



New River Pre Design Report

New River Channel

Grand Avenue to Skunk Creek Incl. Paradise Shores

Peoria, Arizona

Contract FCD 2003C001

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PRE DESIGN REPORT

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1.0 Introduction

This Pre Design Report (PDR) was prepared for the New River Channel from Grand Avenue to Skunk Creek, Including Paradise Shores (Project). J2 Engineering and Environmental Design, LLC (J2) prepared this report for the Flood Control District of Maricopa County (FCDMC) and the City of Peoria (COP) under contract FCD 2003C001. The Project is being administered by FCDMC, and the local project sponsor is COP.

1.1 Project Objectives

The goals of the Project are consistent with that of the overall approach by the FCDMC to make their projects more design sensitive to the context and the environment in which they are placed. The goal of the overall Project is to protect the surrounding developments through the containment of the Standard Project Flood (SPF), the 100 year event and to perform these protections in a manner where the environmental protection and restoration of a more native riverine ecosystem could be maintained and enhanced through the selective use of plant materials and public use areas. The passage of time has brought many changes to the river. It is very different from the free-flowing river that provided the basis of life in the desert southwest. The growth and development of the COP and vicinity has also brought changes to the river. The river still serves the needs of the people on a flood control protection basis, but the environment that defined the river has been severely altered or eliminated over the past 100 years. The most influential changes have been the placement of upstream dams to divert water for crop irrigation, control of cyclical flooding, and creation of a power source for the current inhabitants of this area. These changes have severely limited the hydrology and the related natural wildlife communities. The objective of this Project is to protect the surrounding investments through control of the SPF and the 100 year event while creating a riverine environment that represents many of the natural systems that once flourished along the river's path through the desert southwest.

The primary objective is to provide flood protection the secondary objective will be in the creation of a river ecosystem that will once again achieve a sustainable balance of flora and fauna within the confines and limits of this specific Project and project influences. This balance will be achieved through management and operation of this environment. While the primary FCDMC objective is flood control and river containment the secondary objective to restore significant ecosystem function, structure, and dynamic processes that have been degraded, a tertiary objective will be the important promotion of passive human interaction within this fragile environment. This aspect of human participation will be controlled through the introduction of specific trails and educational areas. The J2 team envisions a river corridor that will be viewed and experienced not as an obstacle to be controlled through hard engineering but as an area that invites controlled visitation and incorporates the river's history and its significance to the desert southwest. To develop and maintain this environment the public must be educated to become stewards of the river corridor (local residential, commercial community, and anticipated visitors).

The goal of the overall Project is to provide flood protection while restoring the native riverine habitat that was historically associated with New River. The design will include a functionally operating water supply and distribution system that both sustains and promotes the natural regeneration of plant materials and a maintenance road/trail system that is required to support and maintain these habitats while providing for the





human interaction and visitation to the area and as a link to the extensive trail systems that are being developed along the waterways of Arizona.

The team will focus on incorporating controlled passive recreational and educational elements and features into the Project by adhering to the following design principles when looking at the passive recreational and educational elements:

- **Recycle/Reuse** – Use both site-specific and manufactured recycled items in the Project as site furnishings and construction materials that are illustrative of the river's history and use. This is the main principle that connects the entire Project and will be applied to the restoration aspects of the Project and the public use facilities where it is cost effective and feasible.
- **Accessibility** – Provide balanced, controlled, safe, and creative solutions for people of all ages and abilities without sacrificing the variety of challenging experiences and realities that a large multiuse facility will present. Access will be balanced and controlled to ensure that it does not negatively impact the flood control facilities and or the environmental restoration aspects of the Project.
- **Local Materials** – Use indigenous materials and facilities to minimize maintenance challenges for the future and educate the public to the diverse materials and solutions that are both locally and regionally significant and available.
- **Create Connections** – Promote the development of connections between different uses and facilities both within and outside the Project area. This connection will include the development and design of a pedestrian/maintenance bridge and connections to the COP trail system corridors that currently abut to both the southern and eastern areas of the project.
- **Historical Interpretation** – Describe, interpret, and honor the history of the river, its people, and the city that grew on its banks in every aspect of the Project's design and programming. Position the Project as a national, regional, cultural, and recreational resource for the FCDMC, COP, and the nation.
- **Respect the Setting** – Enhance the river corridor so that it is compatible and consistent with its natural habitat and the overall Project that is the nucleus of this endeavor.
- **Create Discovery Zones** – Create spaces and areas along the river corridor that serve as "discovery zones" and destinations that invite and educate the visiting public in a positive and enlightened manner.
- **Encourage Frequent and Year-Round Use** – Provide a cohesive mix of attractive, safe elements and spaces along the river that tell the story of the river cycle. This story includes the river's relationship to the environment and the desert seasons to create a compelling user destination.

1.2 Purpose of PDR

The PDR defines the design criteria that are used during the Project's final design. Its purpose will be to refine the landscape aesthetics and multi-use features of the project to integrate these features into the design of the project. The PDR presents the results of the site inventory, recreational and multi-use inventory, and scenery resources inventory





process that the J2 design team has undertaken on this project corridor. The PDR will initially identify preliminary locations for habitat protection and enhancement areas, the types of vegetation that may inhabit such an environment. The PDR will provide concept sketches and ideas for limited and controlled public use improvements that will promote passive recreation and educational opportunities for the public along and within the corridor.

1.3 Project Vision

The J2 design teams vision for this project revolves around the creation of a desert river ecosystem that has been designed to provide the flood control protection required while merging that need with the vision of creating a project that incorporates habitat, aesthetics, public interface areas and multi-use opportunities in every aspect of the projects development and design.

1.4 Project Site

The majority of New River has been improved from a flood control perspective that has provided bank protection and river Channelization. The areas of this project from the confluence of Skunk Creek and New River to Grand Avenue have not been provided these protections. The site has undergone significant changes from its natural river ecosystem due to many factors most notably the influence of development up to its banks. The current river corridor is composed of large amounts of river cobble, sand deposited banks and bottoms, intermittent water flows, standing water zones and a variety of habitat types some that hold great significance to this project. The river bottom is currently composed of both meandering and braided low flow incised channels and flat areas of river cobble and sand bars. The site has been altered by residential and commercial development along its westerly banks while the easterly banks were altered through the development of the States freeway system SR-101 Loop. Large areas of undeveloped land occupy a majority of the eastern portion of the corridor between the SR-101 loop and the banks of the river along the limits of this project. The residential development Desert Harbor to the west backs up to the corridor and currently has no access to the corridor both visually and or physically. This development however relies on the river corridor to accommodate any lake overflows during flood events through a series of drainage culverts that connect to the river. The medical, assisted living and hospice care facilities at the southern and western edges of the project currently face the river and have potential to utilize the river improvements as part of their programming and access. The project limits include the crossing of two major transportation corridor bridges one at Grand Avenue, and the other at Thunderbird Road. These bridges were developed with bank protection for their piers and banks and the Grand Avenue Bridge that is part of the State of Arizona's highway system has significant bank and river corridor stabilizations. Providing trail and multi-use corridors under these existing structures will require further analysis. The City of Peoria is currently developing a community park (Rio Vista Park) just north of Thunderbird Road along the eastern banks of New River and within the confines of this projects corridor. This park and its associated recreational facilities of both passive and active nature will create a destination for users of this projects multi-use trail feature. The COP has also developed a multi-use corridor that currently ends at Grand Avenue at the southwest quadrant and east of 83rd Avenue along the Skunk Creek alignment both of which will require linkages during the development of this project. The river corridor accepts off site flows from storm water, agricultural tail water, and low flows created by nuisance water from the





surrounding area all of which contribute to the vegetation that currently occupies the sites banks and river bottom. The current development of the Skunk Creek low flow improvements by the FCDMC and the COP has the potential to increase this project corridors low flow volumes significantly and may result in increased vegetation potential and the continual flow of water through the ecosystem.





2.0 Data Collection

Data collection is the first step in understanding the complexities of any project. This process takes on an even greater role when the data collection will involve both hard engineering data and the softer landscape architecture data. The data collection begins with the gathering of reports and studies previously completed for the corridor and a physical assessment of the natural resources and constructed ("built") features within the corridor. The following is the process that J2's design team has undertaken in the data collection for this project. This process was undertaken to assist the team in understanding how all the physical elements of the project fit together to shape the channel project.

2.1 Objective and Process of Data Collection and Inventory

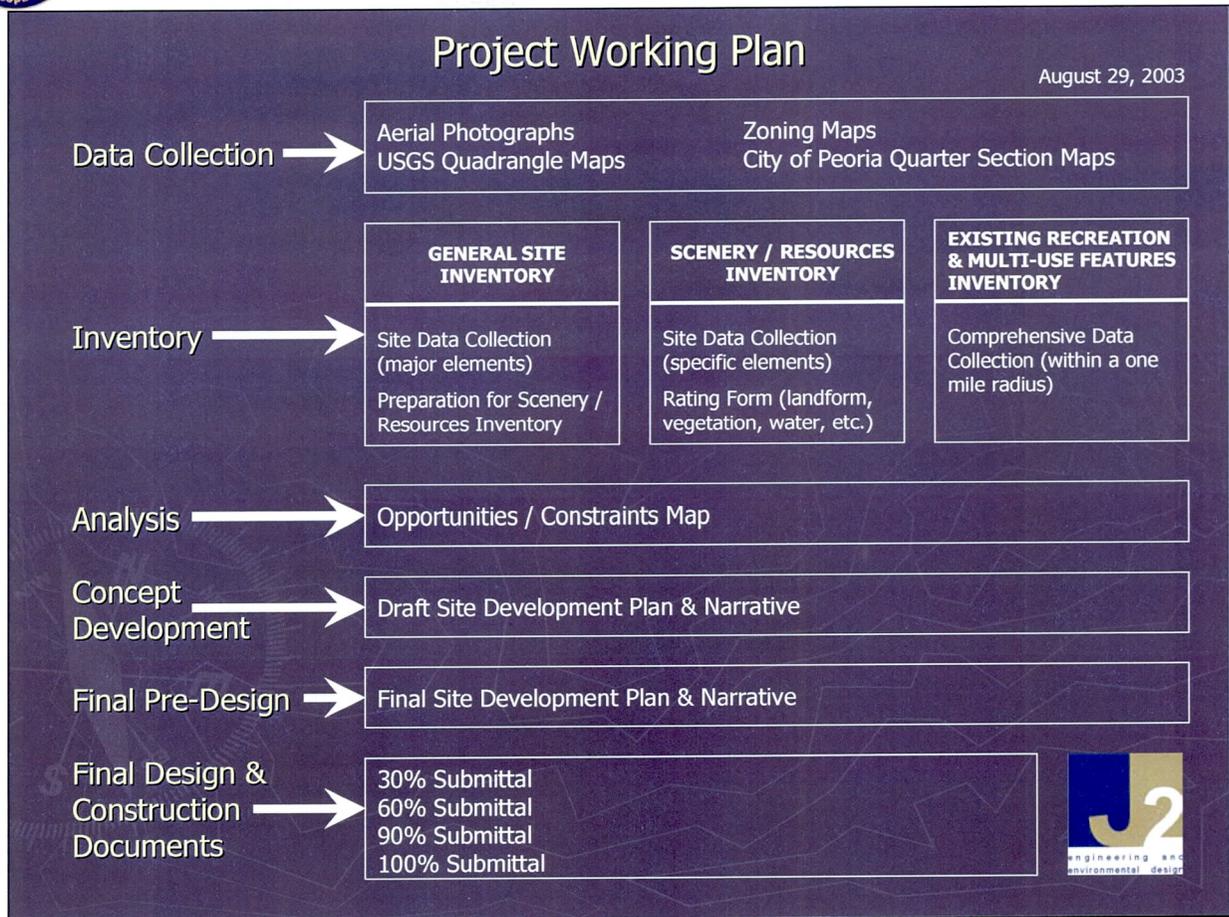
The objective of the data collection phase of the project is multi-faceted, however the focus of the process is to become knowledgeable of and involved in the corridor. This process has and will continue to include the collection of data, the study, and analysis of this data and in confirming this data through the use of site visits and computer modeling. The process of data collection that has been underway and continues on this project has included the following;

- Field Review of Existing Conditions
- Photo Documentation of Existing Conditions
- Review of Data from FCDMC and COP Relative to Project
- Examine existing landscape aesthetic and multi-use elements within and adjacent to the project

The Data Collection phase of the project is vitally important to the ultimate success of this project. The data collection phase will assist the design team in developing an understanding of the existing site conditions and in the development of a basis of data to build upon during project development.

The J2 design team approach to the use of this information and approach to the project can be reviewed in the following graphic:





2.2 Site Inventory

The site inventory process that the J2 design team undertook as part of the data collection phase of the project included an extensive site inventory and investigation process. The site inventory process was undertaken to assist during the design process to review the following;

- DISTRICT AND CITY RIGHTS OF WAY – J2 was seeking information in the field that could assist in identifying the limits of ownership and responsibility. In addition to the field investigation the survey that is currently underway along with base data available from both the FCDMC and COP will assist the team in determining the exact District and City Rights of Way. Our field work indicated that the FCDMC's apparent Right of Way is extensive along the eastern edge of the site and there is a strong possibility that through discussions with ADOT, additional lands of significant size could be obtained. These additions could result in the creation of areas and habitats along this eastern edge of the corridor that benefit ADOT, FCDMC, and COP. There is also an area near the southern boundary where again the FCDMC has excess right-of-way. This site and area has strong potential to be reviewed against a possible habitat development and public use area if access can be achieved through discussions with Sun Health Systems.





- **LAND USE** – The inventory process allowed the design team the opportunity to review the existing and surrounding land uses that impact and or will be impacted by the proposed river improvements. These land uses include single family, and multi-family residential units, commercial, and medical uses and a new community public park with extensive public amenities. The single family residential land use which is located along the corridors western boundary consist of primarily stucco and framed single family lots characterized by similar landscape elements. These areas are composed of homes that range from 20 year old near the southern areas of the corridor to more current subdivisions near the northern end of the corridor. The multi-family units or apartments are focused around the major transportation corridors including Thunderbird Road at the river where the Riverwalk apartments was recently opened. There are many classifications of commercial zoning but in our analysis we grouped all commercial into one category. The commercial influences on the corridor are limited to the southern and western edges of the corridor and as with the multi-family units tend to occur along the major transportation corridors. Their influence although minor in comparison to area is very strong considering that Sun Health is included in this category.
- **TRANSPORTATION CORRIDORS** – The inventory process allowed the design team the opportunity to review the existing street and transportation corridors. The inclusion and incorporation of these significant transportation corridors will be vitally important when analyzing linkages to these facilities. In addition views to the corridor from these facilities and or ways to mitigate their visual influence when viewing them from the project will also be important. The data collection allowed the design team the opportunity to view the corridor as a motorist and as a result several views from these transportation corridors may need to be framed by selective placement of vegetation and site design to capitalize on these view corridors. In addition to the views into the corridor the views out and towards these structures from within the corridor may need to be screened from view or masked to minimize the influence that these structures may have on the visual integrity of the experience. The data collection process assisted us in identifying these corridors and their associated visual impact to the project.
- **ADJACENT DEVELOPMENT** – The inventory process allowed the design team to better understand the current use of adjacent properties that will have a direct influence on the development of the project. There were several existing developments that appear to offer stronger potential for linkages they include the Desert Harbor subdivision, the medical and office complex at the Sun Health development, the long term care facilities near Grand Avenue, Riverwalk apartments near Thunderbird Road and the City's newest community park Rio Vista Park. These planned, built or under construction improvements will be directly affected by this project, and our data collection has allowed us the opportunity to review these facilities which will assist us in designing linkages to them if that is desirable by the design team.





- **VEGETATION-** The inventory process allowed the design team to better understand the amount and diversity of the vegetation within, and adjacent to this project. The selected removal, inclusion, protection, and or reintroduction of vegetation habitats will have a direct impact on the planned improvements. The FCDMC just recently completed a habitat and vegetation analysis of the corridor and that study along with our personal observations and analysis will be used when developing the designs for the corridor. The analysis will include but will not be limited to protecting significant stands of vegetation if possible, re-vegetation of any disturbed site within the corridor, selection of specific plant species that reinforce the design intent of the corridors overall planting scheme and vision, and the salvaging and re-use of selected materials where feasible.
- **DRAINAGE FEATURES-**The inventory process allowed the design team an opportunity to review the impact that existing drainage features will have on the study corridor. These features currently are sustaining the diverse and often lush vegetation which characterizes this corridor. The team will seek opportunities to maintain and enhance the sustaining effects of the incoming drainage ways and outfalls on the channel corridor. Additionally these incoming drainage ways will be reviewed for potential improvement and stabilization to ensure that they are not being negatively impacted by river flows like the 91st Avenue channel is currently experiencing a tremendous amount of erosion and has the potential to impact the surrounding development. To enhance aesthetics of the drainage systems, the drainage structures will be blended into the existing natural character of the river reach through the use of a variety of techniques such as graphics, staining, screening or masking. Photos showing the existing drainage elements are shown in Section 2.7.
- **CHARACTERISTICS OF THE VISUAL ENVIRONMENT –** The inventory process allowed the design team to initiate the development of a visual assessment of the existing corridor and how that may ultimately impact the corridors development. This visual assessment and its results can be viewed on the attached graphics.
- **SCENIC EXPERIENCE –** The inventory process allowed the design team the potential to protect and provide the greatest opportunity to experience scenic areas or features of interest during project design and development. These initial areas were determined through the visual environmental assessment discussed above that allowed us the opportunity to identify high scenic experience areas and potential areas along and within the corridor.
- **ORIENTATION –** The inventory process allowed the design team the opportunity to identify potential areas that provide the users of the multi-use facilities an orientation and an understanding to the river environment. This orientation would be further enhanced through the creative use of signage and or signature events (parking and access areas, public art opportunities, specialized entry nodes, overlooks, ramadas, pavement patterns, interpretative gardens) along the multi-use pathway.





- **CHOICE MAKING** – The inventory process will allow the team to design and provide clear information and understandable visual configuration for the multi-use trail user's decision making activities. The corridor is planned as a multi-use corridor and therefore choice making will be needed when trails for different users and methods of travel intersect. The understanding created by the data gathering will allow the design team the ability to address these choice making opportunities that will present themselves along the corridor.
- **VISUAL COMPLEXITY** – The inventory process will allow the design team to provide an adequate range of interest and visual stimulation utilizing the existing conditions as the basis of this visual complexity mosaic. The concept of framing views, screening views, creating outdoor spaces, and outdoor rooms all deal with visual complexity. The design team has a good feel for the existing corridors visual complexity following the data gathering. Utilizing this data the design team will attempt to enhance, eliminate, or soften the visual complexity of the corridor as perceived by the general public making it a more enjoyable experience.
- **SEQUENTIAL VISUAL EXPERIENCE** – The inventory process will allow the design team an opportunity to provide a clear organization of sequences and a meaningful visual composition to the landscape and aesthetic treatment of the corridor. The data gathering has allowed the design team the opportunity to understand the existing visual experience with an emphasis towards enhancing that experience.
- **FORM OF THE TRAIL ON THE LAND** – The inventory process will allow the design team to provide a multi-use trail alignment that responds harmoniously to the form of the land and the river environment. The data gathering has allowed us the opportunity to walk the site and generally get a feel for the lay of the land. The accessibility issues, grade changes under the existing bridges and the locations of existing CSA bank stabilization will all play a key role in the trail alignment so that it responds to those constraints while maintaining sensitivity to the environment.

2.2.1 Site Character Photos

In order to become familiar with the character of the site, J2 met with representatives from the FCDMC and the COP in the field to gain insight into the major elements of the project. The results of this overview were documented on the Site Inventory Board, which include recreation and multi-use features, land uses, transportation corridors, vegetation and drainage features, and any other relevant information. Thirteen (13) photos were taken at areas that capture the character of the site.





(1) Potential multi-use trail link – looking south from the southwest corner of Grand Avenue & New River.



(2) Standing water from the ADOT channel – looking west into New River just north of Grand Avenue.





(3) Standing water from ADOT channel – looking south into New River just west of ADOT channel.



(4) Palo verde stand – looking south towards Grand Avenue just west of ADOT channel.





(5) 91st Avenue Channel – looking west at Freedom Plaza. Mature palo verde stand.

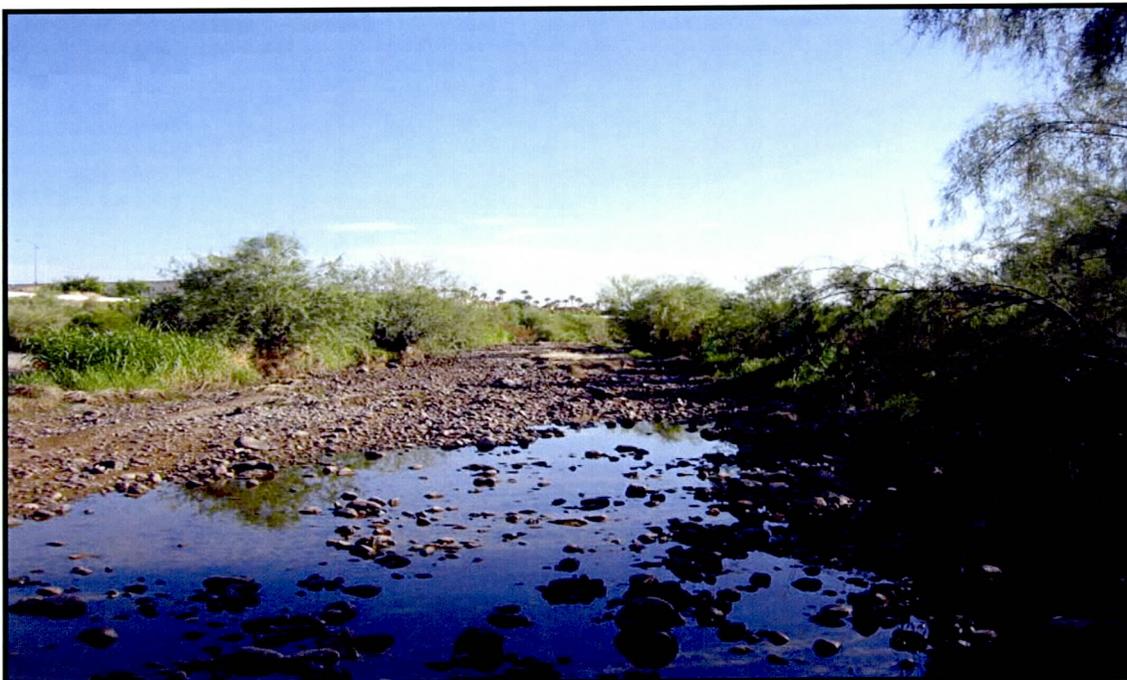


(6) Palo verde stand with overhead power lines – looking south at Freedom Plaza.





(7) Standing water in bottom of channel – looking south at Freedom Plaza.



(8) Riparian habitat with native mesquite & saltcedar – looking north away from Thunderbird Road.





(9) Riparian habitat / mesquite bosque – looking northwest near the confluence drop structure.



(10) Potential multi-use trail link – looking north on the west side of New River near the Greenway Channel.





(11) Drop Structure between 83rd Avenue & the 101 freeway – looking northwest.



(12) Cottonwood / willow riparian habitat northeast of 83rd Avenue – looking northwest.





(13) Potential multi-use trail link on east side of Skunk Creek northeast of 83rd Avenue – looking northeast.

2.2.2 Photo Inventory Process and Result

The photo inventory process that was being undertaken as a facet of the data collection phase of the project would be used as one of the key elements in developing a visual analysis of the corridor. By definition from a number of resources, including the BLM, and the National Park Service, a visual analysis is an analytical process that identifies sets and meets objectives for maintaining scenic values and visual quality. The systems employed to perform an analysis is based on research that has produced ways of accessing aesthetic qualities of the landscape in objective terms. As shown at the beginning of this section our process involved site data collection and utilization of the following rating form that looked at a modified BLM Visual analysis system. We focused in on Landforms, Vegetation, Water, Color, Adjacent Scenery, Scarcity, and Cultural Modification. The matrix on the following page shows the BLM rating sequence that was applied to this corridor and the above mentioned elements. The rating forms used for the scenery resource inventory can be found in the appendices of this report.





2.2.2.1 - Scenic Quality Rating Criteria

Landform

Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.

Vegetation

Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetation features which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind beaten trees, and Joshua trees).

Water

That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

Color

Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.

Adjacent Scenery

Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

Scarcity

This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

Cultural Modifications

Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.





Scenic Quality Inventory and Evaluation Chart

Key factors	Rating Criteria and Score		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 7	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosion patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 4	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 7	Some variety of vegetation, but only one or two major types. 4	Little or no variety or contrast in vegetation. 1
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. 7	Flowing, or still, but not dominant in the landscape. 4	Absent, or present, but not noticeable. 0
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 7	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. 4	Subtle color variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 7	Adjacent scenery moderately enhances overall visual quality. 4	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for	Distinctive, though somewhat similar to others within the region.	Interesting within its setting, but fairly common





	exceptional wildlife or wildflower viewing, etc.	7	4	within the region. 1
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony.	7	4	Modifications add variety but are very discordant and promote strong disharmony. 0

The visual character of the site is formed by the landscape components that both occupy and frame the site that is being viewed. This visual character is further influenced by what lies beyond the immediate visual impact area and composes the foreground, middle ground, and background of the view. The **Foreground** (FG on forms) is the area closest to the viewer where details, forms and textures can be readily perceived and discerned this view usually ranges from 0 to 100 feet. The **Middleground** (MG on the forms) is the area beyond the foreground where details, and textures are less discernible and the form, patterns, and outlines along with dominance and scale of the objects become increasingly important in the viewshed this view usually ranges between 100 to 400 feet. The **Background** (BG on the forms) extends from the middleground to infinity and generally contains any major terrain features this view usually ranges from a minimum of 400 feet to a maximum of 15 miles or associated mountain ranges.

The photo inventory process was completed over a two day period in the month of September, 2003. The corridor was photographed from 85 "view reference points", as shown on the Site Inventory graphic. Each reference point was separated into four quadrants, resulting in 340 views of which each was rated (rating charts for each view attached). Utilizing the BLM rating criteria described above and on the following pages a score was determined for each view. The score determined the scenic quality rating of that specific view. An "A" rating (35-47 points) indicated an excellent scenic quality, a "B" rating (23-34 points) indicated a good scenic quality rating, a "C" rating (11-22 points) indicated a fair scenic quality rating and a "D" rating (0-10 points) indicated a poor scenic quality rating.

The result of this process is the creation of a mosaic of scenic quality ratings from high to low as shown on the attached graphic. Overall the corridor has an average rating of "B" with tremendous potential for preservation and protection where possible and or re-establishment or recreation along or within the corridor for those areas where engineering and safety concerns may cause elimination of some of the higher rated areas.





These results will be used as the design team moves into the next sequence of analysis and concept development. Working closely with the engineering staff these visual quality ratings as applied to the areas of the corridor will be paired with the engineering response to the river Channelization process and engineering models to determine the best approach to the corridor. The result of this analysis will give the design team the ability to review the engineering concerns and designs against the possibilities of protecting, preserving, enhancing or reestablishing the highest rated areas that may have to be disturbed or removed as part of the engineering work.

2.2.2.2 Scenery/ Resources Inventory Rating Form





2.2.3 Recreation and Multi-use Inventory Process and Result

The recreation inventory process that was being undertaken as a facet of the data collection phase of the project would be used as one of the key elements in developing the linkages to and from the corridor. There are a number of recreation opportunities within close proximity to the New River corridor each complimenting the scale and complexity of the New River project. The inventory process initiated in the field, review of aeriels and COP Park and Recreation Master Plan, visits to each of the recreation sites within 2 miles of the corridor to review existing conditions at each and discussions with COP staff regarding linkages and the opportunities and constraints associated with each.

The result of the inventory process was an understanding of the existing conditions. These conditions include the southern end of the project near Grand Avenue. The COP and FCDMC have already implemented the creation of a multi-use trail system that currently terminates at Grand Avenue on the Southwest quadrant of this interchange. The goal according to the COP is to extend this trail down the existing CSA slope (ADA Accessible) traverse across the river bottom and ramp the trail up the CSA banks along the eastern edge of the corridor and begin the trail system along the eastern bank just north of the Grand Avenue Bridge. This linkage would continue north along the eastern bank crossing under Thunderbird Road and linking to Rio Vista Community Park that is currently under construction. The recreational development within Rio Vista Community Park will be extensive including baseball, soccer, tennis, restrooms, picnicking, a lake and other amenities. This park will be a destination zone for residents of Peoria and multi-use trail users. The trail system would then bridge over New River to the west just above the existing drop structure. This pedestrian and maintenance road bridge would provide the pedestrian linkage to Desert Harbor subdivision and its existing trail system and private recreational areas. This trail would continue north crossing the Greenway Channel on a second pedestrian bridge that would result in continuing the existing trail system that exist along the river adjacent to Paradise Shores and Desert Shores subdivision. The COP has also developed Calbrisa Neighborhood Park west of the project site approximately 1 ½ miles that offers trails, play areas and a restroom. The COP has also completed an extensive trail system along Skunk Creek that currently terminates along its southern bank east of 83rd Avenue. This same trail development is proposed to link to the City of Peoria's Sports Complex located along the northern bank of Skunk Creek. It is the desire by the COP that this trail project's southern boundary and alignment be linked to the Rio Vista Community Park. This alignment would involve a series of ADA ramps down existing CSA banks and trail extensions and linkages from the overbank into Skunk Creek. This recreation linkage would go under 83rd Avenue and the SR-101 extending to New River and up the existing CSA banks west of the SR-101 to connect to Rio Vista Park.





2.2.4 Scenery Resources Inventory Process and Result

The scenery resources inventory process was completed through a review and rating process described earlier in this report. The results of this process are the creation of a mosaic of scenic quality ratings from high to low as shown on the attached graphics. Overall the corridor has an average rating of "B" with tremendous potential for preservation and protection where possible and or re-establishment or recreation along or within the corridor for those areas where engineering and safety concerns may cause elimination of some of the higher rated areas.

The result of the scenery resources inventory process for this specific project has resulted in a more thorough understanding of the corridors aesthetic appeal, its opportunities and constraints, and the vision that has been created by both FCDMC and the COP for this project. The process has assisted in linking the project understanding to both the current environment in which it is placed and the future possibilities and visions of the corridor.

The Photo Inventory Sheets and the Scenery Resources Inventory Rating Results can be found under the Appendices.

2.3 Site Hydrology

The J2 team has performed site investigations and collected existing data for the hydrologic/hydraulic inventory along the project corridor. The hydrologic information for this section of the New River was defined as part of the Middle New River Watercourse Master Plan, the New River Grand to Greenway project and the USACOE Design Memo No. 2. Additional information for local tributaries was defined by the Glendale/Peoria Area Drainage Master Plan ADMP (Entellus 2001).

A summary of New River peak discharge values utilized in for this report is shown below, along with the sources. The 100-year peak flows correspond to the latest FEMA FIS.

Table 2.3.1 – New River Channel Flows

New River Reach Location	SPF Peak Flow (cfs)	100-Year Peak Flow (cfs)	10-Year peak Flow (cfs)	Source
Grand Avenue to Skunk Creek Confluence	68,000	41,000	10,500	1 & 2
Above Skunk Creek Confluence	38,000	19,000	5,100	1 & 2





Sources:

1. USACOE Design Memo 2, 1982.
2. New River, Grand to Greenway, Wood Patel 1994

Numerous local tributaries and/or concentration points outfall to New River along the project corridor. A summary of these locations is shown below, along with the sources that have quantified the peak discharge values. Several of these minor concentration points were not identified in the ADMP. Each of these locations is discussed in detail below.

Table 2.3.2- New River Channel Inflows

Drainage Outlets to New River	100-Year Peak Flow	10-Year peak Flow	Source / Notes
Grand Channel	2,951	---	1
Sun City Channel	668	---	1
Casa Del Rio Swale	39	10	2
ADOT Swale	28	13	J2 Rational Calc.
ADOT Channel	895	260	3
94 th Drive Swale	77	35	See Discussion Below
91 st Ave Channel	---	---	See Discussion Below
Riverwalk Apt Pipe Outfalls (Pipes 1, 2 & 3)	---	---	4
Desert Harbor Spillway	---	---	See Discussion Below
Rio Vista Park Outlet Pipe No. 1 (24")	---	12	5
Rio Vista Park Outlet Pipe No. 2 (36")	33	22	5
Rio Vista Park Outlet Pipe No. 3 (24")	24	13	5





Sources:

1. Glendale Peoria ADMP Update, Entellus, 2001. Grand Channel (RS10C); Sun City Channel (RS10B). HEC-1 models fail for 10-yr events. J2 to evaluate further to obtain 10-yr flows.
2. "Revised May 1990 Plaza Del Rio On-Site Drainage Report", dated Jan 1996, revised Feb & Mar 1996 by Kirkham Michael.
3. New River from Grand Avenue to Bell Road dated 1994 by Wood Patel – Q's identified for ADOT Channel for 10yr & 100yr, but source unknown. J2 to verify.
4. Existing headwalls to remain in place. Need to obtain River Walk Apt drainage report to identify design flows.
5. Rio Vista Park Drainage Report, 2003, Aztec Engineering

Casa Del Rio Swale: The ADMP did not quantify the flows for this outfall to New River. The Kirkham Michael report identified a peak discharge of 39 cfs for the 100 year flow for the 3.97 acre drainage area, which included 10.7 cfs from the upstream CSP. A flow of 15 cfs is identified for the 10 year event.

ADOT Swale: The Wood Patel Report (1994) identifies this swale with a drainage area as 6 acres +/- . J2 will refine this drainage area based on new topo and performed hydrology calculations using the Rational Method per FCDMC criteria.

94th Drive Swale: The ADMP did not quantify the flows for this outfall to New River. The Kirkham Michael report identifies a peak discharge of 77 cfs for the 100 year event and 35 cfs for the 10 year event for Parcel 5. Parcel 5 is a 27 acre site, with a concentration point/outfall located at the Plaze Del Rio Blvd and the 94th Drive Swale that outfalls to New River. The KM report states that Parcel 14, which is currently undeveloped, will outfall directly to this swale, without retention. Parcel 14 is planned as a residential care facility. The KM report does not quantify the peak discharge that would result in the swale as parcel 14 is developed. J2 will further investigate this outfall, by determining the planned use of this parcel and determine any retention requirements that may now be required to meet NPDES "first flush" requirements.

