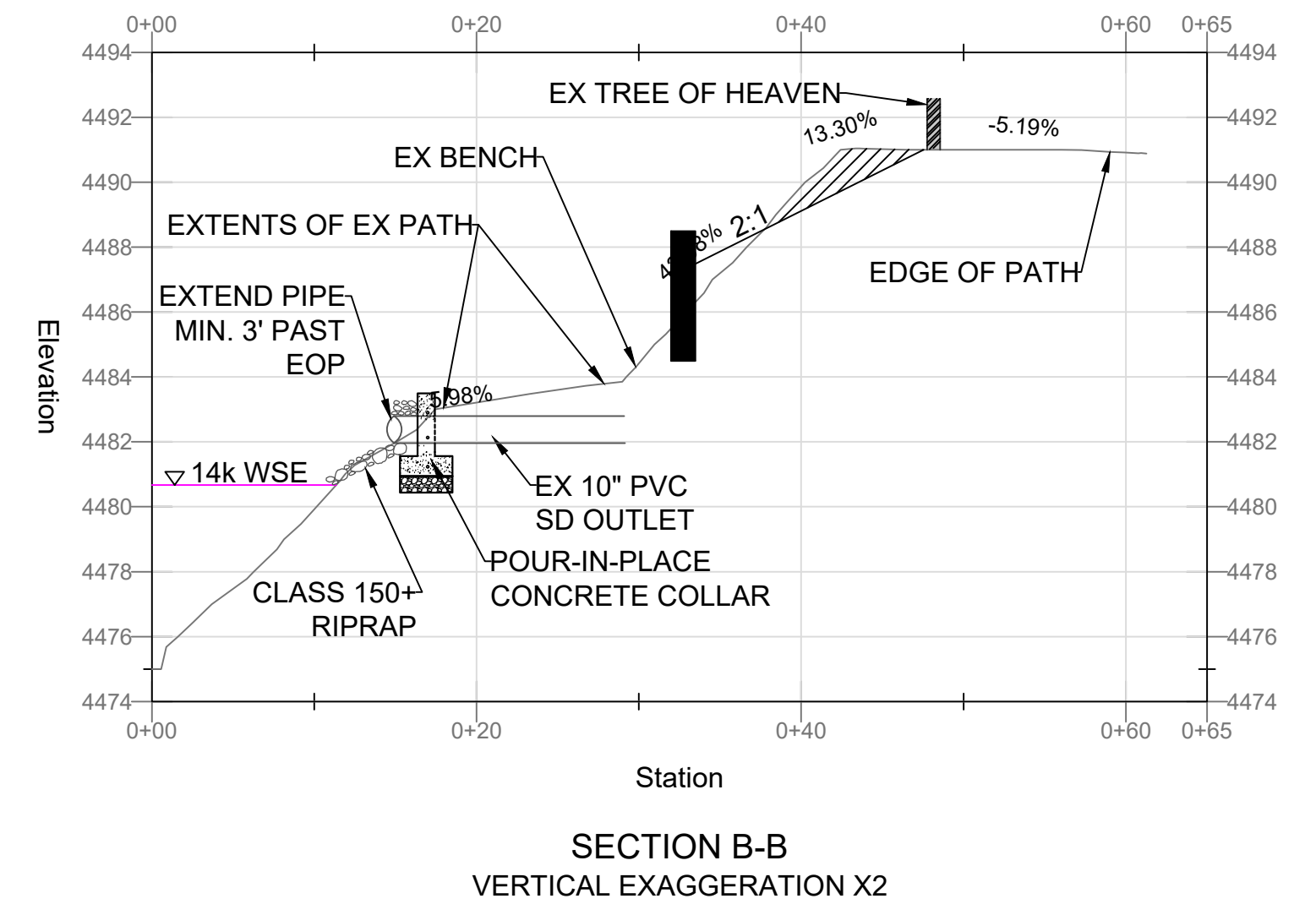
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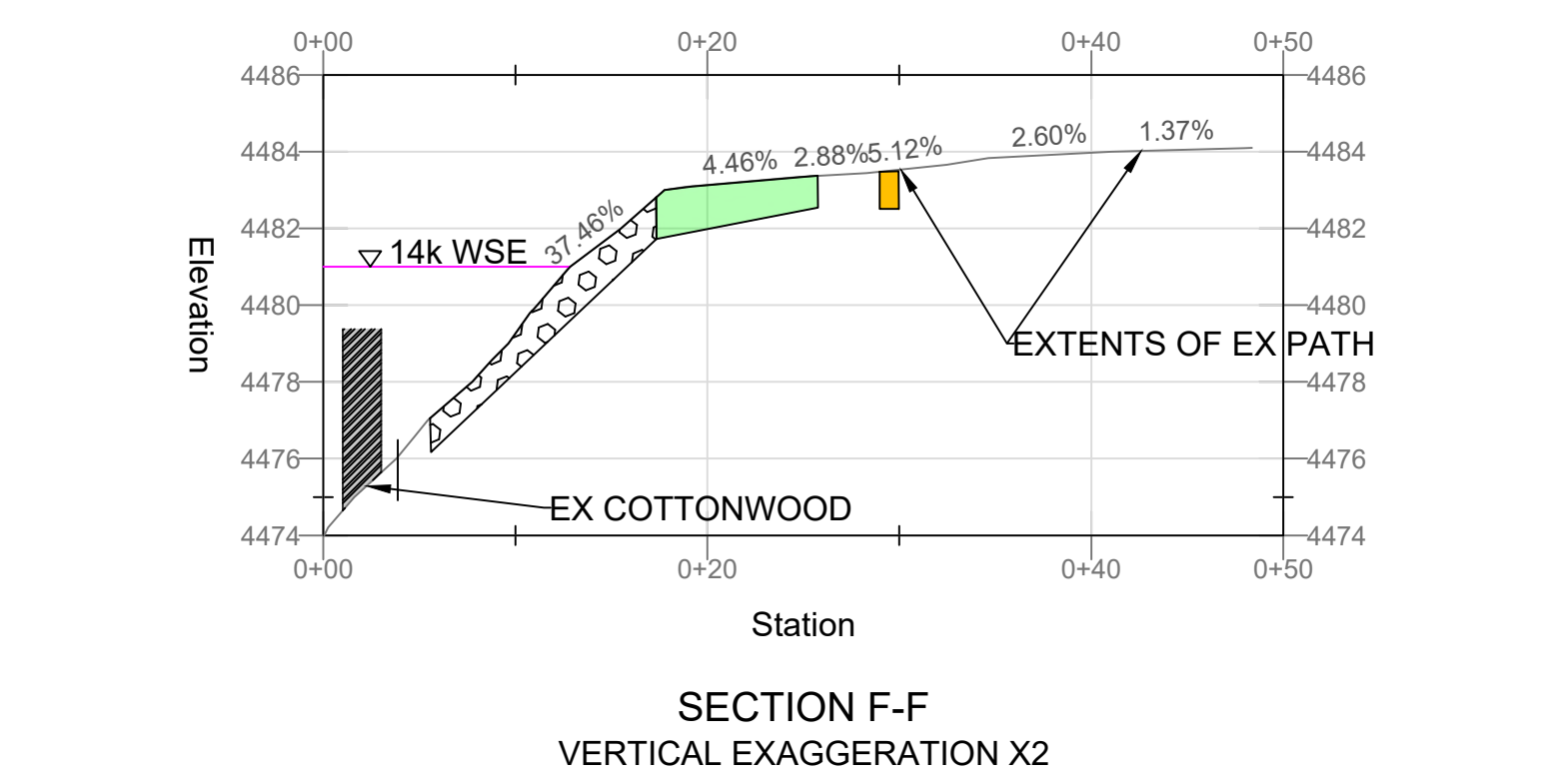
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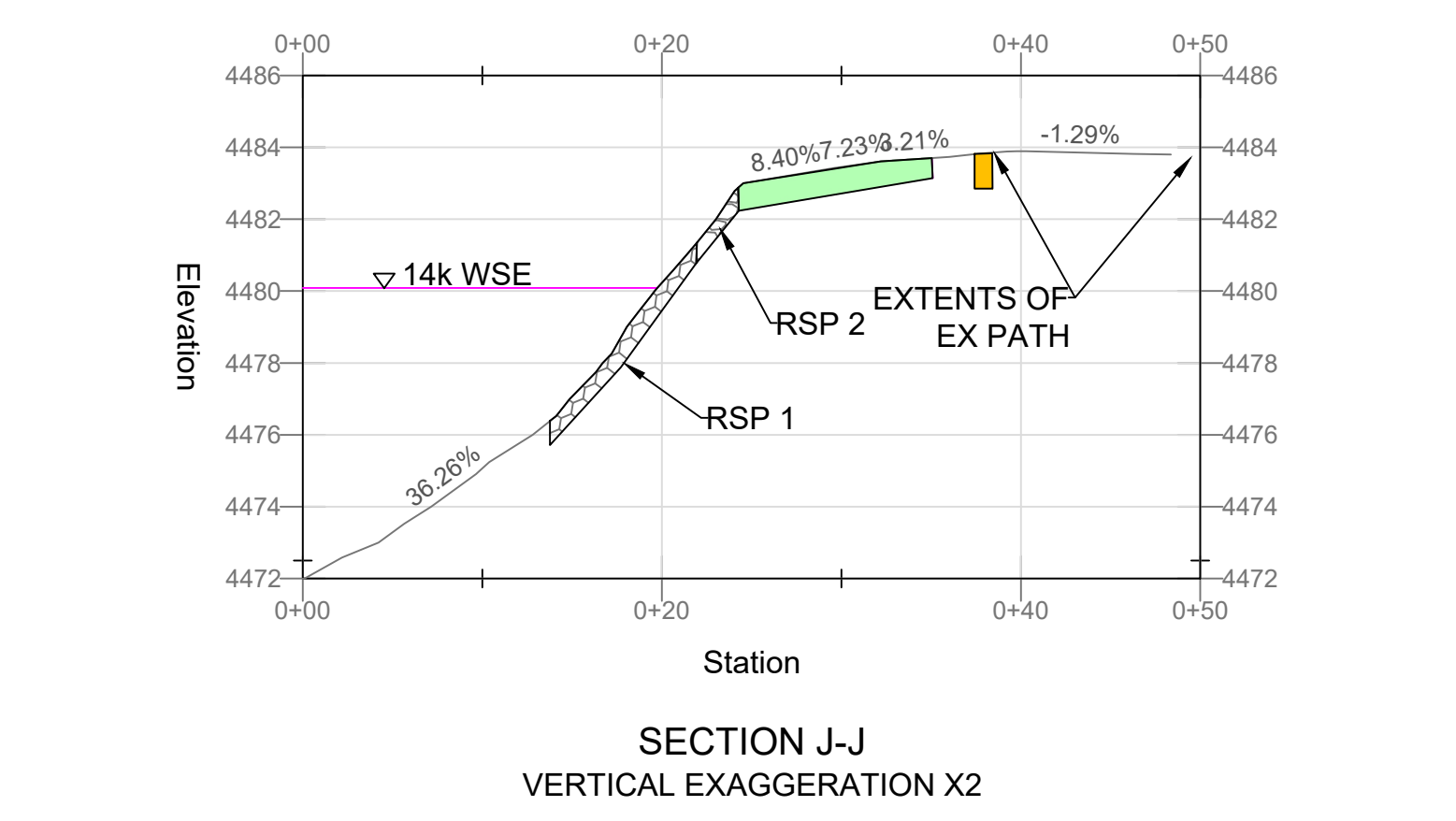
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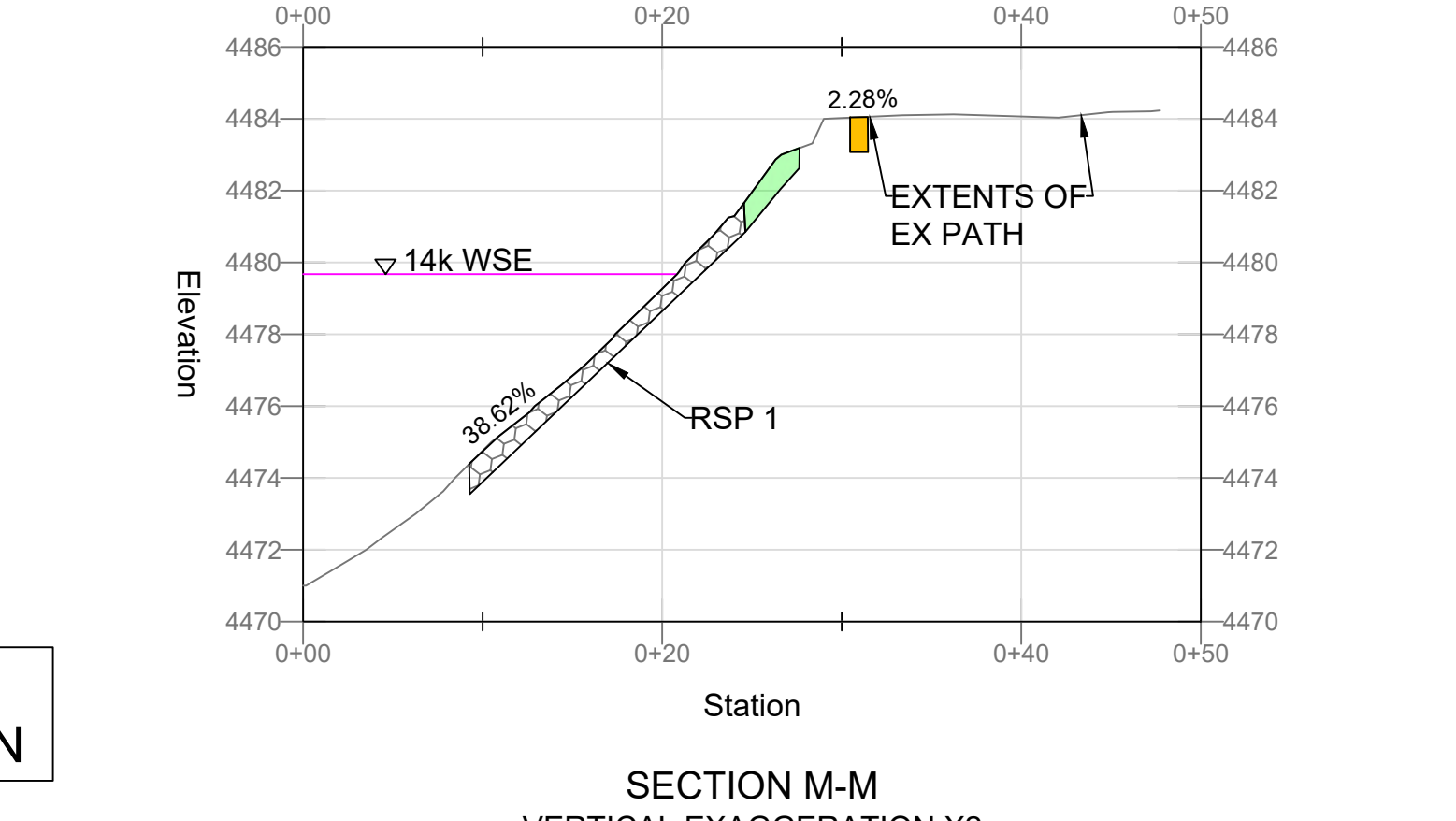
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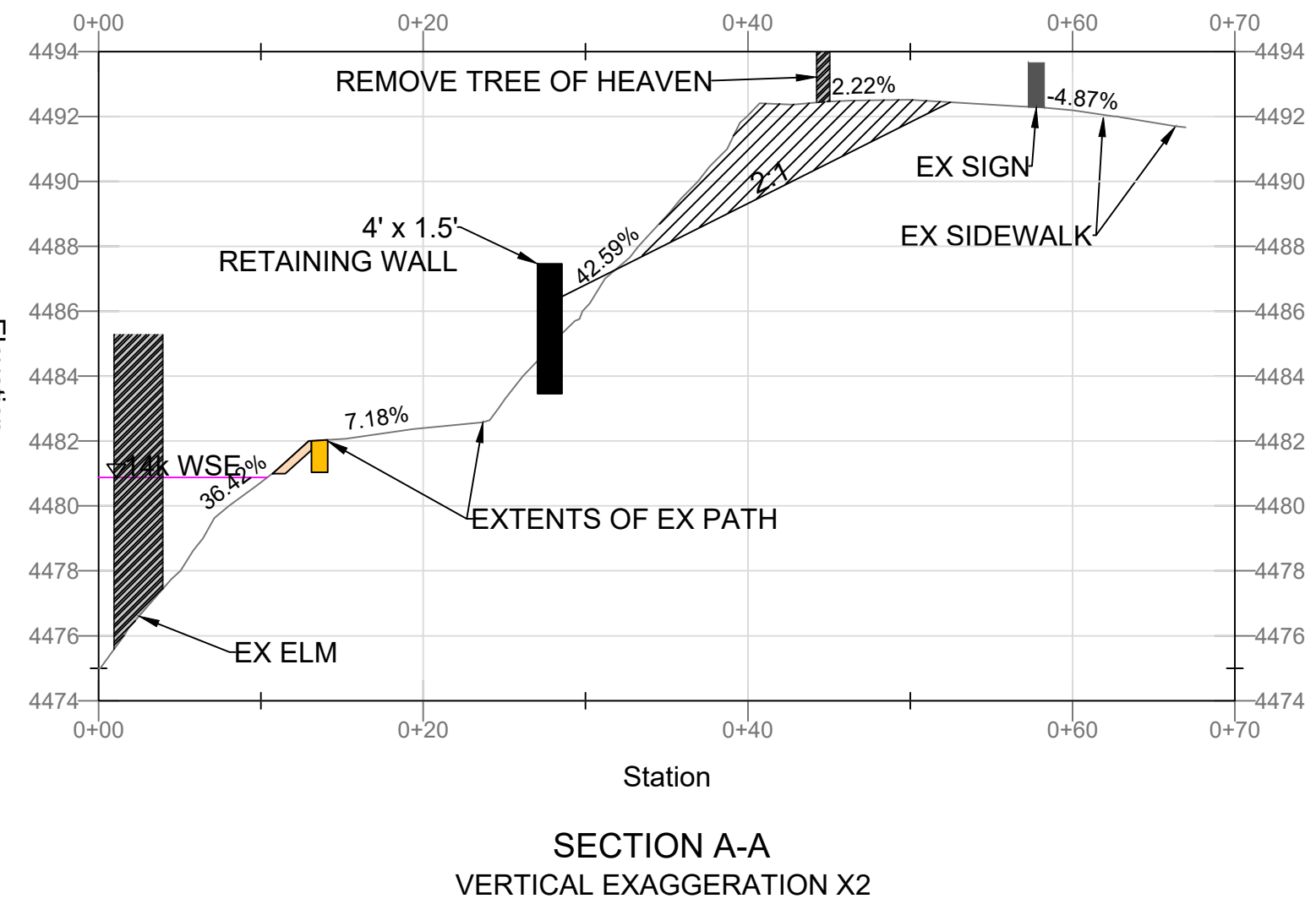
SECTION F-F
 VERTICAL EXAGGERATION X2