91st Avenue Channel: The ADMP did not quantify the flows for this outfall to New River. The ADMP identifies RX26S as a route down 91st Ave, upstream of Thunderbird with a peak discharge of 35 cfs for the 100 yr event. Basin N07, which is northwest of Thunderbird Road and 91st Ave has a peak discharge of 702 cfs (100 yr). The Thunderbird Road is in a sag at this location, with the roadway storm drain system outfalling to the 91st Avenue Channel. The outlet of the system is a 72" RCP with a design discharge of 160 cfs as shown on the as built plans for Thunderbird Road (return period unknown). The Desert Harbor Master Development Drainage Report, by Rick Engineering, dated March 1994 identifies overflow from the lake to 91st Avenue during the 100-year event as 78 cfs. Team members will need to further investigate the hydrology for the 91st Avenue Channel.





Desert Harbor Spillway: The ADMP identified a retention storage of 22.8 ac-ft for Desert Harbor (LN07A), with an outflow of 712 cfs for the 100 yr event (CN07A). The Desert Harbor Master Development Drainage Report, by Rick Engineering, dated March 1994 identifies retention storage of 85 acre feet, which would reduce the flows from the ADMP. The Rick Engineering report also identifies a 100 year peak discharge of 343 cfs to the spillway (outfalls to 2x6'x3' box culvert). The culvert is identified with a capacity of 695 cfs. Team members will need to further investigate the hydrology for the Desert Harbor Spillway.

2.4 *Hydraulics*

Hydraulic models were prepared to evaluate both the existing and proposed conditions in the subject New River Channel reach. The analysis followed methods and procedures as outlined in the "Drainage Design Manual for Maricopa County – Volume 2". Updated topographic mapping was used to digitalize new hydraulic model cross sections. The vertical datum used was NAVD 88. HEC-RAS 3.1.1 was used to compute the water surface profiles for the 100-year and the Standard project Flood (SPF) flow.

The proposed HEC-RAS model was prepared to aid in the design of the gabion mattress side slope protection (height and depth) and to evaluate the proposed channel cross section configurations. The proposed New River HEC-RAS model was derived from a previous study's HEC-2 model. The HEC-2 model was created for the 1993-1994 Flood Control study of the New River channel reach from Grand Avenue to Greenway Road. The HEC-2 model reflected the channel changes as proposed in the study and as actually constructed in the later follow on construction project. The model represented the current condition of the channel.

The project criteria for the proposed improvements are as follows:

- Provide right of way containment plus 1 foot of freeboard for the SPF flow.
- Provide main channel (gabion mattress) plus 1 foot of freeboard containment for the 100-year flow
- Minimize area of disturbance (reduce mitigation requirements) and excavation requirements due to any regrading of the channel as related to capacity requirements.
- Side Channel (local tributaries and/or concentration points) hydraulics into New River. Do not "chase" SPF up side channels. Hydraulic analysis of side channels to evaluate two scenarios: (1) 100 year water surface elevation (WSE) in New River and 10 year WSE in side channel and (2) 100 year WSE in side channel and 10 year WSE in New River.



Desert Harbor Spillway: The ADMP identified a retention storage of 22.8 ac-ft for Desert Harbor (LN07A), with an outflow of 712 cfs for the 100 yr event (CN07A). The Desert Harbor Master Development Drainage Report, by Rick Engineering, dated March 1994 identifies retention storage of 85 acre feet, which would reduce the flows from the ADMP. The Rick Engineering report also identifies a 100 year peak discharge of 343 cfs to the spillway (outfalls to 2x6'x3' box culvert). The culvert is identified with a capacity of 695 cfs. Team members will need to further investigate the hydrology for the Desert Harbor Spillway.

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The project criteria for the proposed improvements are as follows:

- Provide right of way containment plus 1 foot of freeboard for the SPF flow.
- Provide main channel (gabion mattress) plus 1 foot of freeboard containment for the 100-year flow
- Minimize area of disturbance (reduce mitigation requirements) and excavation requirements due to any regrading of the channel as related to capacity requirements.
- Side Channel (local tributaries and/or concentration points) hydraulics into New River. Do not "chase" SPF up side channels. Hydraulic analysis of side channels to evaluate two scenarios: (1) 100 year water surface elevation (WSE) in New River and 10 year WSE in side channel and (2) 100 year WSE in side channel and 10 year WSE in New River.





2.4.1 **Manning's n Values**

The basis HEC-2 (1994) model used the following n values:

- Overbanks – 0.045
- Main Channel – 0.030

Some concern from the FCD was voiced relating to the seemingly low value of the main channel n value as run in the original HEC-2 model when correlated to the existing condition relatively high density of vegetation.

Subsequent discussion with the FCD indicated that increasing the main channel roughness should be done to reflect realistic/current conditions. For the 30% submittal, J2 increased the main channel roughness and overbank n values from the previous study values. J2 increased the n values to the maximum allowable to meet the freeboard criteria stated above. The Manning's n's in the proposed HEC-RAS plan, are values that represent a reasonable future vegetative condition that can be planned for (designed) and also does not cause an excessive water surface profile. In general, the maximum main channel n value was approximately 0.035 and the overbanks were about 0.04. Near Grand Avenue, the roughness values are lower. This area is currently less vegetated and therefore has a lower n value to begin with. However, some management to keep the roughness (e.g. vegetation) in check is required so that the water surface profile in this area will be minimized. North of Thunderbird (near the Skunk Creek Drop Structure), the "allowable" n values were higher (denser growth permitted) since the conveyance areas were greater in this area than at other locations. The main channel roughness values can be increased to around 0.05 in this area. This report contains the 30% preliminary HEC-RAS run printouts in the appendices. An electronic version is also supplied. It is anticipated that the Manning's n values will be refined between the 30% and 60% submittals.

2.4.2 **Berm, Flood Wall and "Wasting Areas"**

The FCDMC is required to contain the SPF plus 1 foot of freeboard within its right of way. Areas immediately north of Grand Avenue have relative high water surfaces. This is caused primary by the existing "choke" caused at Grand Avenue by the bank protection, roadway and railroad bridge. In these areas the SPF flood water overtops the cement stabilized alluvium (CVA) and inundates the over bank area from to the Agua Fria Freeway embankment (beyond the FCDMC right of way). A berm is required in these areas to keep SPF inundation limits within the FCD right of way. In areas of required containment, berms have been preliminarily set and potential wasting (fill) areas have been identified in the 30% plans. These areas will utilize some of the excavated channel material to provided adequate containment of the flood waters to meet requirements.





The recently constructed Rio Vista Park entrance road was constructed below the SPF water surface elevation. Therefore, a flood wall is required along the entrance road (east side of New River) immediately north of Thunderbird Road. The wall will be a maximum of 3.5 feet high. The 30% plans show the proposed wall location.

2.4.3 Regrading – 404 Area of Disturbances

The proposed improvements to the New River Reach include areas within the channel cross section that will be “cleaned” out – excavated - to improve the channel conveyance. This is will be done primarily in the area north of Grand Avenue to Thunderbird Road. The 30% plans show the cross sections and the situation more clearly. The plans also show the preliminary limits of disturbance as a dotted line towards the center of the channel.

2.4.4 Low Flow Channels

Two (2) low flow channels will be incorporated into the proposed channel configuration downstream of the Skunk Creek confluence. The channels will be natural (not concrete lined). It is anticipated that the channels may migrate over time. The purpose of the low flow channels is to concentrate nuisance and minor flows in one or two locations and prevent excessive vegetative growth (roughness) in the channel. These low flows will also increase growth in areas that would benefit aesthetically from a denser vegetative canopy. The low flow channels will be located close to each overbank within the area of disturbance caused by the construction of the proposed New River Channel improvements. This is done to minimize disturbance to New River and also as an added benefit increases the natural appearance of the river bottom. In addition, these channels will collect storm water from adjacent tributaries (culverts and channels). The west side low flow channel shall convey the Skunk Creek tributary low flows from the drop to Grand Avenue. The east side low flow channel shall convey only inflows from the east side of the channel. The west side low flow channel appears to be receiving less side inflows than the east and this was the primary reason for this configuration. In areas where there is a defined low flow area (some areas south of Thunderbird Road) the natural low flow shall be used. The proposed model cross sections took these small drainages into account.

2.4.5 Paradise Shores Section

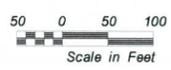
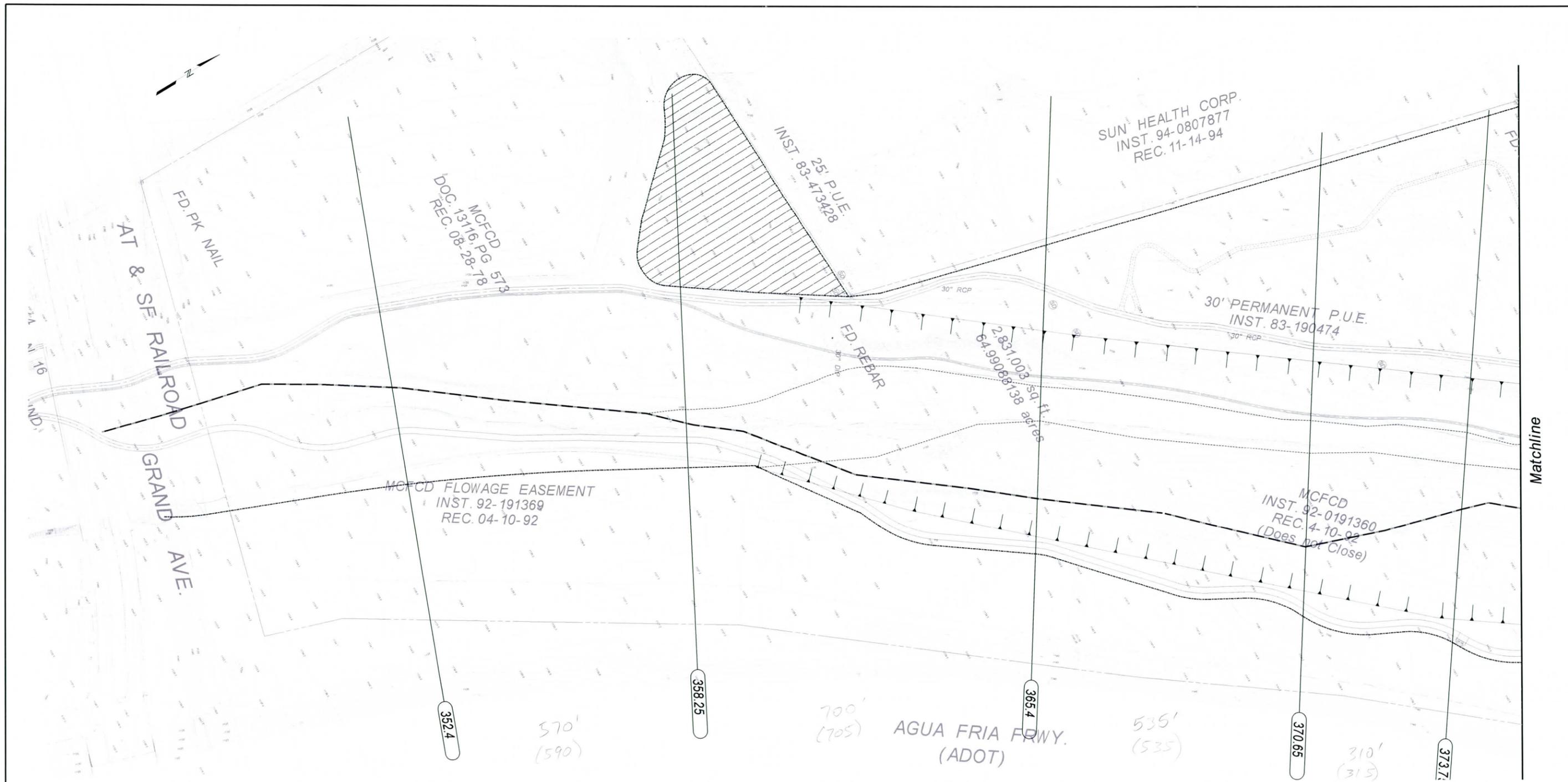
The hydraulic model used for the Paradise Shores bank protection design is the HEC-2 model prepared by Wood/Patel in 1994 for the project titled New River from Grand Avenue to Greenway Road (Contract FCD 93-02). The computed water surface elevations for the SPF and river flow-line elevations are converted from NGVD29 datum to NAVD88 datum of the new topographic map. The top of the bank protection is equal to the computed



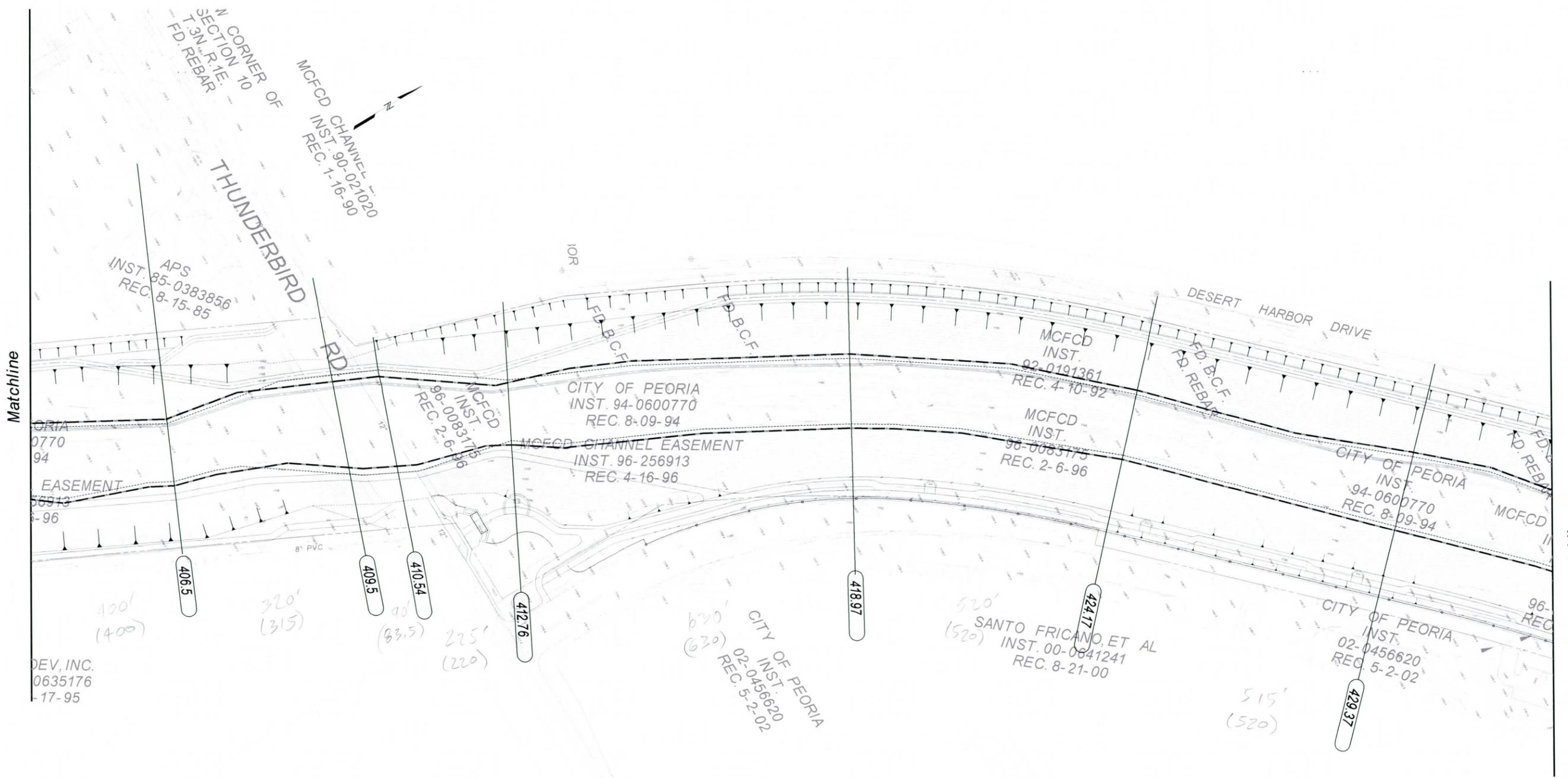


water surface elevation for the SPF plus 1 ft freeboard, and the toe of bank protection is 10 ft below the flow-line within the project limits. The bank protection side slope is equal to 2:1 (H:V). Bank protection for both upstream and downstream project limits are designed to tie-in to the existing bank protection top and toe elevations. The following figures show the HEC-RAS model cross section locations as well as the low flow alignments.

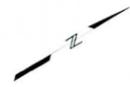




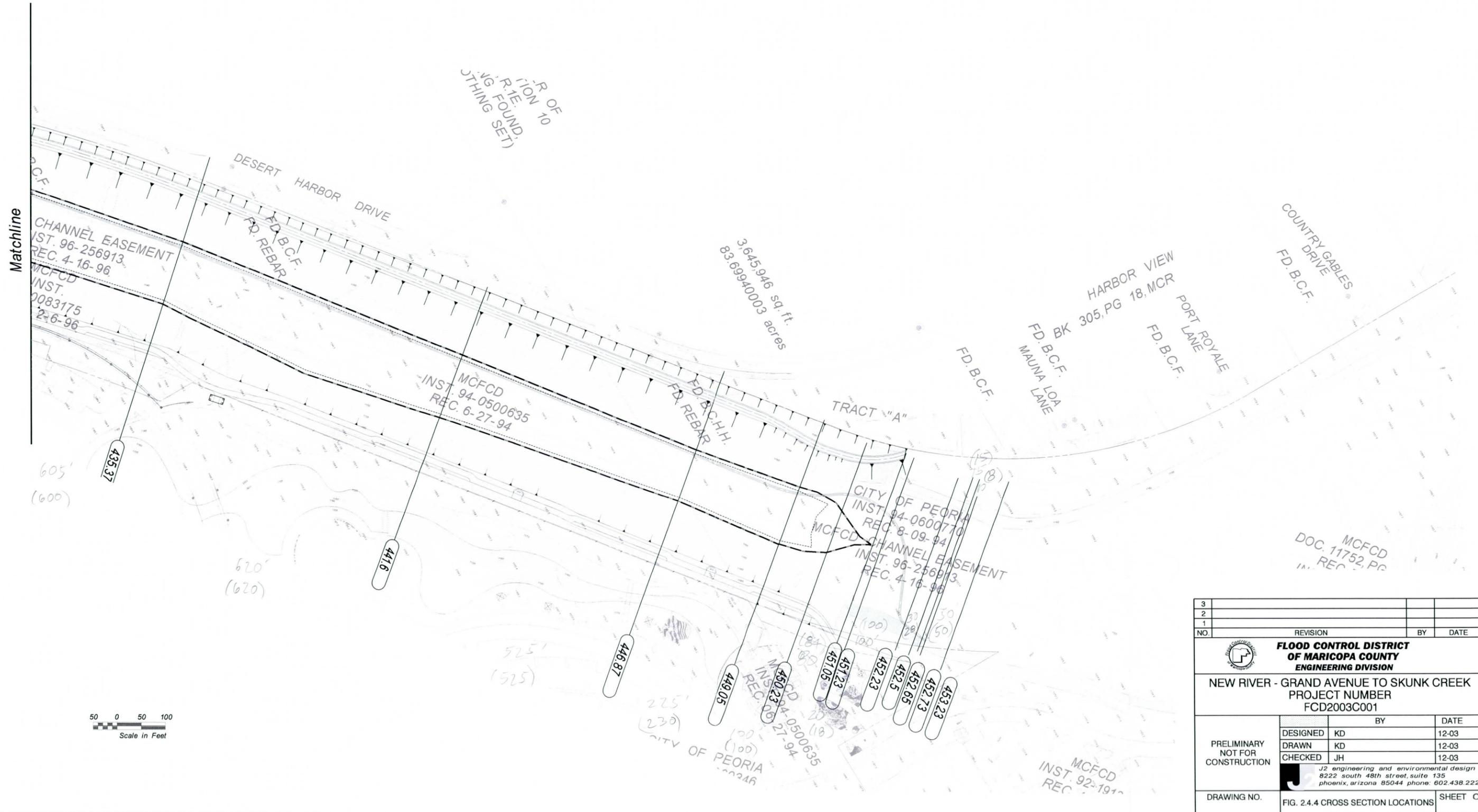
3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001			
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	KD	12-03
	DRAWN	KD	12-03
	CHECKED	JH	12-03
<small>J2 engineering and environmental design 8222 south 48th street, suite 135 phoenix, arizona 85044 phone: 602.438.2221</small>			
DRAWING NO.	FIG. 2.4.1 CROSS SECTION LOCATIONS	SHEET OF	



3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001			
PRELIMINARY NOT FOR CONSTRUCTION		BY	DATE
	DESIGNED	KD	12-03
	DRAWN	KD	12-03
	CHECKED	JH	12-03
<small>J2 engineering and environmental design 8222 south 48th street, suite 135 phoenix, arizona 85044 phone: 602.438.2221</small>			
DRAWING NO.	FIG. 2.4.3 CROSS SECTION LOCATIONS	SHEET OF	



SECTION OF
R.I.E.
(NOTHING FOUND)



Matchline



3			
2			
1			
NO.	REVISION	BY	DATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001			
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	KD	12-03
	DRAWN	KD	12-03
	CHECKED	JH	12-03
<small>J2 engineering and environmental design 8222 south 48th street, suite 135 phoenix, arizona 85044 phone: 602.438.2221</small>			
DRAWING NO.	FIG. 2.4.4 CROSS SECTION LOCATIONS	SHEET OF	



2.5 Site Right of Way

The project site right of way (ROW) was updated and distributed by Wood-Patel at the beginning phase of this project. ROW lines were identified through examination of As-Built drawings, county records and then verified with site survey.

2.5.1 Paradise Shores

This survey was performed without benefit of a current title report. All title information is based on current Maricopa County Assessors Office. No information was provided to Wood/Patel regarding existing easements or licenses.

Ownership of right of way varies for this project. Most ownership lies with Maricopa County Flood Control District or the City of Peoria. The City must be contacted to determine whether Temporary Construction Easements will be required over City of Peoria property.

There are certain parcels still under private ownership. Temporary Construction Easements may be required through these parcels for the duration of construction. The private owners are:

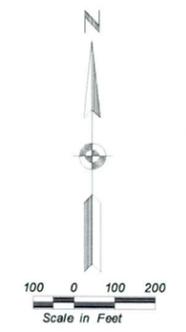
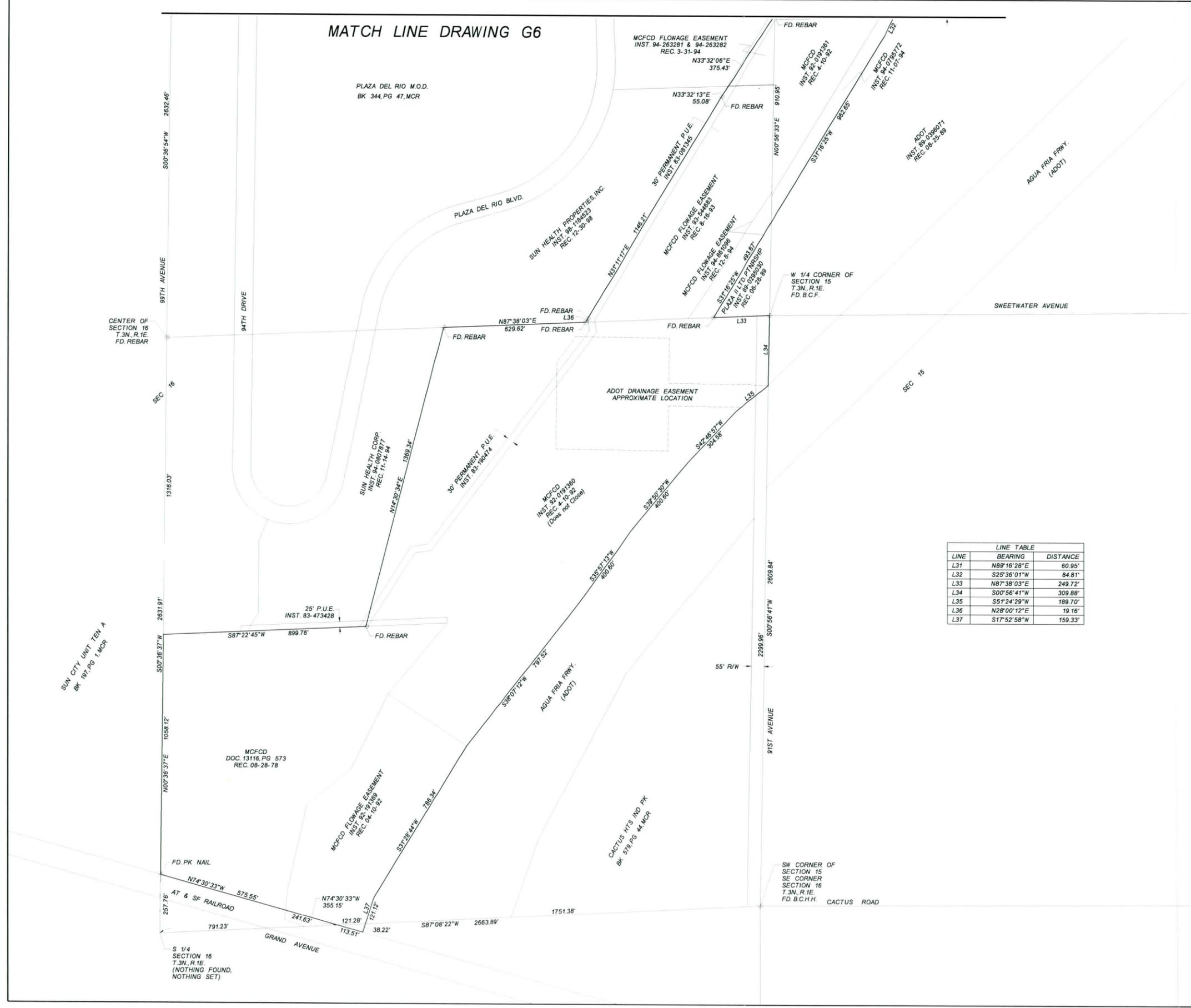
Clarion Homes, L.L.C.
New River Shores Homeowners Association
Sun Health Properties, Inc.

In the late 1990's, the New River Shores Bank Protection Project (Wood/Patel Job #96521) was designed and constructed a small portion of bank protection at the upstream limit (approximately 25 ft long) was not constructed because of right-of-way issues. For this project, approximately 50 LF of temporary construction easement will be required in order to tie-in to the existing New River Shores bank protection limits.

The following Figures show the right of way parcels.



MATCH LINE DRAWING G6



LEGEND

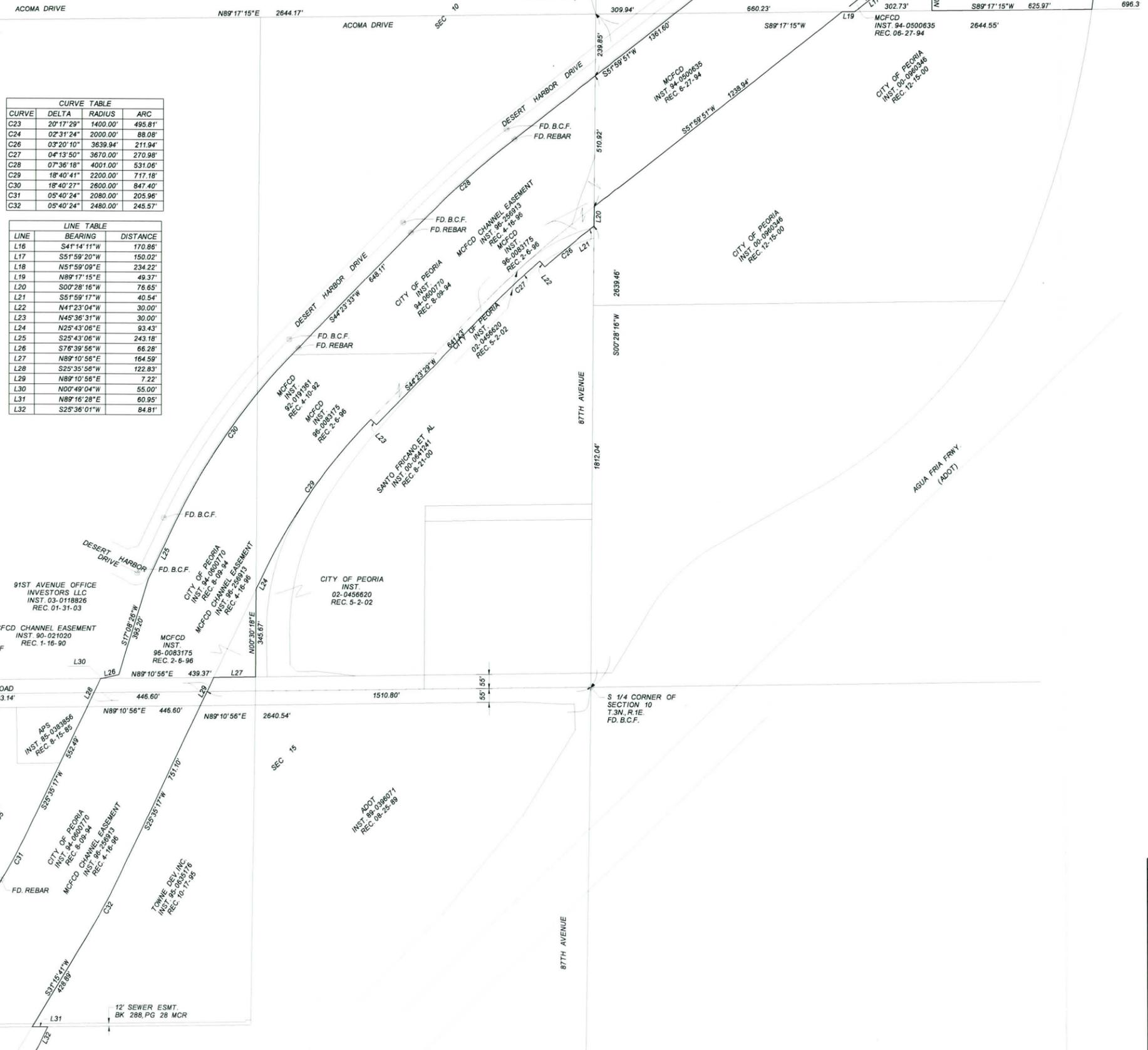
- SURVEY MONUMENT FOUND UNLESS OTHERWISE NOTED
- MCR MARICOPA COUNTY RECORDER
- INST. INSTRUMENT
- REC. RECORDED
- FD. FOUND
- B.C.F. BRASS CAP FLUSH
- P.U.E. PUBLIC UTILITY EASEMENT
- BK BOOK
- PG PAGE
- C.O.P. CITY OF PEORIA
- B.C.H. BRASS CAP IN HANDHOLE
- ADOT ARIZONA DEPARTMENT OF TRANSPORTATION
- ESMT. EASEMENT
- MCFCD MARICOPA COUNTY FLOOD CONTROL DISTRICT
- DOC. DOCUMENT
- FRWY. FREEWAY
- RIGHT OF WAY

LINE TABLE

LINE	BEARING	DISTANCE
L31	N89°16'28"E	60.95'
L32	S25°36'01"W	84.81'
L33	N87°38'03"E	249.72'
L34	S00°56'41"W	309.88'
L35	S51°24'29"W	189.70'
L36	N28°00'12"E	19.16'
L37	S17°52'58"W	159.33'

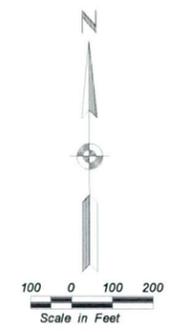
3			
2			
1			
NO.	REVISION	BY	DATE
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>			
NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001			
PRELIMINARY 30% SUBMITTAL NOT FOR CONSTRUCTION	DESIGNED	C.S.D. Jr.	10/09/03
	DRAWN	D.A / A.B.	12/12/03
	CHECKED		
WOOD, PATEL & ASSOCIATES, INC. 2051 W. NORTHERN AVE., SUITE 100 PHOENIX, ARIZONA (602) 335-8500			
DRAWING NO. G7	FIGURE 2.5.1 - RIGHT OF WAY PLAN	SHEET OF	

MATCH LINE DRAWING G5



CURVE	DELTA	RADIUS	ARC
C23	20°17'29"	1400.00'	495.81'
C24	02°31'24"	2000.00'	88.08'
C26	03°20'10"	3639.94'	211.94'
C27	04°13'50"	3670.00'	270.98'
C28	07°36'18"	4001.00'	531.06'
C29	18°40'41"	2200.00'	717.18'
C30	18°40'27"	2800.00'	847.40'
C31	05°40'24"	2080.00'	205.96'
C32	05°40'24"	2480.00'	245.57'

LINE	BEARING	DISTANCE
L16	S41°14'11"W	170.86'
L17	S51°59'20"W	150.02'
L18	N51°59'09"E	234.22'
L19	N89°17'15"E	49.37'
L20	S00°28'16"W	76.65'
L21	S51°59'17"W	40.54'
L22	N41°23'04"W	30.00'
L23	N45°36'31"W	30.00'
L24	N25°43'08"E	93.43'
L25	S25°43'08"W	243.18'
L26	S76°39'56"W	66.28'
L27	N89°10'56"E	164.59'
L28	S25°35'56"W	122.83'
L29	N89°10'56"E	7.22'
L30	N00°49'04"W	55.00'
L31	N89°16'28"E	60.95'
L32	S25°36'01"W	84.81'



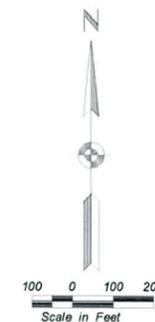
LEGEND

- SURVEY MONUMENT FOUND UNLESS OTHERWISE NOTED
- MCR MARICOPA COUNTY RECORDER
- INST. INSTRUMENT
- REC. RECORDED
- FD. FOUND
- B.C.F. BRASS CAP FLUSH
- P.U.E. PUBLIC UTILITY EASEMENT
- BK. BOOK
- PG. PAGE
- C.O.P. CITY OF PEORIA
- B.C.H. BRASS CAP IN HANDHOLE
- ADOT ARIZONA DEPARTMENT OF TRANSPORTATION
- ESMT. EASEMENT
- MCFCD MARICOPA COUNTY FLOOD CONTROL DISTRICT
- DOC. DOCUMENT
- FRWY. FREEWAY
- RIGHT OF WAY

MATCH LINE DRAWING G7

3		
2		
1		
NO.	REVISION	BY
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>		
<p>NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001</p>		
PRELIMINARY 30% SUBMITTAL NOT FOR CONSTRUCTION	DESIGNED	C.S.D. Jr. 10/09/03
	DRAWN	D.A. / A.B. 12/08/03
	CHECKED	
<p>WOOD, PATEL & ASSOCIATES, INC. 2051 W. NORTHERN AVE., SUITE 100 PHOENIX, ARIZONA (602) 335-8500</p>		
DRAWING NO. G6	FIGURE 2.5.2 - RIGHT OF WAY PLAN	SHEET OF

MATCH LINE DRAWING G4

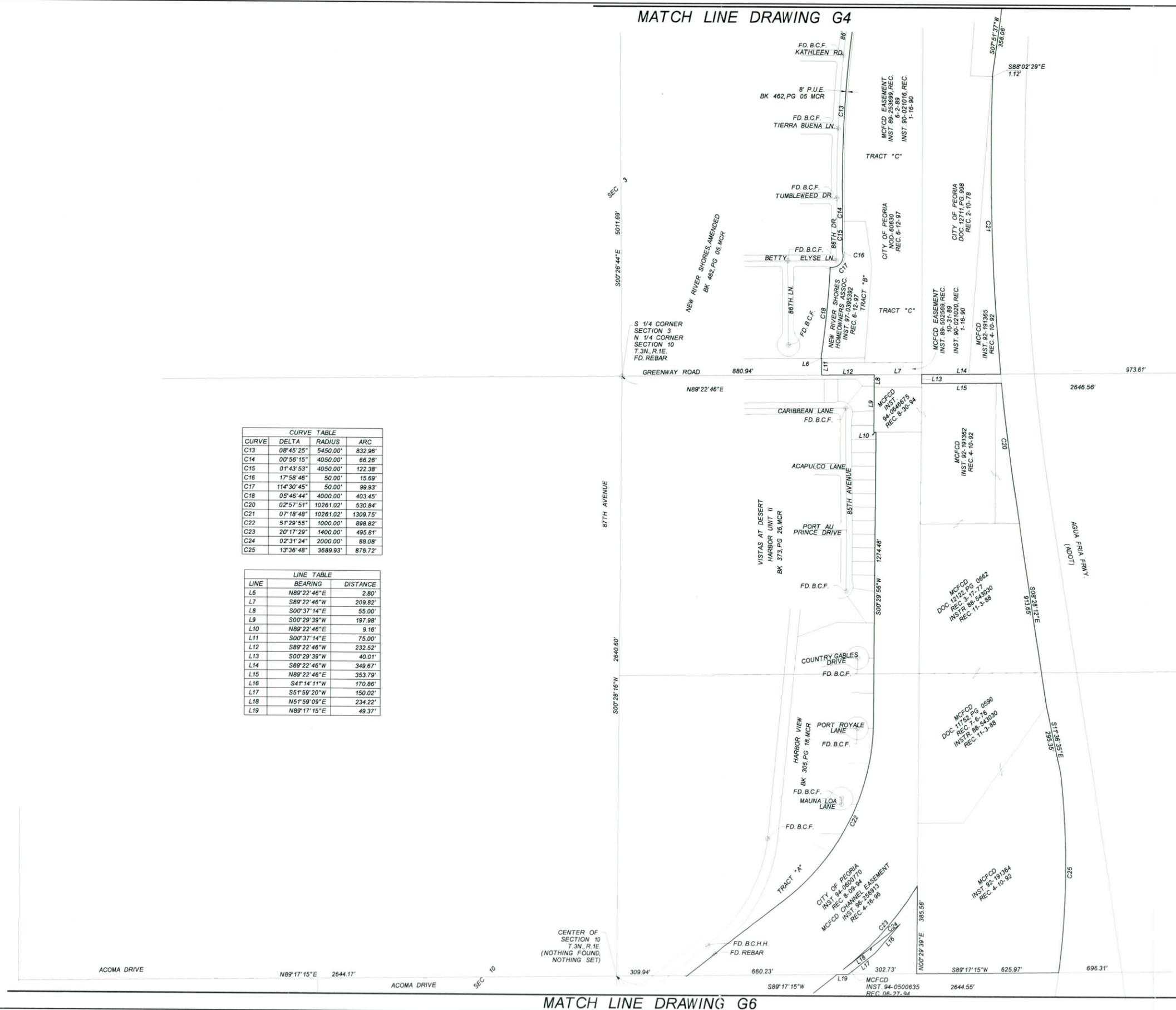


LEGEND

- ⊙ SURVEY MONUMENT FOUND UNLESS OTHERWISE NOTED
- MCR MARICOPA COUNTY RECORDER
- INST. INSTRUMENT
- REC. RECORDED
- FD. FOUND
- B.C.F. BRASS CAP FLUSH
- P.U.E. PUBLIC UTILITY EASEMENT
- BK BOOK
- PG PAGE
- C.O.P. CITY OF PEORIA
- B.C.H.H. BRASS CAP IN HANDHOLE
- ADOT ARIZONA DEPARTMENT OF TRANSPORTATION
- ESMT. EASEMENT
- MCFCD MARICOPA COUNTY FLOOD CONTROL DISTRICT
- DOC. DOCUMENT
- FRWY. FREEWAY
- RIGHT OF WAY

CURVE TABLE			
CURVE	DELTA	RADIUS	ARC
C13	08°45'25"	5450.00'	832.96'
C14	00°56'15"	4050.00'	66.28'
C15	01°43'53"	4050.00'	122.38'
C16	17°58'46"	50.00'	15.69'
C17	114°30'45"	50.00'	99.93'
C18	05°46'44"	4000.00'	403.45'
C20	02°57'51"	10261.02'	530.84'
C21	07°18'48"	10261.02'	1309.75'
C22	51°29'55"	1000.00'	898.82'
C23	20°17'29"	1400.00'	495.81'
C24	02°31'24"	2000.00'	88.08'
C25	13°36'48"	3689.93'	876.72'

LINE TABLE		
LINE	BEARING	DISTANCE
L6	N89°22'46"E	2.80'
L7	S89°22'46"W	209.82'
L8	S00°37'14"E	55.00'
L9	S00°29'39"W	197.98'
L10	N89°22'46"E	9.16'
L11	S00°37'14"E	75.00'
L12	S89°22'46"W	232.52'
L13	S00°29'39"W	40.01'
L14	S89°22'46"W	349.67'
L15	N89°22'46"E	353.79'
L16	S4°14'11"W	170.86'
L17	S5°59'20"W	150.02'
L18	N5°59'09"E	234.22'
L19	N89°17'15"E	49.37'

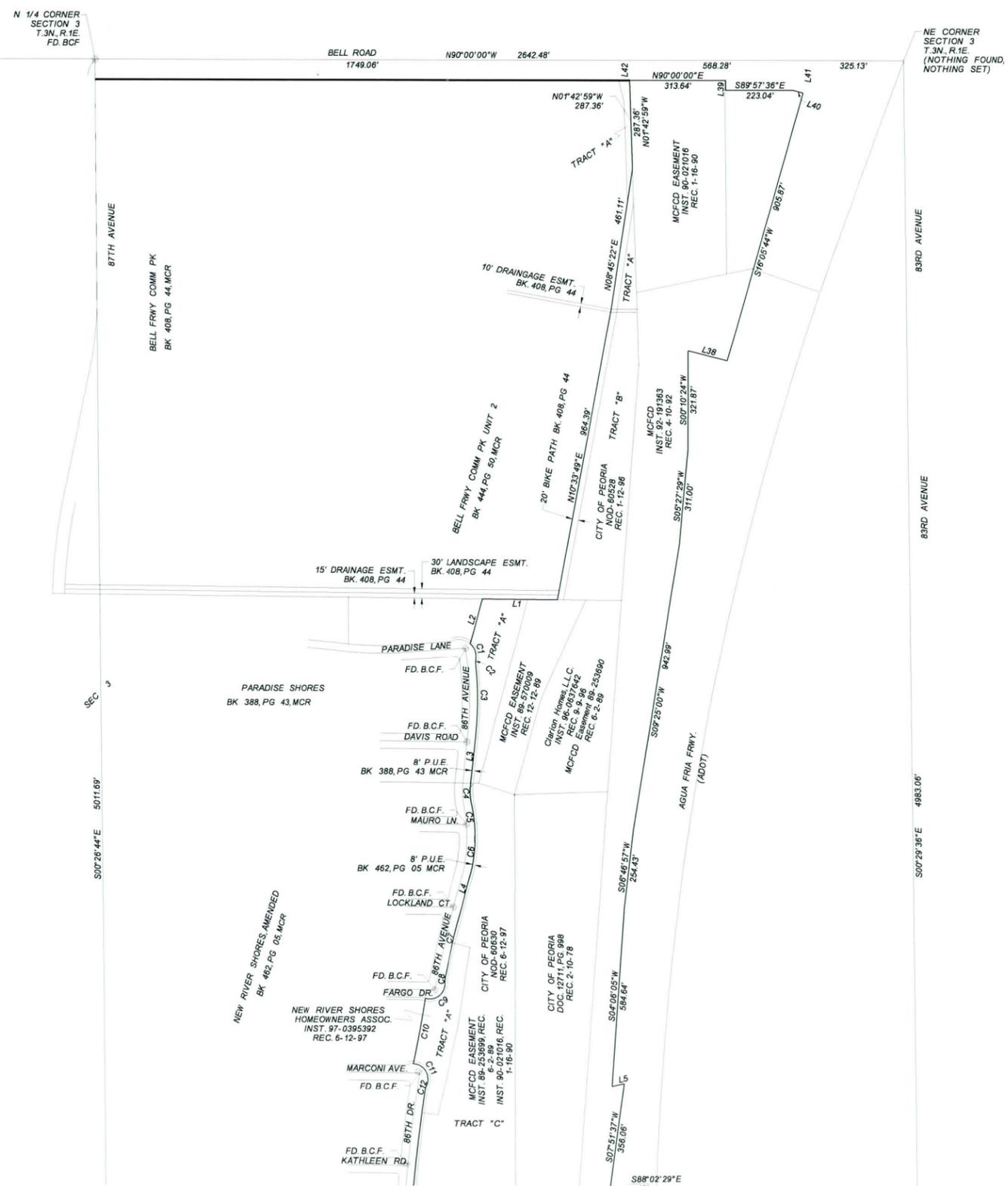


MATCH LINE DRAWING G5

3		
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NO.	REVISION	BY
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>		
<p>NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001</p>		
PRELIMINARY 30% SUBMITTAL NOT FOR CONSTRUCTION	DESIGNED	C.S.D. Jr. 10/09/03
	DRAWN	D.A. / A.B. 12/12/03
	CHECKED	
<p>WOOD, PATEL & ASSOCIATES, INC. 2051 W. NORTHERN AVE., SUITE 100 PHOENIX, ARIZONA (602) 335-8500</p>		
DRAWING NO. G5	FIGURE 2.5.3 - RIGHT OF WAY PLAN	SHEET OF

LINE	BEARING	DISTANCE
L1	S89°25'21"E	245.30'
L2	N15°31'14"E	151.72'
L3	N06°01'30"E	169.15'
L4	S15°06'07"W	80.44'
L5	N77°37'49"E	40.50'
L38	N75°44'20"W	130.82'
L39	S00°02'24"W	31.44'
L40	S74°32'05"E	32.81'
L41	N00°00'00"E	105.34'
L42	N00°00'00"E	65.00'

CURVE	DELTA	RADIUS	ARC
C1	67°00'48"	55.00'	59.53'
C2	19°35'43"	25.00'	8.55'
C3	12°36'10"	1025.00'	225.46'
C4	17°54'17"	225.00'	70.31'
C5	06°56'09"	525.00'	63.55'
C6	19°43'36"	525.00'	180.75'
C7	02°37'49"	5450.00'	250.19'
C8	18°21'27"	50.00'	16.02'
C9	113°43'44"	50.00'	99.25'
C10	02°14'41"	5500.00'	215.47'
C11	113°17'23"	50.00'	98.86'
C12	18°21'27"	50.00'	16.02'



LEGEND

⊙	SURVEY MONUMENT FOUND UNLESS OTHERWISE NOTED
MCR	MARICOPA COUNTY RECORDER
INST.	INSTRUMENT
REC.	RECORDED
FD.	FOUND
B.C.F.	BRASS CAP FLUSH
P.U.E.	PUBLIC UTILITY EASEMENT
BK	BOOK
PG	PAGE
C.O.P.	CITY OF PEORIA
B.C.H.	BRASS CAP IN HANDHOLE
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
ESMT	EASEMENT
MCFCD	MARICOPA COUNTY FLOOD CONTROL DISTRICT
DOC.	DOCUMENT
FRWY.	FREEWAY
—	RIGHT OF WAY

MATCH LINE DRAWING G5

3		
2		
1		
NO.	REVISION	BY
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>		
<p>NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001</p>		
PRELIMINARY 30% SUBMITTAL NOT FOR CONSTRUCTION	DESIGNED	BY C.S.D. Jr. DATE 10/09/03
	DRAWN	D.A / A.B. 12/12/03
	CHECKED	
<p>WOOD, PATEL & ASSOCIATES, INC. 2051 W. NORTHERN AVE., SUITE 100 PHOENIX, ARIZONA (602) 335-8500</p>		
DRAWING NO. G4	FIGURE 2.5.4 - RIGHT OF WAY PLAN	SHEET OF



2.6 Site Utilities

From US 60 (Grand Avenue) to the Skunk Creek confluence, there are two (2) main utility crossing points. North of Grand Avenue and south of the Sun Health Corp Facility, a 30 inch sanitary sewer line crosses New River. Approximately halfway between Grand Avenue and Thunderbird Road, a 16-inch waterline (ductile iron pipe - DIP) also crosses. Prior to the 30% submittal, potholes were taken at 7 locations to specifically identify these crossings. It does not appear that any of these utilities will impact the construction of the proposed improvements.

2.6.1 Paradise Shores:

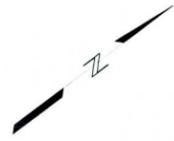
The underground utilities shown on the plans are from furnished information from the utility companies and on-site observations. No underground investigation has been performed.

Two utilities have been identified crossing New River within this project's limits: The City of Peoria maintains a 30 inch diameter sanitary sewer which crosses under New River at approximately one quarter mile north of Grand Avenue, and an 8 inch water line that crosses under New River at Sweetwater Avenue alignment. Subsequent to the 30% submittal, potholing will be performed to determine if vertical conflicts exist and if additional protection of these utilities will be required.

There are a few utilities which are in the vicinity of the project site but do not appear to cross New River. An existing 30 inch sewer is located on the west side of the project site and runs from north Grand Avenue to north of Sweetwater Avenue. Several overhead power line crossings are also located within the project site, one of which is an APS high-power transmission line. The contractor should coordinate closely with APS prior to operating any machinery in this vicinity.

The following figures show the site utility locations.



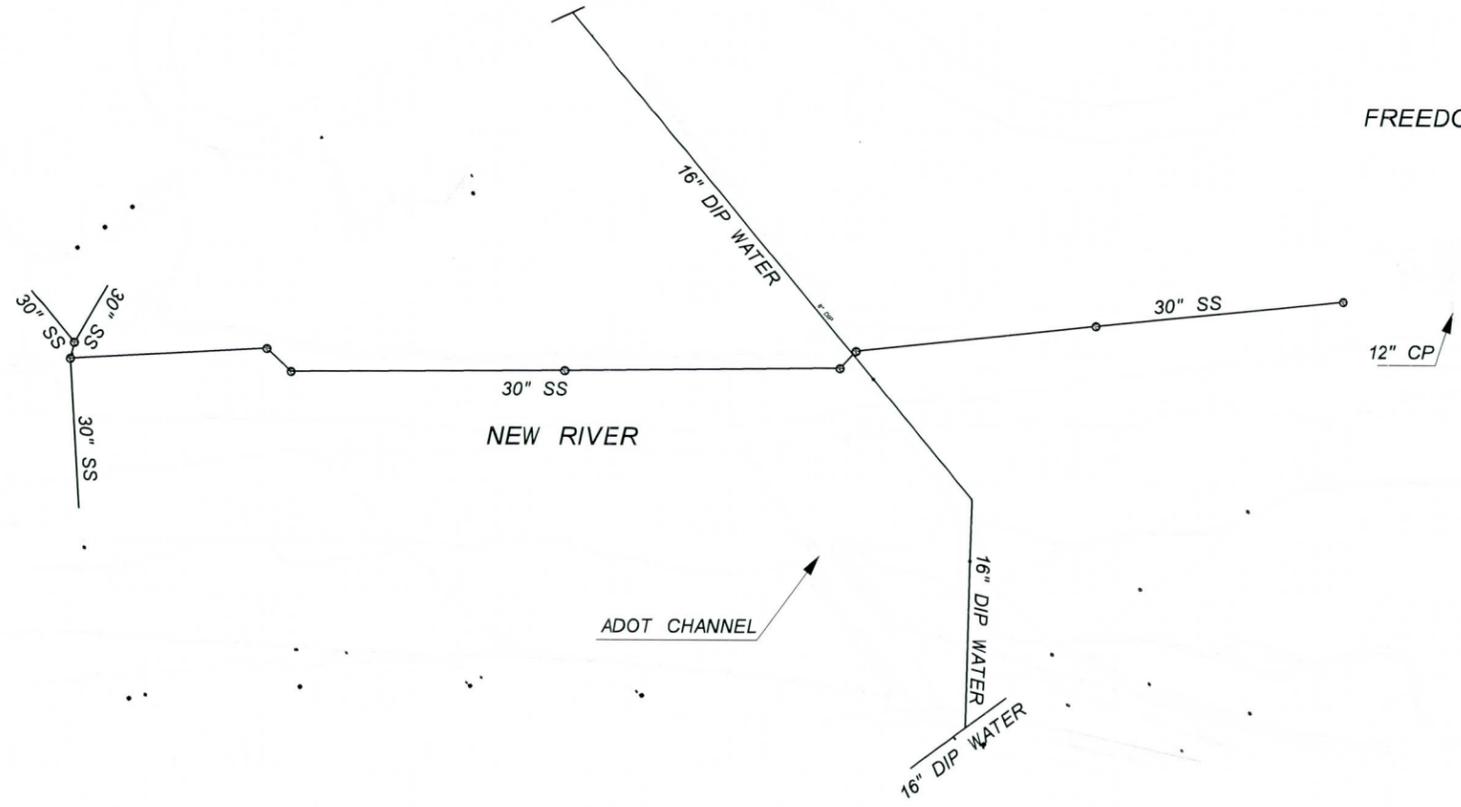


THUNDERBIRD ROAD

PLAZA DEL RIO BOULEVARD

FREEDOM PLAZA

Matchline

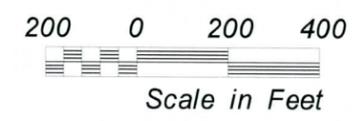


30" HDDP

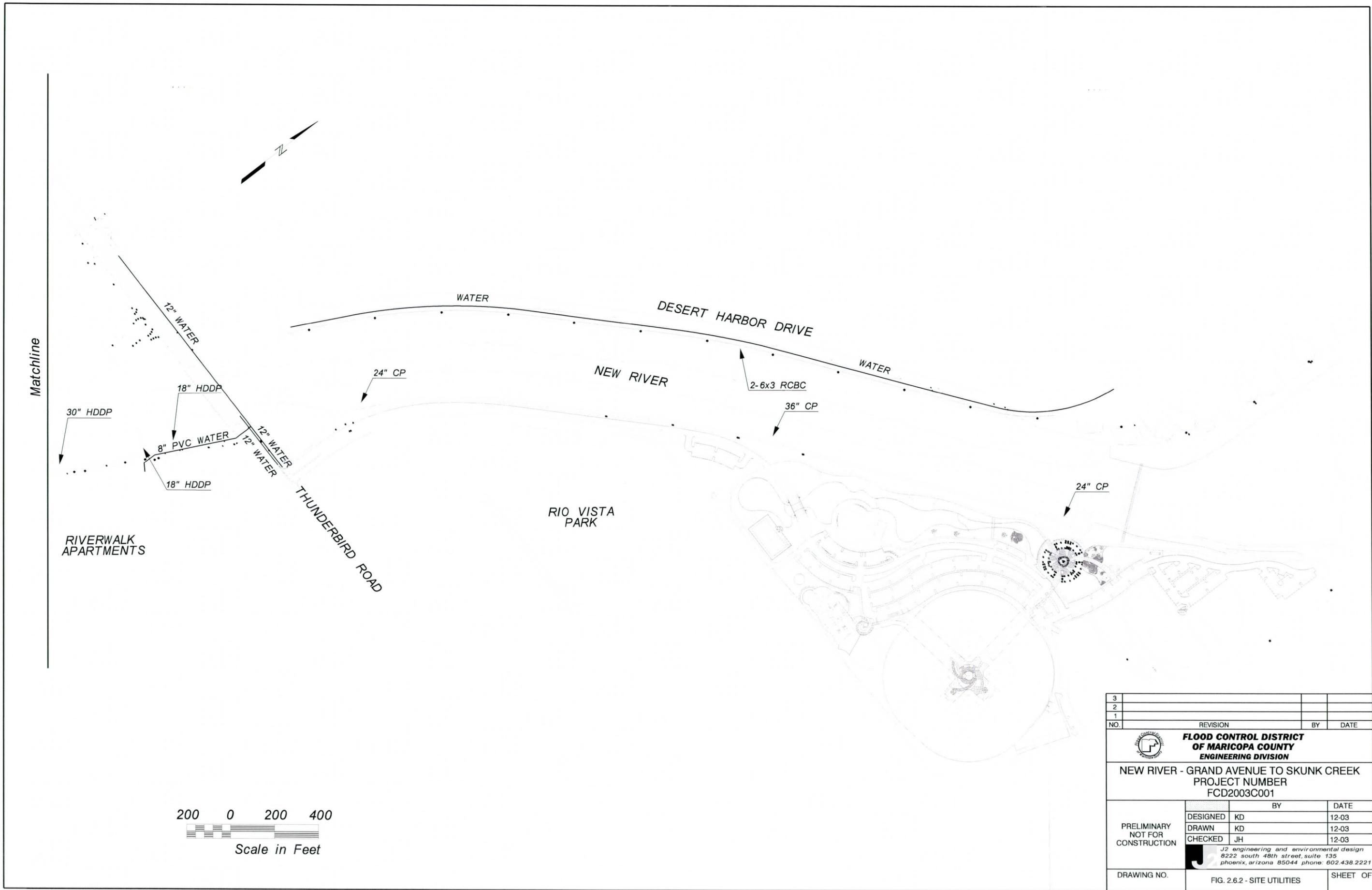
RIVERWALK APARTMENTS

US 60

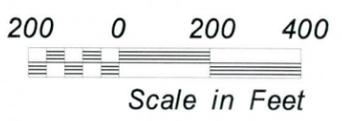
To Verify



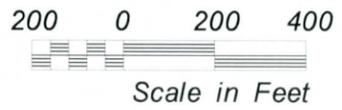
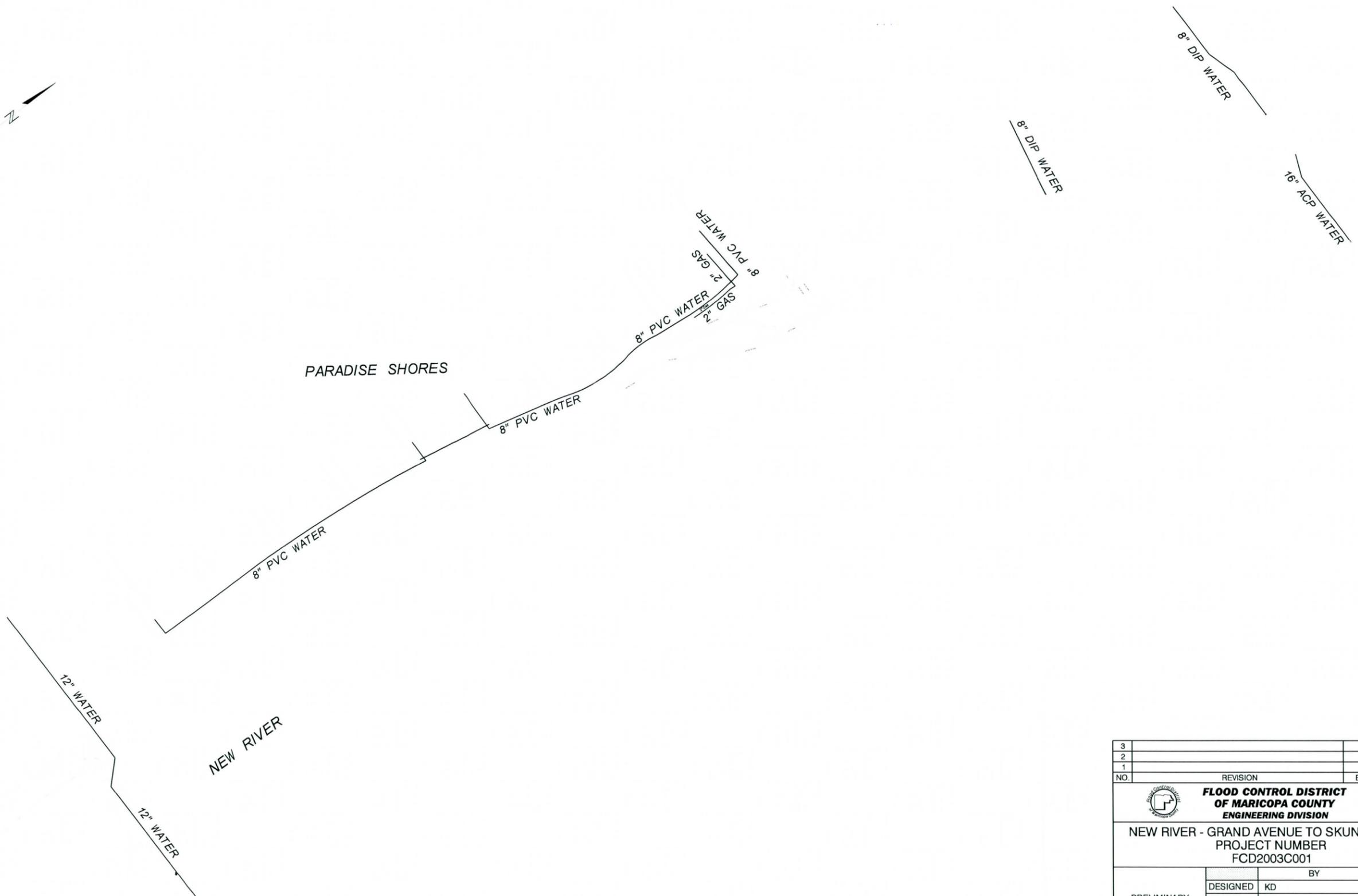
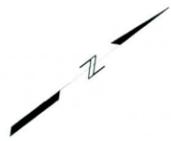
3			
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NO.	REVISION	BY	DATE
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>			
<p>NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001</p>			
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	KD	12-03
	DRAWN	KD	12-03
	CHECKED	JH	12-03
<p><small>J2 engineering and environmental design 8222 south 48th street, suite 135 phoenix, arizona 85044 phone: 602.438.2221</small></p>			
DRAWING NO.	FIG. 2.6.1 - SITE UTILITIES	SHEET OF	



Matchline



3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001			
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	KD	12-03
	DRAWN	KD	12-03
	CHECKED	JH	12-03
<i>J2 engineering and environmental design</i> 8222 south 48th street, suite 135 phoenix, arizona 85044 phone: 602.438.2221			
DRAWING NO.	FIG. 2.6.2 - SITE UTILITIES	SHEET OF	



3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
NEW RIVER - GRAND AVENUE TO SKUNK CREEK PROJECT NUMBER FCD2003C001			
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	KD	12-03
	DRAWN	KD	12-03
	CHECKED	JH	12-03
<small>J2 engineering and environmental design 8222 south 48th street, suite 135 phoenix, arizona 85044 phone: 602.438.2221</small>			
DRAWING NO.	FIG. 2.6.3 - SITE UTILITIES		SHEET OF



2.7 Summary of Drainage Data Collection

The intent of the data collection phase of the project is to allow the design team the opportunity to become intimately familiar with the existing site conditions. These conditions will impact the ultimate development of the proposed projects channel design, habitat creation, maintenance, and the multi-use component. These components should all be designed as one unit to compliment the river ecosystem and respond to existing site conditions; the data collection phase will make that more of a reality. The data collection will assist the design team in analysis and during creation of the links to the ecosystem, environment, and the surrounding community as the project is developed. The data collection will allow the design team to continually review the data against the project design allowing design refinements to better accommodate the existing site conditions and desires of both FCDMC and COP.





The following documents have been obtained by team members:

2.7.1 Related Documents and Reports		
Document Title	Prepared By	Data, Results, or Assumptions brought into this Design
91st Avenue Ramps to Agua Fria Freeway (101-L), March 2001	Earthtech	ADOT project within project vicinity
Glendale/Peoria Area Drainage Master Plan Update, 2001.	Entellus	Hydrology for local tributaries
West Valley Multi-Modal Transportation Corridor Master Plan, 2001.	Entranco	Identify trail systems within the New River Channel project corridor.
Draft Landscape Planning and Design Handbook, 2003.	FCDMC	Guidelines for Landscape.
New River Floodway Analysis HEC-1 data Files	FCDMC	Base FEMA hydraulic data
Local Government Bridge Scour Evaluation Study, Final Scour Evaluation Report for City of Peoria, Structure No. 9684 Thunderbird Road Over New River, 1996.	Michael Baker, Jr.	Identified Local Scour at Thunderbird Road
Paradise Shores – New River Bank Protection Project, Candidate Assessment Report, 2000.	Stantec	Evaluated bank protection adjacent to Paradise Shores.
Middle New River Watercourse Master Plan, 2000.	Stantec	Provides design criteria and describes intent of New River corridor between the confluence of Skunk Creek and New River Dam.
Report for Geotechnical Engineering Services – New River Channelization – Grand Avenue to Greenway Road, Peoria, Arizona	Thomas-Hartig & Associates, Inc.	Provides geotechnical data for project corridor.
Phoenix, Arizona and Vicinity (Including New River) Hydrology Part 2, Design Memo No. 2, 1982.	USACOE	Hydrology data for New River, including 100-year and SPF flows.
New River Channel Improvement, Grand Avenue to Skunk Creek, Candidate Assessment Report, 2000.	Willdan	Evaluated capital improvement alternatives and cost estimates for project corridor. Identifies gabion mattress for bank protection.





Related Documents and Reports (cont)		
Document Title	Prepared By	Data, Results, or Assumptions brought into this Design
New River from Grand Avenue to Greenway Road Design Report, 1984.	Wood Patel	HEC-2 analysis for corridor.
Report for Geotechnical Engineering Services New River Channelization Grand Avenue to Greenway Road Peoria, Arizona	Thomas Hartig & Associates, Inc.	Geotechnical Report

The J2 team is continuing the data collection process. They have begun correspondence with several private utility companies within the project limits. Information has not been received from them at this time. This information will be added to the data collection report as it is obtained.

J2 has performed a visual site review as part of the data collection process. The following Table summarizes the photographs taken of drainage elements of interest, with the photos to follow. Locations of the photo subjects are shown on the Opportunities and Constraints maps.





2.7.2 Drainage Site Inventory Photographs

Photo ID	Description
1	Grand Avenue Channel looking upstream (west).
2	Grand Avenue Channel entering New River - looking west
3	Grand Avenue Channel looking downstream at New River outfall.
4	West Channel – drains to Grand Avenue Channel just above New River outfall.
5	Looking towards Sun City Channel on west Bank - looking south - note handrail, steep slope, and channel entering from west.
6	Incoming Sun City Channel – looking west.
7	Looking upstream (northwest) at Casa Del Rio Swale.
8	Incoming ADOT swale looking downstream (south/southwest).
9	Looking upstream (northeast) along ADOT swale.
10	Incoming ADOT Channel. Looking upstream (east).
11	Incoming ADOT Channel looking downstream (west).
12	ADOT channel looking downstream (southwest), closer to New River outfall, immediately downstream of concrete lined segment.
13	94 th Drive Swale at Plaza Del Rio Blvd. – looking west.
14	Pipes under Plaza Del Rio - 30 CMP & 60x36 CMPA – looking northwest.
15	94 th Drive swale looking upstream (northwest). At end of channel is a hole that acts as detention before emptying into New River.
16	End of 94 th Drive swale entering into New River – looking east.





Photo ID	Description
17	Freedom Plaza Outlet Pipe - 12" line exiting Freedom Plaza – looking west
18	91 st Avenue Channel outfall to New River – looking north
19	Riverwalk outlet pipe #1 – looking east
20	Riverwalk outlet pipe #1 – looking north
21	Riverwalk outlet pipe #2 – looking east
22	Riverwalk outlet pipe #3 – looking east
23	Typical riprap apron at terminus of Riverwalk apartment outlet pipes.
24	Riverwalk outlet pipe #4 – looking west.
25	Looking at east bank (Rio Vista Park Outfall pipe #1).
26	Rio Vista Park Outfall pipe #1 - 24 inch exiting close to Thunderbird Road on east bank.
27	Looking upstream (west) at Desert Harbor spillway and box culvert under Desert Harbor Drive.
28	Desert Harbor Spillway - end of grouted spillway on west bank in New River – looking north.
29	Rio Vista Park Outfall pipe #1 - looking downstream towards New River (west).
30	Rio Vista Park Outfall pipe #2 - Looking east at incoming pipe.
31	Rio Vista Park Outfall pipe #3 at drop structure south of Skunk Creek – looking northeast.
32	Drop Structure south of Skunk Creek – looking northeast.
33	Greenway Channel looking upstream (west) at incoming channel.
34	Greenway Channel at New River Outfall point – looking southeast.





(1) Grand Avenue Channel looking upstream (west).



(2) Grand Avenue Channel entering New River - looking west.