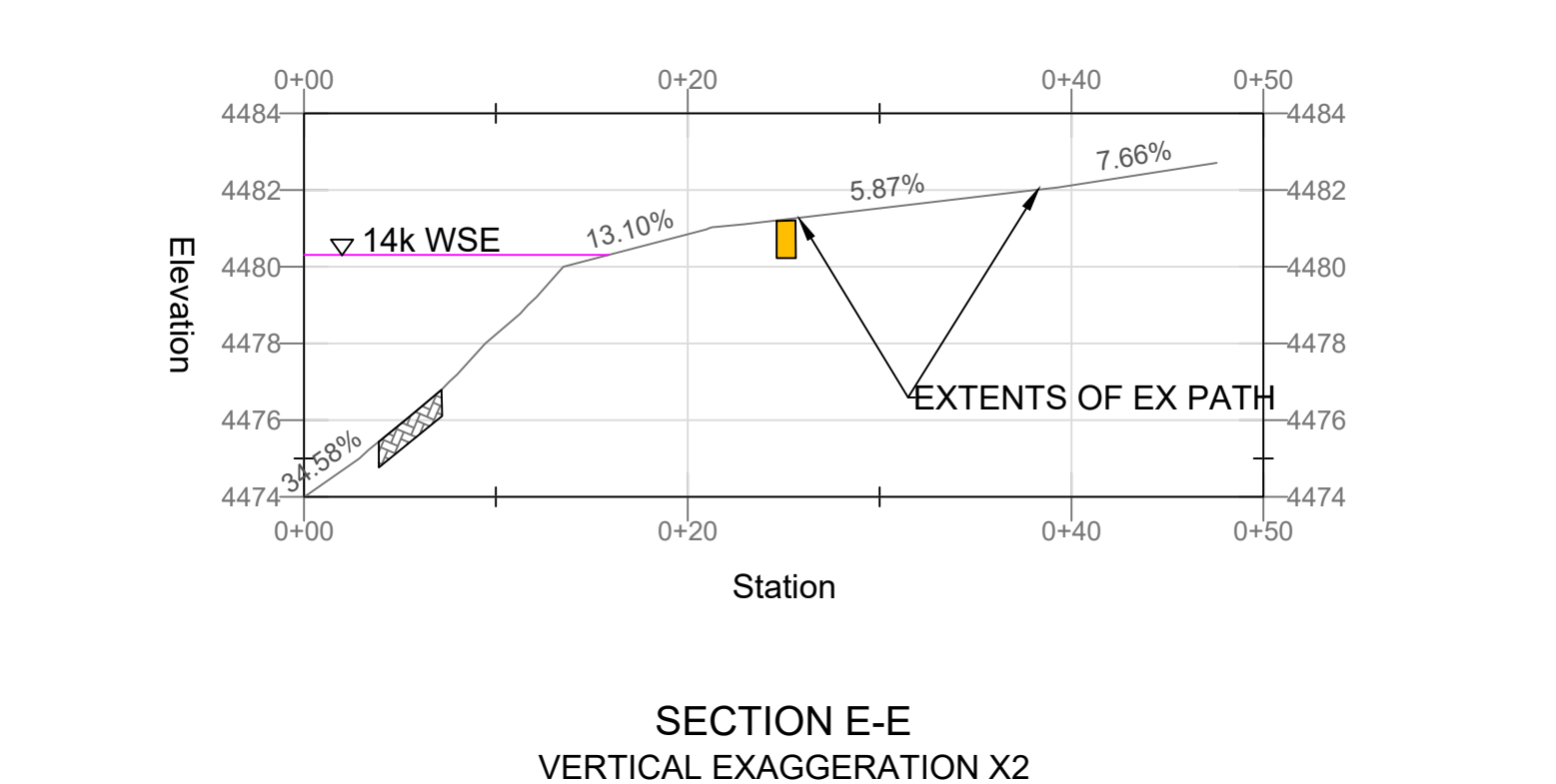
SECTION J-J
 VERTICAL EXAGGERATION X2



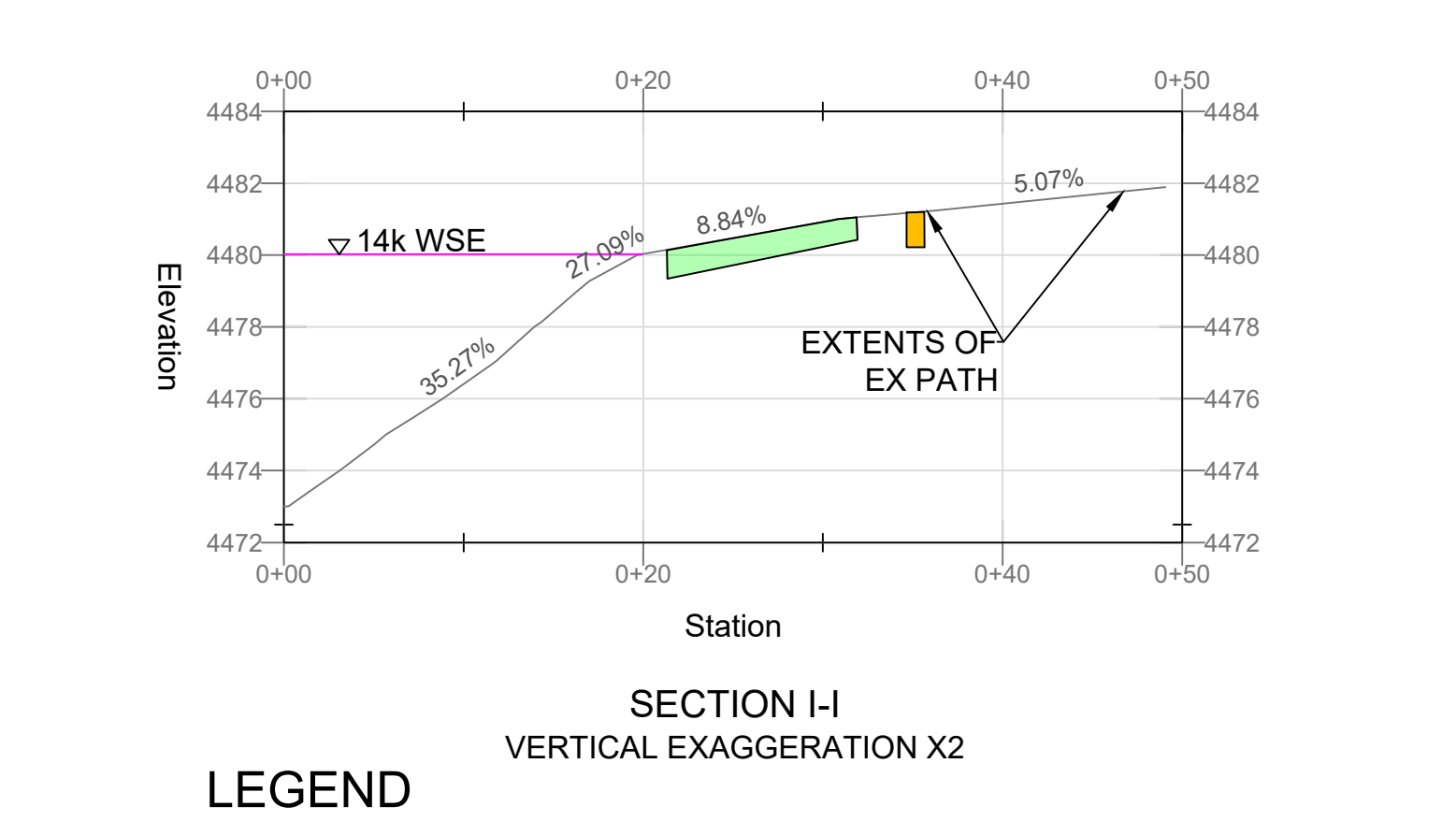
SECTION M-M
 VERTICAL EXAGGERATION X2



SECTION A-A
 VERTICAL EXAGGERATION X2



SECTION E-E
 VERTICAL EXAGGERATION X2

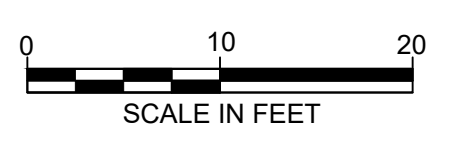


SECTION I-I
 VERTICAL EXAGGERATION X2

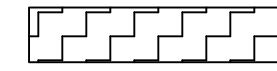

LEGEND

- CUT
- FILL
- RSP 1
- RSP 2
- UPLAND ZONE PLANT PALETTE
- TRANSITIONAL ZONE PLANT PALETTE
- OVERBANK ZONE PLANT PALETTE
- WOODS ROSE AND SKUNKBUSH SUMAC
- N TRAIL
- GRAVEL SHOULDER
- 14K CFS WS ELEVATION

60% DESIGN NOT FOR CONSTRUCTION





LEGEND:
 STAGING AREA
 ACCESS DIRECTION

60% DESIGN NOT FOR CONSTRUCTION



WILDSCAPE ENGINEERING
 WILDSCAPE ENGINEERING, INC.
 1901 Airport Rd, Suite #109
 South Lake Tahoe, CA 96150
 www.wildscape-engineering.com



**Brodhead Park
 Riverbank Restoration**
 Reno, NV 89502

Staging and Access

Designed:	Drawn:	Checked:
CYB	JA	CYB
File Date: 10/13/2023		

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No.	Description

Notes:

Sheet Scale: AS SHOWN

C-4

7 of 11



WILDSCAPE
ENGINEERING
WILDSCAPE ENGINEERING, INC.
1901 Airport Rd, Suite #108
South Lake Tahoe, CA 96150
www.wildscape-engineering.com