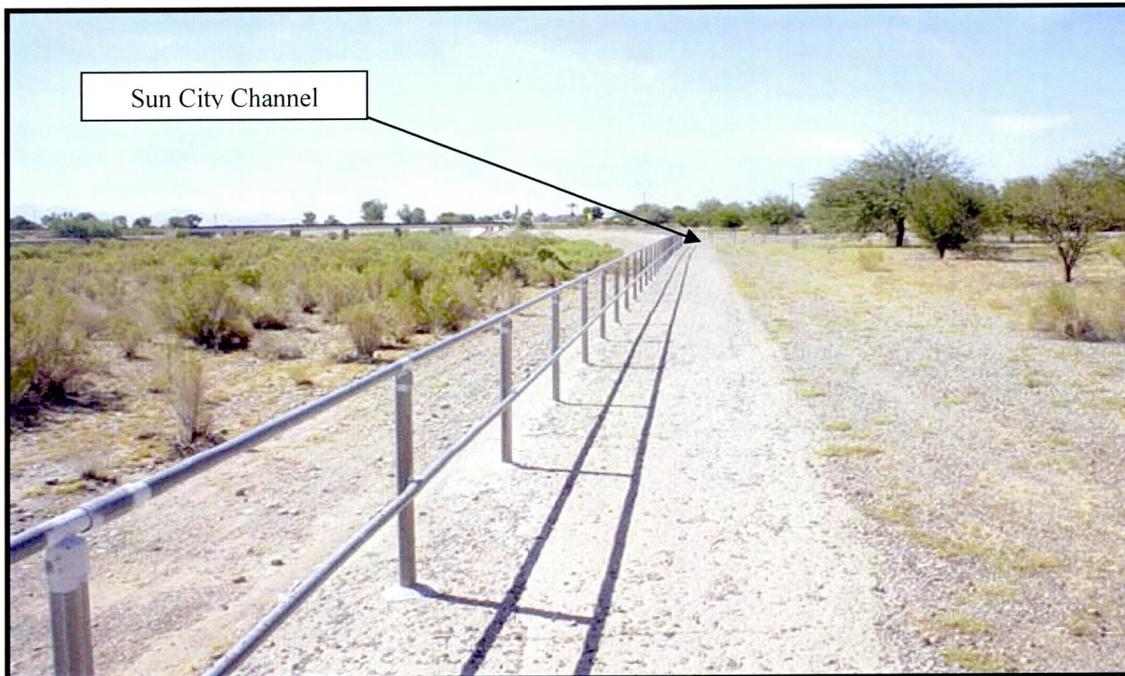


(3) Grand Avenue Channel looking downstream (east) at New River outfall.



(4) West Channel – Drains to Grand Avenue Channel just above New River outfall.





(5) Looking towards Sun City Channel – on west bank - looking south - note handrail steep slope and channel entering from west.



(6) Incoming Sun City Channel – looking west.





(7) Looking upstream (northwest) at Casa Del Rio Swale.



(8) Incoming ADOT swale looking downstream (south / southwest). Flows originate along ADOT right-of-way.



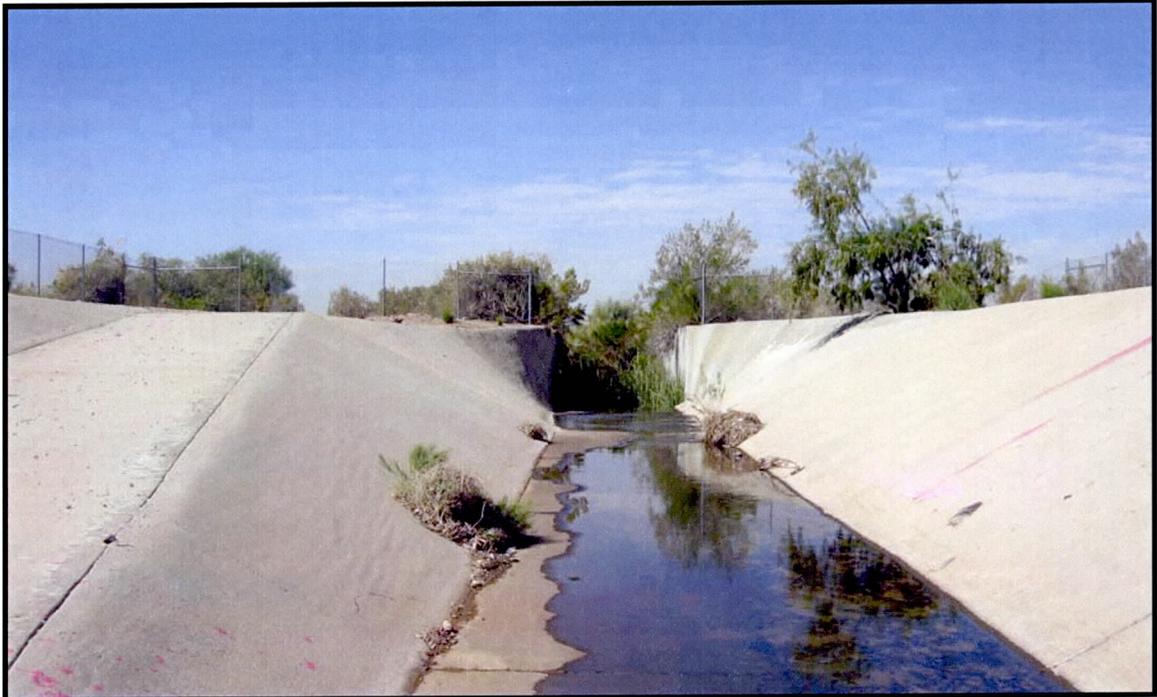


(9) Looking upstream (northeast) along ADOT swale.



(10) Incoming ADOT Channel. Note low flows vary dramatically and significantly affect downstream extents of wetland areas in New River channel - looking east.





(11) Incoming ADOT Channel looking downstream (west).



(12) ADOT channel downstream near New River immediately downstream of concrete-lined segment. - Note dense vegetation - low flows intermittently feed the vegetation. - Looking southwest.



(13) 94th Drive Swale at Plaza Del Rio Blvd – Looking west



(14) Pipes under Plaza Del Rio - 30 CMP & 60x36 CMPA –Looking northwest.





(15) 94th Drive swale looking upstream. At end of channel is a hole that acts as detention before emptying into New River – Looking northwest.



(16) End of 94th Drive swale entering into New River – Looking east.



(17) Freedom Plaza Outlet Pipe - 12" line exiting Freedom Plaza Comm - Note grouted riprap arpon – Looking west.



(18) 91st Avenue Channel outfall to New River. Note dense vegetation. Not apparent is highly incised nature of this channel further upstream. – Photo is taken looking north





(19) Riverwalk outlet pipe 1 - Riverwalk Apts – South most Outlet – Looking East



(20) Riverwalk outlet pipe 1 - Riverwalk Apts – South most outlet to New River- Looking North





(21) Riverwalk outlet pipe 2 – Looking East- Note lack of flap gate.



(22) Riverwalk outlet pipe 3 – - Outlet – Looking East.





(23) Typical riprap apron at terminus of Riverwalk apartment outlet pipes - Looking West



(24) Riverwalk outlet pipe 4 - Looking East





(25) Looking at East bank (Rio Vista Park Outfall pipe 1). Looking east.



(26) Rio Vista Park Outfall pipe 1. 24 inch exit from park close to T-Bird on east bank – Looking east.





(27) Looking upstream at Desert Harbor spillway and box culvert under Desert Harbor Drive. The RCBC is a 2-6x3. Looking west.



(28) Desert Harbor Spillway - End of grouted spillway on west bank in New River Looking north.





(29) Rio Vista Park Outfall pipe #1. Looking downstream towards New River. Typical riprap apron..



(30) Rio Vista Park Outfall pipe #2. 36" Pipe.- Looking east at incoming pipe.





(31) Rio Vista Park Outfall pipe #3 (24" pipe) at drop structure south of Skunk Creek – Looking northeast.



(32) Drop Structure south. of Skunk Creek – Looking north northeast.



(33) Greenway Channel looking upstream at incoming channel – Looking west.



(34) Greenway Channel at New River Outfall point – Looking southeast





2.7.3 Drainage References

- Earthtech. *91st Avenue Ramps to Agua Fria Freeway (101-L)*. March 2001
- Entellus. *Glendale/Peoria Area Drainage Master Plan Update*. 2001
- Entranco. *West Valley Multi-Modal Transportation Corridor Master Plan*. July 30, 2001
- Flood Control District of Maricopa County. *Draft Landscape Planning and Design Handbook*. March 2003
- Flood Control District of Maricopa County, *New River Floodway Analysis HEC-1 data Files* (revsb.dat, scfld.dat). 1989.
- Michael Baker Jr., Inc. for Arizona Dept. of Transportation-ADOT. *Local Government Bridge Scour Evaluation Study, Final Scour Evaluation Report for City of Peoria, Structure No. 9684 Thunderbird Road over New River*. 1996
- Michael Baker Jr., Inc. for Arizona Dept. of Transportation-ADOT. *Local Government Bridge Scour Evaluation Study, Summary Report for City of Peoria*. 1997
- Stantec Consulting, Inc. *Paradise Shores – New River Bank Protection Project, Candidate Assessment Report*. February 2000
- Stantec Consulting, Inc. *Middle New River Watercourse Master Plan*. Revised May 2000
- Thomas-Hartig & Associates, Inc. *Report for Geotechnical Engineering Services – New River Channelization – Grand Avenue to Greenway Road, Peoria, Arizona*. July 1993.
- U. S. Corps of Engineers. *Phoenix, Arizona and Vicinity (Including New River) Hydrology Part 2, Design Memorandum No. 2*. 1982
- Willdan Consultants. *New River Channel Improvement, Grand Avenue to Skunk Creek, Candidate Assessment Report*. June 2000 (including Addendum #1)
- Wood, Patel & Associates. *New River from Grand Avenue to Greenway Road Design Report*. February 23, 1994 (including Addendum #1)





3.0 Opportunities and Constraints Analysis and Summary

3.1 Recreation and Multi-use Trail Opportunities and Constraints

The river corridor offers a vast opportunity for multi-use trails, recreation access, habitat interaction, education, and places for reflection and solace. These opportunities will be balanced against the constraints of the corridor. One of the main objectives of the New River Project is to create an environment that enables the reestablishment of some desert riparian habitats while maintaining the flood protection that is at the core of the project's purpose. A side benefit of combining flood protection with habitat restoration and multi-use is in the creation of educational and passive recreation opportunities that could occur for the public along the corridor. For several decades the river has been neglected, abandoned and development turning its back to the corridor resulting in a river that is currently not conducive to public use.

A primary benefit of this design effort will be the opportunity for the community to interact on a controlled and limited basis with the reintroduced river setting. In the past, the river's environment provided life's necessities. Today, people do not expect the river to be a source of life's basic needs, such as food, water, and shelter, but when the project is completed will realize the intrinsic benefits of having a viable river ecosystem. This unique opportunity to connect the urban dweller with a significant natural setting in the midst of a metropolitan area will become an exemplary demonstration of reestablishing natural habitats and creating valuable open space for the City of Peoria.

This section provides many concepts for incorporating public use elements into the design of this facility. Many of these concepts cannot be designed nor constructed as part of this project given the current funding limitations. However, the J2 team believes that these ideas should be brought forward for consideration and to set the vocabulary, theme and vision for the projects public use facilities if additional funding becomes available.

3.1.1 Recreation and Multi-use Trail Linkages Assumptions and Objectives

The Project's design assumptions and design intent must incorporate a wide variety of technical, scientific, functional, and aesthetic considerations. A major component of these assumptions includes the inclusion and incorporation of recreational and multi-use trail systems. The importance of this trail system cannot be misinterpreted the New River trail system identified as Segment One in the Maricopa County Regional Trail System Plan is one of the key backbone systems and this portion will assist in connection completed trails to the south and those underway to the north. The goal of the Maricopa County Regional Trail System is to connect the County Parks System, link recreational corridors, and preserve open space. The New River trail system as part of this overall regional trail system will include hard surface trails that are developed around the use of bicycles, roller bladers, strollers, walkers, and wheel chair users as well as a





separated and more passive equestrian and soft surface trail system. There will be designated areas where the public is encouraged to participate in passive recreational and educational activities associated with trail improvements in the corridor. These controlled areas will be the direct contact points between the public and the environment. It is important that all of these connection points demonstrate the design ethic of the Project, and that they inform the viewer and the user of the values and objectives identified to tell the story of the river.

The multi-use objectives serve as guidelines to create and develop design solutions to make the corridor a truly multi-use corridor. The thematic interpretation of these objectives will be incorporated into the public facility design elements. These objectives include:

- Connect Trail System to Maricopa County Regional Trail System
- Restore areas of native river habitat
- Interpret the historic evolution of the river
- Interpret the cultural influences that have used the river
- Demonstrate the creative reuse of existing salvaged materials
- Demonstrate the natural cycles that influence the river
- Incorporate design solutions that are sustainable and environmentally appropriate
- Create unique, safe, areas that respond to the accessibility requirements of the public
- Explore the use of natural and man-made materials that reinforce the design theme
- Use cost-effective materials that require a minimum level of maintenance and provide maximum durability

The majority of the public interface with this project will occur along and/or as a part of the multi-use trail system. The routing and alignment of these trail systems is directly influenced by the field conditions. These conditions offer both opportunities and constraints. The constraints of the trail system development are related to the several key factors including existing bank protection, off-site drainage corridor influences, future bank protections, flows in the river, and vegetation. The opportunities include protection and capitalization of positive view corridors, creating spaces for users to interact with a river environment, creation of solace and reflection areas, linkages to surrounding community and neighborhood parks, sporting venues, schools, and neighborhoods.

3.2 Scenery Resources Inventory Opportunities and Constraints

The J2 Design team has performed a Scenery Resources Inventory of the project as previously explained in the inventory section of this report. The results of this analysis have provided a visual resource that assists in identifying visual opportunities and areas of visual constraints.





3.2.1 Analysis of Scenery Resources Inventory

The mapping of these Scenery Resources provided an analysis of the corridor that has identified or rated the areas based on four scenic qualities. These ratings are Excellent, Good, Fair and Poor. Upon collecting the data from the Scenery Resources Inventory maps, opportunities and constraints were considered as part of the next stage of design. Each of the four ratings has specific considerations in order to achieve a successful corridor.

Excellent Rating: The primary goal of these areas is to preserve, protect, or enhance. These are the most important areas because they represent a strong ecological, cultural, or recreational aspect of the project. Most of these areas exist in the river bottom between Thunderbird Road and the Skunk Creek confluence, which will be very important when determining what engineering designs need to be achieved.

Good Rating: This rating indicates an area that needs minimal repair. Some repairs and enhancements will be necessary to bring it to a level that would bring it up to an Excellent Rating, but it is not as critical that the focus be on these areas because it is more important to protect the Excellent Ratings and repair the Poor ratings.

Fair Rating: These areas have minimal preservation value and require careful design consideration in order to prevent unsightly pockets throughout the corridor. In terms of importance, the Fair and Good Ratings do not need as much design consideration as the Excellent and Poor Ratings.

Poor Rating: Because these areas create a severe visual disturbance in the corridor, it is important to bring these areas up to a level that will assist in creating a uniform design throughout New River.

3.3 Habitat Resource Opportunities and Constraints

The habitat resources of this corridor are extensive and provide multiple opportunities, as well as construction and hydrologic constraints. This section of the New River corridor has remained relatively undisturbed over the past 10 years when compared to many of the river corridors in the Phoenix metropolitan area where sand and gravel operations, landfills, and other influences have self-sustaining nature that once existed. The level of undisturbed influence over the past ten years or more within our section of New River has allowed the native desert to reestablish itself. The level of maturity and stature of the trees present both in and along the corridor offer tremendous opportunities for preservation and/or reuse of this material when placing and creating the environment that will become New River. In addition, riparian habitats are trying to reestablish themselves in areas that are now either retaining water or influenced by storm water outfalls or irrigation delivery outfalls. The reintroduction of a water source





from these various and diverse supplies has created in many areas of the corridor an example of a true desert riverine ecosystem.

3.3.1 Habitat Design Assumptions and Objectives

The habitat diversity of the area will be impacted by this project's bank stabilization. One of our objectives will be to minimize the intensity of these impacts and salvage and re-use this material within the project site. Our objective will be to maintain and/or enhance a riparian model in this river corridor. Along our section of the New River Project, this riparian model design will adhere to a natural riparian model as much as possible. This model will potentially include Lower Sonoran Palo Verde and Mesquite associations on the project overbanks (upland), and drought-tolerant native grasses and shrubs on the dry side slopes. The placement of these plants along the banks and on the overbanks are being used to mimic what would have been a natural river channel's landscape progression. Mesquite Bosque pockets will be established on the terrace levels (river corridor) where these species would flourish in a natural desert river corridor. Wetland and cottonwood/willow riparian habitat pockets may also be located on the terrace level (river corridor) as suggested by the "natural riparian" effect that is desired from an ecological and aesthetic standpoint. Aquatic strand plantings of wetland grasses and reeds will be encouraged within the project's low flow channel and at select open-channel conveyance point located throughout the project reach where water may be made available and assured of delivery. It is important to point out that these objectives will be weighed against the engineering needs of the project and the use or extent of these habitat types may be limited to certain areas because of hydraulics, maintenance, and safety.

Restoration of this reach of New River using the "Natural Riparian" model as a guide described above, will not only provide an important habitat corridor for wildlife, and a seed source for other reaches of New River downstream of the Project, but will also improve the quality of life for the people of the Peoria metropolitan area. This project will provide the public with an oasis of riparian habitat within a dense urban area. Urban dwellers can directly observe the ecological complexity and function of a native riparian habitat while being educated about the importance of preserving remaining riparian habitat throughout the region. This project will also increase awareness about the condition of urban streams, which have all too frequently been abused and ignored. The restoration of habitat on this reach of New River provides the opportunity to show the public how a once degraded and ignored river corridor can again support urban wildlife and riparian communities.

3.3.2 Habitat Opportunities and Constraints

The following constraints impact the entire project:

- Necessity to maintain the existing New River flood conveyance capacity in light of the addition of vegetation within New River in the terrace area and against the slopes.
- Project water source(s) and the manner in which water is delivered to the habitat features are of concern because all project water must satisfy the





- Arizona Pollutant Discharge Elimination System permitting (AZPDES) requirements and adhere to Federal Clean Water Act (CWA) guidelines.
- The timing and quantity of discharges from upstream controls places a constraint on the type and placement of vegetation species based upon its susceptibility to scour and loss during peak and long-term discharges in the river.
- The amount and placement of such vegetation must not induce bank erosion.
- Constraints associated with the urban setting, especially the presence of trash and human disturbance.
- Lack of a “natural” flood regime.
- Habitat features must take into account the various facilities planned along the banks of the river to minimize future disturbance.
- For vector control, habitat features must be designed that minimize mosquito breeding and successful life-cycling, and maximize their management.
- In general, several areas of the river corridor may lack suitable soil conditions for the establishment of vegetation, and the existing bank conditions of the rock and cobble present will dictate soil needs and or vegetation habitat support.
- Wetland and riparian plant communities, if used within the river corridor or along the overbanks as a demonstration area, may be required to be installed over an earthen or artificial liner because the natural rate of infiltration is expected to be high within the river terrace. The soil profile may be either amended in place to reduce percolation rates or a confining layer provided to retard or perch water. Otherwise, the amount of water needed to be supplied for the wetlands and cottonwood-willow habitats would likely exceed the amount available for the project as it is currently envisioned. In an attempt to maintain a balanced and achievable water demand and to minimize costs, the excavation depth needed to construct these features, especially the wetlands and cottonwood-willow riparian habitats, will be minimized, and if necessary the areas will be reduced in size, scale and complexity, to reduce the amount of earth moving and subgrade preparation.
- There is limited area within the project boundaries to locate staging areas (parking lot, entry to river corridor) on the overbanks. A balance between these facilities and habitat plantings will be required.
- The altered hydrology of New River watershed has resulted in a lack of fine organic soils at locations within the project area. In areas where the river bottom has been reduced to only large cobble materials, soil amendments may be needed for the successful establishment of riparian vegetation. Due to cost considerations, soil amendments will be utilized only in critical areas where soil fertility viability proves through soil testing to be non-conductive to a particular habitat type. The intent is to utilize the existing site soil as the primary planting media wherever feasible, using a minimum amount of amendments wherever possible.





- Removal and management of noxious plant species should be considered in the design, construction and operational phases of the project. Design of habitat features will take into account the location of noxious plant species in relation to existing desirable vegetation. Noxious vegetation will be removed from project areas when it can be done without disturbing such existing desirable vegetation. During construction and plant establishment phases, competition from species such as noxious grasses and saltcedar (*Tamarix* spp.), can significantly hinder revegetation efforts. During this time, aggressive weed control operations and removal of noxious vegetation should be conducted. As the habitats mature, a reduction in the need and effort required for removal and management of non-native species should be realized.
- The FEMA flood plain encroaches on some of the overbank areas. As a constraint any facilities within the flood plain have a greater chance of damage due to flood events.

3.3.2.1 Wetlands

The introduction and creation of "wetlands" may be beyond the desires of the County and or the City of Peoria. We are discussing the opportunity of a wetland in this project because of the importance to this type of ecosystem and its vanishing presence within the southwest. The wetland marsh features would be located on the terrace level to serve as transitional habitat(s) from the aquatic environments of the low flow to the upland areas. Open water and emergent marsh areas will occupy the majority of this habitat type. In the open water areas, submerged and floating aquatic plants such as *Hydrocotyle* and/or *Ceratophyllum* spp. will be established. This area will provide an open water surface available for gas exchange with the atmosphere, sunlight penetration, and wind induced mixing all of which tend to improve overall water quality. The deeper water in these areas will also provide refuge and forage for fish, mammals, and invertebrates that utilize the wetland for all or part of their lifecycle.

The emergent marsh areas will be typified by bulrush (*Scirpus* spp.), cattail (*Typha* spp.), and floating aquatic vegetation (*Ludwigia* spp.). The shallow water column and dense vegetation located in these areas will provide habitat for juvenile fish, amphibians, reptiles, and forage for mammals. Avian species such as the Red-winged blackbird may find these areas suitable for nesting, as may the Yuma Clapper Rail. Because of the densely vegetated areas, mosquito breeding may occur in the wetland basins. Water management (flow rate and water level) will need to be reviewed and operated and maintained to minimize mosquito breeding activity in the wetlands. The wetland features would require that they be designed for the development of balanced floral and biotic components that also will minimize mosquito activity.

3.3.2.2 Cottonwood-Willow

Cottonwood-willow is representative of high-quality riparian habitat in Arizona. Riparian habitats are defined as habitats or ecosystems that are associated with adjacent bodies of water (rivers, streams, or lakes) or are dependent on the existence of perennial or ephemeral surface or subsurface water drainage. They are further characterized by having diverse assemblages of plant and animal species in comparison with adjacent upland areas. The cottonwood-willow





habitat is important as a relatively continuous migration corridor connecting large areas throughout the western United States. This habitat type provides valuable nesting habitat for birds, supporting the greatest density and diversity of breeding bird species in the southwest. The diversity of habitat stratification makes this habitat type valuable to a wide range of wildlife species.

The cottonwood-willow habitat would be located within the active floodplain of the terrace and would be, in most conditions, associated with the wetlands or storm water outfalls. It serves as a transitional habitat from the lush wetland aquatic zones to the drier mesquite bosque and Sonoran desert habitat zones. As the name implies, dominant canopy species include cottonwoods (*Populus fremontii*) and willows (*Salix goddingii* and *S. exigua*). Other important canopy species include ash (*Fraxinus velutina*) and elderberry (*Sambucus mexicana*) in mesic areas and a variety of mesquite (*P. velutina*, *P. torreyana*, and *P. pubescens*) in drier areas (Aspen Environmental Group, 2000).

Cottonwoods may be susceptible to uprooting during flood events and the debris may lodge at downstream bridge crossings. Measures to minimize the potential for uprooting will be evaluated during the detailed design. Measures to minimize the potential for uprooting may include the orientation of the habitat relative to the Low Flow Channel (LFC), decreasing plant density, or maintenance practices such as thinning.

It is anticipated that the succession of cottonwood-willow habitat would have an initial, low vegetation stage consisting of 0-7 years of growth following planting, a medium height stage taking 7-14 years, and a mature stage taking over 21 years to reasonably mature.

3.3.2.3 Mesquite Bosque

The mesquite bosque habitat proposed for the Project area is a modified, low-density mesquite bosque with additional plant species that have been added for increased diversity within the Project. Mesquite bosques (groves or stands) dominated by mesquite are most prevalent on the old alluvium of dissected floodplains, especially at the confluence of major rivers and streams. As a result, mesquite bosques generally occur between 5 and 20 feet above the most recently active river channel. As with the cottonwood-willow habitat, the mesquite habitat has been substantially reduced and has been replaced by saltcedar.

This habitat zone occurs on the terrace areas of the project, along with some use along terrace slopes at specific areas for aesthetic transition purposes. The mesquite bosque habitat serves as a transition zone between cottonwood-willow and the drier Sonoran desert habitat zones.

3.3.2.4 Palo Verde Associations

The Palo Verde Association of the Lower Sonoran habitat consists primarily of blue palo verde and foothills palo verde. Understory species include cacti and scrub.

This habitat, the driest and most xeric of the major tree habitat associations, is used on the terrace level, banks and overbanks to provide habitat diversity in the areas where cottonwood-willow and wetland marsh habitat are restricted. Palo Verde associations may also be utilized at overbank areas at some of the major





street intersection transition zones to aesthetically blend with adjacent offsite streetscape planting schemes.

3.3.2.5 Aquatic Strand

Aquatic strand habitat is associated with the LFC and consists primarily of opportunistic plant species provided by upstream seed sources. Species found in this habitat type are typically those that are adapted to periodic flooding, scouring, and soil deposition. This habitat will likely include strands of cattail, rushes, native grasses and shrubs, and the occasional cottonwood seedling. The LFC may require removal or cutting back of woody vegetation to ensure that adequate conveyance capacity is maintained.

Aquatic strand habitat will be concentrated near stormwater outfalls, along conveyance drainage channels, and on the inside of bends in the LFC where deposition will naturally occur.

Incorporation of the aquatic strand habitat type will help to control erosion within the LFC, while providing habitat value within the channel for aquatic species. Aesthetically, aquatic strand habitat will help to visually define the LFC while reinforcing the aesthetic image of a healthy, diverse riparian corridor. Aquatic strand habitat serves as nesting and roosting habitat supporting numerous wetland-dependent bird species, including the abundant red winged blackbird. This habitat type will require periodic maintenance to manage its spread into areas within the LFC that could benefit from natural stabilization and in other areas to minimize its effect on surrounding habitats.

3.3.2.6 Open Space

Open Edges is typically defined as the area between two habitat types and, for this project, there are no specific plant types for this habitat type.

All remaining zones not occupied by any of the above-mentioned habitats will be considered Open Edges. These zones include parking areas, trails, staging areas and the undeveloped areas. This habitat zone will offer the greatest transition zone between each of the habitats discussed above. Open-space habitat will be occupied by both native seed mixes and other native desert grasses and forbs that will be utilized to assist in stabilizing banks, screening objectionable river debris from view, and creating a unifying habitat for the corridor. This open-space habitat will be a feature common to all of the habitat zones discussed above.

3.3.3 Habitat Operation and Maintenance Opportunities and Constraints

As with any multi-use, multi-objective project, operation and maintenance of the facilities will be necessary. The following list represents a list of potential activities the owner/operator of the project will likely encounter. These activities will need to be addressed by the entity that ultimately takes control of the project.

- Removal of woody species from the LFC to ensure conveyance capacity is maintained
- Reestablishment of wetlands and wetland habitats following large flood events
- Fertilization of plant materials during establishment phase





- Establishment of watering cycle that maintains and promotes the natural regeneration of restored habitats (Fremont cottonwoods are dioecious trees, producing fragile seeds. Seeds are released during the spring, and viable seed tends to germinate within 48 hours after being dispersed. Fremont cottonwood seeds tend to have a short life span, losing viability within 5 weeks of dispersal. These and other issues related to the watering cycle (creation of flood events, leaky liners from wetlands to feed trees etc.) will be critical operation and maintenance issues.)
- Maintenance/monitoring of water delivery system
- Water quantity and quality monitoring
- Maintenance and monitoring of existing bank protection
- Monitoring and maintenance of wetland liner material
- Monitoring and control of vectors
- Periodic removal of trash and debris
- Visual inspection of inlet and outlet devices
- Management of beavers
- Manipulation of water levels
- Cleanup/repair after graffiti and vandalism
- Periodic removal of sediment
- Removal of live and dead vegetative material(s)
- Replacement of project signage (Interpretative and Informational)
- Controlling Public Access and Monitoring Access
- Inspection of bridges and culverts
- Removal of debris from culverts
- Removal of saltcedar and other noxious plants
- Inspection and monitoring of public use areas i.e. rest rooms, parking lots, overlooks, roads/trails and seating areas.
- Management of wildlife
- Repair and replacement of public use items, after flood events
- Trail maintenance
- Evaluate critical zone habitat and wildlife activity
- Evaluate accessibility on unimproved surfaces
- Trim vegetation to maintain acceptable clearances for trail standards





- Inspection priorities after rain events
- Permits/reporting

3.4 Water Supply and Distribution Opportunities and Constraints

The water supply and distribution system is critical to the success and sustainability of the overall New River corridor (Project). A sufficient quantity and adequate quality of water must be available to maintain the viability of the various habitat types that are being considered for the Project. Groundwater, potable water and lake water from Rio Vista Park have all been initially identified as reliable supplies of water for the Project with dry weather flows from storm drains being a secondary source. A third option may include a future water treatment plant that the City of Peoria is preparing to bring on-line within the next 5-10 years. The location and source for this water is a critical factor in the overall success of the project.

3.4.1 Water Supplies for Habitats - Assumptions and Objectives

The projects water supply assumption is that a reliable clean source of water will be made available for the project. Discussions have taken place regarding the use of the City of Peoria lake water from Rio Vista Park however the extent and limits to the pressure that can be reliably extended from the lake needs to be discussed and confirmed with the City of Peoria.

3.4.1.1 Potable Supply

The City of Peoria has water lines within the vicinity of the project area that may be able to supply a potable water source for the project. This supply may need to be tapped in multiple locations because of breaks in the system by streets, lengths of run and associated pressure drops and other physical site constraints.

3.4.1.2 Non Potable Supply

The City of Peoria has indicated that there is the possibility that they will have one non-potable water supply available from the Rio Vista Lake project currently under construction. A longer term non-potable water source may be available in 5-10 years from a water treatment plant that is currently under design by the City. The design team has been directed to design for a dirty water source.

3.4.1.3 Storm Water Supply

A majority of the current habitats of New River are surviving on storm water supply. This has introduced a constraint in the fact that at these sources the water ways have become clogged with vegetation and in some cases created embankments that are unstable and in need of repair and or replacement. The utilization of these storm water supplies should not be discounted despite its infrequent supply and required maintenance if routed safely and correctly they offer a tremendous opportunity for habitat value and establishment.

3.4.1.4 Agricultural Supply

The southern portion of the river corridor (south of Thunderbird) is currently being supplied with water from the ADOT drainage channel. The source of the water appears to be from agricultural tail water that is collected from the agricultural fields to the east of the SR101L. The long term viability of this source of water is





very unreliable and eventually as development replaces the agricultural fields this water supply will be removed. The opportunity exists in having a supply channel that could be supplemented with water by other sources to continue and increase the habitat that it has helped to create and sustain.

3.4.2 Water Delivery System Opportunities and Constraints

The delivery and source of potable water will not pose as large a constraint as the potential to have a non-potable water source available for the project. Potable water exists adjacent to the site in many areas and will allow great flexibility and opportunity to provide a potable source for drinking fountains and/or other potable uses along the corridor.

The delivery and source of a non-potable water supply for this project for use in irrigation and as a supplement to the low flow channel has a broader set of opportunities and constraints associated with its development. The opportunities exist when looking at developing a supply of non-potable water that could serve as a source for irrigation and as a means to contribute to a meandering low flow that has water introduced into that system periodically throughout the year to mimic the natural drainage patterns associated with seasonal ebb and flows of a desert river water course. The use of this supply for irrigation has many benefits with the largest being cost savings. The opportunity of introducing water back into the river carries another set of opportunities including the type and density of plant materials that would be able to survive with this water delivery system, the habitat and wildlife value, and as a ground water resource credit for both the City of Peoria and the County. The constraints from this perspective would be cost and finding a reliable and safe non-potable water source that could function in this capacity. The other constraint would be in the routing or delivery of this water to the specific areas of the site that would most benefit from this water. These areas may be difficult to make the required connections. The delivery of a non-potable water source to this project needs to be investigated further to understand the true viability of such an undertaking.

3.5 Public Facility Opportunities and Constraints

One of the main objectives of the New River Project is to create an environment that enables the reestablishment of select portions of a desert riparian habitat to occur in unison with the required bank protection and river hydraulics. A side benefit of reviving the habitat areas of the river is the educational and passive recreation opportunities that could occur for the public. For several decades the river has been lined for flood control purposes and ignored by the general public. The current state of this stretch of New River is not conducive to use by the public, so the potential of the river to function as a shared use facility has not been truly realized or explored in this section.

A secondary benefit of this design effort will be the opportunity for the community to interact on a controlled and limited basis with the protected river bank. In the past, the river's environment provided life's necessities. Today, people do not expect the river to be a source of life's basic needs, such as food, water, and shelter, but when the project is completed will realize the intrinsic benefits of having a viable river ecosystem. This unique opportunity to connect the urban dweller with a significant natural setting in the midst of a metropolitan area will





become an exemplary demonstration of reestablishing natural habitats to provide valuable open space for the City of Peoria.

This section provides many concepts for incorporating public use elements into the design of this facility. Many of these concepts cannot be designed nor constructed as part of this project given the current funding limitations. However, the J2 design team believes that these ideas should be brought forward for consideration and to set the vocabulary, theme and vision for the projects public use facilities if additional funding becomes available.

3.5.1 Public Facilities Design Assumptions and Objectives

As discussed throughout this pre-design report, the Project must incorporate a wide variety of technical, scientific, functional, and aesthetic considerations. There will be designated areas where the public is encouraged to participate in passive recreational and educational activities associated with the river habitat. These controlled areas will be the points of direct contact between the public and the environment. It is important that all of these points of connection demonstrate the design ethic of the Project, and that they inform the viewer and the user of the values and objectives identified to tell the story of the river.

The Project objectives identified throughout this document serve as guidelines to create and develop design solutions. The thematic interpretation of these objectives will be incorporated into the public facility design elements. These objectives include:

- Restore the native river habitat
- Interpret the historic evolution of the river
- Interpret the cultural influences that have used the river
- Demonstrate the natural cycles that influence the river
- Incorporate design solutions that are sustainable and environmentally appropriate
- Create unique, safe, areas that respond to the accessibility requirements of the public
- Explore the use of natural and man-made materials that reinforce the design theme
- Use cost-effective materials that require a minimum level of maintenance and provide maximum durability

3.5.2 Potential Users and Activities

A balance will need to be achieved between the level of human of activity and the capacity of the river environment. There are some areas where the public access will be encouraged, however public access will be directed and controlled. For the most part, the human involvement and recreation opportunities to activities associated with this project are classified as "passive." These passive activities will be designed to have a minimal impact to the natural setting. These activities are typically enjoyed on an individual basis or in small groups. They are also





activities that can be compatible with one another and don't typically generate excessive noise levels. The following is a list of possible passive recreational activities that may occur and not be detrimental to the river environment; walking, hiking, jogging, bicycling, bird watching, wildlife viewing, plant identification, photography, environmental interpretation, informal picnicking.