**Brodhead Park
Riverbank Restoration**
Reno, NV 89502

Revegetation

Designed: SM/CYB
Drawn: JA
Checked: SM/CYB
File Date: 09/23/2023

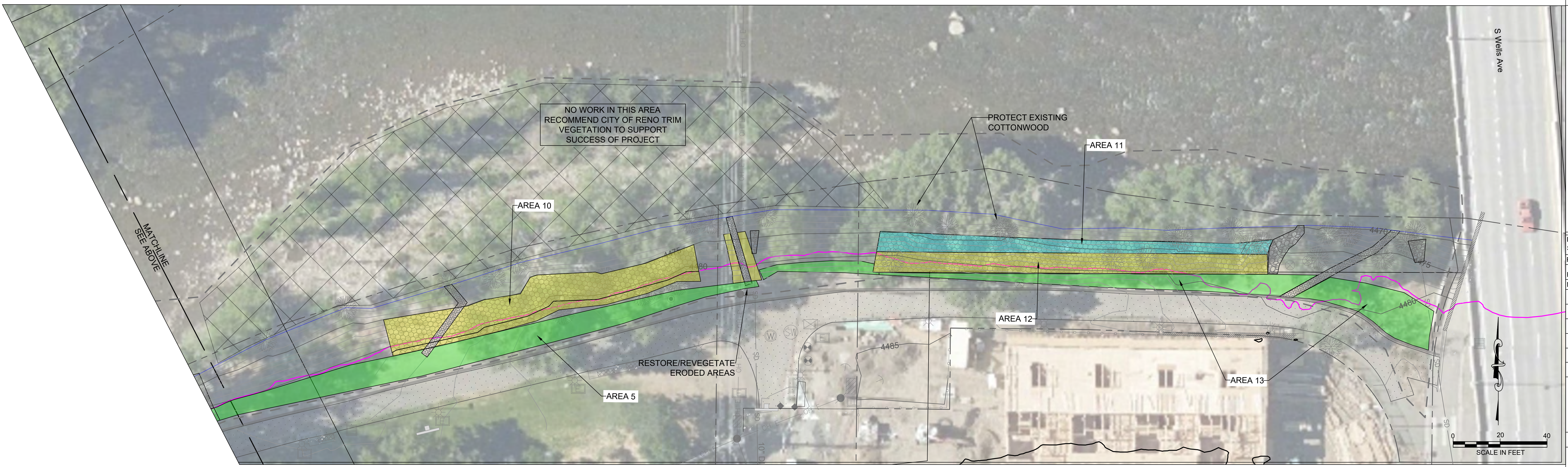
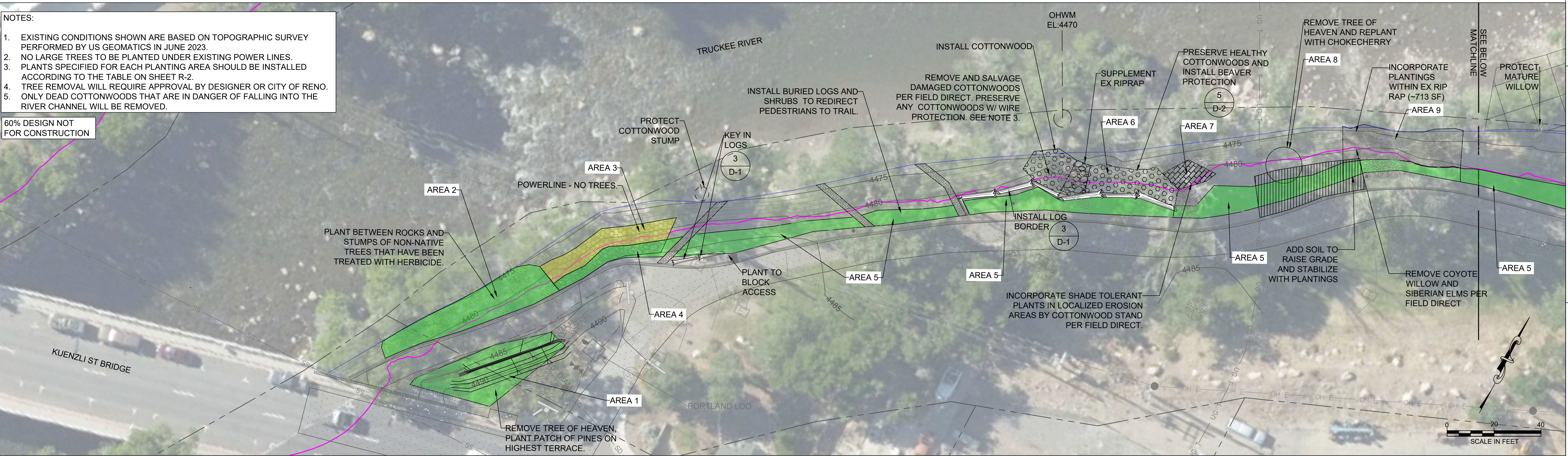
REVISIONS:
No. Date Description

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- NOTES:
- EXISTING CONDITIONS SHOWN ARE BASED ON TOPOGRAPHIC SURVEY PERFORMED BY US GEOMATICS IN JUNE 2023.
 - NO LARGE TREES TO BE PLANTED UNDER EXISTING POWER LINES.
 - PLANTS SPECIFIED FOR EACH PLANTING AREA SHOULD BE INSTALLED ACCORDING TO THE TABLE ON SHEET R-2.
 - TREE REMOVAL WILL REQUIRE APPROVAL BY DESIGNER OR CITY OF RENO.
 - ONLY DEAD COTTONWOODS THAT ARE IN DANGER OF FALLING INTO THE RIVER CHANNEL WILL BE REMOVED.

60% DESIGN NOT FOR CONSTRUCTION



Area	Species	Common Name	Spacing (ft on center)	Quantity	Area	Species	Common Name	Spacing (ft on center)	Quantity	
1	<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	6	7	6	<i>Ribes aureum</i>	golden currant	6	10	
	<i>Clematis ligusticifolia</i>	western white clematis	8	16		<i>Rosa woodsii</i>	Wood's rose	6	10	
	<i>Eriogonum umbellatum</i>	sulfur flower buckwheat	8	4	7	<i>Clematis ligusticifolia</i>	western white clematis	8	3	
	<i>Penstemon eatonii</i>	firecracker penstemon	2	117		<i>Populus fremontii</i>	Fremont cottonwood	12	2	
	<i>Penstemon strictus</i>	Rocky Mountain penstemon	2	117		<i>Rubus parviflorus</i>	thimbleberry	6	3	
		<i>Pinus jeffreyi</i>	Jeffrey pine	12	7	8	<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	6	6
		<i>Prunus andersonii</i>	desert peach	6	7		9	<i>Cornus sericea</i>	redosier dogwood	6
2	<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	6	9	<i>Salix laevigata</i>	red willow		12	6	
	<i>Eriogonum umbellatum</i>	sulfur flower buckwheat	8	6	10	<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	6	27	
	<i>Prunus andersonii</i>	desert peach	6	9		<i>Cornus sericea</i>	redosier dogwood	6	27	
3	<i>Prunus virginiana</i>	chokecherry	12	4	11	<i>Alnus incana</i>	gray alder	12	8	
	<i>Ribes aureum</i>	golden currant	6	6		<i>Cornus sericea</i>	redosier dogwood	6	14	
	<i>Rosa woodsii</i>	Wood's rose	6	6		<i>Rubus parviflorus</i>	thimbleberry	6	14	
4	<i>Ericameria nauseosa</i>	rubber rabbitbrush	6	9	12	<i>Amelanchier alnifolia</i>	Saskatoon serviceberry	6	9	
	<i>Eriogonum heracleoides</i>	parsnipflower buckwheat	5	36		<i>Populus fremontii</i>	Fremont cottonwood	12	6	
	<i>Penstemon palmeri</i>	Palmer's penstemon	2	36		<i>Prunus virginiana</i>	chokecherry	12	6	
5	<i>Achillea millefolium</i>	common yarrow	2	115		<i>Ribes aureum</i>	golden currant	6	9	
	<i>Achnatherum hymenoides</i>	Indian ricegrass	4	27		<i>Rosa woodsii</i>	Wood's rose	6	9	
	<i>Asclepias speciosa</i>	showy milkweed	2	115	<i>Sambucus nigra ssp. cerulea</i>	black elderberry	6	9		
	<i>Eriogonum heracleoides</i>	parsnipflower buckwheat	2	115	13	<i>Achillea millefolium</i>	common yarrow	2	106	
	<i>Eriogonum robustum</i>	granit buckwheat	2	115		<i>Eriogonum heracleoides</i>	parsnipflower buckwheat	2	106	
	<i>Eriogonum umbellatum</i>	sulfur flower buckwheat	8	23		<i>Eriogonum umbellatum</i>	sulfur flower buckwheat	8	14	
	<i>Leymus cinereus</i>	Great Basin wildrye	4	27		<i>Penstemon strictus</i>	Rocky Mountain penstemon	2	106	
	<i>Lupinus argenteus</i>	silvery lupine	2	115		<i>Prunus andersonii</i>	desert peach	6	24	
	<i>Penstemon palmeri</i>	Palmer's penstemon	2	115	<i>Penstemon eatonii</i>	firecracker penstemon	2	106		
	<i>Prunus andersonii</i>	desert peach	6	40						
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	4	27							
<i>Salvia dorrii</i>	purple sage	6	40							

PLANTING NOTES

- CONTRACTOR WILL TRANSPORT PLANTS FROM WASHOE STATE TREE NURSERY TO BRODHEAD PARK. PLANT MATERIALS SHALL BE STORED IN A SHADED LOCATION PROTECTED FROM WIND AND WATERED REGULARLY. IF THE MINIMUM TEMPERATURE IS BELOW 30°F, PLANTS MUST BE STORED IN A SHELTER. PLANTING SHALL OCCUR WHEN THE GROUND IS NOT FROZEN. PLANTING SHALL NOT TAKE PLACE IF THE MINIMUM DAILY TEMPERATURE IS BELOW 32°F.
- PLACE PLANTS ACCORDING TO SPACING PRESCRIBED ABOVE UNDER THE DIRECTION OF THE DESIGNER. CREATE PLANTING AREA AND ENSURE THAT THERE IS ENOUGH SOIL TO COVER ROOTS. SUPPLEMENTAL SOIL WILL BE NEEDED TO RAISE GROUND LEVEL IN AREAS 5 AND 13. SOIL SHALL BE SELECTED BY THE DESIGNER AND SHALL BE A SIMILAR TEXTURE AND PH AS EXISTING SOIL.
- PLANTING AND ROCK SLOPE PROTECTION INSTALLATION SHALL OCCUR CONCURRENTLY. BOULDERS SHALL BE KEYED IN AND ALTERNATED WITH PLANT INSTALLATION UNDER THE DIRECTION OF THE DESIGNER.
- EXCAVATE A PLANTING HOLE TWO INCHES WIDER (ONE INCH ON EITHER SIDE) AND DEEPER THAN THE CONTAINER. EXCAVATE SOIL SO THAT THE CROWN IS ½-INCH BELOW GRADE, FORMING A PLANTING POCKET. LOOSEN SOILS IN THE BOTTOM AND ALONG THE SIDES OF THE HOLE. THOROUGHLY WATER HOLES PRIOR TO PLANTING. PLACE PLANTS WITH ROOTS FACING COMPLETELY DOWNWARD. ROOTS SHOULD NOT BE TURNED UP. PLANT ROOTS SHOULD BE IN DIRECT CONTACT WITH SOIL WITH NO AIR POCKETS.
- PLANTS SHALL RECEIVE MYCORRHIZAE THAT DOES NOT CONTAIN FERTILIZER. EACH ENDOMYCORRHIZAL INOCULUM SHALL CARRY A SUPPLIER'S GUARANTEE OF NUMBER OF PROPAGULES PER UNIT WEIGHT OR VOLUME OF BULK MATERIAL. INOCULUM SHALL CONTAIN *RHIZOPHAGUS IRREGULARIS*. THE INOCULUM SHALL HAVE A PROPAGULE COUNT OF 120 PER GRAM OF WHICH A MINIMUM OF 20 SPORES PER GRAM PRESENT PER SAMPLE VERIFIED BY AN THIRD PARTY INDEPENDENT LABORATORY. MYCORRHIZAE SHALL BE MIXED IN THE SOIL IN THE PLANTING HOLE NEAR THE ROOTS ACCORDING TO MANUFACTURER INSTRUCTIONS AND ACCORDING TO CONTAINER SIZE. APPROVED THIRD PARTY LABS ARE AS FOLLOWS:

Laboratory	Address	Contact Information
Western Laboratories, Inc.	211 Highway 95 Parma, ID 83660	Tel: 800-658-3858 Harry Kreeft
U of Florida, Soil & Water	2169 McCarty Hall, PO Box 110290 Gainesville, FL 32611 0290	Tel: 352-392-1951, ext 220 Abid Al Agely
Mycoroots	1970 NW Lance Way Corvallis, OR 97330-2209	Tel: 541-752-0339 Efen Cazerres

- FILL AROUND EDGES OF PLANTS WITH SOIL AND ENSURE THAT AIR POCKETS DO NOT OCCUR AROUND ROOTS. THE AREA AROUND EACH PLANT SHALL BE COMPACTED BY FOOT AFTER INSTALLATION. WATER THOROUGHLY AFTER PLANTING AND RECOMPACT IF VOIDS ARE EVIDENT.
- INSTALL BEAVER EXCLUSION CAGES AROUND COTTONWOOD AND WILLOW TREES IN AREAS 7, 9, AND 12 FOR A TOTAL OF 14 CAGES. CAGES WILL BE AT LEAST 4 FEET TALL, WITH A DIAMETER OF 2 FEET. 2 x 4-INCH GALVANIZED WIRE MESH (NOT CHICKEN WIRE) SHALL BE USED TO CONSTRUCT THE CAGES. EACH CAGE SHALL BE SUPPORTED BY TWO 3/8-INCH, 4-FOOT TALL REBAR POSTS. PLANTS SHALL BE INSTALLED PRIOR TO CAGE CONSTRUCTION. THE BOTTOM SHALL BE BURIED UP TO 3 INCHES BELOW GROUND TO ALLOW FOR LEVEL PLACEMENT. CAGES SHALL BE HELD TOGETHER BY INTERTWINING THE WIRE MESH, FENCE TIES, OR HOG RINGS. WEAVE REBAR SHOULD BE WOVEN THROUGH MESH TO SUPPORT THE CAGES. CAGES SHALL NOT CONTAIN GAPS GREATER THAN 4 INCHES.