There are a number of activities being considered that would not fall into the passive recreation category. These are primarily associated with group activities. They include special event functions such as small concerts, arts and craft festivals, organized demonstrations, exhibits, etc. They would also include group tours associated with education and/or interactive programs. By design, specific areas will be established for group activities or gathering nodes. These areas will be limited to the developed staging and plaza activity nodes located along the river corridor and that occur immediately adjacent to the arterial streets that cross the river. The majority of these types of activities will occur at the "Access" features proposed along the corridor and at select staging areas one of the prime ones being the new City of Peoria Rio Vista Community Park. It is assumed that any group tours, school field trips or other group activities will use this park and the river as it will be the main focal point for group use. This facility will provide adequate parking for larger groups and buses. The location of Rio Vista Park offers the opportunity to use the river areas in its immediate proximity to provide controlled and monitored walking tours and interpretive discussions. This Project will need to coordinate those activities and potential uses to ensure the objective of the project can be achieved within the acceptable limits of disturbance and impact to the passive recreation uses and the river.

3.5.3 ADA Implications

The Architectural and Transportation Barriers Compliance Board (Access Board) is responsible for developing accessibility guidelines under the Americans with Disabilities Act of 1990 (ADA) to ensure that new construction and alterations of facilities covered by Titles II and III of the ADA are readily accessible to and usable by individuals with disabilities. The Access Board initially issued the Americans with Disabilities Act Accessibility Guidelines (ADAAG) in 1991. Newly constructed and altered recreation facilities and outdoor developed areas are required to comply with ADAAG, as adopted by the Department of Justice as the Standards for Accessible Design, where the provisions can be applied. The current provisions, however, did not recognize that some recreation facilities have unique features for which additional provisions and special application sections needed development. The Access Board convened an Advisory Committee to develop the additional guidelines and a report was issued in 1994 that addressed the various types of recreation facilities and identified the features of each facility type that are not adequately addressed by ADAAG. The Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas was established in June 1997. The Committee published its final report in September of 1999 and it is currently awaiting final adoption pending public comment.

Recognizing the importance of developing accessible features in areas open to the public, the design team will coordinate with the City of Peoria and the County to define guidelines to the accessibility approach. The design team will utilize the document that is disseminated under the sponsorship of the U.S. Department of





Transportation. The title of the document is "Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide" unless directed otherwise.

A general overall approach to ADA is as follows. At locations determined by the County, City, and the design team, public access will be provided from the over bank to the terrace. Pedestrian access will not be provided from the terrace to the Low Flow Channel. The design of these terrace locations shall adhere to national and City accessibility guidelines. The performance of the material for these multi-purpose maintenance roads/pedestrian trails subject to flooding and potential damage shall be evaluated on long-term accessibility guidelines, capital cost, management and operations impacts, replacement cost, and ease of replacement.

3.5.4 Material Selections

The selection of materials will have a significant influence on the design character of the Project. The materials should reinforce the design objectives and themes. The materials selected will be enduring, integral, indigenous, and where appropriate be of the most basic unmodified and naturalistic materials. They will demonstrate a sense of permanence and will hold their character or even become enhanced as they weather. The materials will be "of the place" and consist of the following:

- Cast-in-place concrete (natural gray or integral color) surface textures will be sandblasted or exposed aggregate.
- Cast-in-place concrete "desert masonry" with the stone being New River rock.
- "Art-weld" gabion baskets, 9-gauge with river rock from the river.
- Heavy-gauge wire-mesh/gravel sifting screens.
- Exposed steel members and rebar with no finishes.
- Corrugated steel panels; unfinished or galvanized and allowed to weather.
- Recycled materials
- Paving materials include compacted earth, asphalt with aggregates from the river, stabilized decomposed granite, soil cement, concrete, placed river cobbles, etc.
- Concrete and raw metals will be used for site amenities such as drinking fountains, bike racks, and trash receptacles.
- Cast-in-place concrete, rusted raw metals, galvanized metals, gabions, etc. will be used for supports for signage, interpretive displays, and information graphics. The signs and graphics provide an opportunity to add the colors found within the strata and stones of the river in strong tones such as purple, olive-green, rust, red-orange, etc. Colors should not be bleached out pastels like baby blue, pink, etc.
- In addition to the signage, there will be other opportunities to include specialty features that, through the use of color or texture, can stand apart when contrasted to the other raw, unfinished, natural materials. Examples of these





elements include artist-designed inlaid tiles at the gateways or colorful banners bracketed to light poles.

The materials used will have a basic raw quality. They will be materials that demonstrate a permanence and give a voice to the river's story. These types of materials will afford the Project elements a maximum life-cycle. They are suitable for enduring abuse, vandalism, and look best when left to weather in the elements.

3.5.5 Public Access and Staging Areas

The staging areas provide the public with the primary means of access to the river features. These areas offer a variety of amenities including direct access from an arterial roadway, parking, restrooms, plaza areas, open space areas, access to the trail system. For this Project, these staging areas have yet to be determined, but sites along the corridor are being investigated, including sites off of 83rd Avenue in the northern end of the project and at Grand Avenue in the southern end of the project. Each will offer similar facilities but, due to the varied conditions and configuration of the layout of the amenities, will be adjusted to maximize each site's potential. The staging areas with restroom facilities will have hitching posts and horse trail connections to the equestrian trail that is typically located in the bottom of the river.

It is anticipated that a significant number of visitors who participate in the recreation and leisure opportunities of this Project will travel to the site by cars or mass transit. Therefore, in most instances, their first impression of the Project will be at the entry points and parking areas. To demonstrate that the New River Project is unique, the team will develop parking areas that get treated as "parking gardens." The following criteria will be used to establish the unique character and sense of place desired for these parking gardens.

- Hard-surface pavements will be minimized except for meeting ADA accessibility requirements. Alternative pavements such as "grasscrete," stabilized granite, milled concrete, gravels, and other inert materials will be used.
- When hard-surface pavement is required, alternative pavements will be used. Materials such as chip-sealed asphalt, soil cement, and integral colored, textured concrete will be considered.
- Parking areas are to be enhanced by the inclusion of shade trees. When space permits trees should be planted in parking islands or adjacent to parking areas to provide shade.
- Parking bays will be marked with concrete rubble or river stones buried flush with the surface. Painted lines will be limited to accessible spaces.
- Permanent vertical concrete curbing will be minimized, if required, they will be colored to blend with the natural surrounding or rusted metal I-Beams. Ribbon curbs may be placed to contain roadway sections. Maintaining a flush grade to accommodate parking surface drainage to water harvest swales will be required.





- Traffic lanes will be as narrow as possible and in many areas the use of one-way lanes with diagonal parking bays will be incorporated.
- The inclusion of large-canopy desert shade trees will take precedent over the convenient configuration and count of the parking spaces.
- Dense understory plantings including some naturally thorny varieties planted either in water harvesting swales or on bermed earth forms will help direct pedestrian traffic to the trails and walks leading from the parking bays to the river facilities.
- Lighting mounted on poles that reinforce the design theme will be considered in areas that may be open to the public after dark. To minimize costs, parking lot lighting should be judiciously used.
- Parking lot design will focus on the safe and efficient movement of pedestrians, minimizing potential automobile conflicts.
- Although bus shelters are not a part of this Project, they may occur near the staging areas and could reflect a design style consistent with the Project (see Exhibit 4-3).
- The requirements and conditions to provide fully accessible hard-surface parking bays to meet ADA requirements will be included.
- Swing gates will be provided at parking area entry drives to allow the city to close off public access to the facilities when needed. The gates are to be designed and constructed with materials consistent with the design theme and vocabulary for the area where they are located.
- The majority of the parking areas are to be surface drained. Surface drainage is to be collected in retention areas that can serve as water harvesting areas. The inclusion of small water harvesting depressions scattered throughout a parking area is preferred to having catch basins with piping leading to large retention areas.

3.5.6 Restrooms

The Project may include sites for comfort station development associated with entry and staging areas. These sites should be selected to be in close proximity to existing utility services and where monitoring of the sites by law enforcement patrol cars is possible.

The City of Peoria, which will ultimately be responsible for the operation and maintenance of the building and related site elements, may want the following design criteria:

- The building and other built works should continue the established vocabulary of the existing restroom structures located throughout the City; however this "vocabulary" would be expanded to include river-oriented designs. This vocabulary will be used for all built elements of the Project.
- The plan of the comfort station should link to Rio Vista Park. The programming for this building may include four stalls and two lavatories for each sex, a





plumbing chase/storage room with a separate locked enclosure, and shelving and wall space for electrical, control, and telephone equipment

- The prototype includes the following finish and engineering concepts:
 - Concrete floors with sealer.
 - Concrete Masonry Unit (CMU) wall with stain finishes at exterior and painted or glazed units at the interior.
 - Metal roof and structural elements.
 - No heating ventilation, and air conditioning (HVAC) systems; natural ventilation throughout.
 - Drinking fountain at entry with a remote chiller located in the plumbing chase.
 - No hot water for the facility.
 - Hosebibs recessed into the walls at front and back of the facility.
 - Floor drains in each room.
 - Indirect lighting meeting local health department standards and maintenance requirements.
 - Lighting controls on a timer.

The architectural vocabulary will include the following design elements and concepts:

- The design of all built forms will feature freestanding structural support elements of integrally colored cast-in-place concrete or river run rock.
- The proposed built forms will be compatible with the existing industrial context of the site as well as the Project theme of “recycle/reuse.” The proposed design will capitalize on existing salvaged materials when available and exposed structural detailing.
- The New River built elements will be symbolically separated from the nearby urban environment with different screening elements to emphasize the difference between the restored habitat and natural areas and the city urban form and vehicular throughways.

3.5.7 Ramadas

The team has identified that the use of both structured and unstructured shade elements will be used to meet the Project goals of providing pedestrian comforts within and as an integral part of the project. Primary use of ramadas will be to shade the public at rest areas or educational interpretive areas. This will occur most frequently in conjunction with the overlook areas discussed below. Shade will encourage the visitor to rest and enjoy the environment. This is especially important during the hot summer months.





Simple overhead canopy structures are being proposed. Here again, the use of indigenous and rustic materials will be used when available. Standard construction methods and materials will be used to minimize costs and ensure the greatest quantity of structures throughout the Project. This will consist of steel structural supports and roof coverings. To provide some variation between areas and uses, a variety of finish treatments will be proposed that are added to the basic structural elements of the shade structure and canopy.

3.5.8 Overlooks

Overlooks will be included on the overbank to provide the public with opportunities to have an overview of the river system. The overlooks will be one of the design elements most frequently used by the public. The objective of these overlooks will be to provide an attractive, safe, and somewhat comfortable area where the public can experience some level of privacy, enjoy a respite from their trail activities, and observe various aspects of the riparian river corridor.

The locations of the overlooks should occur along the overbank where these structures will not be subject to damage during river flow events. The use of highpoints and peninsula landforms, which provide panoramic views of the river or other interesting offsite views such as the city skyline and surrounding mountains, will be suggested for overlook locations. In some instances, the overlooks may be located near arterial road crossings as a part of an entry feature. These facilities will be ADA accessible, so they will have a direct link to accessible routes. When possible and practical, the overlook area will not occur immediately adjacent to the maintenance road. A connective path will lead from the maintenance road to the overlooks. This separation from the activities of the maintenance road will afford some privacy to those who choose to walk out and use the overlook.

The frequency of the overlooks will occur at approximately the midpoints between maintenance trail access points or entry features. The objective of the spacing will be to spread the overlooks out along the entire trail system, but if a prominent view or unique interactive opportunity presents itself these locations will take precedence over the uniform spacing of the overlooks.

The design and amenities of the overlooks will be consistent from location to location. They will generally provide a level surfaced area, an overhead permanent shade canopy, and seating areas. In some cases, the overlooks will include a drinking fountain, railings, and leaning posts. Telescopes and interpretive information may be provided at a later date.

The overlook features will provide an important visual design element to the overall Project. The use of constructed site features will be limited along the river corridor so these overlooks will provide accent areas where the story of the river and the associated design elements can be extended into or over the habitat areas of the Project. The structures and seating elements will be designed to use a similar design vocabulary as the other constructed features of the Project. This will contribute to a uniformity of design and reinforce a thematic continuity that will help define the identity of the New River Project.

Materials identified for use include stabilized decomposed granite, or concrete pavement that is textured and colored to blend with the natural environment.





Seating areas are proposed to be monolithic concrete pieces that would be designed to have a connection to the river. These features could be partially embedded to provide stable seating areas at varied heights. For variations between the overlooks, the design would include gabions with the adoption of a seating cap, cast-in-place concrete benches, or precast concrete benches. Concrete would be textured with sandblasting or exposed aggregate finishes and integral color would be used to link that theme to the river.

Providing shade will be an important consideration to provide the public with a comfortable setting at the overlooks, particularly during the hot summer months. Simple overhead canopy structures are being suggested. Here again, the use of indigenous and rustic materials will be used. For simplicity of construction and uniformity of design the basic structural elements of the shade structures will be a consistent design. This will consist of steel members to serve as support columns and a steel frame to support roof structures.

To enhance the visual appeal of the overlooks and to provide some variation among the structures, a variety of treatments may be added to the basic structural elements of the shade canopy. For example, the materials selected for the roof decking may include corrugated metal sheeting, woven rebar members, wire-mesh screens, or other suitable materials. The shade provided by the screen materials can be increased by the placement of river rocks on top of the screen or the use of indigenous vines to provide a living shade structure.

The columns of the structures will also be constructed of various materials that will surround a steel-post structural member. The use of decorative rebars, gabion baskets, and cast concrete columns are suggested as a variety of options.

3.5.9 Equestrian Users

An equestrian staging area is desperately needed for this corridor. The preliminary research and site investigation has indicated the potential of two sites one at 83rd Avenue in the southeast quadrant and one north of Grand Avenue. Due to the limitations of the areas, and accessibility by the size and turning radii of these trailers it is only planned to accommodate individual trailers or small groups. Specific numbers will need to be defined but at this time space for six to eight trailers is anticipated. Riders will have access to the equestrian trail within the river's low flow channel by a trail leading from the overbank through the terrace area. If the low flow channel is flooded then riders will have access to a secondary soft surface trail on the overbank.

The facilities and accommodations considered for the equestrian staging area would be basic and rustic. The staging area will be treated in a similar fashion as the parking gardens. The inclusion of overhead desert canopy trees will provide shade and help separate the overall area. The following features are proposed:

- The access drive will be hard paved with colored and textured concrete to ensure a stable surface and good traction for vehicles entering and exiting the staging area.





- The access gate will serve as a barricade when the area is closed. The gate will be a manual swing gate made of exposed steel and other inert materials identified as part of the New River Project design vocabulary.
- The surface treatment of the staging area will be suitable for supporting vehicular access and be conducive to the equestrian activities. Compacted aggregate base material or soil cement is recommended for the structural integrity of the roadways and parking areas.
- Hitching posts will be provided to designate each trailer parking area. These posts will also be steel or an equally durable material and the configuration will be practical but will reflect the design theme.
- If potable water is available, a watering trough and washoff area can be provided on the way to the trailhead from the trailer parking area. Here again simple, practical materials will be used.
- A small group ramada and barbecue is proposed for the horse staging area. These facilities will be located within clear view of the trailer and hitching post area but separated enough to afford some sense of privacy for those using the structure.
- A trailhead marker and kiosk will be provided to indicate the trail access and provide orientation information and rules for the trail riders.

3.5.10 Trail System

To facilitate public access along the river corridor, a trail system will be developed. There will be a hierarchy of trails designed to address various activities and levels of use. The trail system will provide the network of access routes to the various features and amenities located along and within the river corridor. The width, surface material, and location will vary to best facilitate the intended use in an economical way.

3.5.10.1 Hard Surface Trail / Maintenance Road

The primary and most permanent access will be provided by the hard surface trail / maintenance road. This access will occur on the overbank on one side of the river corridor. The surface of this road will be smooth and hard, and it will be wide enough to accommodate maintenance and emergency vehicles. In terms of pedestrian and recreational activities, the hard surface trail / maintenance road will serve as the primary spine connecting the entry nodes, staging areas, or entry features at each arterial road. The hard surface trail / maintenance road will cross the river north of Grand Ave but will be confined to one side of the river for the entire reach. Access from parking areas to most of the other trails and facilities will occur from this hard surface trail / maintenance road. The slopes and cross-slopes of the hard surface trail / maintenance road will be in compliance with ADA requirements. This trail will also be used for any of the recreational activities that require a hard, smooth surface such as rollerblading and recreational walking and bicycling.

A secondary system of unpaved soft surface trail / maintenance roads will be provided throughout the river corridor, both on the overbank and the terrace area. As on the overbank, pedestrians will also be able to use the soft surface trail /





maintenance roads in the terrace level for traveling around the Project. Trails will serve as connections from the maintenance road to specific features as well as an opportunity for users to get off the main hard surface pedestrian trail. This secondary trail will roughly parallel the proposed hard surface trail only on the opposite side of the river corridor. This trail will appeal to those users who prefer an unpaved trail (equestrians, mountain bikers, joggers, etc.).

The construction of this secondary trail system will consist of compacted earth as the base and a compacted inert stone or gravel as the surface. Because the terrace area is subject to damage by flooding, the installation of a permanent hard-surface trail in these areas would not be cost effective and will be severely limited. There may be some hard-surface secondary trails on the terrace but they would serve a specific purpose and would be recognized as sacrificial if a large-flow event occurred. The appearance of the secondary trails is to be rustic. These trails will occur in some of the more interesting habitat areas and the trail color, texture, and configuration should blend with the natural setting. In most cases, the edge of the trail will be defined by the contrast of the trail's surface material with the natural surface of the adjacent ground plane and will be wide enough so they can accommodate maintenance vehicles and two-way pedestrian traffic.

3.5.10.2 Equestrian Trail

The primary area being designated for the equestrian trail will occur within the river corridor and associated with the low flow channel. This will maximize the separation between the equestrians and other trail activities. The trail will be a simple graded path and will primarily meander within the low flow corridor, but there may also be occasions where it will be routed on areas of the terrace overbank.

3.5.10.3 Trail Nodes and Overlooks

As a part of the trails system there will be a variety of seating nodes provided as required by provisions of ADA. These nodes will be very simple in design and will typically provide a seating area consisting of large river boulders or concrete designed as seating with a strong river influence to serve as benches. The ground surface will be treated with the same material as the adjacent path. Typically these nodes will be in close proximity to the trail but set aside to not interrupt trail traffic and provide some level of privacy for people using the seating areas. The seating nodes will be located where they can offer shade from canopy trees and there will be other sensorial features associated with the node. Examples of these features include the sound of water flowing in a nearby canal, the fragrance of a blooming plant, and many other natural attractions.

3.5.10.4 Trail Markers and Signage

A system of trail markers will be developed to indicate the trail routes and/or the distance of the trails. The materials will be rustic and materials from the river will be used. These markers will supplement the signage that will be developed under a separate contract.

In addition to the trail markers, a series of monuments or enlarged markers will be developed to identify the Project or special features within the Project. The materials and design of these monuments will be of the same vernacular as the





other proposed specialty features. These monuments will serve as visual cues for the New River Project. They could be visible from the arterial streets where entry features are not planned. They could also be included at trail intersections or other areas where the public has visual contact with the facilities. This will help reinforce the design theme and Project identity of all visual areas of the Project.

3.5.11 Pedestrian Bridge

Bridges are important because they acknowledge the precious path of water. They also give the pedestrian great vantage points for viewing habitat since they are elevated above riparian flows. Realizing that bridges are very expensive, they should be used in key areas where the public gets the most benefit from them. In less important locations, culvert and at-grade crossings can be used in creative, aesthetically pleasing ways.

3.5.12 Site Furnishings

Throughout the project, accommodations will be made for those who participate in the many passive recreational opportunities. These accommodations will be located and arranged for the convenience of the users. They will not interfere with the requirements of the habitat or distract from the desired natural setting.

The use of site furnishings also provides a means to extend the design theme into the more remote areas of the site. When similar forms, materials, finishes, and colors are used on these furnishings a continuity and consistency is established. This continuity reinforces the overall design theme and enables the user to identify with the Project.

The materials for the furnishings reflect those identified in this Section. Obviously, where people come in direct contact with materials they will need to be finished and refined to be comfortable.

The majority of the site furnishings proposed will be custom made or will have material that is fashioned from river elements. The use of premanufactured furnishings will be limited, and they will be integrated into the setting or design elements to maintain a consistent visual quality.

Site furnishings, some of which may be provided by others, that are anticipated for the Project include the following:

- Benches, seating features
- Bike racks
- Drinking fountains
- Trash receptacles
- Information kiosks
- Interpretive displays
- Picnic tables
- Trail markers
- Barriers/Bollards
- Railings
- Footpath water crossings
- Signage; informational, directional, regulatory





3.5.13 Interpretive Areas

One of the exciting opportunities this Project can offer to the public is a means for providing interpretive information about the many influences that have shaped the river. The primary area where this type of information will be made available to the public will occur at the main public staging areas and may be at or adjacent to Rio Vista Park. However, there will also be many “in the field” opportunities to provide interpretive displays and demonstration features. The opportunities where interpretive field observations and reflections can occur include overlooks, plazas, or other facilities, but there may also be specific areas designated to certain interpretive information. The opportunity to designate a certain trail or series of seating nodes to a particular subject should also be included. Suggestions for interpretive information include but are not limited to:

- Historic elements of the river
- Cultural influence of historic peoples
- Recent influences of man on the river
- Natural history and wildlife information
- Interpretation of the city and/or mountain skyline
- Interpretation of the restoration habitats
- Identification of the restoration efforts
- Historical and current irrigation techniques
- Ornithological identifications

The configuration of these areas will vary depending on the setting and what information is being interpreted. Including interpretive exhibits at public facilities already described, such as the overlook areas or seating nodes, is a viable option. Some of the interpretive features may merit a standalone area. The team will need to work with the COP and its signage consultant to determine the most effective way of incorporating interpretive information into this Project.

3.6 Grading and Earthwork Opportunities and Constraints

There will be a significant amount of earthwork associated with the Project. This will include site preparation, excavation for bank stabilization, low flow channels, roads, trails, water conveyance, and structure foundations. These grading efforts will provide both opportunities for reuse of some of this material and a constraint in making what is put back following these operations in alignment with the corridor.

3.6.1 Overall Grading Assumptions and Objectives

The overall assumption for the project is centered on the realization that this project will result in a tremendous amount of earthwork and grading within the river corridor. The objective will be to try and minimize the overall grading impacts to the project site. With the required bank stabilization, low flow alignment, and roadway work, the amount of disturbance could be significant with associated impacts being large, so minimizing and balancing the earthwork requirements with aesthetics will be of the highest priority.





3.7 Hydrology and Hydraulics Opportunities and Constraints

3.7.1 Grand Avenue Channel

The Grand Avenue Channel enters New River on the west bank immediately north of Grand Avenue (US 60). The channel serves as an outlet for a large portion of Sun City. It is a concrete trapezoidal channel with a grouted riprap apron at the terminus point.

Constraints:

The primary constraint at this point is the reduction in circulation capacity along the west bank. The channel, the Grand Avenue bridge, and the existing buildings to the north limit access to the west bank. This leaves a land-locked parcel north of the channel. If the trail system is to cross the channel, then a large pedestrian bridge or RCBC will be required, although the railroad tracks north of Grand Avenue prevent a multi-use trail from crossing anywhere but under the bridges. There is also little opportunity to soften this area with vegetation due to the domination of hardscape.

Opportunity:

Aesthetics may be improved by staining the grouted riprap at the end of the grouted riprap spillway, or opening areas for vegetative pockets. This channel provides an excellent opportunity to utilize ephemeral rainfall as a water source for any potential riparian or wetland communities.

Additional Analysis:

The original flood study for this reach of New River Channel was prepared by the US Army Corps of Engineers (USACOE). The USACOE study was submitted to FEMA by the Letter of Map Revision (LOMR) process to define the 100-year FEMA designated floodplain. As part of a bank improvement project sponsored by the FCDMC, the channel hydraulics was reevaluated for both SPF and 100-year discharges. The analysis was performed by Wood-Patel using the HEC-2 hydraulic analysis program, as documented in the New River from Grand Avenue to Greenway Road (February 23, 1994). Wood-Patel delineated the SPF floodplain utilizing new topographic mapping. The Wood-Patel study determined that Grand Avenue and the UPRR bridges at this location operated as "chokes" to New River by significantly raising the water surface elevation upstream of the bridges due to the bridge constriction and resulting energy losses that occur. New River Channel flows in the area immediately north of the bridges to River mile 379.75 (approximately 94th Drive Channel), broke out and flooded the adjacent areas.

Wood-Patel has performed preliminary hydraulic analysis (with HEC-RAS) for this project using the previous HEC-2 data. Wood-Patel has verified the general hydraulic conditions as determined in the previous study. It appears that to meet the current FCDMC criteria of containing the SPF flows with one foot of





freeboard, the channel cross sectional area in the vicinity of Grand Avenue to the 94th Drive Channel, should be increased. The limits of the expansion are shown in the Opportunities and Constraints maps. The design criterion has significant impacts to the east bank. The requirement for increasing the channel section conveyance area poses a large constraint on the multi-use and aesthetic enhancements in this area. In addition, this widens the channel significantly, creating excess wastes that will require export from the project. The hydraulic model will be updated based on the latest mapping that is being performed for this project, as the 30% plans are developed.

The Project Team will need to consider options on how to deal with this issue. The multi-use and aesthetic concepts may require additional enhancements since this design constraint will locate multi-use paths closer to the ADOT freeway. An alternative to help mitigate this constraint would be to consider a design exception from FCDMC to eliminate the freeboard requirement within the east bank at this location, in an effort to reduce the required cross section to contain SPF flows.

3.7.2 West Channel

The West Channel enters Grand Avenue Channel immediately upstream of the New River outfall point. This channel is earthen and does not appear to be maintained. Vegetation in the channel is dense and consists of Palo Verde trees and shrubs throughout the channel.

Constraints:

A hydraulic structure may be required for trail access. The structure will provide an outlet through the proposed bank protection. Erosion and sediment control should be examined in case the adjacent properties are depositing pollutants into New River.

Opportunity:

The existing vegetation is a terrific buffer for the residential area to the west. The open area to the east of this channel may serve as a major trail or interpretive trail zone, and water could be diverted from this channel to enhance the area. A wetland demonstration area may also be introduced.

3.7.3 Sun City Channel

The Sun City Channel enters New River on the west bank at approximately station 360+00. The location of the outfall with New River corresponds approximately with the beginning of CSA bank protection. The channel is earthen and enters New River Channel via an opening in the CSA bank protection.

Constraints:

There is no outlet end treatment as the Sun City Channel enters New River. The outfall hydraulics should be evaluated to make sure no adverse impacts result from incoming flows. There does not appear to be any erosion problems at this





point, but sediment transport should be evaluated as a potential pollutant into New River. Circulation is currently limited by the channel, but a trail crossing could be incorporated.

Opportunity:

Upgrade the outlet of the Sun City Channel (if necessary). Increase access to areas upstream or downstream by providing a pedestrian crossing in the form of a dip or a pedestrian bridge. This channel could provide an ephemeral water source for a future wetland demonstration area or the existing detention basin north of the Grand Avenue bridge.

3.7.4 Casa Del Rio Swale

This earthen swale collects primarily on-site flows from Casa Del Rio and discharges them to New River. The swale appears to be relatively ill maintained.

Constraints:

The swale outfall seems incidental and improvements may be required in order to control the drainage patterns. This channel may also conflict with the multi-use trail circulation. Sediment transport should be controlled so that pollutants do not enter into New River.

Opportunity:

The existing swale is not well maintained and presents a "cluttered" appearance. Drainage capacity and aesthetic value can be added by grading the incoming swale. A dip crossing or small pedestrian bridge can be provided where trails cross the swale. An improved outfall configuration may be constructed at New River in such a way that it appears blended into the channel bank.

3.7.5 94th Drive Swale

The 94th Drive Swale is an earthen ditch running from 94th Drive to New River. There are two pipe culverts passing flow beneath Plaza Del Rio Drive, immediately upstream of the New River Channel. The culvert battery consists of 1-36" CMP and 1-60"x30" CMPA. The swale and the outfall point are ill maintained.

Constraints:

An appropriate outfall structure will be required through the bank protection. Considerable widening of the New River corridor may be needed to accommodate the runoff from this channel in combination with other nearby channels. A dip crossing or culvert may be needed for the trail circulation. Erosion and sediment are potential pollution hazards for New River. Future development plans should be investigated in order to determine if the channel with conflict with construction.

Opportunity:





The swale can be regraded and cleaned out to improve conveyance and also make its appearance more pleasant. The surrounding area is currently devoid of vegetation, which could be incorporated to provide recreational and ecological opportunities. The water from this channel is important for the vegetation that depends on ephemeral precipitation.

3.7.6 ADOT Swale

This earthen swale is located on the east side of New River Channel. The swale itself is ill defined. Flows conveyed presumably originate at the ADOT SR101 freeway.

Constraints:

Flows are minor. However an appropriate outfall is required.

Opportunity:

Similar improvements can be made as mentioned with previous swale locations. If flows are very minor, the design team may redirect to an appropriate outfall point in order to create more recreational and circulatory opportunities. One way to achieve this is to install a spillway or pipe into the channel as the outfall structure into New River. This area could also be used to take advantage of the runoff and install vegetation that will filter the water before it enters into New River.

3.7.7 ADOT Channel

The ADOT channel is a concrete lined channel which ends at the ADOT right of way (New River east bank) with a stepped spillway energy dissipater. Currently, there is a reliable water source originating from agricultural runoff on the east side of the 101 freeway.

Constraints:

As with all major drainage ways, a bridge structure or culvert will be needed for the multi-use trail. There may also need to be a new channel design if there is a conflict with the modified bank protection. As agricultural land is bought and development occupies the land on the east side of the 101 freeway, the reliable water source may be terminated. This could affect future decisions on creating or enhancing riparian or wetland zones that may rely on this water source.

Opportunity:

The water from this channel has created standing water within New River, which in turn has established a relatively young riparian community. Although the water may not be available for long, this is still an excellent opportunity to take advantage of this water.

3.7.8 Freedom Plaza Outlet Pipe:

A 12 inch outlet pipe with a flapgate was identified during the site visits. This outfall has a grouted riprap spillway. The flows originate from the Freedom Plaza Retirement Community.





Constraints:

It should be determined if sediment or other pollutants are entering into New River. This pipe will need to be avoided or moved if construction occurs nearby. Currently, the pipe is considered an eye sore.

Opportunity:

As with all outfalls, a valuable seasonal water source exists. This is very important for the native vegetation within the corridor. In addition the outfall offers an opportunity to consider staining the outlet pipe and grouted spillway to blend in better with the surrounding environment, consideration will be given to utilizing containerized plant materials around the outlet to assist in shielding view to this structure.

3.7.9 91st Avenue Channel

This earthen channel originates north of Thunderbird Road on 91st Avenue and proceeds due south into New River adjacent to Freedom Plaza Retirement Community.

Constraints:

This is a large channel and a structure will need to be built to convey flows through the banks to New River Channel at the outfall. The extent of required channel improvements will be identified as part of the conceptual design process. Residents of Freedom Plaza have explained that the mature vegetation as a result of the water from this channel is a safety concern. The erosion at the south end is severe and will need to be addressed as soon as possible.

Opportunities:

There is an excellent opportunity for a multi-use trail for the Plaza del Rio residents (especially the Freedom Plaza residents). The existing vegetation could be thinned and pruned to create a very comfortable pedestrian area.

3.7.10 Riverwalk Apartment Pipe Outfalls

There are 4 outfall pipes originating in the Riverwalk Apartment Complex and discharging along the New River Channel east bank. Two have flap gates while the other two do not (grate only). Dumped riprap aprons are provided for erosion protection.

Constraints:

In addition to the outfalls needing to be maintained, these structures are highly visible from Freedom Plaza and the west overbank.

Opportunity:

The outfalls provide valuable runoff for the New River vegetation and will need to be screened with a measure such as vegetation or staining, as will the existing gabion bank.





3.7.11 Rio Vista Park Pipe Outfalls

There are 3 pipe outlets along the east side of the New River Channel. All pipes are concrete with headwalls as end treatment. There are no flap gates provided. Dumped riprap is provided downstream of the inlets to provide erosion protection.

Constraint:

In addition to the outfalls needing to be maintained, these structures are highly visible from the west overbank.

Opportunity:

It appears that the outfalls of these pipes are high enough to prevent flows from backing up into the Park. This is likely the reason the pipes do not have flapgates. However, the design team can evaluate the hydraulic conditions at these locations and upgrade the outfall pipes. The outfalls provide valuable runoff for the New River vegetation and will need to be screened with a measure such as vegetation or staining.

3.7.12 Channel Drop Structure South of Skunk Creek

A concrete/CSA drop structure was previously constructed to stabilize New River.

Constraint:

The structure and associated steep bank protection may limit trail circulation. In addition, the drop structure blocks sub-surface flow and creates a wetland immediately upstream. Team members will work to manage the wetland areas both upstream and downstream of the structure.

Opportunity:

As the low flow channel from Skunk Creek gets installed, an opportunity for dispersing the water over the drop structure arises. Team members will work to utilize the channeled water efficiently in order to potentially create a riparian zone while establishing an artistic opportunity by enhancing and modifying some of the concrete elements.

3.7.13 Desert Harbor Spillway

The lake in the residential development of Desert Harbor has an emergency spillway. Breakout flows are conveyed from the lake to New River via a 2-6x3 RCBC and into New River down a grouted riprap spillway. The spillway ends in the New River Channel.

Constraint

The spillway should be visually enhanced. Staining and grading around the spillway may blend the spillway into its surroundings. A toe-down may be needed to reduce signs of existing erosion. In addition, the structure will need to be maintained on a regular basis.





Opportunity:

The water that will periodically be dumped into New River may be an opportunity for native vegetation to flourish. In addition containerized plant materials may be strategically placed to screen views to this spillway.

3.7.14 Greenway Channel Outfall

Greenway Channel is a concrete lined channel which terminates at New River Channel.

Constraint: The channel will require a pedestrian bridge (or RCBC) in order to provide continuity for the trail system. The aesthetics of the Greenway Channel are lacking (limited R/W & existing concrete lined channel).

Opportunity: Improve the aesthetics of area based on the proposed structure and surrounding landscaping. A potential connection to Calbrisa Park and adjacent neighborhoods should be studied.

3.7.15 Paradise Shores

The bank protection adjacent to paradise Shores was not constructed as part of the development. This project will construct the missing portion of bank protection.

Constraint: Gabion bank protection will be constructed in this area. The bank protection may limit access to the river and create an unsightly landscape.

Opportunity: Team members will attempt to minimize the visual impact of the bank protection by using vegetative material in combination with river rock.





4.0 *Concept Development*

4.1 *Theme: "A Connected Riparian Desert"*

The primary goal of the New River Project is to protect the surrounding developments through the containment of the Standard Project Flood (SPF), while respecting the existing native riverine ecosystem by preserving and enhancing the landscape through strategic ecological design. Many factors have altered the river's environment, including natural occurrences and the growth and development of adjacent areas. Urban corridors like this one can serve as an important:

- Circulatory Network
- Preservation / Conservation Area
- Multi-use Corridor
- Recreational and Educational Opportunity
- Open Space Corridor
- Regional Trail System
- Historical and Cultural Opportunity

The development of our theme was generated from our understanding of the overall goals and objectives of the project. Our theme is as follows:

"A Connected Riparian Desert". This theme originates from the basis that we are **"connected"** to the river in many ways. The **connectivity** stems from the basis of our civilization that was formed around thriving desert ecosystems. Rivers like New River provide the basis for a connected life and community that has expanded beyond the confines of the river banks to what we have today. This theme will allow us to **reconnect** to the **riparian desert** in multiple ways. This **"connectivity"** includes multi-use trails that connect into and become a part of the environment, educational zones utilized to **reconnect** the public with the history and importance of the river ecosystem, and re-establishment of **riparian desert habitats** that flourished and thrived throughout these corridors. This theme will become a part of the urban ecological fabric in the metropolitan Phoenix area by fostering and promoting rivers as a place to be connected to. The theme of **A Connected Riparian Desert** will be blended into the ecological, hydrological, recreational, and cultural aspects of the project.

4.2 *Hydraulic Analyses*

Preliminary hydraulic models (HEC-RAS) have been developed for the corridor. Team members obtained the FEMA model of record from the FCDMC for use as the baseline condition. The FEMA model was prepared with the Corps of Engineers HEC-2 computer program (NAV 29 datum). Team members converted the HEC-2 models into the HEC-RAS computer program (NAV 88). In theory, an identical water surface profile would be generated by HEC-RAS as





was generated by HEC-2. Team members found that there were slight discrepancies in the models (due to changes in bridge subroutines, etc.), but the maximum deviation in the water surface elevation was less than one foot. Therefore, the HEC-RAS model was adopted as the model of record for this project.

Development of the design condition model will be an iterative process that will continue through the 30% submittal. Several key design assumptions will be utilized to develop the design condition model including:

- The project must provide flood protection for the SPF (with one foot of freeboard);
- Gabions will be utilized as the primary bank protection treatment;
- Gabion bank protection will extend to the 100-year plus 1 foot freeboard elevation;
- The trail system will be at or above the 100-year (except at bridge crossings);
- Vegetation within New River will be as dense as feasible (in order to meet the required hydraulic conveyance);
- The bank protection will integrate a multi-use trail system;
- Where feasible, 404 mitigation areas will be incorporated into the bank protection design;
- Existing bank protection will be left in place (minimize capital cost).

The project corridor may be broken into several distinct design reaches. Each reach has specific hydraulic issues that will be addressed by the design team. The following paragraphs provide a brief description of each design reach.

4.2.1 Reach 1 – Existing CSA Bank Protection North of Grand Avenue

CSA bank protection is located from Grand Avenue to a point approximately 1300 feet to the north. The bank protection within this reach provides a 100-year level of protection. However, the SPF overtops the bank protection. The existing bank protection is to remain in place. Additional protection will be required outside of the CSA in order to contain the SPF.

The SPF bank protection may be in the form of earthen berms, floodwalls or a combination. It is anticipated that earthen berms (with appropriate bank and erosion protection) are the preferred alternative. Team members will evaluate both alternatives.

The proposed improvements may create a "sump" area in the overbank between New River and the Agua Fria Freeway. Drainage in this area may become a concern. It is anticipated that the local drainage may be handled in several ways: construction of a storm drain pipe to New River, placement of fill to eliminate the sump or creation of a water percolation zone that allows the water to naturally





percolate while providing water to any surrounding vegetation. Team members will evaluate these alternatives.

4.2.2 Reach 2 – Existing CSA to Riverwalk Apartments

This area offers a great deal of flexibility in bank protection design. The FCDMC (and ADOT) have significant rights-of-ways adjacent to New River throughout this reach. Team members propose to widen New River north of the existing CSA. In order to achieve this land acquisition, portions of ADOT land (as well as other private interests) would need to be purchased by the FCDMC. Acquiring this land will provide an opportunity to receive credit for mitigation areas, if needed. It is anticipated that the east bank would be widened approximately 100 feet to provide additional conveyance and plant habitat. Excess earth from this excavation will be placed as berms east of the channel on the available ADOT or FCDMC right-of-ways. This will provide flood protection, help screen the river from the freeway, and minimize earthwork hauling cost. The ADOT outlet channel will need to be modified to accommodate this alignment.

The west overbank area also has an opportunity to be a large mitigation area. The main channel bank protection would be located adjacent to the existing utility easement. This bank protection would be designed for the 100-year storm event. Flows in excess of the 100-year event would overtop the bank and flow into the mitigation area. The main channel bank protection will be designed for both sides of the berm in order to prevent failure from the back side. Velocities in the overbank area are relatively low. Therefore, existing and proposed vegetation within these areas may be sufficient to prevent substantial erosion. Team members will evaluate the erosion potential in more detail prior to the 30% submittal.

It should be noted that the widening of the channel to increase vegetation opportunities is dependent upon acquiring right-of-way from Sun Health and ADOT. The cost / availability of the right-of-way will impact the width of the proposed channel if these areas are unavailable.

The area immediately south of the Riverwalk Apartments is constrained by the existing utility easement on the west and the FCDMC right-of-way on the east. If ADOT right-of-way is acquired, then the opportunity to expand the channel is enhanced.

4.2.3 Reach 3 – Riverwalk Apartments

The river adjacent to the Riverwalk Apartments has limited right-of-way on both sides of the channel. As part of their development, the Riverwalk Apartments constructed a large section of gabion bank protection on the east side of New River. They covered a large portion of the gabions to enhance the aesthetics of the river and to minimize earthwork cost. The existing channel condition does not provide SPF protection for the Riverwalk Apartments. Team members modified the channel depth (steepened banks) and were able to pass the SPF in accordance with FCDMC criteria. In addition, the location of the existing bank protection and right-of-way minimizes the trail alternatives for the area adjacent to the apartments. Because of these constraints, the proposed trail will be a straight section in this reach. The benching of the trail to accommodate the





underpass at Thunderbird will be analyzed in regards to impacts on the hydraulics in this reach.

4.2.4 Reach 4 – Thunderbird to Rio Vista Community Park

New River is constrained on both banks by Desert Harbor Drive along the west and the park entrance road to the east. Preliminary review of the park entrance road plans show that it was constructed below the SPF. Therefore, through conversations with the City of Peoria, team members have determined that there will be a need to construct an earthen berm and/or floodwall adjacent to the road. In order to maximize the conveyance in the river and allow sufficient room for a trail and vegetation, team members are looking at a floodwall for this location. The team has asked and the City of Peoria has responded to halt construction of the planned walkway adjacent to the proposed park road so that this trail alignment, elevation, and flood wall can be coordinated with the final design of this project.

The west side of the river (Desert Harbor) appears to contain the SPF event. Team members will work with the FCDMC and the City to determine the best design for the maintenance road/trail, and the existing wall in this area.

It is preferred that the trail be located below Desert Harbor Road (near the 100-year WSEL) to provide a better river experience for the citizens that choose to use the soft surface maintenance road/trail along that alignment. Team members are working on several alternatives for trail/bank protection in this area.

4.2.5 Reach 5 - Rio Vista Park at Drop Structure

New River is constrained on both banks by the Park and Desert View development, respectively. Due to the relatively high banks, adequate conveyance is provided in this reach of the corridor. The gabion bank protection will transition into the existing CSA/roller compacted concrete at the drop structure. Soil will be used to cover the gabions and allow Mesquite / Native Grassland vegetation to re-vegetate these slopes.

4.2.6 Hydraulic Conclusions

Hydraulic design of this reach of the New River is an iterative process. Team members will develop conceptual designs, then refine them to improve the trail system alignment and elevation, provide increased vegetation/mitigation area, work within right-of-way constraints, and work within the capital cost limitations and responsibilities of the project features. It is understood that the conceptual design for the project will be completed for the 30% submittal. However, it is anticipated that modifications to the conceptual design will occur after the 30% submittal. Team members will work to minimize the changes to the design, but do not want to limit the opportunity for discussion, creativity, and optimization of the design.

4.3 Trail Systems

The J2 design team is proposing the development of a combination of four (4) different trail experiences throughout New River. The trail system will serve as one of the key elements of the New River project. The connection of this project's





trails to the City of Peoria's overall trail system and the regional Maricopa County Trail System speaks to the importance of this network, both locally and regionally. The four trail types that are planned for this corridor can be summarized as follows:

4.3.1 **Hard Surface Trail / Maintenance Road** – Located along eastern boundary of project

- 12 ' wide concrete surface
- Compliant with ADA guidelines (slopes of 5% or less)
- Will accommodate all users and abilities
- Will serve as the main pedestrian/public use trail of the project
- Trail will be bordered by landscape and irrigation system
- Trail alignment and design will incorporate intermittent nodes for overlooks, rest, solace and reflection
- Trail connects to Thunderbird Road at both the north and south sides
- Trail connects into Rio Vista Park under construction by the City of Peoria
- The trail ramps into the river at a slope less than 5% north of the existing CSA Bank Stabilization located near Grand Ave. The trail crosses the river channel and under Grand Ave ramping up a reconstructed maintenance ramp at less than 5% to the south western bank connecting to the existing trail system located along the western right of way of New River to this system.
- The trail system will serve as one of the primary maintenance access locations for the channel
- Trail goes under Thunderbird Road with 12'-0" Clearance and at a 5% Maximum Slope for ADA access
- Concrete trail gives better opportunities for textures, patterns and artwork incorporation
- The majority of the trail will be protected from SPF event but in some limited areas protection from this event is not possible. Trail will be protected from the 100 year event except at bridge undercrossings.

4.3.2 **Soft Surface Trail / Maintenance Road** – Location along western boundary of project

- 12 ' wide stabilized and or compacted aggregate base
- The trail will not be considered ADA accessible or compliant based on the ADA guidelines of providing a smooth stable surface





of which a compacted aggregate base is not considered acceptable. In addition many of the slopes up and down into the channel associated with this trail system will exceed the ADA 5% slope guidelines.

- Will accommodate maintenance vehicles, mountain biking, jogging and equestrians.
- Utilizes existing river access ramps for maintenance access
- Landscape treatment will be developed as part of the mitigation and re-vegetation efforts associated with the bank stabilization. Trail system will not have a formal irrigation system but may include a temporary irrigation system during plant establishment for the planned landscape treatments.
- Has potential to be utilized in specific areas as part of a community trail linkage or connection where the use would dictate a conversion to concrete. Cost for this conversion would be responsibility of group that is to benefit from conversion to concrete.
- Trail will be utilized for maintenance access
- The majority of the trail will be protected from 100 year event except at bridge undercrossings but may be subject to damage from SPF.

4.3.3 **Community Trail** – Various locations project wide

- 8 ' wide concrete surface or stabilized base, depending on ADA and recreational needs
- Compliant with ADA guidelines (slopes of 5% or less) where needed
- Will serve as a sub-trail of either the multi-use trail or the maintenance-soft surface trail
- Trail will be designed off of the main trails and associated with a more intimate and or educational area within and traversing through specific habitat types and/or areas identified for community trail activities
- Trail alignment and design will incorporate intermittent nodes for rest, solace and reflection
- Emphasis will be to bring people into the habitat and mitigation areas to experience the habitat on a more intimate basis
- Landscape and irrigation system and design will focus on specific mitigation area or zone where trail is located





- Trail will be protected from 100 year event but may be subject to damage from SPF

4.3.4 ***Equestrian Trail*** – Low Flow/River Bottom area

- Varying widths depending on anticipated usage. 4' minimum to 10' maximum in areas where multiple equestrian users are anticipated. The majority of the equestrian trail design for this project is proposed to be 4'-0".
- Trail surface to be a bladed from natural dirt and river cobble in river bottom
- Not ADA compliant or accessible
- Trail alignment will roughly follow the alignment of the existing low flow
- Landscape treatment will rely upon existing landscape within the river bottom. Any additional landscape will be "borrowed" from the mitigation and re-vegetation efforts associated with the bank stabilization. The trail will not have a formal irrigation system or adjacent landscape design
- Trail is subject to damage from any storm events
- Trail interface and traversing the existing drop structure will be addressed during final design

4.4 ***Habitat Restoration Zones***

There are four main habitat restoration zones identified within the New River corridor: **Riparian, Mesquite / Native Grassland, Lower Sonoran, and Cottonwood / Willow**. The zones will be found in areas that represent the existing vegetation or strengthen a landscape theme that is appropriate for that area. In general, the Riparian Zones will be located in the bottom of the channel where the plant material will be able to take advantage of the ephemeral water. The Mesquite / Native Grassland Zones will be located on the side slopes of the channel, and within the channel itself where appropriate. The idea is to use plant material that is effective in erosion control to reinforce the stabilization that the gabion and reinforcement mats will provide while creating a transition from the riparian zones to the drier banks and overbank areas. The Lower Sonoran Zones will be found outside of the bank areas where there are opportunities to utilize existing vegetation and create linear habitat connections for native wildlife. There are several areas that contain large stands of palo verde trees and other native Sonoran desert vegetation that could be enhanced to be a healthy native community. All three zones will be designed to assist in satisfying the mitigation requirements of the U.S. Army Corps of Engineers.

The species used and the areas for their specific application will be identified by J2 in close association with FCDMC and the City of Peoria as we move towards construction documents. We have included a preliminary list of possible plant materials associated with each habitat type that J2 has initially identified on the





site. The following lists are to serve as a starting point for discussions with FCDMC and the City on species type and density. A specific and limited list of plants and densities will be developed for the construction documents for the plans and specifications by J2 after discussing with FCDMC and the City the merits or constraints of each of the species listed below:

4.4.1 Riparian Habitat Zone Plant List			
Scientific Name	Common Name	Location in Riparian Habitat	Density: Plants/Acre
Trees			
<i>Populus fremontii</i>	Fremont's cottonwood	Overstory	15
<i>Salix gooddingii</i>	Goodding's willow	Overstory	30
<i>Fraxinus pennsylvanica</i> <i>var. velutina</i>	Velvet Ash	Understory; Shrub-Tree	15
Shrubs/ Small Trees			
<i>Atriplex canescens</i>	Four Wing Saltbrush	Understory; Shrub	30
<i>Baccharis salicifolia</i>	Seep Willow	Understory; Shrub	90
<i>Celtis reticulata</i>	Net-leaf hackberry	Understory; Shrub-Tree	30
<i>Hymenoclea monogyra</i>	Burrobush	Understory; Shrub	18
<i>Hymenoclea salsola</i>	Burrobush	Understory; Shrub	60
<i>Pluchea sericea</i>	Arrowweed	Understory; Shrub	18
<i>Prosopis glandulosa</i> <i>var. torreyana</i>	Honey mesquite	Understory; Shrub-Tree	30
<i>Prosopis pubescens</i>	Screwbean mesquite	Understory; Shrub-Tree	30
<i>Prosopis velutina</i>	Velvet mesquite	Understory; Shrub-Tree	30





<i>Salix exigua</i>	Sandbar willow	Understory; Shrub-Tree	36
<i>Sambucus mexicana</i>	Elderberry	Understory; Shrub-Tree	18
Forbs/Grasses			
<i>Ambrosia ambrosioides</i>	Canyon ragweed	Understory; Herb	
<i>Amsinckia tessellata</i>	Fiddle-neck	Understory; Herb	
<i>Anemopsis californica</i>	Yerba mansa	Understory; Herb	
<i>Aristida adscensionis</i>	Six-week three awn	Understory; Herb	
<i>Aristida purpurea</i>	Purple three awn	Understory; Herb	
<i>Bromus arizonicus</i>	Arizona brome	Understory; Herb	
<i>Cleome lutea</i>	Spider-flower	Understory; Herb	
<i>Clematis drummondii</i>	Virgin's bower	Understory; Herb	
<i>Cyperus odoratus</i>	Sedge	Understory; Herb	
<i>Datura wrightii</i>	Datura	Understory; Herb	
<i>Distichlis spicata</i>	Salt grass	Understory; Herb	
<i>Elymus glaucus</i>	Wild-rye	Understory; Herb	
<i>Filago arizonica</i> , <i>F. depressa</i> or <i>F. californica</i>	Filago	Understory; Herb	
<i>Gnaphalium palustre</i>	Cudweed	Understory; Herb	
<i>Hordeum arizonicum</i>	Arizona barley	Understory; Herb	
<i>Juncus bufonius</i>	Rush	Understory; Herb	
<i>Lotus humistratus</i>	Deervetch	Understory; Herb	
<i>Lotus salsuginosus</i>	Deervetch	Understory; Herb	
<i>Marah gilensis</i>	Vine (Wild) Cucumber	Understory; Herb	





<i>Mimulus guttatus</i>	Yellow monkeyflower	Understory; Herb	
<i>Mimulus pilosus</i>	Monkeyflower	Understory; Herb	
<i>Muhlenbergia rigens</i>	Deer Grass	Understory; Herb	
<i>Phragmites communis</i>	Reed	Understory; Herb	
<i>Platystemon californicus</i>	Cream-cups	Understory; Herb	
<i>Sporobolus airoides</i>	Alkali sacaton	Understory; Herb	

4.4.2 Mesquite / Native Grassland Habitat Zone Plant List

Scientific Name	Common Name	Location in Mesquite Bosque Habitat	Density: Plants/Acre
Small Trees			
<i>Baccharis salicifolia</i>	Seep willow	Understory; Shrub	90
<i>Cercidium floridum</i>	Blue palo verde	Transition to upland	5
<i>Chilopsis linearis</i>	Desert willow	Overstory in higher water table	9
<i>Olneya tesota</i>	Ironwood	Transition to upland	5
<i>Prosopis glandulosa var. torreyana</i>	Honey mesquite	Overstory	9
<i>Prosopis pubescens</i>	Screwbean mesquite	Overstory	54
<i>Prosopis velutina</i>	Velvet mesquite	Overstory dominant	90
<i>Sambucus mexicana</i>	Elderberry	Overstory	9
Shrubs			
<i>Acacia constricta</i>	Whitethorn acacia	Transition to upland	6





<i>Acacia greggii</i>	Catclaw acacia	Transition to upland	6
<i>Atriplex canescens</i>	Four-wing saltbush	Understory; Shrub; saline	6
<i>Atriplex lentiformis</i>	Quailbush	Understory; Shrub; saline	6
<i>Celtis pallida</i>	Desert hackberry	Understory; Shrub	7
<i>Celtis reticulata</i>	Net-leaf hackberry	Understory; Shrub-Tree	7
<i>Encelia farinosa</i>	Brittlebush	Understory; Shrub	18
<i>Hymenoclea monogyra</i>	Burrobush	Understory; Shrub	9
<i>Hymenoclea salsola</i>	Burrobush	Understory; Shrub	9
<i>Hyptis emoryi</i>	Desert lavender	Understory; Shrub	9
<i>Lycium andersonii</i> , <i>L. berlandieri</i> , <i>L. californicum</i> , and <i>L. exsertum</i>	Desert thorn	Understory; Shrub	30
<i>Lycium fremontii</i>	Fremont thorn bush (Wolfberry)	Understory; Shrub	9
<i>Pluchea sericea</i>	Arrowweed	Understory; Shrub	7
<i>Sphaeralcea ambigua</i>	Desert mallow	Understory; Shrub	18
<i>Trixis californica</i>	Trixis	Understory; Shrub	12
<i>Zizyphus obtusifolia</i> (<i>Condalia lycioides</i>)	Greythorn	Understory; Shrub	6
Forbs/Grasses			
<i>Abronia villosa</i>	Sand verbena	Understory; Herb	
<i>Aristida adscensionis</i>	Six-week three awn	Understory; Herb	
<i>Amaranthus palmeri</i>	Careless weed	Understory; Herb	
<i>Amsinckia tessellata</i>	Fiddle-neck	Understory; Herb	
<i>Aristolochia watsoni</i>	Indian-root	Understory; Herb	





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<i>Baileya multiradiata</i>	Desert marigold	Understory; Herb	
<i>Bouteloua curtipendula</i>	Side-oats grama	Understory; Herb	
<i>Bouteloua gracilis</i>	Blue-grama	Understory; Herb	
<i>Bromus arizonicus</i>	Arizona brome	Understory; Herb	
<i>Cammissonia boothii</i> , <i>C. brevipes</i> , <i>C. californica</i> , <i>C. micrantha</i>	Suncups	Understory; Herb	
<i>Chaenactis carphoclinia</i> , <i>C. stevioides</i>	Pincushion	Understory; Herb	
<i>Clematis drummondii</i>	Virgin's bower	Understory; Herb	
<i>Datura wrightii</i>	Datura	Understory; Herb	
<i>Distichlis spicata</i>	Salt grass	Understory; Herb	
<i>Emmenanthe penduliflora</i>	Whispering bells	Understory; Herb	
<i>Eriogonum inflatum</i>	Desert trumpet	Understory; Herb	
<i>Erioneuron pulchellum</i>	Fluff grass	Understory; Herb	
<i>Eschscholzia mexicana</i>	Mexican poppy	Understory; Herb	
<i>Festuca arizonica</i>	Fescue	Understory; Herb	
<i>Festuca pacifica</i>	Fescue	Understory; Herb	
<i>Filago arizonica</i> or <i>F. depressa</i> or <i>F. californica</i>	Filago	Understory; Herb	
<i>Gerea canescens</i>	Desert sunflower	Understory; Herb	
<i>Juncus bufonius</i>	Rush	Understory; Herb	
<i>Lepidium thurberi</i>	Peppergrass	Understory; Herb	
<i>Lotus humistratus</i>	Deervetch	Understory; Herb	
<i>Lotus salsuginosus</i>	Deervetch	Understory; Herb	
<i>Lupinus arizonicus</i>	Lupine	Understory; Herb	





<i>Muhlenbergia microsperma</i>	Annual muhly	Understory; Herb	
<i>Muhlenbergia porteri</i>	Deergrass	Understory; Herb	
<i>Oenothera deltoides</i>	Evening primrose	Understory; Herb	
<i>Opuntia spinosior</i>	Cane Cholla	Understory; Herb	
<i>Opuntia engelmannii</i>	Engelmann's prickly pear	Understory; Herb	
<i>Orthocarpus purpurascens</i>	Owl's clover	Understory; Herb	
<i>Panicum obtusifolium</i>	Curly mesquite	Understory; Herb	
<i>Penstemon parryi</i>	Parry's penstemon	Understory; Herb	
<i>Phacelia crenulate, P. distans</i>	Wild heliotrope	Understory; Herb	
<i>Pleuraphis rigida</i>	Big galleta	Understory; Herb	
<i>Poa bigelovii</i>	Bluegrass	Understory; Herb	
<i>Psilotrophe cooperi</i>	Paper flower	Understory; Herb	
<i>Salvia columbariae</i>	Chia	Understory; Herb	
<i>Senecio lemmonii</i>	Groundsel	Understory; Herb	
<i>Sporobolus airoides</i>	Alkali sacaton	Understory; Herb	
<i>Verbesina encelioides</i>	Cowpen daisy	Understory; Herb	

4.4.3 Lower Sonoran Palo Verde Association Zone Plant List

Scientific Name	Common Name	Location in Lower Sonoran Palo Verde Habitat	Density: Plants/Acre
Small Trees			





<i>Cercidium floridum</i>	Blue palo verde	Overstory; Tree	6
<i>Cercidium microphyllum</i>	Foothill palo verde	Overstory; Small Tree	9
<i>Olneya tesota</i>	Ironwood	Overstory; Tree	6
<i>Prosopis pubescens</i>	Screwbean mesquite	Overstory; Tree	9
<i>Prosopis velutina</i>	Velvet mesquite	Overstory; Tree	6
Shrubs			
<i>Acacia constricta</i>	Whitethorn acacia	Understory; Shrub;	4
<i>Acacia greggii</i>	Catclaw acacia	Understory; Shrub;	4
<i>Agave chrysacantha</i>	Agave	Understory; Shrub;	4
<i>Ambrosia dumosa</i>	Bursage	Understory; Shrub;	9
<i>Atriplex canescens</i>	Four-wing saltbush	Understory; Shrub; Saline	9
<i>Calliandra eriophylla</i>	Fairy duster	Understory; Shrub;	18
<i>Cassia covesii</i>	Senna	Understory; Shrub;	6
<i>Celtis pallida</i>	Desert hackberry	Understory; Shrub;	9
<i>Encelia farinosa</i>	Brittlebush	Understory; Shrub;	30
<i>Fouquieria splendens</i>	Ocotillo	Understory; Tall shrub;	6
<i>Justicia californica</i>	Chuparosa	Understory; Shrub;	9
<i>Larrea tridentata</i>	Creosote bush	Understory; Shrub;	30
<i>Lotus rigidus</i>	Desert rock-pea	Understory; Shrub;	9
<i>Lycium andersonii</i> , <i>L. berlanderi</i> , <i>L. californicum</i> , <i>L. exsertum</i>	Desert thorn	Understory; Shrub;	24
<i>Mirabilis bigelovii</i>	Four-o'clock	Understory; Shrub;	15
<i>Opuntia acanthocarpa</i>	Buckhorn cholla	Understory; Succulent	4





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<i>Opuntia basilaris</i>	Beavertail cactus	Understory; Succulent	4
<i>Opuntia bigelovii</i>	Teddy-bear cholla	Understory; Succulent	4
<i>Opuntia chlorotica</i>	Pancake pear	Understory; Succulent	4
<i>Opuntia engelmannii</i>	Engelman's prickly pear	Understory; Succulent	4
<i>Opuntia fulgida</i>	Chain-fruit cholla	Understory; Succulent	4
<i>Opuntia leptocaulis</i>	Desert Christmas cactus	Understory; Succulent	4
<i>Simmondsia chinensis</i>	Jojoba	Understory; Shrub;	9
<i>Sphaeralcea ambigua</i>	Desert mallow	Understory; Shrub;	17
<i>Trixis californica</i>	Trixis	Understory; Shrub;	12
<i>Viguiera parishii</i>	Golden-eye	Understory; Shrub;	9
<i>Yucca baccata</i>	Banana yucca	Understory; Succulent	4
<i>Ziziphus obtusifolia</i>	Lotebush	Understory; Shrub;	9
Forbs/Grasses			
<i>Ambrosia ambrosoides</i>	Canyon ragweed	Understory; Herb	
<i>Amsinckia tessellata</i>	Fiddle-neck	Understory; Herb	
<i>Aristida glabrata</i>	Three-Awn	Understory; Herb	
<i>Asclepias linearis</i>	Milkweed	Understory; Herb	
<i>Astragalus allochrous</i>	Milkvetch, Locoweed	Understory; Herb	
<i>Astragalus lentiginosus</i>	Milkvetch, Locoweed	Understory; Herb	
<i>Baileya multiradiata</i>	Desert marigold	Understory; Herb	
<i>Bouteloua curtipendula</i>	Side-oats grama	Understory; Herb	
<i>Bouteloua gracilis</i>	Blue grama	Understory; Herb	





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<i>Bromus arizonicus</i>	Arizona brome	Understory; Herb	
<i>Calochortus kennedyi</i>	Desert mariposa	Understory; Herb	
<i>Cammissonia boothii</i> , <i>C. brevipes</i> , <i>C. californica</i> , <i>C. micrantha</i>	Suncups	Understory; Herb	
<i>Chaenactis carphoclinia</i> , <i>C. stevioides</i>	Pincushion	Understory; Herb	
<i>Cheilanthes parryi</i>	Lip Fern	Understory; Herb	
<i>Clematis drummondii</i>	Virgin's bower	Understory; Herb	
<i>Datura wrightii</i>	Datura	Understory; Herb	
<i>Delphinium amabile</i>	Larkspur	Understory; Herb	
<i>Dichelostemma pulchellum</i>	Blue dicks	Understory; Herb	
<i>Emmenanthe penduliflora</i>	Whispering bells	Understory; Herb	
<i>Eriogonum inflatum</i>	Desert trumpet	Understory; Herb	
<i>Erioneuron pulchellum</i>	Fluff grass	Understory; Herb	
<i>Eschscholzia mexicana</i>	Mexican poppy	Understory; Herb	
<i>Festuca arizonica</i>	Fescue	Understory; Herb	
<i>Festuca pacifica</i>	Fescue	Understory; Herb	
<i>Filago arizonica</i> or <i>F. depressa</i> or <i>F. californica</i>	Filago	Understory; Herb	
<i>Gerea canescens</i>	Desert sunflower	Understory; Herb	
<i>Hordeum arizonicum</i>	Arizona barley	Understory; Herb	
<i>Lepidium thurberi</i>	Peppergrass	Understory; Herb	
<i>Lotus humistratus</i>	Deervetch	Understory; Herb	
<i>Lotus salsuginosus</i>	Deervetch	Understory; Herb	
<i>Lupinus arizonicus</i>	Lupine	Understory; Herb	





<i>Muhlenbergia microsperma</i>	Annual muhly	Understory; Herb	
<i>Muhlenbergia porteri</i>	Deergrass	Understory; Herb	
<i>Notholaena stanleyi</i>	Cloak fern	Understory; Herb	
<i>Oenothera deltooides</i>	Evening primrose	Understory; Herb	
<i>Orthocarpus purpurascens</i>	Owl's clover	Understory; Herb	
<i>Pellaea longimucronata</i>	Cliff-brake	Understory; Herb	
<i>Penstemon parryi</i>	Parry's penstemon	Understory; Herb	
<i>Phacelia crenulata. P. distans</i>	Wild heliotrope	Understory; Herb	
<i>Plantago ovata (insularis)</i>	Plantain	Understory; Herb	
<i>Pleuraphis rigida</i>	Big galleta	Understory; Herb	
<i>Poa bigelovii</i>	Annual bluegrass	Understory; Herb	
<i>Psilotrophe cooperi</i>	Paper flower	Understory; Herb	
<i>Salvia columbariae</i>	Chia	Understory; Herb	
<i>Selaginella arizonica</i>	Club moss	Understory; Herb	
<i>Senecio lemmonii</i>	Groundsel	Understory; Herb	

Habitat locations will be designed to minimize impacts to the channel capacity while assisting in revitalizing a river habitat that has been severely altered by urban influences and providing viable habitats and urban interface areas. Habitat densities and locations will be included in the analysis of the channel capacity and hydraulic impacts and models.

4.4.4 Plant Material Sizes

Regardless of which plant species are chosen for the corridor, an important factor will be the selection of the size of the plant material. The size of the plant material will depend on availability, suitability for specific zones, and budget constraints. The selection of sizes will be as follows:

Container-grown: Trees and shrubs will be planted using conventional planting techniques. Plant pits will be modified to adapt to the existing site conditions. These conditions may require that larger than normal plant





pits be excavated, due to the rocky/gravelly soil conditions. Soil amendments as specified in the contract documents will be added to the backfill mix. The planting work will be implemented as specified in the contract documents and as detailed on the drawings.

Pole plantings: Will be used for selected plant species such as cottonwood and willow species. Pole planting work will be implemented as detailed on the drawings.

Wetland Plantings: The wetland and aquatic plants will include transplants (entire plants dug from a natural site or nursery grown), seedlings (entire plants, container grown), and tubelings (seedlings grown in narrow tube-shaped containers).

Hydroseeding: With the exception of paved areas, soft surfaced trails, or other constructed features, all areas that are viable locations outside of the overbank within the Project area may receive the application of a specific and designated hydroseed plant mix. The bare areas that may be targeted for seeding will incorporate standard ecological restoration techniques, such as discing with plow equipment, seeding, and leaving "microdepressions" in the soil so that small pools of water can collect in order to assist in seed germination. Other techniques will be researched from the recently released primer from the Society of Ecological Restoration.

Areas that will accept seeding on the riverbank will be hydroseeded. There are existing banks in the project where hydroseeding will not be appropriate. These areas include the soil cement banks east and west in association with Grand Avenue, the east and west banks near the drop structure and the banks near the 91st Ave and ADOT channels. These specific slope and bank areas will be screened from view where possible by strategically placing trees along the toe of slope associated with each occurrence.

The banks composed of gabion matting and river cobble will be hydroseeded. The limits and extent of the available seeding areas within the project area is extensive and may be cost prohibitive to accomplish; therefore, the J2 design team will coordinate with the County and the City of Peoria to determine the areas that seeding will be most desired. The banks will be seeded to provide the maximum potential for habitat restoration within the Project boundaries and provide erosion protection for the slopes and the surrounding environments. Seeding of the slopes will also aid in aesthetic mitigation of bare, disturbed slopes. The areas along the overbank will also be seeded because of the heavy pedestrian use, and to assist in minimizing erosion and slowing offsite stormwater flows across the overbank. The basic approach, developed by the J2 design team, is to include all of the bank slopes, overbank areas, and open space zones in the terrace as priority seeding areas. This will ensure that all bare/exposed areas are seeded and will be considered as part of the base bid. The J2 design team believes that the existing low





flow area habitats will have an existing seed source present from the shrub and tree species that are naturally occurring in these areas.

4.5 Aesthetic Enhancements

The development of aesthetic enhancements in the corridor will serve several purposes. The overriding goal of the enhancements is to strengthen the overall theme of “The Connected Riparian Desert”. The J2 design team has envisioned this theme being strengthened through the selected use and placement of wall graphics, and material selection based on the type of material, color, and texture of these materials, geometric layout, and placement of facilities. The J2 design team feels that the aesthetic enhancements will serve as design principals and guidelines for the project.

The material selection will be based on the use of raw native materials such as steel that is allowed to naturally rust and weather, concrete that is sandblasted or specified to display the aggregate that is used specifically to match and/or blend into the surrounding environment, and the creation of shade for seating areas through the use of native plants and/or structures that have a strong connection to the river. This aesthetic will be applied to all items that will be visible to the public. The possibility of incorporating aesthetic enhancements into the overall project will be greatly dictated by the allotted budget, but utilizing these as design principals and guidelines will only serve to strengthen the project over time as items are added that are balanced against these principals and guidelines. Sketches of these enhancement concepts can be found in the appendix of this report.