**Brodhead Park
Riverbank Restoration**
 Reno, NV 89502

Planting Plan

Designed: SM/JE	Drawn: JA	Checked: SM
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File Date: 10/13/2023

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No.	Description

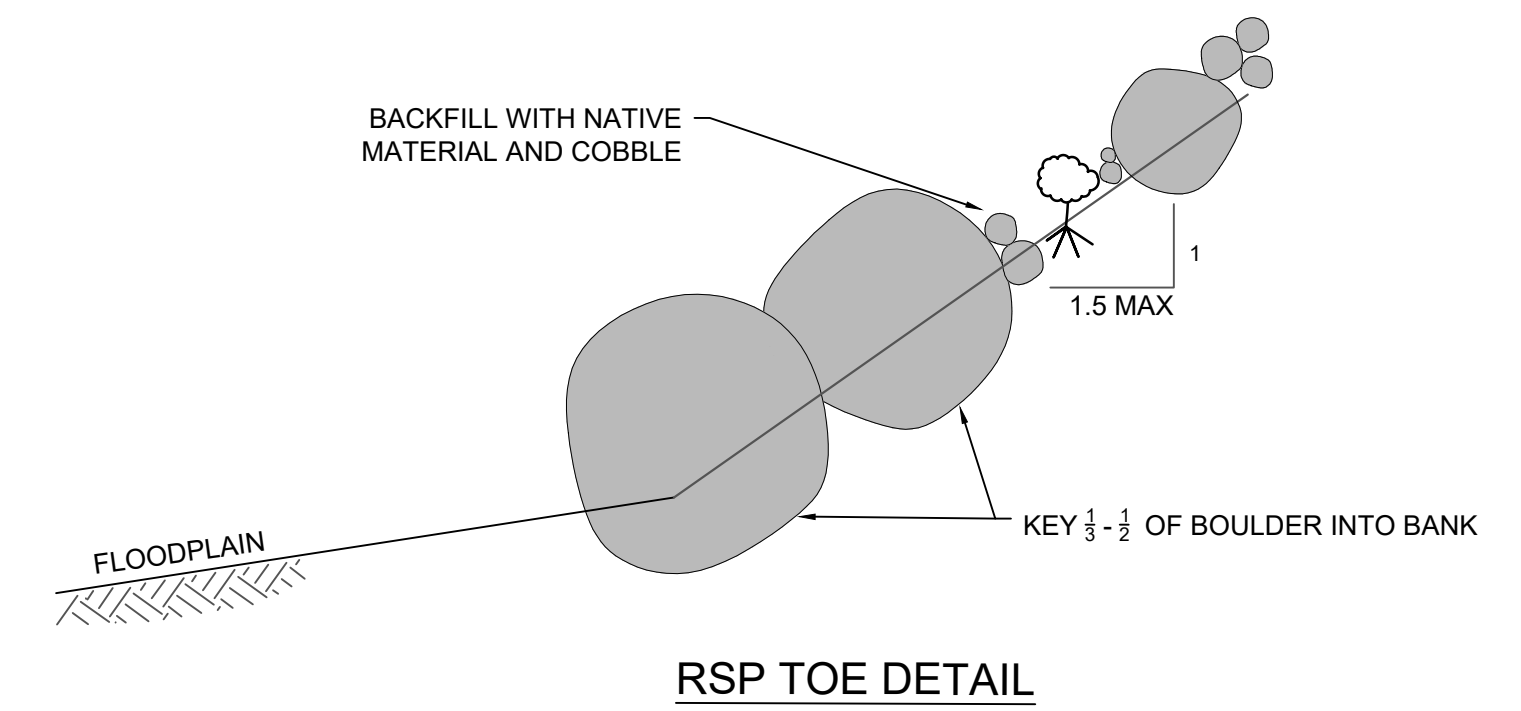
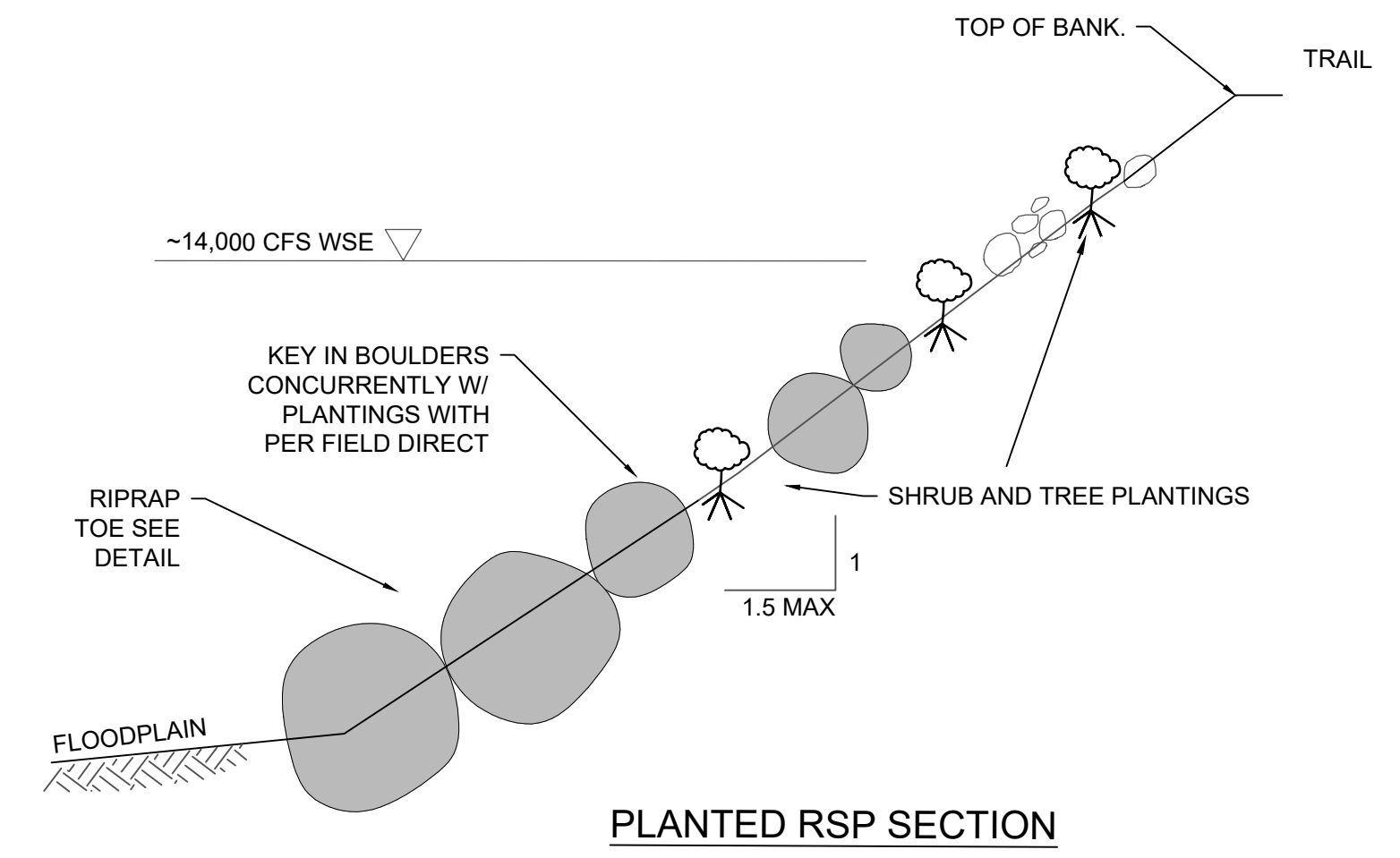
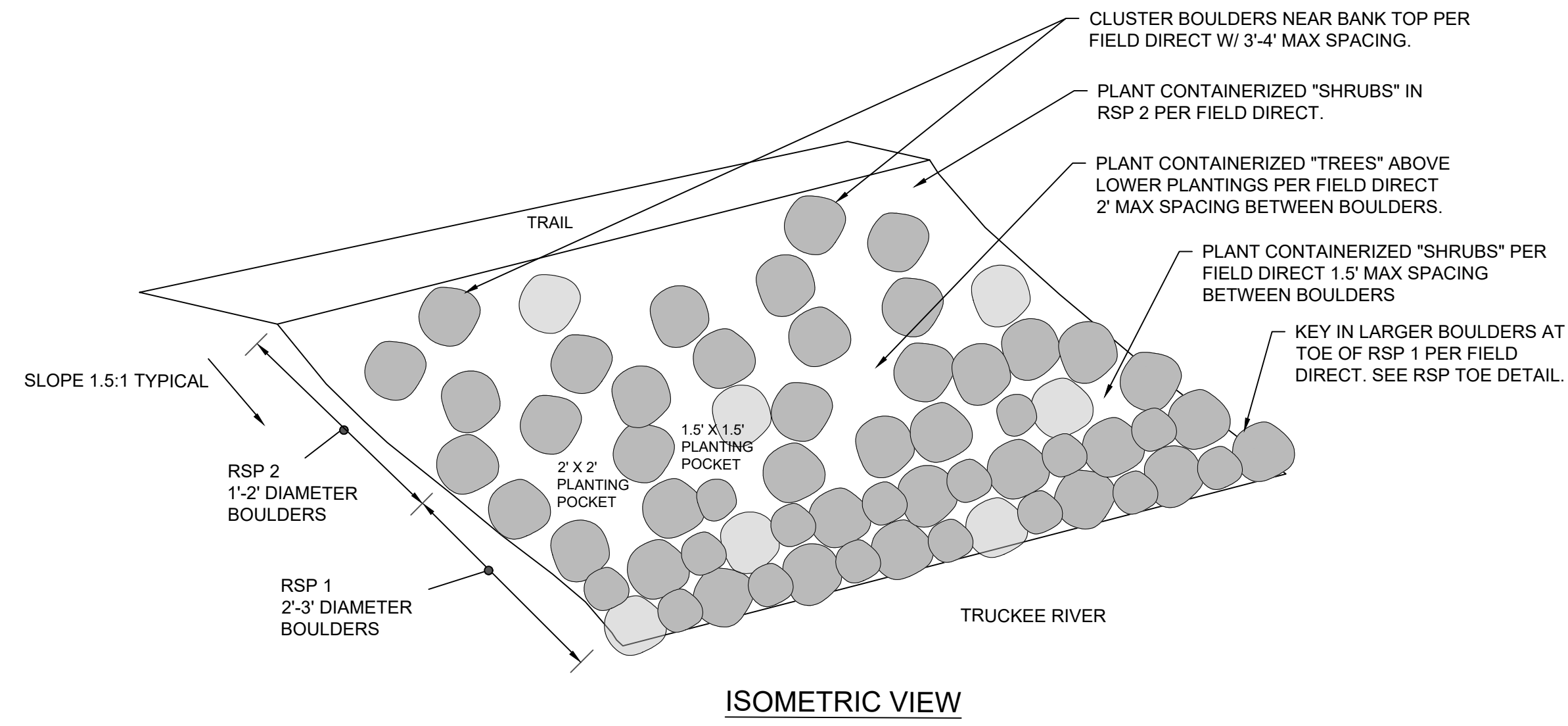
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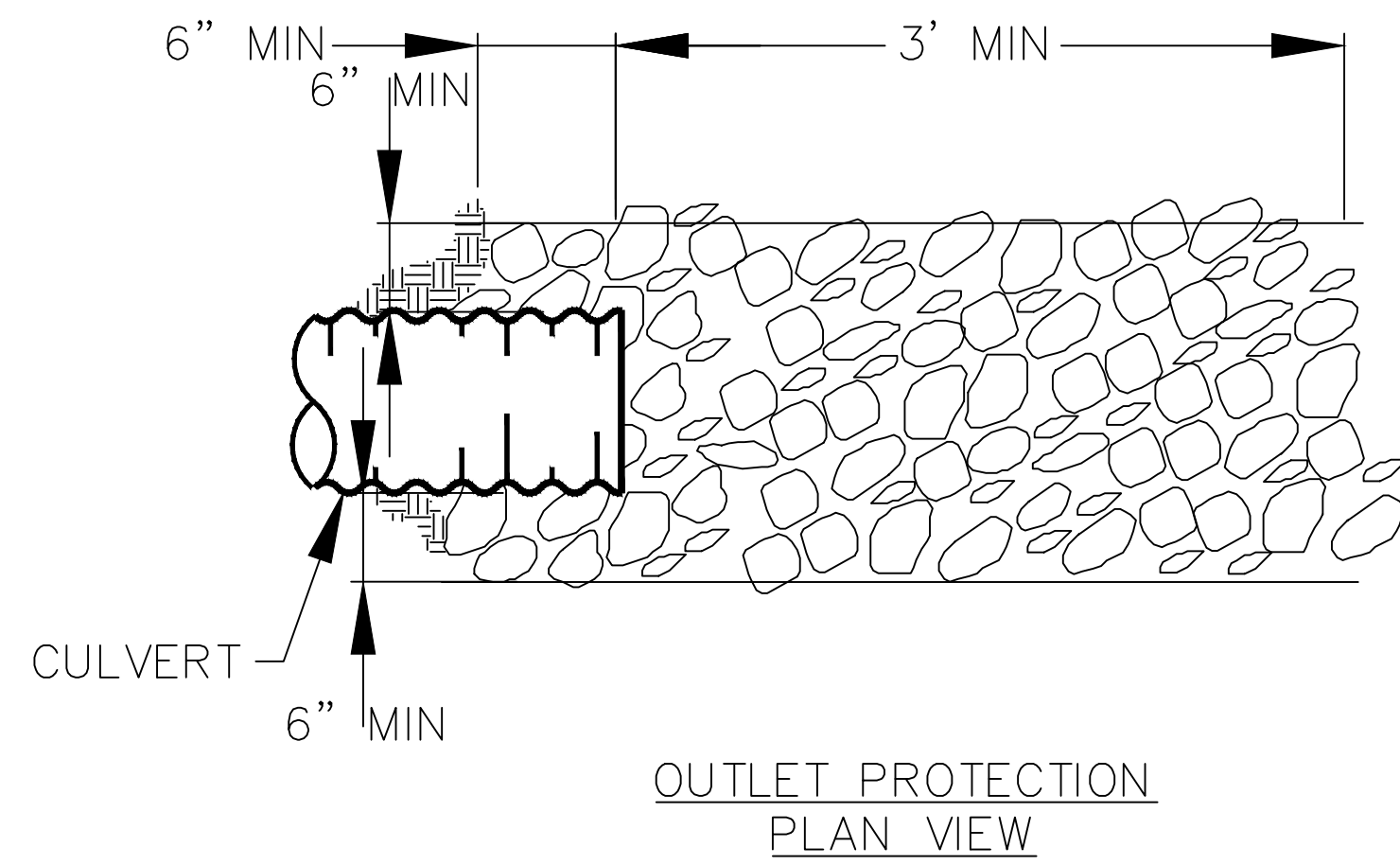
60% DESIGN NOT FOR CONSTRUCTION