4.5.1 Icons and Patterns – The development and creation of site specific icons and patterns were inspired from the native environment that encompasses the New River habitat. The icons speak to the wildlife and plant materials that are present in Sonoran river ecosystems. The patterns speak more to the ebb and flow of the river, the texture of the river aggregate and their influence on the topography of a place. The inclusion of these icons and patterns can be utilized in a variety of settings including seat walls, pavement surfaces, shade canopy columns, interpretive signage, and educational areas.

4.5.2 Fencing and Guardrail – The development of a fencing and guardrail design was again inspired by the native ecosystem of New River’s riparian desert and the use of raw steel that would be allowed to naturally rust and patina. The locations for these types of enhancements would be limited and would be focused primarily at those areas where safety and control of access is a concern. These areas could include the trail areas near the existing and steep CSA banks, channel crossings, and maintenance ramps. There may be the possibility that these features could also be incorporated into entry monuments and or the signage for the area. In addition to the new installations these enhancements could easily be added to the existing fence that currently serves as some protection from the CSA slopes and other areas along New River by providing an environmental enhancement to an existing situation.





- 4.5.3 **Seatwall Options** – The development of seatwalls with an aesthetic link to the overall environment, theme, and material selection is important to the overall design. The placement of these seatwalls will occur sporadically throughout the corridor with an emphasis on placement in areas where views both into and out of the corridor can be enjoyed. The relationship of the seatwall aesthetic to the surrounding environment serves to reinforce the importance of the overall theme of a “Connected Riparian Desert”. This connection is made stronger through the use of seatwalls that rely on graphics, colors, textures, forms, and material selection.
- 4.5.4 **Nodes** – The development of nodes that serve as entries, seating areas, and focal points will be developed with an aesthetic link to the overall environment, theme, and material selection. These nodes may have benches, tables, and roofs that support and grow native grasses or serve as an entry to a place. The placement of these nodes will occur sporadically throughout the corridor in areas where views, educational areas, and quiet areas meant for solace and reflection can be enjoyed. The nodes will incorporate graphics, colors, textures, forms, roof types, and material selection into the overall theme.
- 4.5.5 **Gateways and Entry Monuments** – The development of Gateways and Entry monuments will be designed to serve as a formal welcome into this special project. These gateways and entry monuments would be designed to reinforce the overall environment, theme, and material selection. The placement of these gateways and entry monuments will occur at planned public locations with an emphasis on placement in areas where views to them from the nearby roadway network and pedestrian walkways serve to advertise this project to the general public. The relationship of these gateways and entry monuments to the overall aesthetic and surrounding environment serves to reinforce the importance of the overall theme of a “Connected Riparian Desert”. This connection is made stronger through the use and placement of these gateways and entry monuments that speak to the environment through graphics, colors, textures, forms, and material selection.
- 4.5.6 **Slope Sections** – The development of varying slope sections serves to soften the overall aesthetic of a bank stabilization project. The J2 design team is envisioning that the varying slope sections will allow the incorporation of soil on top of the gabion bank stabilization. The placement of soil over the baskets would allow the establishment of native grasses and forbs. We have provided several sections that show varying options of bank stabilization concepts for the New River Corridor. The application of any or all of these examples will be driven by site specific opportunities and constraints. The J2 design team envisions the possible application of any of these sketches based on existing conditions which will be refined and detailed during construction document development.
- 4.5.7 **Specialty Features** – The development of special areas and features throughout this corridor will allow the project visitor to “Connect” to this “Riparian Desert” environment. These specialty features include the development of specific habitat zones that are focused on the display of a





specific and limited “Riparian Desert” habitat zone or treatment. The creation of these areas will serve as a smaller example of the larger riparian desert. These specialty features include the development of designs and techniques to screen the storm water outfall features that enter into the New River corridor from the surrounding developments. The incorporation of a Trail system into the overall design will, in areas, involve the design and development of a benched trail system. This type of development will require that a wall be constructed the relationship of the wall and trail design will be vitally important to the success and safety of that trail. All special design features will consider location, layout, design, visibility, accessibility, graphics, colors, textures, forms and material selection.

4.6 Grand Avenue to Thunderbird Character Areas

This portion of the overall corridor can be broken into 9 Character areas. The following is a summary for the graphic that is attached to this report.

4.6.1 Character Area 1 – East overbank from Grand Ave. to end of CSA bank: The concept for this area is the protection and enhancement of the existing lower Sonoran desert plant materials that currently occupy this area. It is envisioned that this area offers a unique opportunity to reintroduce some of the larger riparian plantings such as cottonwoods to create a plant mosaic that links to the wildlife corridor that currently exists south of the ADOT channel outlet. Also, the development of a lower Sonoran desert ecosystem offers the potential to have wildflower displays that continually reseed themselves. There is an opportunity to design a community trail that can lead the public through a “Sonoran Desert Flower Garden”. By selecting a plant palette that consists of flowering natives, a low cost low impact botanical walk can be achieved.

Character Area 1 Benefits:

- **Creates visual interest from Freeway and Grand Avenue**
- **Buffers views to existing CSA banks from offsite**
- **Riparian connection through strategic use of vegetation to low flow as a wildlife corridor**
- **Mitigation credits for high habitat value**
- **Potential to develop a Community trail system**
- **Low overall and long term maintenance**
- **Transforms a landlocked parcel from a desolate unusable and inhospitable area to a welcoming, educational public use area**

Character Area 1 Considerations:

- **Right-of-Way area part of ADOT ownership**
- **FCDMC currently hold a drainage easement in this overbank area and development beyond or outside of this use will require negotiations and discussions with ADOT**





- **Automatic irrigation points of connection may be difficult to route and or obtain**
- **Access and visibility to the site**

4.6.2 **Character Area 2 – East overbank from end of CSA bank to Riverwalk Apartments:** This area (**Flood Control Overbank Property Acreage approximately 12.74 Acres**) is proposed to serve as one of the many mitigation zones for the project. The concept for this area is the protection and enhancement of the existing lower Sonoran desert plant materials that exist in portions of this area. The development of a lower Sonoran desert ecosystem offers great potential to showcase our native desert ecosystems to those trail users on the hard surface trail that parallel the bank protection and river corridor.

Character Area 2 Benefits:

- **Offers excellent potential as a mitigation area**
- **Creates a strong linear connection for multi-modal use**
- **Creates appealing visual interest from freeway to river**
- **Creates a visual buffer to freeway from river corridor**
- **Creates perception of noise buffering from freeway**
- **Allows creation for view corridors to surrounding mountains from the corridor**
- **Allows creation of areas for solace and reflection**
- **Allows creation of community trail areas**
- **Preserves existing Sonoran desert plant materials**
- **Allows for the enhancement of existing bare slopes through the use of re-vegetation applications of site specific seed mixes**
- **Transforms a landlocked parcel from a desolate unusable and inhospitable area to a welcoming public use area**

Character Area 2 Considerations:

- **A portion of the available Right-of-Way area is not owned by the project partners**
- **Automatic irrigation point of connection may be difficult to route and or obtain**
- **Access and visibility to the community trail areas**

4.6.3 **Character Area 3 - Riparian low flow from Grand Ave. to ADOT Channel outfall:** This area is proposed to serve as one of the few riparian mitigation zones of the project. The concept for this area is to protect the existing Sonoran riparian plant materials and water course that currently flow and occupy the low flow area of this project. The enhancement of a





Sonoran riparian ecosystem offers great potential to showcase our native desert riparian ecosystems to those trail users on both the hard surface and soft surface trails that parallel the bank protection and river corridor along this stretch of the corridor. This specific area is currently thriving because of the intermittent flows that enter New River from off site flows including the ADOT Channel spillway the carries intermittent storm water and irrigation tail water flows to the river. The protection of these water ways and their associated vegetation is a high priority for the design team; however the limits and extents of the bank protection and its associated disturbance will dictate the true limits of protection.

Character Area 3 Benefits:

- **Offers excellent potential as a mitigation area that will be protected from human interaction or disturbance**
- **Opportunity to widen low flow areas to allow riparian pockets to establish in areas of disturbance**
- **Offsite flows from the following sources benefit habitat in this zone:**
 - **Sun City Channel**
 - **ADOT Channel**
 - **ADOT Swale**
 - **Casa del Rio Swale**
 - **Grand Ave. Channel**
- **Incorporation of Equestrian Trails**
- **Hard surface and maintenance trails enter corridor near Grand Ave. and potentially at the channel crossings allowing trail users the opportunity to experience the river corridor from a different and unique perspective**
- **Existing CSA banks at Grand Ave. and elsewhere along this river course beyond this projects limits could be considered candidates for staining to make them appear more natural, adorned with glyphs that speak to past cultures and river environments, or planted at the toe of slope if possible to provide vegetative screening**
- **Corridor will allow for the creation of aquatic habitat that transitions up the banks through the use of mesquite, grasses, forbes and shrubs to the drier Sonoran Desert Habitats of the Palo Verde associations.**

Character Area 3 Considerations:

- **Habitat in low flow area subject to frequent damage and reestablishment following storm events.**
- **Any realignment of low flow to create riparian pockets subject to damage following a storm event.**





- **Equestrian trail and the crossing or entering within this corridor of the hard surface and maintenance trails will all be subject to damage from flows**
- **Maintenance of vegetation will be required to be monitored to assure conveyance of storm events**
- **Vector control**
- **Existing CSA is visually unappealing**
- **River bottom with concrete guide dikes and reinforcing will make vegetation near Grand Avenue and the existing CSA impossible.**
- **Saltcedar removal and monitoring will be required**

4.6.4 Character Area 4 – Riparian low flow from north of ADOT Channel to Riverwalk Apartments: This area is proposed to be composed of a river habitat plant selection. There is limited water resources from off site flows in this section within the actual river and low flow areas, however there may be a regular water source once the Skunk Creek low flow project is complete. The eastern and western banks provide excellent opportunities to create Mesquite / Native Grassland Zones.

Character Area 4 Benefits:

- **Offers excellent potential to display Mesquite / Native Grasslands and more xeric landscape elements**
- **Opportunity to design areas to protect or enhance the fragile riparian habitats**
- **Incorporation of Equestrian Trails through the low flow areas of this zone**

Character Area 4 Considerations:

- **Habitat in low flow area subject to frequent damage and reestablishment following storm events.**
- **Any realignment of low flow to create riparian pockets subject to damage following a storm event.**
- **Equestrian trail will be subject to damage from flows**
- **Maintenance of vegetation will be required to be monitored to assure conveyance of storm events**
- **Vector control**
- **Saltcedar removal and monitoring will be required**

4.6.5 Character Area 5 – Entire Channel from 91st Ave. Channel Outfall to Thunderbird Road: This area is proposed to be a continuation of the river habitat plant selections that are planned in Character Area 4. There are limited water resources from off site flows in this section within the actual



river and low flow areas. The existing east banks near Thunderbird and adjacent to the Riverwalk Apartments have been stabilized, however exposure of the gabion mattresses and lack of vegetative cover in these areas will need to be addressed as part of this project. The eastern and western overbanks provide excellent opportunities to capitalize on the existing upland Sonoran vegetation that occupy areas along and within this zone.

Character Area 5 Benefits:

- **Offers excellent potential to display Mesquite / Native Grasslands**
- **Elimination of exposed gabion mattress and re-vegetation with seed mix will improve overall visual quality of the corridor near Thunderbird Road**
- **Opportunity to physically link Riverwalk residents to the river through trail connections to the apartment complex**
- **Opportunity to screen through staining, use of stone veneers, and selective plant placement the existing storm water outfalls to the river corridor from the surrounding developments**
- **Create enhancements and bank stabilizations that protect apartments from SPF through the deepening of the river channel**
- **Incorporation of Equestrian Trails through the low flow areas of this zone**
- **Opportunity to take advantage of the dense palo verde stand on the western overbank.**

Character Area 5 Considerations:

- **Habitat in low flow area subject to frequent damage and reestablishment following storm events.**
- **Any realignment of low flow to create riparian pockets subject to damage following a storm event.**
- **Equestrian trail will be subject to damage from flows**
- **Maintenance of vegetation will be required to be monitored to assure conveyance of storm events**
- **Vector control**
- **Saltcedar removal and monitoring will be required**

4.6.6 Character Area 6 – West overbank from Grand Ave. to Casa del Rio Swale: This area of the project offers an exceptional opportunity to create a Sonoran Desert ecosystem that would be developed exclusively for mitigation and habitat development. The area of this zone (**Flood Control Overbank Property Acreage approximately 14.39 Acres**) is highly visible





from Grand Ave. and is secluded from access by the Sun City Channel and the railroad north of Grand Avenue. This area provides a tremendous visual area and buffer from Grand Avenue and has great existing potential in regards to existing vegetation that can be capitalized on when designing any enhancements to this area.

Character Area 6 Benefits:

- **Creates visual interest from Grand Avenue**
- **Mitigation credits for high habitat value and low or no human interaction**
- **Low overall and long term maintenance**
- **Transforms a landlocked parcel from a desolate unusable and inhospitable area to a useful desert pocket**
- **Opportunity to create microdepressions that will serve as water holding pockets to facilitate vegetation establishment**
- **Opportunity to preserve and capitalize on significant stands of existing palo verdes and Sonoran desert vegetation**
- **Opportunity to create a vegetative buffer for the existing residential areas to the west**
- **Opportunity to investigate whether Sun City channel can be rerouted or widened to provide storm water to habitat area**

Character Area 6 Considerations:

- **Automatic irrigation point of connection may be difficult to route and or obtain**
- **Access and visibility to the site**

4.6.7 Character Area 7 – West overbank from Casa del Rio Swale to New River Crossing: This area of the project offers an exceptional opportunity to create a Sonoran Desert ecosystem that would be developed for mitigation, habitat development and environmental education. This site (**Flood Control Overbank Property Acreage approximately 11.28 Acres**) offers one of the few areas that small intimate looped trail system could be developed to focus on education and making a link to the surrounding community. The goal and objective in this area will be in the ultimate development of the site through the combined efforts of FCDMC and the Plaza Del Rio Development.

Character Area 7 Benefits:

- **Mitigation credits for medium habitat value**
- **Opportunity to develop a Botanical walking path and garden for use by surrounding residents**
- **Opportunity to develop a Community trail area for use by the Plaza Del Rio residents and employees**



- **Low overall and long term maintenance**
- **Opportunity to create microdepressions that will serve as water holding pockets to facilitate vegetation establishment**
- **Opportunity to preserve and capitalize on significant stands of existing palo verdes and Sonoran desert vegetation**
- **Opportunity to create a visual and vegetative linkage to the Plaza Del Rio development to the west**
- **Opportunity to create a vegetative link to the exclusive mitigation zone located in area 7 to the south**
- **Opportunity to utilize the Casa del Rio wash as a strong component of the ultimate plan and design**

Character Area 7 Considerations:

- **Automatic irrigation point of connection may be difficult to route and or obtain**
- **Access by Plaza Del Rio residents and staff to this area may be difficult if access is not coordinated with surrounding development**
- **Visibility to the site**

4.6.8 Character Area 8 – West overbank from New River Crossing to 91st Ave. Channel Outlet: This area of the project offers an exceptional opportunity to create a Sonoran Desert ecosystem that would be developed for mitigation, habitat development and environmental education. This area offers a trail system that could be developed and focused on making a link to the surrounding community and specifically Freedom Plaza residents and staff use. The goal and objective in this area will be in the ultimate development of the site through the combined efforts of FCDMC, City of Peoria, and the Plaza Del Rio Development and Freedom Plaza management.

Character Area 8 Benefits:

- **Opportunity to develop a Community trail for use by Freedom Plaza residents and staff**
- **Low overall and long term maintenance**
- **Opportunity to create a visual and vegetative linkage to Freedom Plaza**
- **Opportunity to capitalize on and improve existing decomposed granite trail system that currently exist along the eastern portion of Freedom Plaza**

Character Area 8 Considerations:

- **Access by Freedom Plaza residents and staff to this area.**





- **91st Avenue Channel Bank Stabilization**
- **Private Land Ownership between 91st Avenue Channel and the River**

4.6.9 Character Area 9 – West overbank from 91st Ave Channel Outlet to Thunderbird Road: This area of the project offers an opportunity to improve an existing and potentially dangerous drainage situation while capitalizing on the tremendous vegetation that has matured along this drainage channel. There is a strong possibility that a pedestrian trail linkage from Freedom Plaza north could traverse through the mature Palo Verde stand of vegetation that has developed in association with the channel drainage. The possibility that the trail system will serve as one of the links to Freedom Plaza will dictate the increase in some design elements including the possibility of designing more frequent rest areas and overlooks.

Character Area 9 Benefits:

- **Opportunity to continue the Community trail for use by Freedom Plaza residents and staff north to Thunderbird Road**
- **Low overall and long term maintenance**
- **Opportunity to create a visual and vegetative link to Freedom Plaza**
- **Opportunity to capitalize on and improve existing vegetation that has matured along the 91st Ave channel**

Character Area 9 Considerations:

- **91st Avenue Channel Bank Stabilization**
- **Private Land Ownership between 91st Avenue Channel and the River**

4.7 Thunderbird to Drop Structure Character Areas

This portion of the overall corridor can be broken into 5 Character areas. The following is a summary for the graphic that is attached to this report.

4.7.1 Character Area 10 – Entire channel from Thunderbird Road to 500' north: The concept for this area is to preserve and/or enhance the existing riparian vegetation while creating a comfortable and interesting environment for people using the corridor. This area also represents a transition along the eastern edge from a more natural Sonoran desert habitat located south of Thunderbird to the turf, lake and active and planned recreation and public space of the Rio Vista Park area north of Thunderbird. This transition will be most noticeable in plant palette and selection of transition plant species.



Character Area 10 Benefits:

- **Opportunity to continue the Multi-Use concrete trail for use and linkage to Rio Vista Park**
- **Low overall and long term maintenance cost associated with concrete Multi-Use Trail**
- **Potential to create trail gateway in association with Park entry on the northeast quadrant and at the southeast quadrant**
- **Potential to utilize existing storm water outfalls from park and Desert Harbor subdivision as a means to create minor wetland habitat pockets**
- **Potential to link the Forum development and its residents to the river trail system and the river habitat**

Character Area 10 Considerations:

- **Multi-Use Concrete Trail along the eastern edge will be located within the 100 year floodplain and subject to inundation during this event.**
- **Multi-Use Concrete Trail under Thunderbird will be subject to potential flooding damage**
- **Limited Lower Sonoran mitigation areas available**
- **Forum resident use along western edge have ADA and accessibility issues that may require a portion of this trail be paved**
- **Saltcedar stands are moderately heavy and will require removal**

4.7.2 Character Area 11 – Entire channel from 500' north of Thunderbird Road to Drop Structure: This area is the tightest portion of the overall project corridor due to the lack of available right-of-way to widen the river channel. This will result in steeper banks and channel excavations to accommodate the SPF requirements. Currently the main Rio Vista Park road is below the SPF and will need to be protected through the use of natural earthen berming, a short flood wall, or a combination of both. The amount of soil and plant removal and regrading required within this character area will result in large areas that will require re-vegetation and mitigation which will be focused on the areas of disturbance which will primarily be the banks of the channel. The goal will be to maintain the invert in its natural condition with as little impact as possible.

Character Area 11 Benefits:

- **Opportunity to continue the Multi-Use concrete trail for use and linkage to Rio Vista Park**



- **Low overall and long term maintenance cost associated with concrete Multi-Use Trail along east side**
- **Opportunity to bench maintenance road/trail along western boundary of the project below Desert Harbor wall leaving views open for Desert Harbor residents and placing trail users into the river habitat**
- **Opportunity to add vegetation into this section of the corridor that currently is lacking significant vegetation along the banks and upland areas**
- **Opportunity to re-vegetate disturbed areas with plant materials that reflect the overall concept**

Character Area 11 Considerations:

- **Majority of the Multi-Use Concrete Trail along the eastern edge will be located within the 100 year flood plain and subject to inundation during this event.**
- **Maintenance Road/Trail along the western portion of the project will be located within the 100 year flood plain and subject to inundation during this event.**
- **Saltcedar stands are moderately heavy and will require removal**

4.7.3 Character Area 12 –Drop Structure: This area represents an extension of the wetland and riparian area while providing aesthetic relief of the drop structure. The vegetation in and around this structure will be somewhat limited because of the CSA and the associated structures above and below the drop structure, however strategically placed plant materials along the overbanks could assist in screening and softening this structures dominance of the landscape.

Character Area 12 Benefits:

- **Opportunity to mask the drop structure through the use of grouted stone veneer, staining to blend with native environment, and or utilizing historic glyphs to decorate the face of this structure.**
- **Opportunity to mask the existing CSA embankment that is associated with the drop structure through the use of grouted stone veneer, staining to blend with native environment, and or utilizing historic glyphs to decorate the face of these CSA slopes**
- **Opportunity to raise the elevation of the Multi-Use concrete trail system along the eastern boundary out of the 100 year event to link into Rio Vista Park**
- **Opportunity to create an equestrian crossing of the drop structure through the use of ramps or identification of areas**





along the drop structure that would safely allow equestrian passage.

- Opportunity to utilize the drop structure as a focal point of the corridor during storm events where the sight and sound of falling water can be observed and enjoyed

Character Area 12 Considerations:

- Bridge crossing location
- Saltcedar stands above the drop structure are extremely heavy and will require removal in order to prevent them from reseeding downstream

Bridge Structure Location:

The drop structure area is the most cost effective location for any proposed pedestrian bridge crossing of New River to Rio Vista Park. The J2 design team understands that the bridge structure is the total responsibility of the City of Peoria. The City has indicated that any pedestrian bridge within this corridor is a long range project with an estimate of 2007-2010 completion. The City has stated that the bridge will be a result of securing grants for its construction and a City council action for its approval. The City process will require its own public involvement review and approval process. Despite these facts, the J2 design team is addressing this location issue because the bridge's final design may impact the layout and design of the pedestrian and maintenance features that are considered part of this design contract. The J2 design team has located 4 potential locations for the bridge based on public involvement and engineering issues and we have attempted to outline the benefits and the considerations associated with each of the 4 bridge locations for discussion with both the FCDMC and the City of Peoria.

Bridge Structure at the Drop Structure Benefits:

Bridge Location 1

- River opening at the drop structure is the narrowest part of the river corridor minimizing bridge length and cost
- Opportunity to utilize the drop structure bank stabilization to assist in supporting the proposed pedestrian bridge crossing
- Capitalize on positive views into existing Skunk Creek Habitat and the Mesquite Bosque above the drop structure
- Opportunity to direct traffic away from Desert Harbor subdivision as soon as possible
- Limited view of drop structure minimizing need for enhancement to structure
- Good access into Rio Vista Park

Bridge Structure at the Drop Structure Considerations:





**Bridge
Location 1**

- Residents of Desert Harbor voiced strong opposition to location at Public meeting
- Little visibility from Desert Harbor Blvd.
- Perception that bridge will allow and/or promote an increase in vandalism and homeless activities on and or near the bridge
- Limited view of drop structure and associated waterfall during flows

Bridge Structure below (100' south) the Drop Structure Benefits:

**Bridge
Location 2**

- Opportunity to utilize the drop structure to assist in supporting the proposed pedestrian bridge crossing
- Opportunity to utilize the drop structure bank stabilization to assist in supporting the proposed pedestrian bridge crossing.
- Opportunity to direct traffic away from Desert Harbor subdivision early
- Good access to Rio Vista Park

Bridge Structure below (100' south) the Drop Structure Considerations:

**Bridge
Location 2**

- Residents of Desert Harbor voiced strong opposition to location at Public meeting
- Little visibility from Desert Harbor Blvd.
- Perception that bridge will allow and/or promote an increase in vandalism and homeless activities on and or near the bridge

Bridge Structure Below (350' south) Drop Structure Benefits:

**Bridge
Location 3**

- Opportunity to use drop structure as a visual feature and a waterfall allowing bridge users the potential to view the action of the water over the structure during flows
- Better visibility to the bridge from Desert Harbor Blvd.
- Good access to Rio Vista Park

Bridge Structure Below (350' south) the Drop Structure Considerations:

- Bridge cost increased because of long bridge length





**Bridge
Location 3**

- Perception that bridge will allow and or promote an increase in vandalism and homeless activities on and or near the bridge
- Increases length of western hard surface trail with associated structures to support trail (i.e. retaining walls, bank stabilization etc.)
- Future Multi-Use Trail approaches the low wall at Desert Harbor subdivision

Bridge Structure at the Forum Benefits:

**Bridge
Location 4**

- Best visibility to the bridge from Desert Harbor Blvd.
- Eliminates visual impact to surrounding residential areas and reduces perception of intrusion of backyard space
- Reduces perception that bridge will allow and/or promote an increase in vandalism and homeless activities on and or near the bridge because of increased visibility to bridge

Bridge Structure at the Forum Considerations:

**Bridge
Location 4**

- Bridge cost dramatically increased because of span differential
- Bridge cost dramatically increase because of river / bank stabilization required upstream and down stream of bridge location
- Project trail cost increases because of extension of concrete trail down to bridge location
- Increases length of western hard surface trail down to Forum will increase pedestrian traffic down to the Forum and back north.
- Creates inconvenient path to Rio Vista Park for traffic coming from north

4.7.4 **Character Area 13 – Paradise Shores:** This area represents the completion of the bank stabilization that has been installed north and south of this approximately 800 lineal foot section of New River. The goal of the J2 design team at this area is to match the existing bank stabilization, re-vegetate all disturbed areas along the bank and within the river corridor, remove the existing asphalt trail and replace with a concrete trail section connecting the concrete trails to the north and south of this section, and landscape and irrigate adjacent to the trail to match the existing planting design north and south of this connection.

Character Area 13 Benefits:

- Finalize missing bank stabilization





- **Eliminate asphalt trail replacing with concrete trail that matches the existing concrete trails to the north and the south**
- **Complete the landscape and irrigation system in this area so that the area is complete and consistent**

Character Area 12 Considerations:

- **Construction access**
- **Minimization of disturbance or damage to adjacent trails, landscape and irrigation system**

4.7.5 **Character Area 14 –Skunk Creek Trail Extension:** This area represents the completion and final linkage of a City of Peoria trail system that currently ends just east of 83rd Avenue. The goal within this character area will be to connect Rio Vista Park to the existing Peoria trail system. Because of engineering issues, the alignment and routing of this linkage will result in this trail being designed within Skunk Creek from Rio Vista Park to the 83rd Avenue connection. The design will be done to minimize environmental disturbance within Skunk Creek.

Character Area 14 Benefits:

- **Completes City of Peoria Trail connection to Rio Vista Park**
- **Allows for and accommodates equestrian users in Skunk Creek to connect to New River trail system**
- **Allows for safe and unimpeded pedestrian flow under both the SR101L Freeway and 83rd Avenue**
- **Opportunity for pedestrians to experience a reestablished wash habitat**
- **Opportunity for pedestrians to view into and get close to wetland mitigation zone currently within Skunk Creek**

Character Area 14 Considerations:

- **Construction access into Skunk Creek**
- **Coordination of trail system alignment with current Skunk Creek low flow channel construction**
- **Existing CSA, gabion bank protection and drainage outlets at Rio Vista Park may have to be altered to accommodate trail access and meet ADA guidelines**
- **Existing CSA at 83rd Ave will have to be altered to accommodate trail access and meet ADA guidelines**
- **Trails (equestrian and pedestrian) are subject to storm flows and associated damage and/or replacement**



- **Trails (equestrian and pedestrian) will have to traverse up and over Skunk Creek drop structure located in channel bottom between 83rd Ave and SR101L Freeway**
- **Skunk Creek impacts and construction will require 404 permits**

4.8 Saltcedar Removal

The amount and density of salt cedars within the river corridor have affected the overall plant diversity and habitats and the river hydraulics. The removal of this species is vitally important to river hydraulics and hydrology models and to the establishment of a true Sonoran desert riverine habitat. Our initial field investigations have indicated that north of Grand Avenue to just south of the Riverwalk apartments approximately 10% of the existing vegetation is Salt Cedar. From the Riverwalk apartments to Thunderbird Road Bridge 75% of the existing vegetation is Saltcedars. North of Thunderbird Road Bridge approximately 1600 LF we have estimated that 30-40% of the existing vegetation is Saltcedars. The area north of this point to a point south of the existing drop structure approximately 1200 LF we have estimated that 20-25% of the existing vegetation is Saltcedar and from there to the drop structure 50% or more of the existing vegetation is Saltcedar. Removal of this invasive species will benefit both the river hydrology and the riverine habitat.

Saltcedar infestations strongly affect native riparian plant and animal communities. They do so by rapidly gaining dominance and reducing biodiversity, especially in cottonwood and willow communities that are highly valuable for wildlife. Saltcedars invade both anthropogenically altered and unaltered natural riparian areas. Once invaded, riparian areas usually progress inexorably toward monotypic saltcedar thickets. Wildlife populations are harmed directly by saltcedars by the poor habitat they provide, and indirectly through changes they produce in the physical environment and to native plant communities. Most native wildlife species, especially the more specialized birds, insects, and aquatic organisms, are unable to adapt to saltcedars. They are unable to utilize saltcedar's tiny fruits and seeds and their unpalatable foliage. The stands also do not provide structure for cavity-dwelling species that are abundant in the native vegetation. Among birds, woodpeckers, raptors, and frugivores are absent in saltcedar-dominated areas, and populations of some insectivores and granivores are low and declining. Saltcedars are linked to the decline in populations of at least 41 of the 51 species of endangered or threatened animals and plants that occur in saltcedar-infested areas of the West. Adult pollinating insects are abundant in saltcedars but immature insects and foliage, fruit, seed-feeding, and wood-boring species are generally absent. Saltcedars cause springs and small streams to dry up, forcing terrestrial animals to relocate or perish. Their degradation of stream channel structure and water quality reduces populations of aquatic plants and invertebrates. This reduces food resources, damages breeding sites, and causes population declines of many rare desert fish species and some amphibians and reptiles. An unprecedented development in wildlife use of saltcedar habitat is the recent finding that the endangered southwestern subspecies of the willow flycatcher (*Empidonax traillii* Audubon subspecies *extimus* Phillips) has begun using saltcedars as nesting substrate, especially in some areas of Arizona. Analysis





of the many field studies and observations indicate that this usage of saltcedar by the southwestern willow flycatcher is superficial.

Saltcedar invasions of riparian areas result from its several innate, aggressive characteristics and its unfortunate feed-forward interactions with both abiotic and biotic environmental factors. Saltcedars gain dominance over native plant communities by directly outcompeting the native plants during their growth phase and by preempting their nursery sites as floodwaters recede and expose bare sand and mud bars. An important factor is that cottonwoods and willows produce seeds only for a short period in the spring, whereas most species of saltcedars produce seeds throughout most of the growing season. This gives saltcedars a strong advantage in areas of summer rains in the Southwest and below large dams where the natural high spring floods are regulated to low floods into the summer or fall. Most saltcedars can germinate whenever the floods recede but the natives cannot. Saltcedars gain a further indirect advantage through their changes to the physical environment (lowered water tables, increased soil salinity, and wildfires), the differential effects of livestock and wildlife browsing and insect attack, and even some control practices, all of which damage the native plants but for which saltcedar has moderate to high tolerance.

It is recommended that all saltcedar within the corridor be removed through a combination of mechanical and chemical treatments. Eradication of this species will not only benefit this corridor, but riparian zones upstream and downstream of this scope.