PLANTED RSP GENERAL NOTES

1. BOULDER RIPRAP SHALL BE KEYED INTO THE BANK TOE TO AVOID UNDERMINING AT THE TOE OF THE SLOPE.
2. WILLOW POLES OR PLANTED SHRUBS AND TREE SHALL BE IN CONTACT WITH THE MOIST SOIL BELOW THE ROCK. PLANTING OF WILLOW TREE POLES DURING THE DORMANT SEASON OF THE PLANT SPECIES IS PREFERRED.
3. LIVE WILLOW TREE POLES SHALL BE 0.75 INCHES TO 2.5 INCHES IN DIAMETER AND A MIN. OF 4 FEET LONG WITH SIDE BRANCHES CLEANLY REMOVED.
4. THE BOTTOM (BASAL) END OF LIVE POLES SHALL BE CLEANLY CUT AT A 45 DEGREE ANGLE. ALL PLANTINGS SHALL BE INSTALLED PERPENDICULAR TO THE SLOPE.
5. LIVE POLES FOR PLANTED RSP MAY BE INSTALLED THE DAY THEY ARE HARVESTED IF WATERED. SOAKING FOR A MINIMUM 24 HOURS IS REQUIRED WHEN PLANTING IS DELAYED.
6. LIVE POLES FOR PLANTED RSP MAY BE INSTALLED LEAVING A FEW INCHES ABOVE THE TOP OF THE RSP OR CUT FLUSH WITH THE TOP OF THE RSP. AT LEAST TWO BUDS OR BUD SCARS SHALL BE PRESENT ON THE STAKE WHEN INSTALLED.
7. VOIDS IN ROCK WHERE LIVE STAKES OR PLANTS ARE INSTALLED SHALL BE BACKFILLED WITH A WATER AND SOIL SLURRY MIXTURE TO A MINIMUM DEPTH OF HALF THE RSP LAYER THICKNESS.
8. BOULDERS FOR RSP 1 TO BE 2'-3' DIAMETER. BOULDERS FOR RSP 2 TO BE 1'-2' DIAMETER. RSP SHOULD BE HARD, DURABLE, AND ANGULAR IN SHAPE. ONSITE SALVAGE BOULDERS MAY ALSO BE USED.
9. ALL BOULDERS TO BE PLACED AND KEYED INDIVIDUALLY, ALTERNATING WITH PLANT INSTALLATIONS PER FIELD DIRECT. SPACING INCREASES AS SHOWN MOVING UP THE BANK.
10. ABOVE 14,000 CFS WATER SURFACE LINE SPACING BETWEEN BOULDERS TO BE INCREASED TO 3' TO 4' IN CLUSTER FORMATION TO ALLOW FOR INCREASED PLANTINGS.



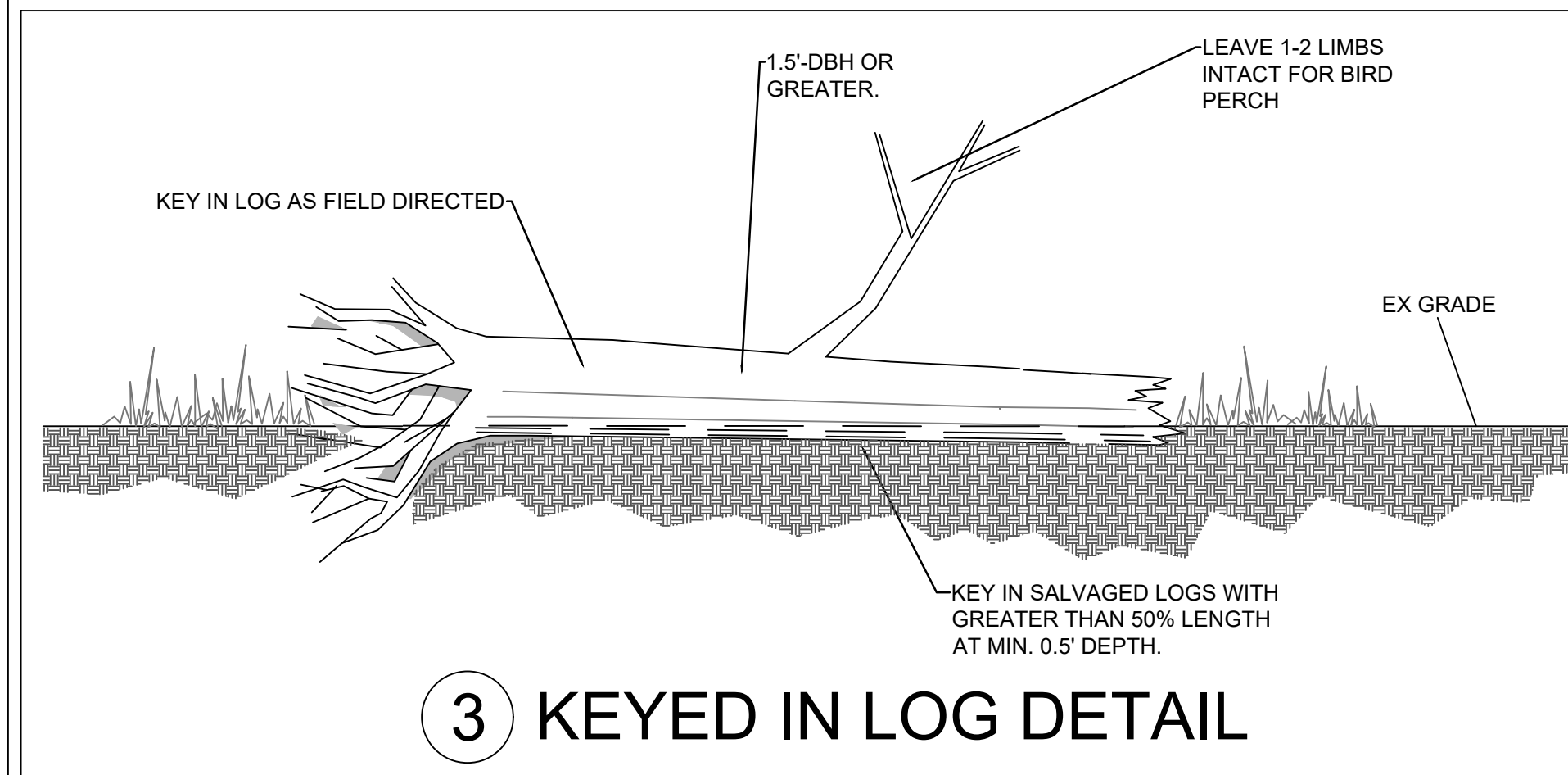
1 PLANTED ROCK SLOPE PROTECTION (RSP) NTS



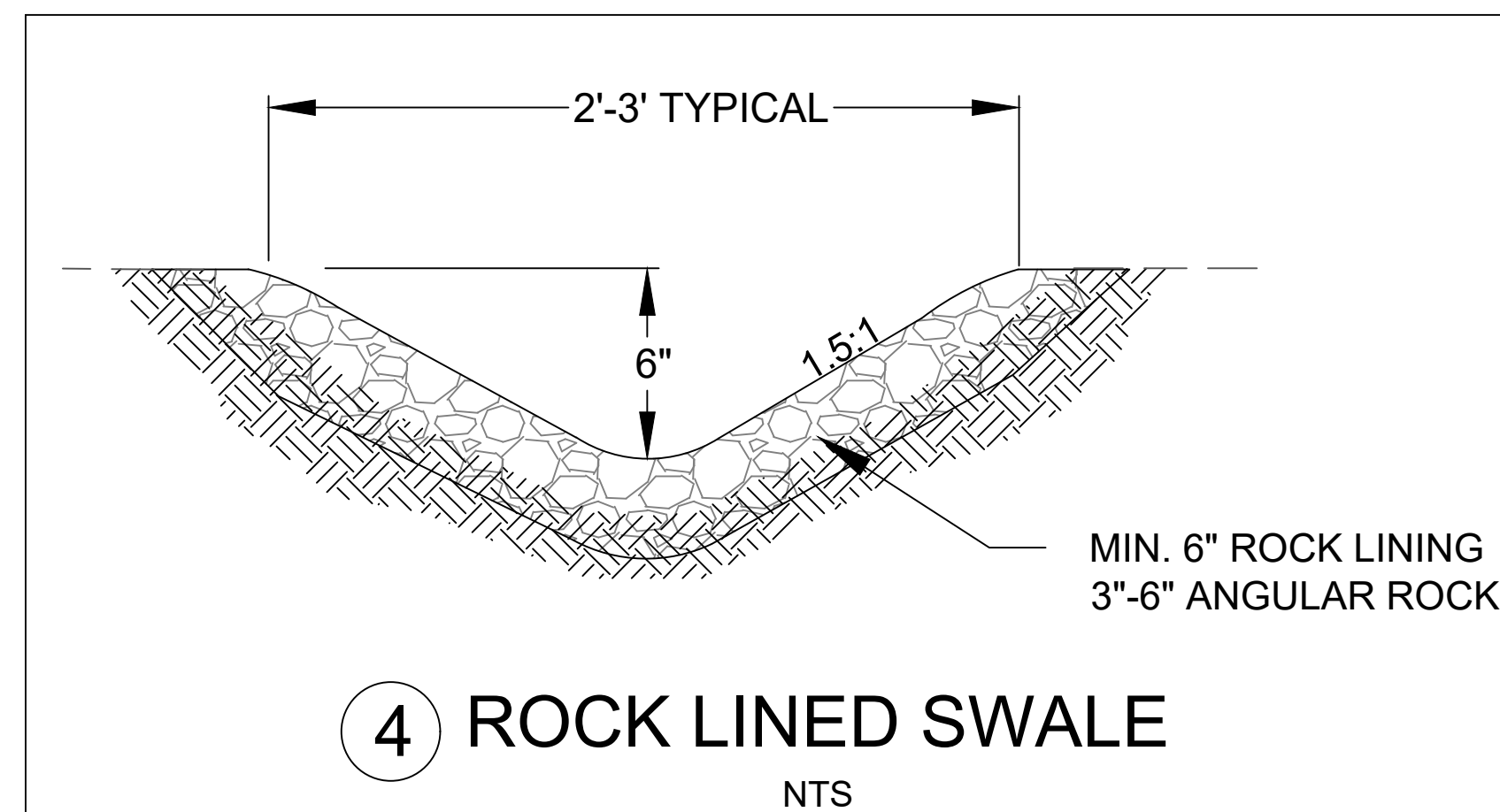
OUTLET PROTECTION PLAN VIEW

- NOTES:**
1. CLASS 300 BEDDING AND CLASS 150 RIPRAP TO BE PLACED ON TOP OF PIPE TO PROVIDE A 1' SHOULDER AND 2:1 SLOPE FROM THE SHOULDER HINGE TO PROVIDE BUFFER FROM EOP TO PIPE. CLASS 150+ RIP RAP TO BE HAND PLACED BELOW THE PIPE.
 2. ALL ROCKS SHALL BE ANGULAR.
 3. ROCK SLOPE PROTECTION SHALL BE SLOPED AT A MIN OF 1% OUT OF CULVERT.

2 ARMORED PIPE OUTFALL NTS



3 KEYED IN LOG DETAIL



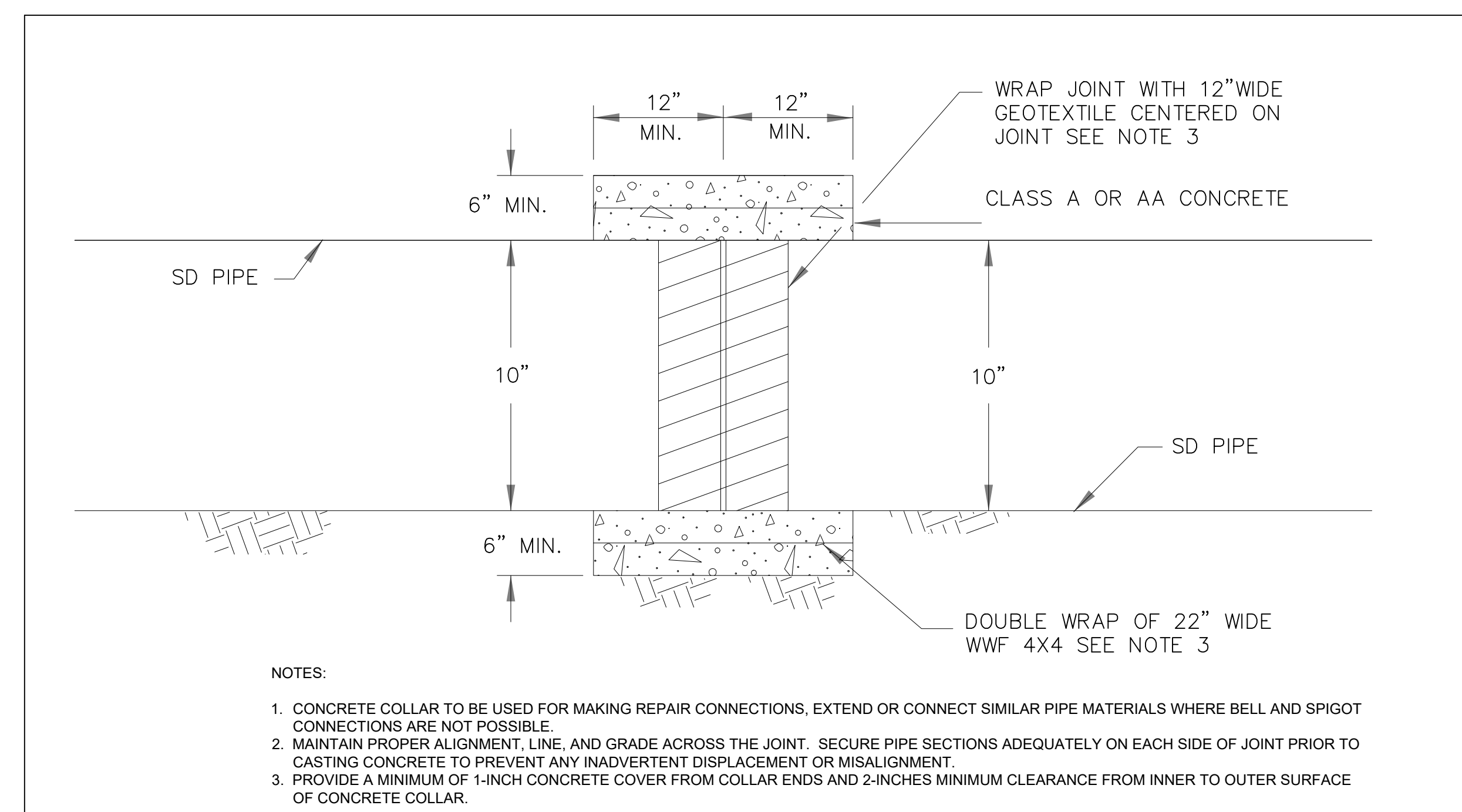
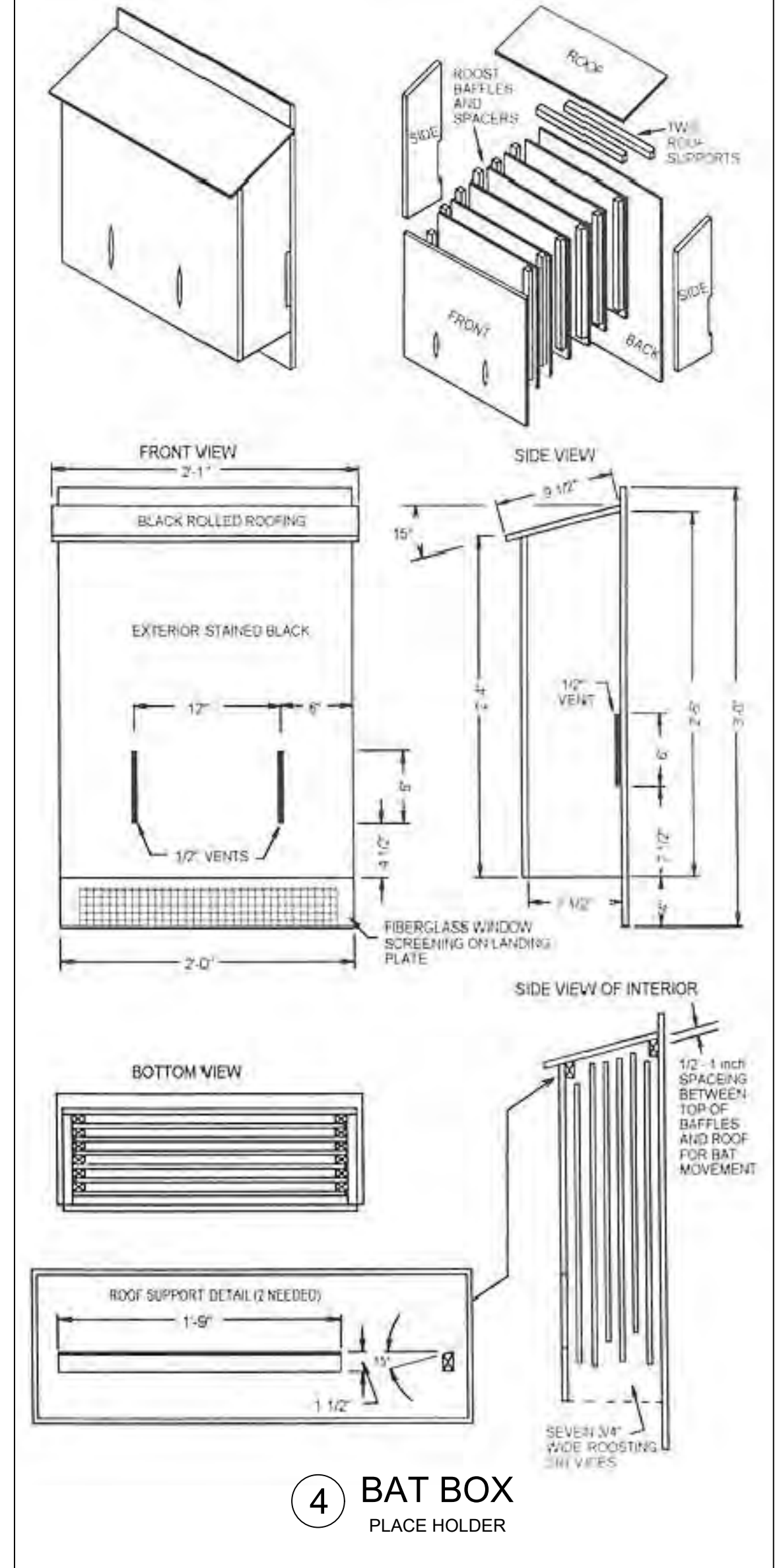
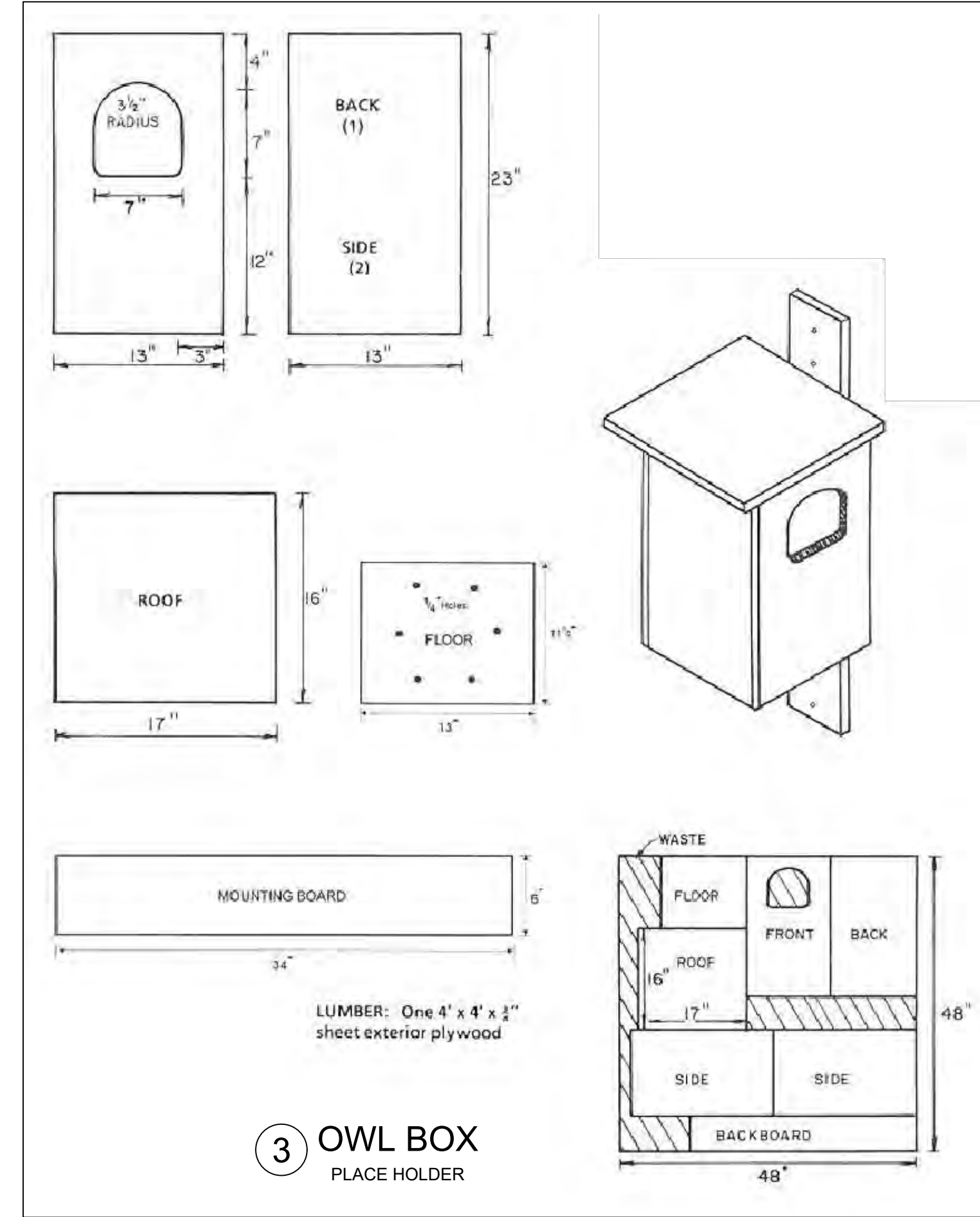
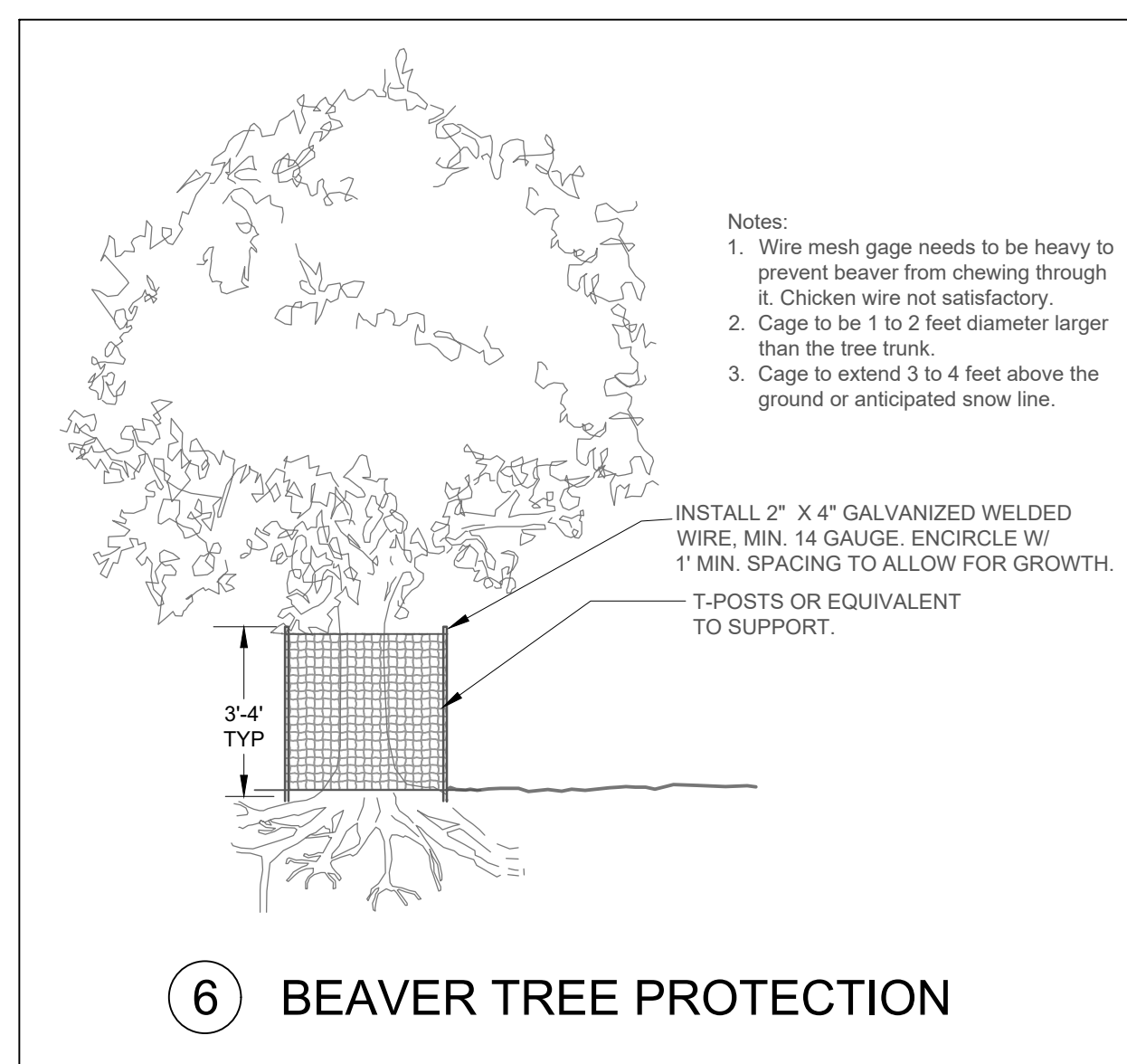
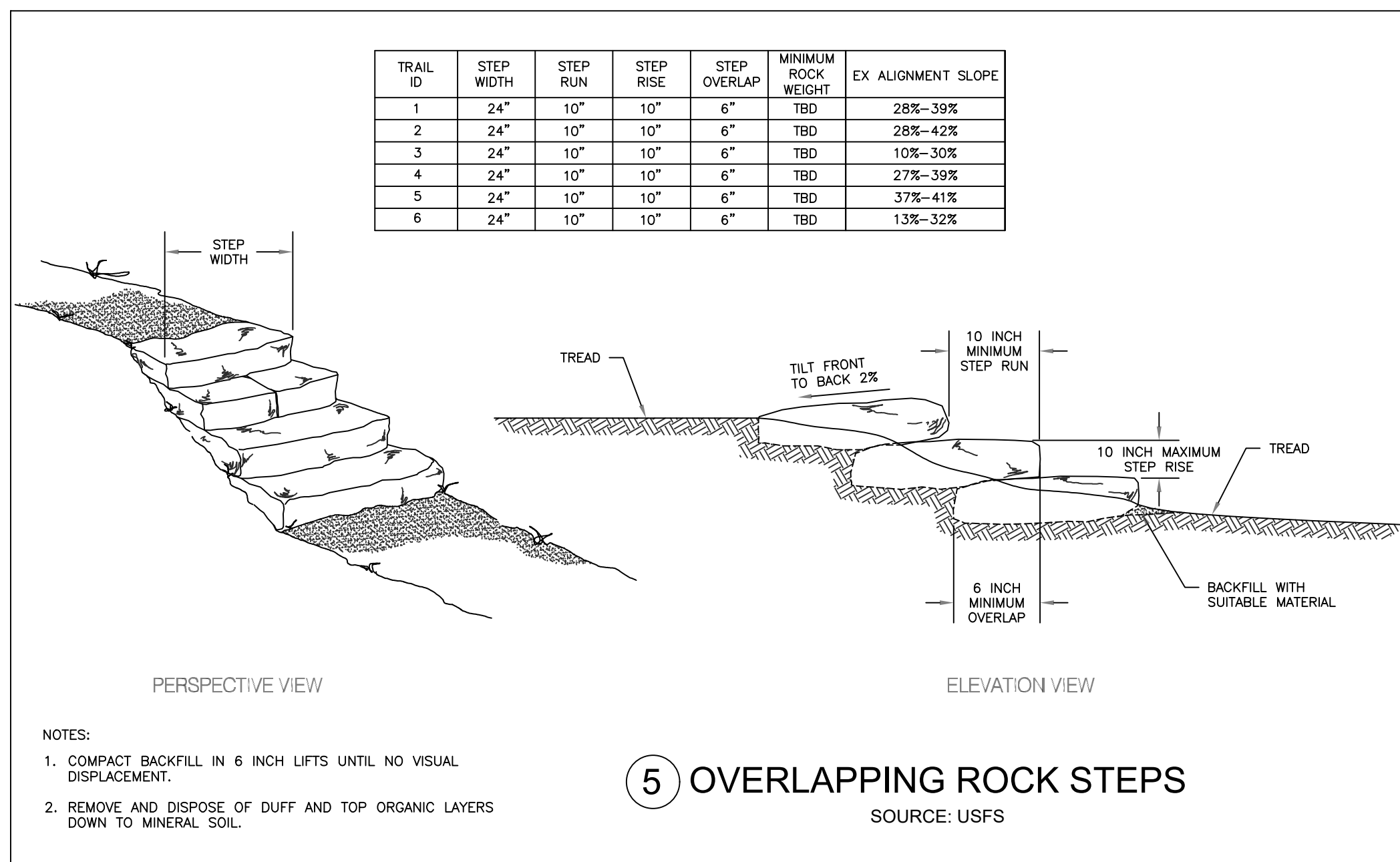
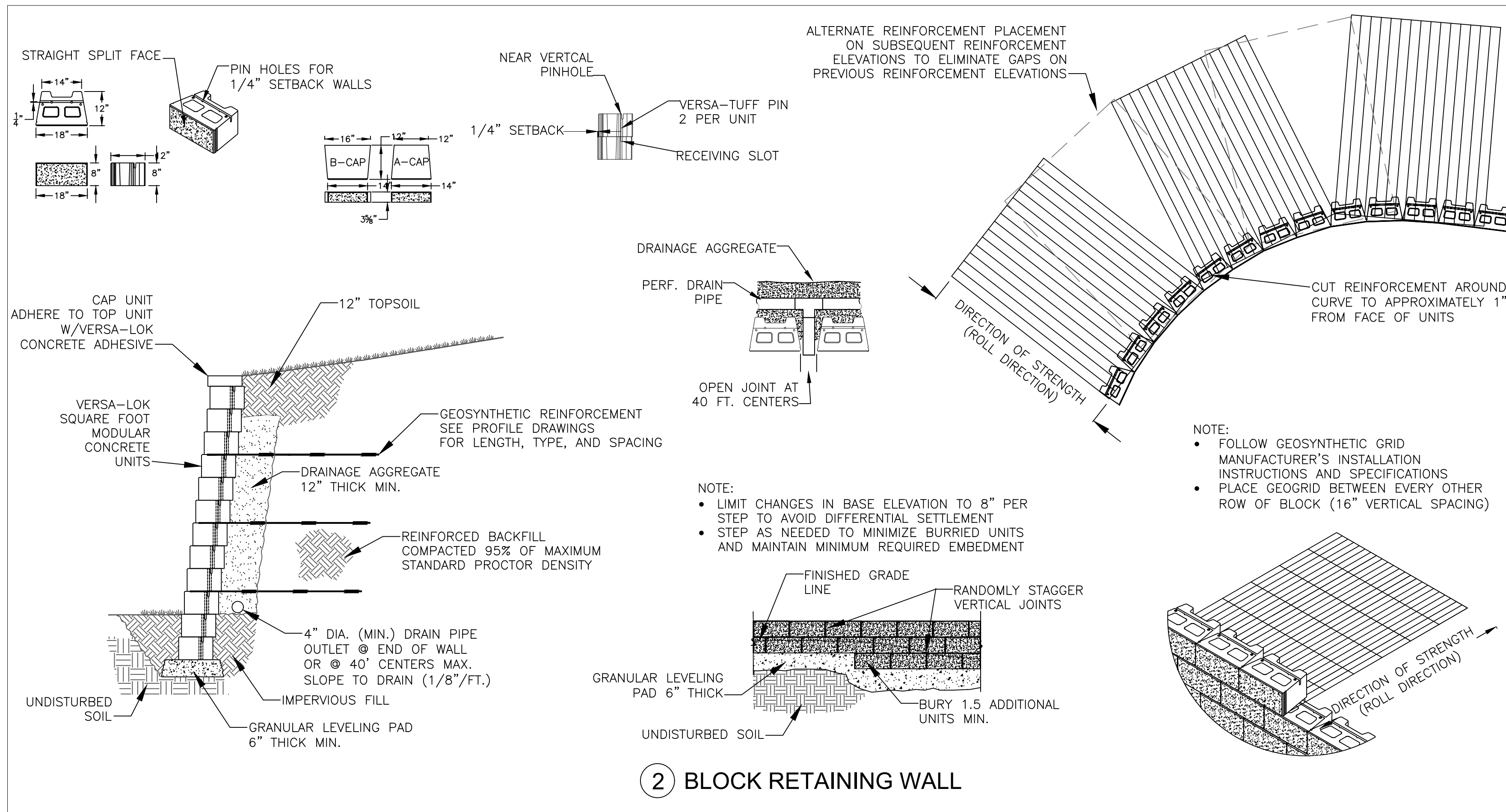
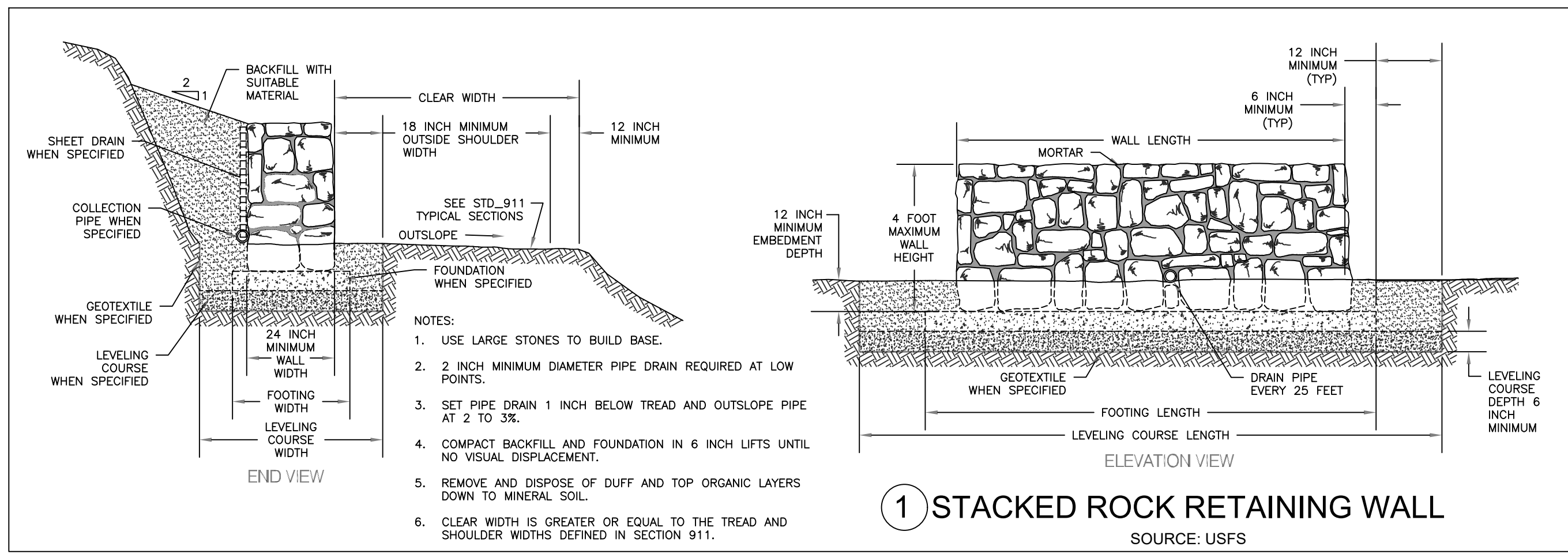
4 ROCK LINED SWALE NTS

Designed: CYB	Drawn: JA	Checked: CYB
File Date: 10/13/2023		

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Attachment 2 – Background Information on the Truckee River

The Truckee River is a terminal river system that flows for 121 miles in a northeasterly direction. The river flows from Lake Tahoe at the dam outlet in Tahoe City through wooded and canyon areas along State Route 89, then through the town of Truckee and along Interstate 80 in California and flows through an urban reach in Nevada before terminating in Pyramid Lake within the Pyramid Lake Paiute Tribe Reservation.

People have lived, traveled, gathered, hunted, and fished along the Truckee River and its tributaries for more than 10,000 years. The Truckee River is located on the ancestral lands of the Wa She Shu (Washoe) and Numu (Northern Paiute), whose descendants recognize it as sacred. Members of the Reno-Sparks Indian Colony, the Washoe Tribe, and the Pyramid Lake Paiute Tribe continue to care for the river and its resources today. During the Gold Rush in the 1840s and 1850s, Reno/Sparks served as the preferred Truckee River crossing point for travelers on their way to California. Use of the river's water increased in 1859 to support the growing mining and agricultural needs after the discovery of the Comstock Lode. In 1903, the Bureau of Reclamation began work on the Newlands Project, which controlled flow from Lake Tahoe (via the Lake Tahoe Dam) and diverted water from the Truckee River watershed at Derby Dam to the Lahontan Valley (Carson River Watershed) for agricultural use.

Today the Truckee River provides drinking and municipal water for residents and businesses in the Truckee Meadows area, generates hydroelectric power, supplies irrigation water, provides recreational experiences, and provides habitat for fish and wildlife (including threatened and endangered species).

The Truckee River has historically been one of the most heavily litigated and managed river systems in the United States. The Truckee River Operating Agreement (TROA) was finalized in December 2015 to increase flexibility in water management between the TROA parties, including Nevada, California, the Truckee Meadows Water Authority, the U.S. Department of the Interior, and the Pyramid Lake Paiute Tribe. The Federal Water Master administers the TROA, which governs management of a series of complex water rights, decrees, and case law, which ultimately controls flow of the river. The TROA increased efficiency of reservoir storage, allowing users to time the releases of water to meet demands for municipal supply, irrigation, riparian plant establishment, and instream flows for fish and aquatic habitat. The TROA's implementation has alleviated many prior water operations and supply concerns within the watershed. The TROA supports collaboration and flexibility for many users along the Truckee River.

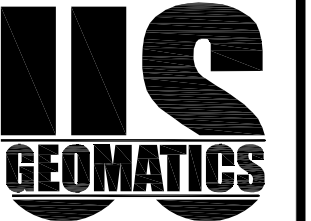
While the TROA has addressed many water supply issues along the river, other critical watershed issues remain within the Truckee River, including within the Project reach and downstream into lower reaches:

- **Water Quality.** Water quality has been impacted from urban development, stormwater runoff, and a legacy of historical and current changes to vegetation and hydrologic modification throughout the watershed. While the U.S. Environmental Protection Agency has defined the river as a "water of high quality" reaches of the Truckee River within and downstream from the Project area are listed as impaired waters (under Nevada's 303(d) list) for temperature and turbidity.
- **Ecological Resiliency.** Historical and current human activities, including development, logging, recreation, rail and highway expansion, grazing, and mining, have led to bank hardening and channelization, loss of native vegetation, and proliferation of noxious and invasive species. Aquatic and riparian habitats within many reaches of the river have degraded ecological function.
- **Noxious and Invasive Weeds.** Even with the efforts of local agencies and organizations to eradicate noxious (designated in Nevada Revised Statutes 555) and invasive (other

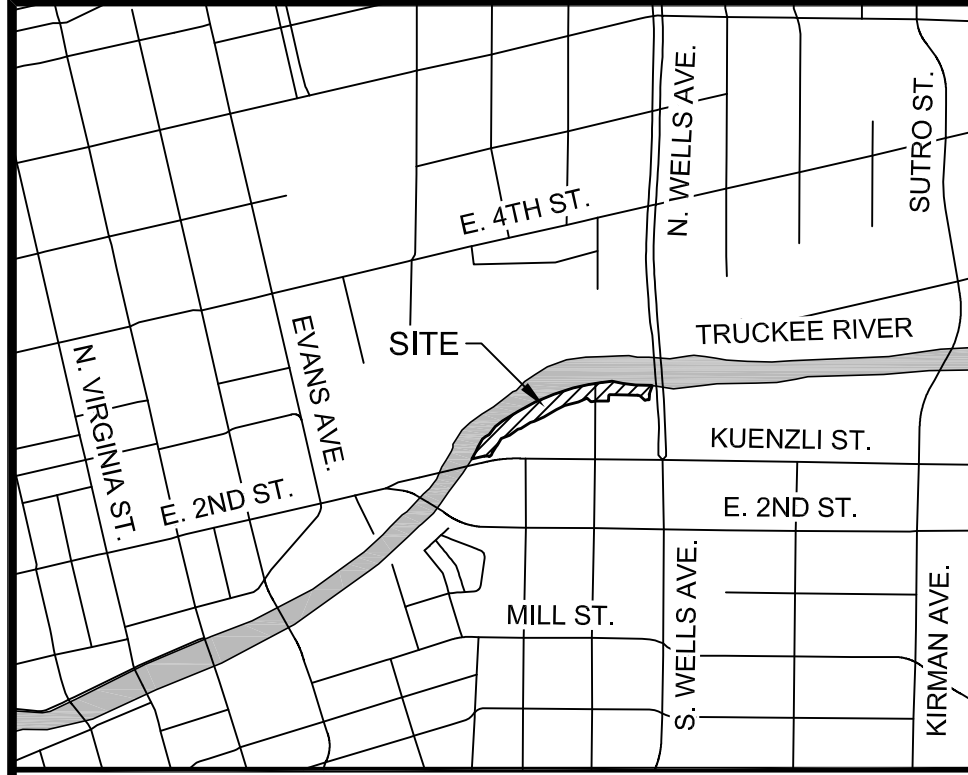
undesirable non-native) weed species, these common species out-compete natives, degrade habitat function, and increase fire risk.

- **Endangered Species.** Pyramid Lake, the terminus of the Truckee River, is home to an endemic, federally endangered fish species, the cui-ui (*Chasmistes cujus*), as well as a large population of federally threatened Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*). Cui-ui are culturally important for the Pyramid Lake Paiute Tribe. Both fish species swim up the lower Truckee River to spawn and are impacted by degraded water quality and low flows.
- **Flooding.** There have been several damaging flood events in the past on the Truckee River in the Reno area, including the years of [1955](#), [1963](#), [1986](#), [1997](#), [2005](#), and [2017](#). The Truckee Meadows Flood Management Project addresses flooding in the region to prevent and alleviate flooding along the Truckee River in Washoe County. Climate change is expected to intensify the hydrologic cycle, leading to more extreme droughts and flooding.

Attachment 3 – U.S. Geomatics Professional Land Survey Map



P.O. Box 3299
 Reno, NV 89505
 P. 775.786.5111
 www.usgeomatics.com
 info@usgeomatics.com



VICINITY MAP
 (1" = 1000')

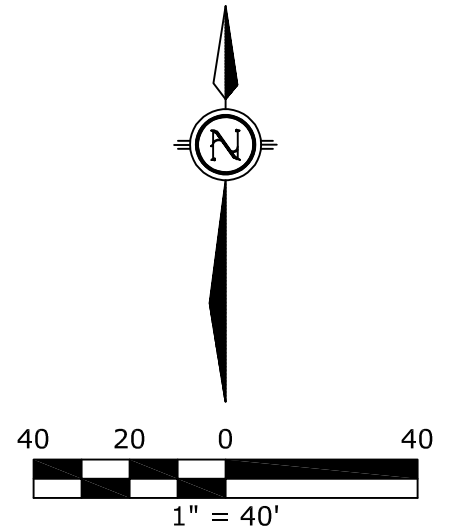
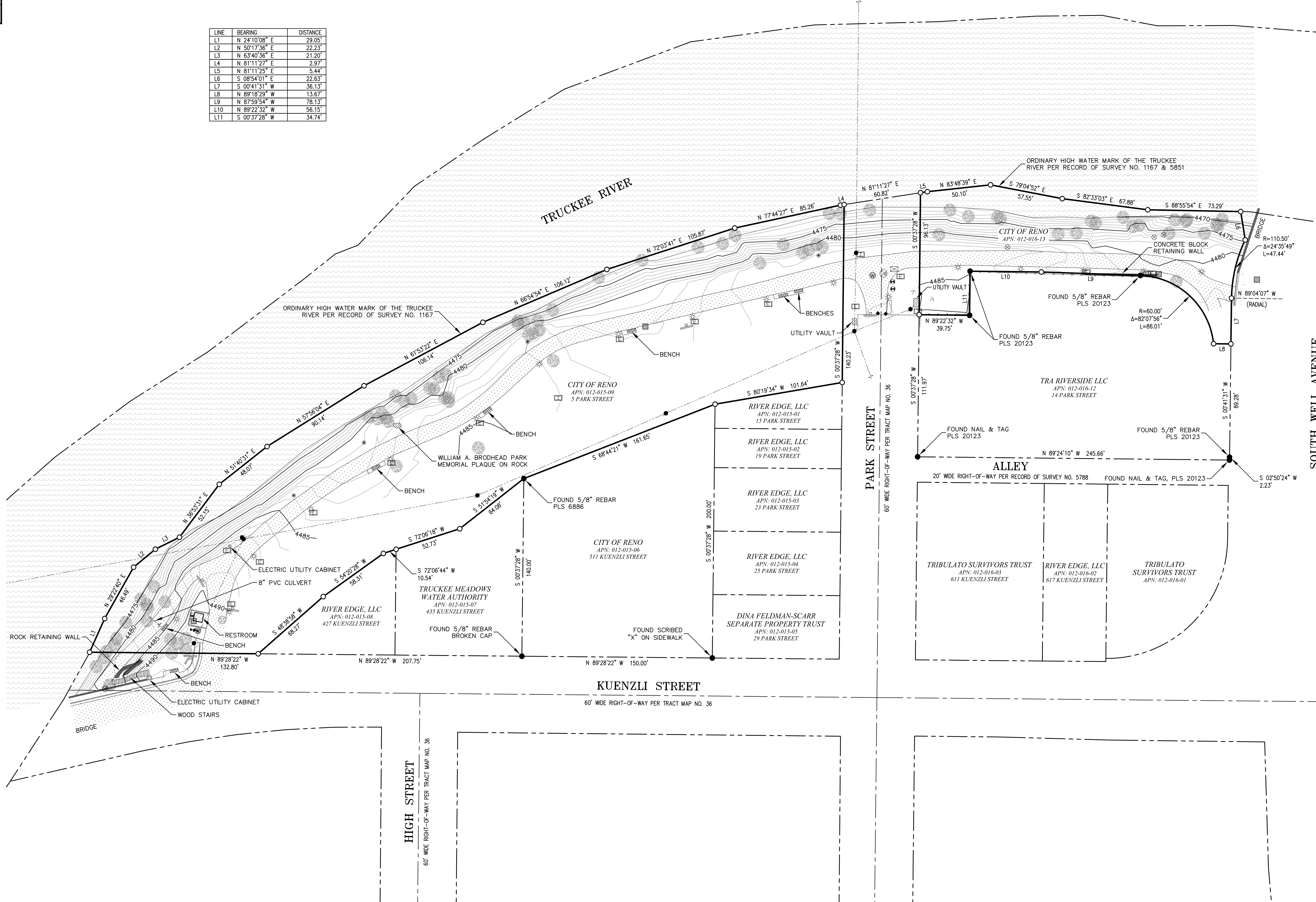
LINE	BEARING	DISTANCE
L1	N 24°10'08" E	29.05'
L2	N 50°17'36" E	22.23'
L3	N 63°40'36" E	21.20'
L4	N 81°11'27" E	2.97'
L5	N 81°11'25" E	5.44'
L6	S 08°54'01" E	22.63'
L7	S 00°41'31" W	36.13'
L8	N 89°18'29" W	13.67'
L9	N 87°59'54" W	78.13'
L10	N 89°22'32" W	56.15'
L11	S 00°37'28" W	34.74'

LEGEND:

- SUBJECT TRACT PROPERTY LINES
- ADJACENT PROPERTY LINES
- RIGHT-OF-WAY CENTERLINES
- FOUND PROPERTY CORNER AS NOTED
- DIMENSION POINT, NOTHING FOUND OR SET
- 1-FOOT CONTOURS
- FENCELINE
- OVERHEAD WIRES
- UTILITY POLE
- GUY WIRE
- LIGHTPOST
- WATER METER
- WATER VALVE
- MONITORING WELL
- SPRINKLER
- SANITARY SEWER CLEANOUT
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- CATCH BASIN
- PVC PIPE
- ELECTRIC UTILITY BOX
- IRRIGATION VALVE BOX
- UTILITY BOX
- BOLLARD
- STREET SIGN
- DECIDUOUS TREE
- ASPHALT
- CONCRETE
- WATER SURFACE

NOTES:

- 1) BASIS OF BEARING:
 NORTH WAS ESTABLISHED WITH GPS OBSERVATIONS USING THE NEVADA STATE PLANE COORDINATE SYSTEM (WEST ZONE, NAD83).
- 2) BASIS OF ELEVATION:
 THE VERTICAL DATUM FOR THIS SURVEY WAS ESTABLISHED USING GPS OBSERVATIONS OF CITY OF RENO BENCHMARK NO. 2893, WHICH HAS AN ELEVATION OF 4487.38 FEET (NAVD88) ACCORDING TO DATA PUBLISHED ONLINE BY THE NEVADA DEPARTMENT OF TRANSPORTATION.
- 3) ALL COORDINATES AND DISTANCES SHOWN HEREON HAVE GROUND VALUES. THE WASHOE COUNTY COMBINED FACTOR OF 0.999802100 WAS USED TO SCALE GRID COORDINATES TO GROUND COORDINATES.
 GROUND-TO-GRID SCALE FACTOR = 0.999802100
 GRID-TO-GROUND SCALE FACTOR = 1.000197939
- 4) THIS MAP DOES NOT REPRESENT A BOUNDARY SURVEY, AND SHOULD NOT BE REFERRED TO OR USED AS SUCH.
- 5) THE FIELD WORK FOR THIS SURVEY WAS COMPLETED ON JUNE 14, 2023.

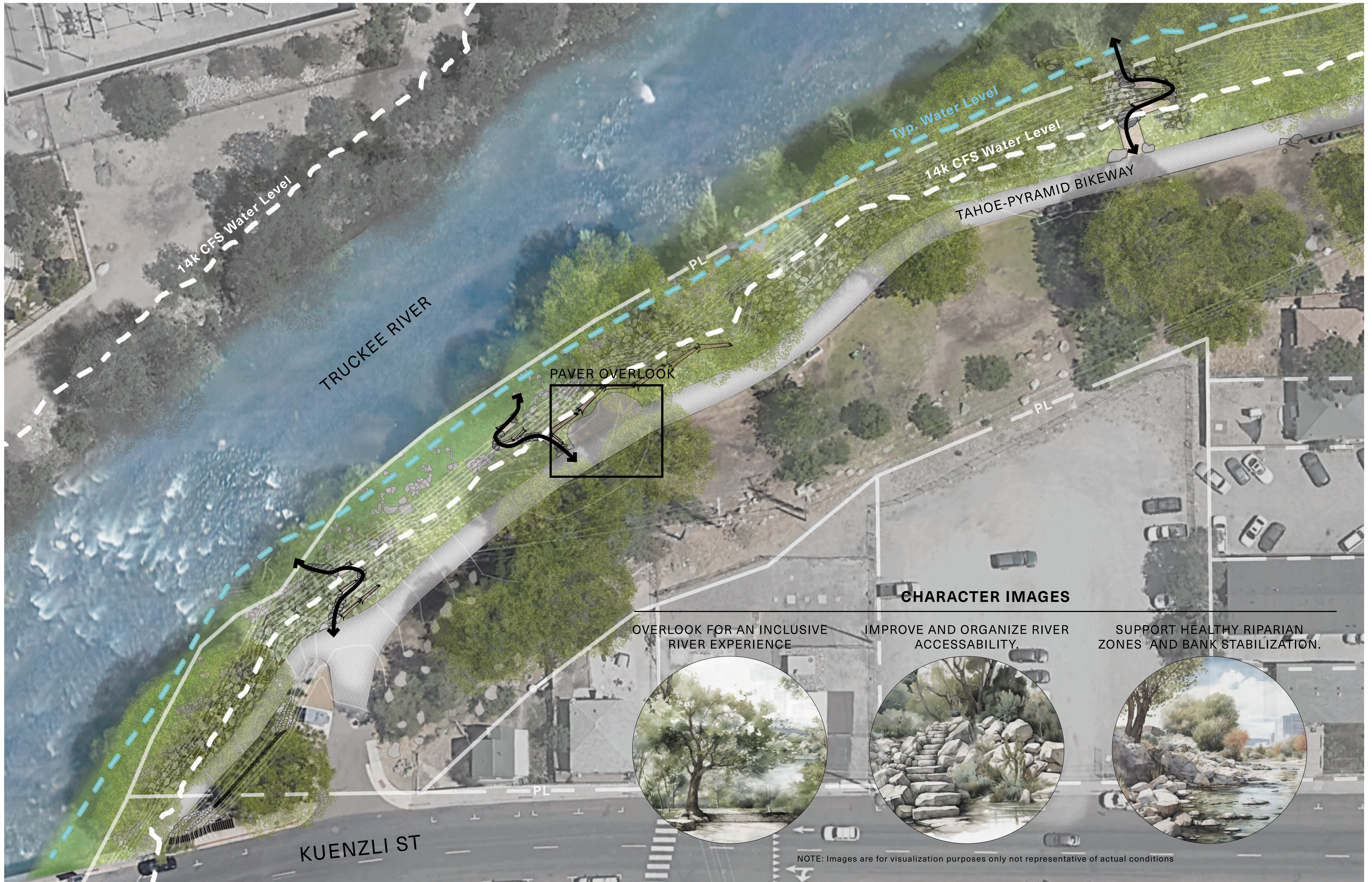


Rev.	Date	Description

WILDSHAPE ENGINEERING
 TOPOGRAPHIC SITE PLAN FOR BRODHEAD PARK
**A PORTION OF THE NW 1/4
 OF SECTION 12, T.19N., R.19E., M.D.M.**
 WASHOE COUNTY NEVADA

Project No: 308-01-23
 Date: 07-13-2023
 Drawn by: RPT
 Designed by:
 Checked by:
 Horiz. scale: 1" = 40'
 Vertical scale: 1" = 40' CONTOURS
 Projection:
 Horiz. datum: NAD83
 Vertical datum: NAVD88

Attachment 4 – Design Workshop Rendering of 60% Design



14k CFS Water Level

Typ. Water Level

14k CFS Water Level

TRUCKEE RIVER

TAHOE-PYRAMID BIKEWAY

PAVER OVERLOOK

KUENZLI ST

CHARACTER IMAGES

OVERLOOK FOR AN INCLUSIVE RIVER EXPERIENCE

IMPROVE AND ORGANIZE RIVER ACCESSABILITY.

SUPPORT HEALTHY RIPARIAN ZONES AND BANK STABILIZATION.



NOTE: Images are for visualization purposes only not representative of actual conditions

14k CFS Water Level

TRUCKEE RIVER

Typ. Water Level

14k CFS Water Level

TAHOE-PYRAMID BIKEWAY

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