Appendices





i. Graphics





New River Channel Grand Avenue to Skunk Creek

PHOTO INVENTORY SHEETS

Photos taken on September 2, 3, & 5





PHOTO INVENTORY SHEET

Location #1



PHOTO #1N



PHOTO #1E

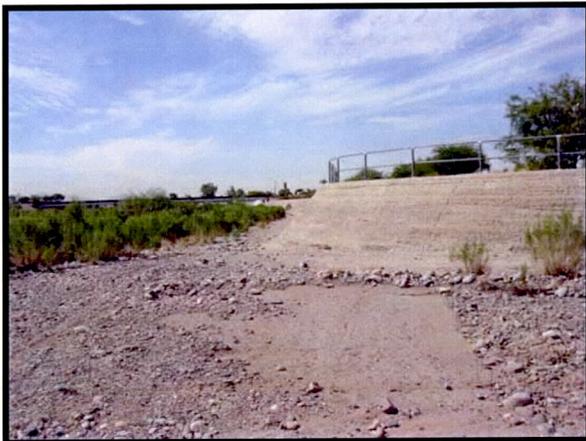


PHOTO #1S



PHOTO #1W



PHOTO INVENTORY SHEET

Location #2



PHOTO #2N



PHOTO #2E



PHOTO #2S



PHOTO #2W



PHOTO INVENTORY SHEET

Location #3



PHOTO #3N



PHOTO #3E



PHOTO #3S

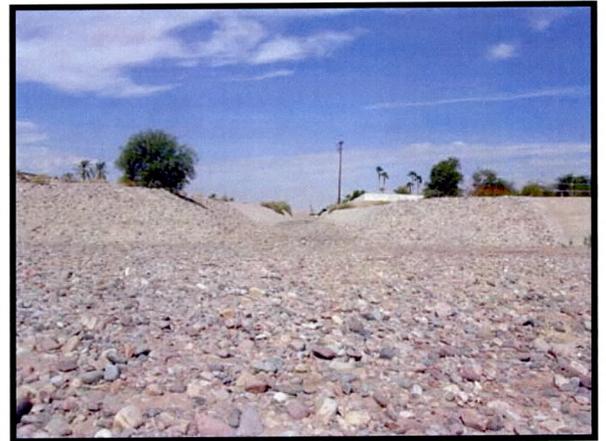


PHOTO #3W



PHOTO INVENTORY SHEET

Location #4

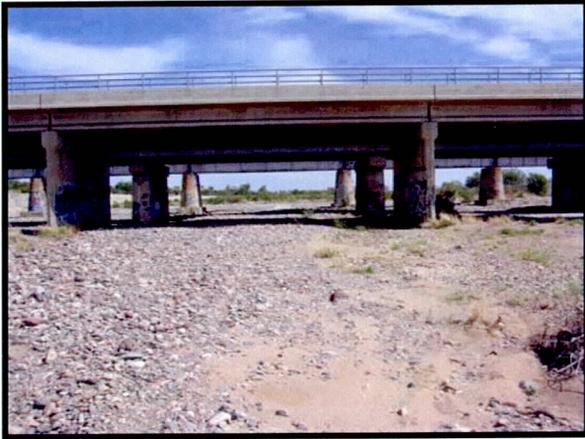


PHOTO #4N



PHOTO #4E



PHOTO #4S



PHOTO #4W



PHOTO INVENTORY SHEET

Location #5



PHOTO #5N



PHOTO #5E

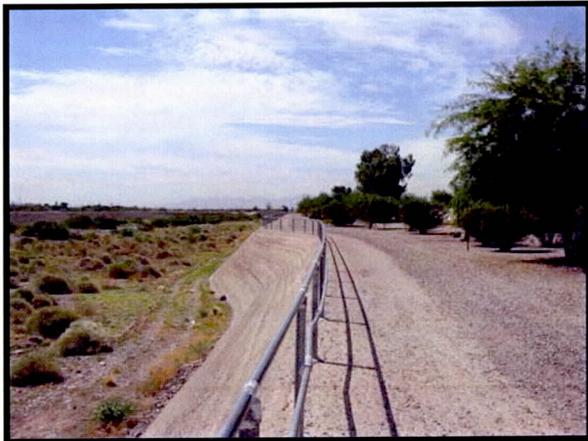


PHOTO #5S



PHOTO #5W



PHOTO INVENTORY SHEET

Location #6



PHOTO #6N



PHOTO #6E

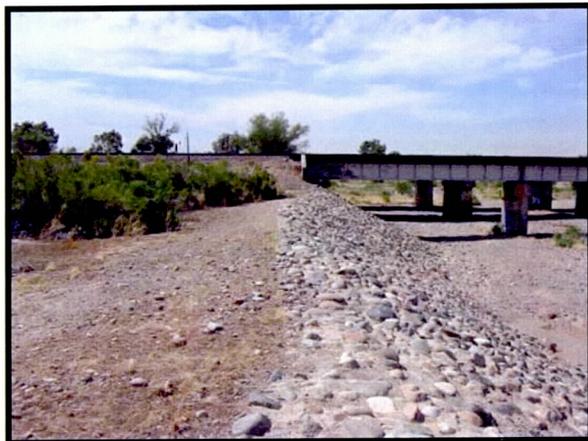


PHOTO #6S



PHOTO #6W



PHOTO INVENTORY SHEET

Location #7



PHOTO #7N



PHOTO #7E



PHOTO #7S



PHOTO #7W



PHOTO INVENTORY SHEET

Location #8



PHOTO #8N



PHOTO #8E



PHOTO #8S

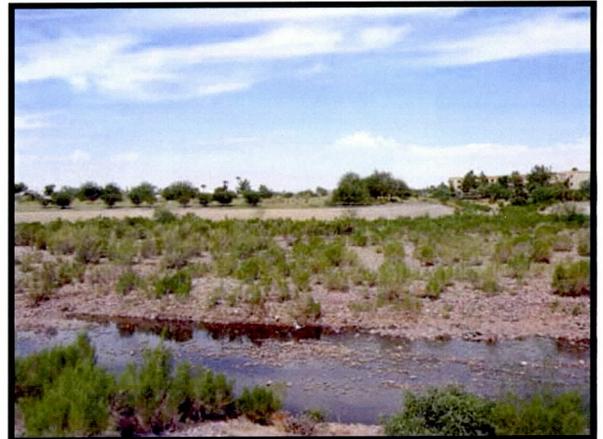


PHOTO #8W



PHOTO INVENTORY SHEET

Location #9



PHOTO #9N



PHOTO #9E



PHOTO #9S



PHOTO #9W



PHOTO INVENTORY SHEET

Location #10



PHOTO #10N



PHOTO #10E



PHOTO #10S



PHOTO #10W



PHOTO INVENTORY SHEET

Location #11



PHOTO #11N



PHOTO #11E



PHOTO #11S



PHOTO #11W



PHOTO INVENTORY SHEET

Location #12



PHOTO #12N



PHOTO #12E



PHOTO #12S



PHOTO #12W



PHOTO INVENTORY SHEET

Location #13



PHOTO #13N

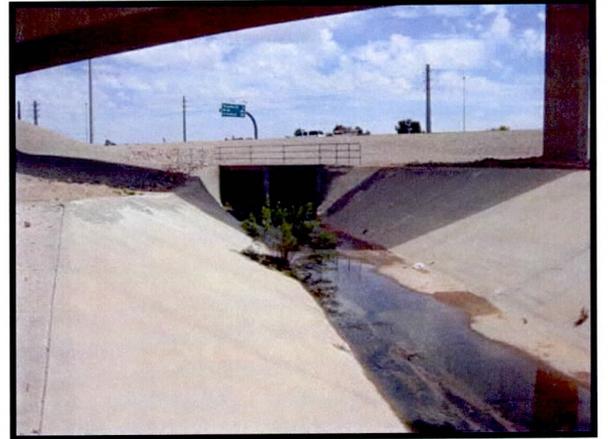


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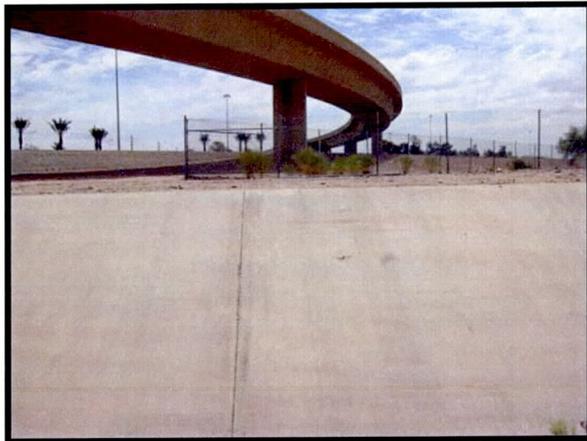


PHOTO #13S



PHOTO #13W



PHOTO INVENTORY SHEET

Location #14



PHOTO #14N



PHOTO #14E



PHOTO #14S

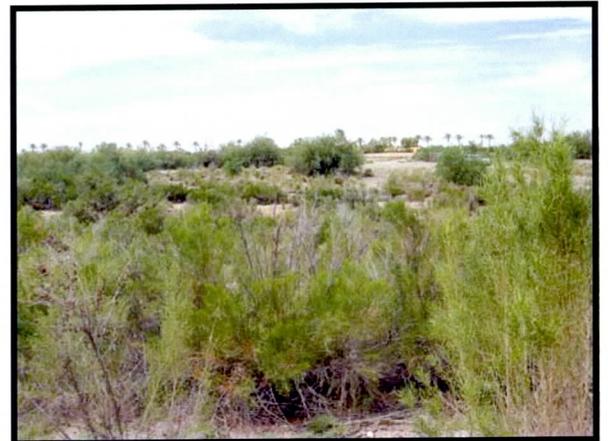


PHOTO #14W



PHOTO INVENTORY SHEET

Location #15



PHOTO #15N

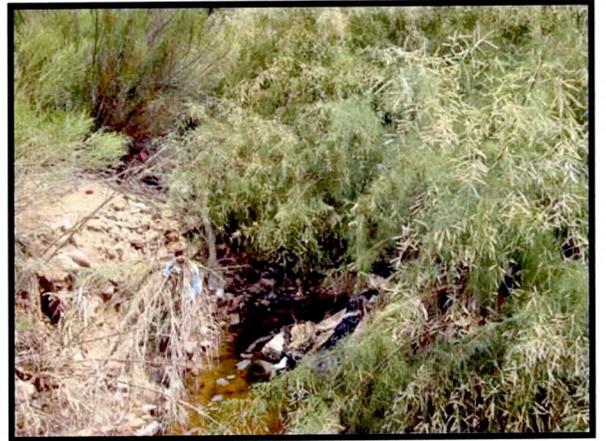


PHOTO #15E



PHOTO #15S



PHOTO #15W



PHOTO INVENTORY SHEET

Location #16



PHOTO #16N



PHOTO #16E

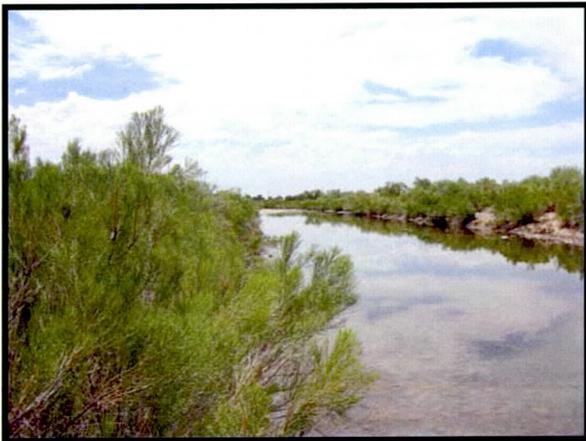


PHOTO #16S



PHOTO #16W



PHOTO INVENTORY SHEET

Location #17



PHOTO #17N

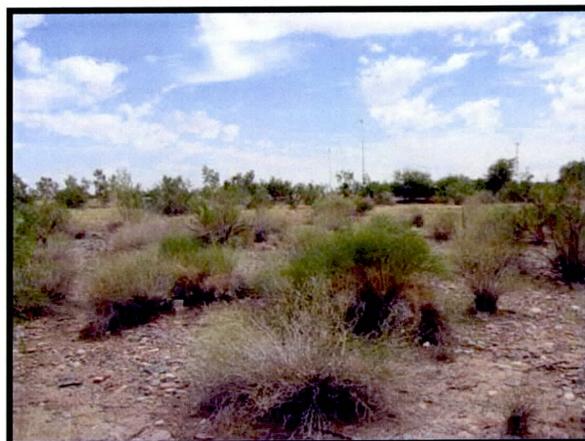


PHOTO #17E



PHOTO #17S



PHOTO #17W



PHOTO INVENTORY SHEET

Location #18



PHOTO #18N



PHOTO #18E



PHOTO #18S



PHOTO #18W



PHOTO INVENTORY SHEET

Location #19



PHOTO #19N



PHOTO #19E



PHOTO #19S



PHOTO #19W



PHOTO INVENTORY SHEET

Location #20



PHOTO #20N



PHOTO #20E



PHOTO #20S

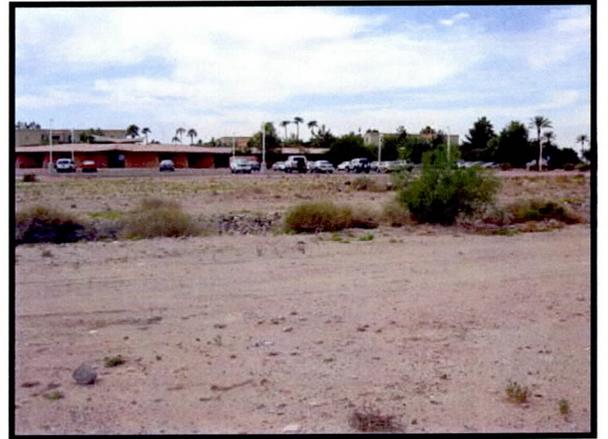


PHOTO #20W



PHOTO INVENTORY SHEET

Location #21



PHOTO #21N



PHOTO #21E



PHOTO #21S



PHOTO #21W



PHOTO INVENTORY SHEET

Location #22



PHOTO #22N



PHOTO #22E



PHOTO #22S



PHOTO #22W



PHOTO INVENTORY SHEET

Location #23



PHOTO #23N



PHOTO #23E



PHOTO #23S



PHOTO #23W



PHOTO INVENTORY SHEET

Location #24

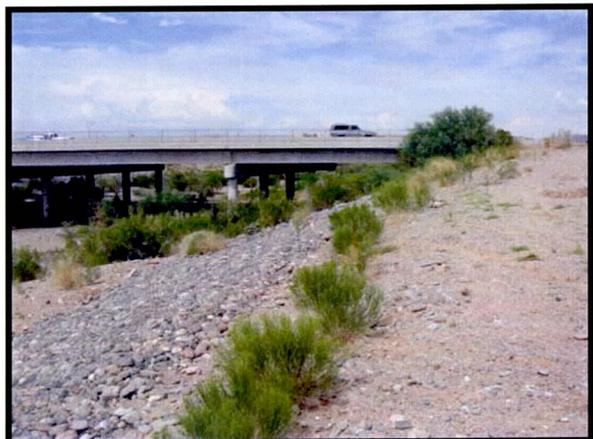


PHOTO #24N



PHOTO #24E



PHOTO #24S



PHOTO #24W



PHOTO INVENTORY SHEET

Location #25

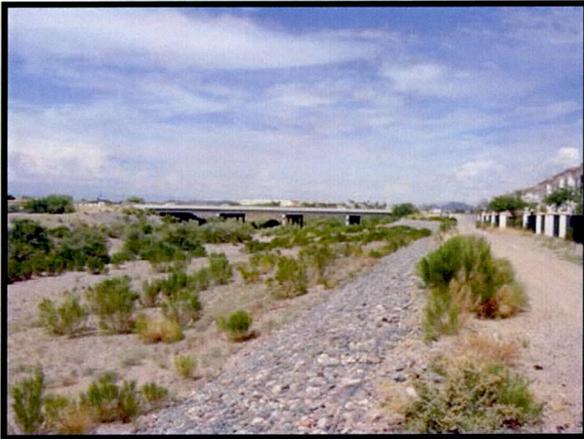


PHOTO #25N



PHOTO #25E



PHOTO #25S



PHOTO #25W



PHOTO INVENTORY SHEET

Location #26



PHOTO #26N



PHOTO #26E



PHOTO #26S



PHOTO #26W



PHOTO INVENTORY SHEET

Location #27



PHOTO #27N



PHOTO #27E



PHOTO #27S



PHOTO #27W



PHOTO INVENTORY SHEET

Location #28



PHOTO #28N



PHOTO #28E



PHOTO #28S



PHOTO #28W



PHOTO INVENTORY SHEET

Location #29



PHOTO #29N



PHOTO #29E



PHOTO #29S



PHOTO #29W



PHOTO INVENTORY SHEET

Location #30



PHOTO #30N



PHOTO #30E



PHOTO #30S



PHOTO #30W



PHOTO INVENTORY SHEET

Location #31



PHOTO #31N



PHOTO #31E



PHOTO #31S



PHOTO #31W



PHOTO INVENTORY SHEET

Location #32



PHOTO #32N



PHOTO #32E



PHOTO #32S



PHOTO #32W



PHOTO INVENTORY SHEET

Location #33



PHOTO #33N

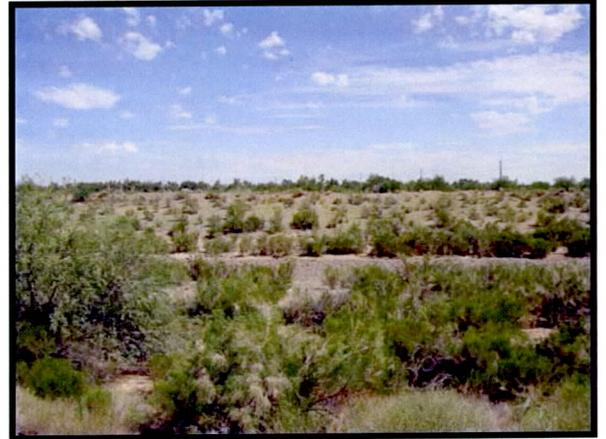


PHOTO #33E



PHOTO #33S



PHOTO #33W



PHOTO INVENTORY SHEET

Location #34



PHOTO #34N



PHOTO #34E



PHOTO #34S



PHOTO #34W



PHOTO INVENTORY SHEET

Location #35



PHOTO #35N



PHOTO #35E



PHOTO #35S



PHOTO #35W



PHOTO INVENTORY SHEET

Location #36



PHOTO #36N



PHOTO #36E



PHOTO #36S



PHOTO #36W



PHOTO INVENTORY SHEET

Location #37



PHOTO #37N



PHOTO #37E



PHOTO #37S



PHOTO #37W



PHOTO INVENTORY SHEET

Location #38



PHOTO #38N



PHOTO #38E



PHOTO #38S



PHOTO #38W



PHOTO INVENTORY SHEET

Location #39



PHOTO #39N



PHOTO #39E



PHOTO #39S



PHOTO #39W



PHOTO INVENTORY SHEET

Location #40



PHOTO #40N

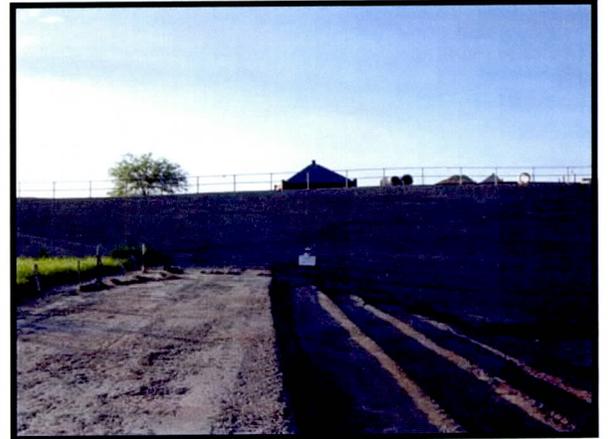


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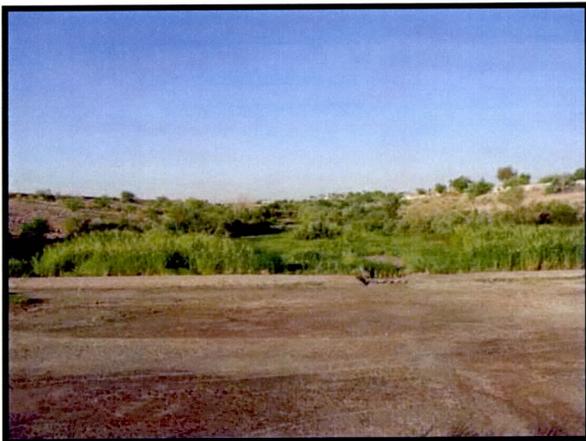


PHOTO #40S



PHOTO #40W



PHOTO INVENTORY SHEET

Location #41



PHOTO #41NW

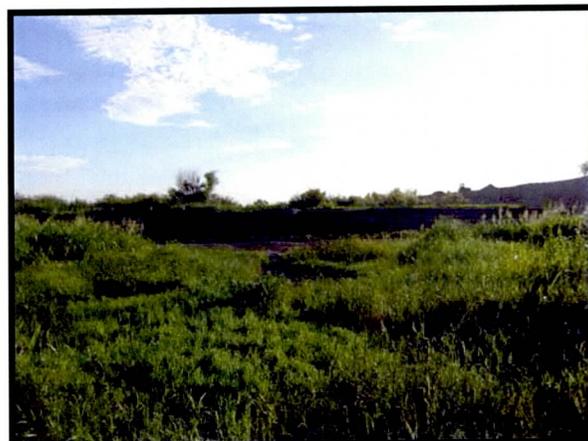


PHOTO #41NE



PHOTO #41SE

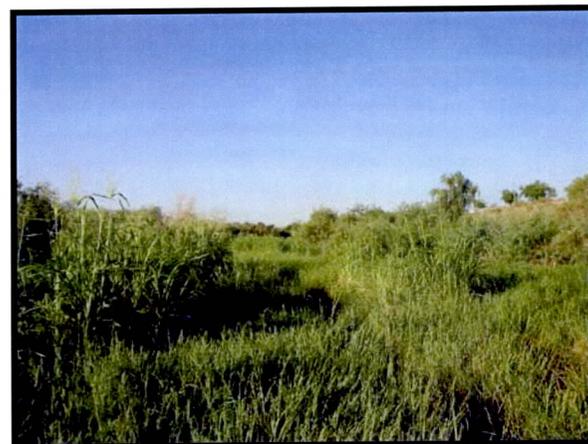


PHOTO #41SW



PHOTO INVENTORY SHEET

Location #42



PHOTO #42NW

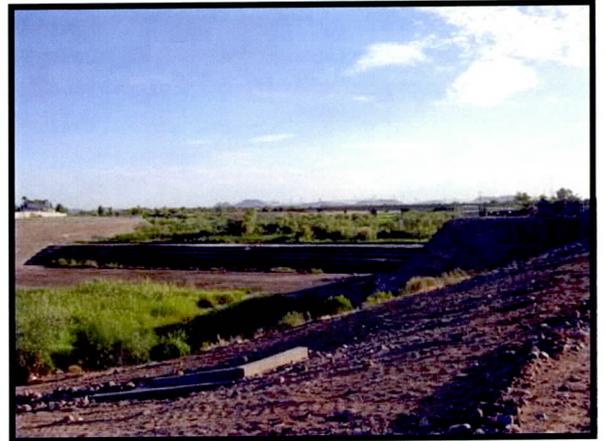


PHOTO #42NE



PHOTO #42SE

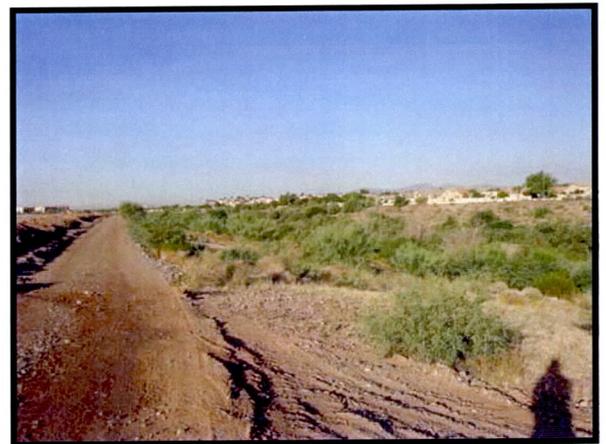


PHOTO #42SW



PHOTO INVENTORY SHEET

Location #43



PHOTO #43NW

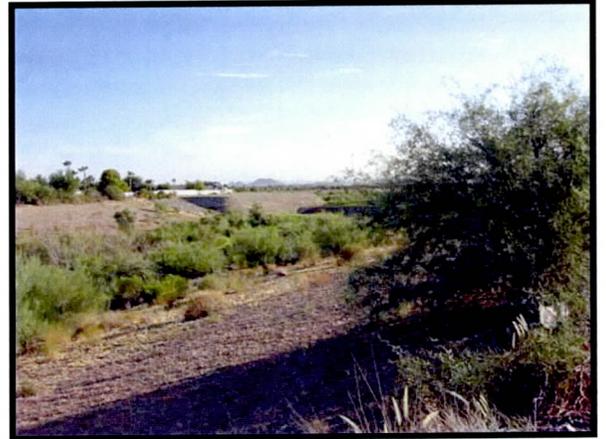


PHOTO #43NE



PHOTO #43SE



PHOTO #43SW



PHOTO INVENTORY SHEET

Location #44



PHOTO #44NW

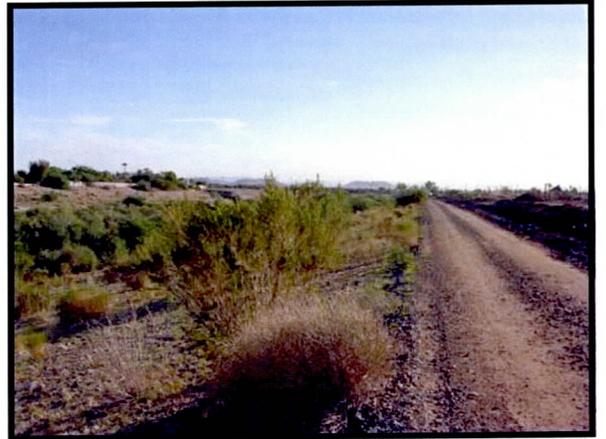


PHOTO #44NE



PHOTO #44SE



PHOTO #44SW



PHOTO INVENTORY SHEET

Location #45



PHOTO #45N



PHOTO #45E



PHOTO #45S



PHOTO #45W



PHOTO INVENTORY SHEET

Location #46



PHOTO #46NW



PHOTO #46NE



PHOTO #46SE

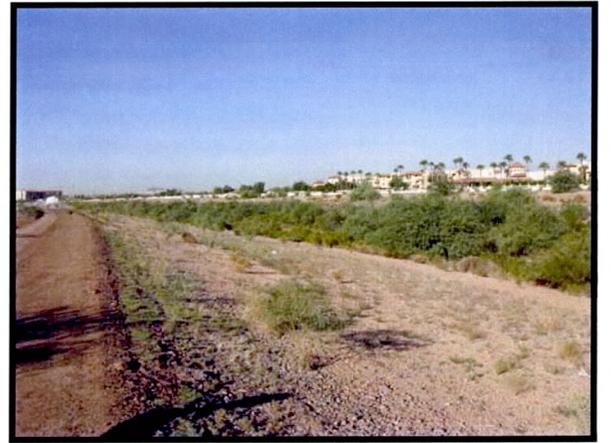


PHOTO #46SW



PHOTO INVENTORY SHEET

Location #47

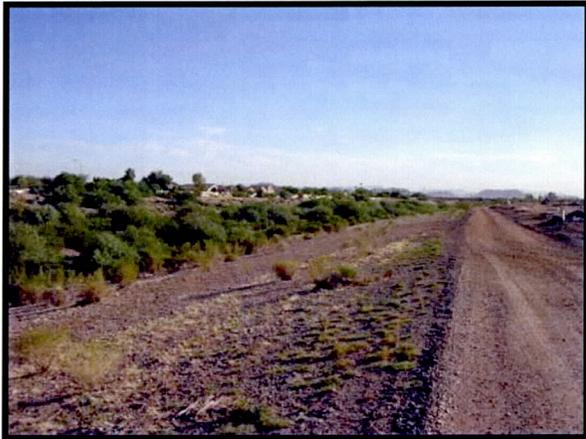


PHOTO #47NE



PHOTO #47NW



PHOTO #47SE



PHOTO #47SW



PHOTO INVENTORY SHEET

Location #48



PHOTO #48NW



PHOTO #48NE



PHOTO #48SE



PHOTO #48SW



PHOTO INVENTORY SHEET

Location #49



PHOTO #49E



PHOTO #49N

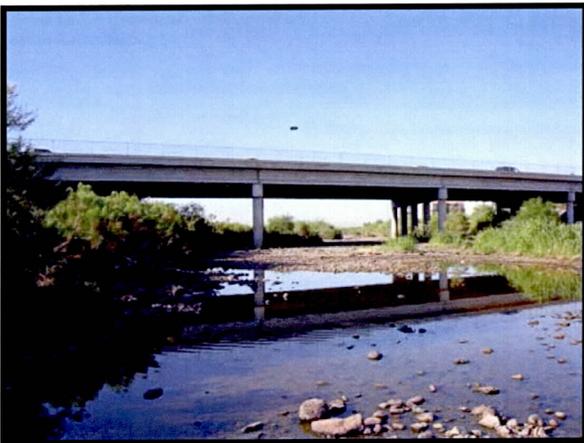


PHOTO #49S



PHOTO #49W



PHOTO INVENTORY SHEET

Location #50



PHOTO #50NW



PHOTO #50NE



PHOTO #50SE



PHOTO #50SW



PHOTO INVENTORY SHEET

Location #51



PHOTO #51NE

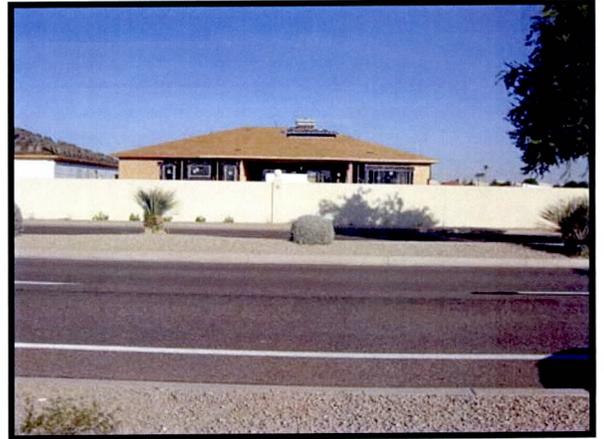


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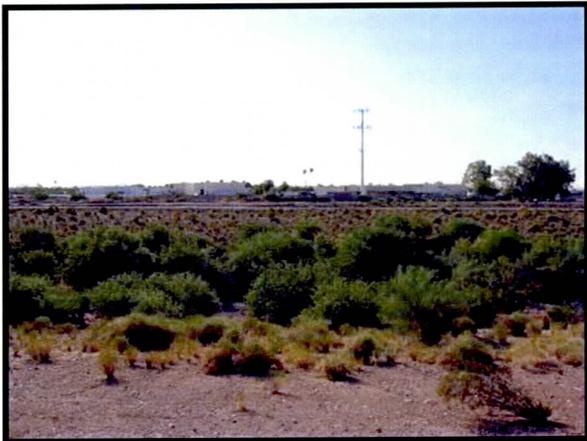


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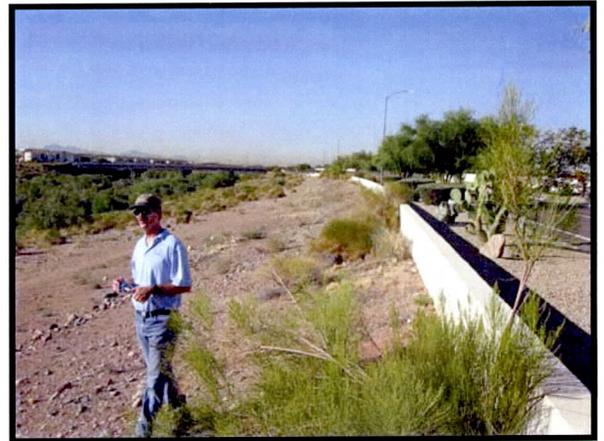


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PHOTO INVENTORY SHEET

Location #52

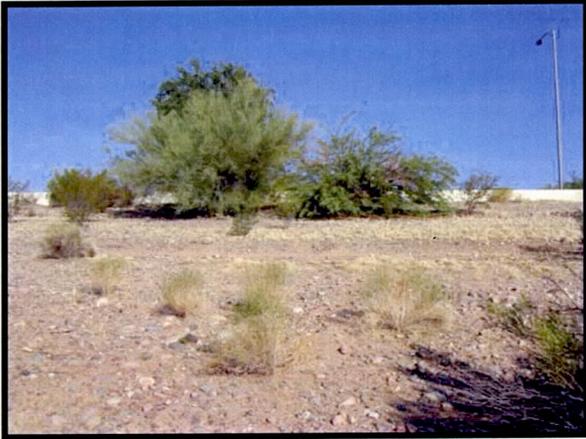


PHOTO #52NW



PHOTO #52NE



PHOTO #52SE



PHOTO #52SW



PHOTO INVENTORY SHEET

Location #53



PHOTO #53NE

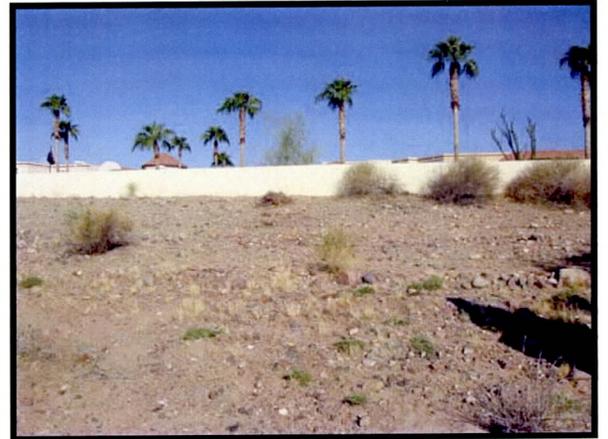


PHOTO #53NW



PHOTO #53SE



PHOTO #53SW



PHOTO INVENTORY SHEET

Location #54



PHOTO #54NW



PHOTO #54NE



PHOTO #54SE



PHOTO #54SW



PHOTO INVENTORY SHEET

Location #55



PHOTO #55NE



PHOTO #55NW



PHOTO #55SE



PHOTO #55SW



PHOTO INVENTORY SHEET

Location #56

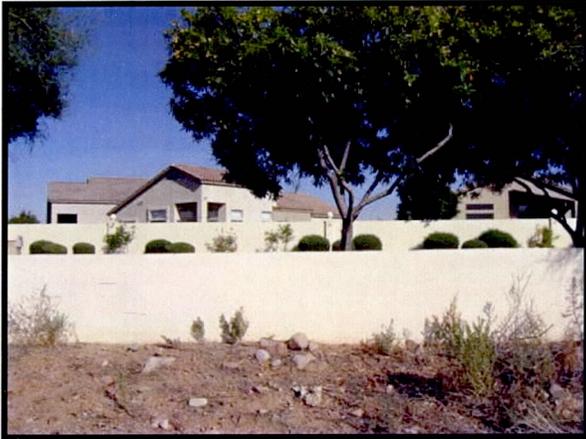


PHOTO #56NW



PHOTO #56NE



PHOTO #56SE



PHOTO #56SW



PHOTO INVENTORY SHEET

Location #57



PHOTO #57NE



PHOTO #57NW



PHOTO #57SE



PHOTO #57SW



PHOTO INVENTORY SHEET

Location #58

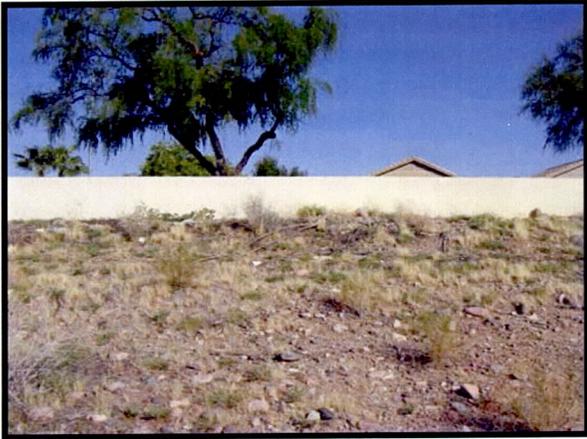


PHOTO #58NW



PHOTO #58NE



PHOTO #58SE



PHOTO #58SW



PHOTO INVENTORY SHEET

Location #59



PHOTO #59N

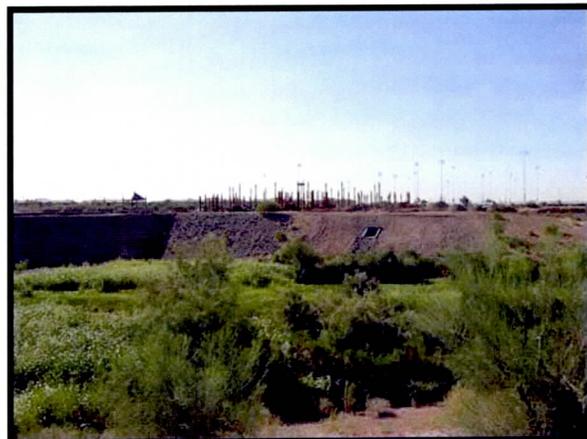


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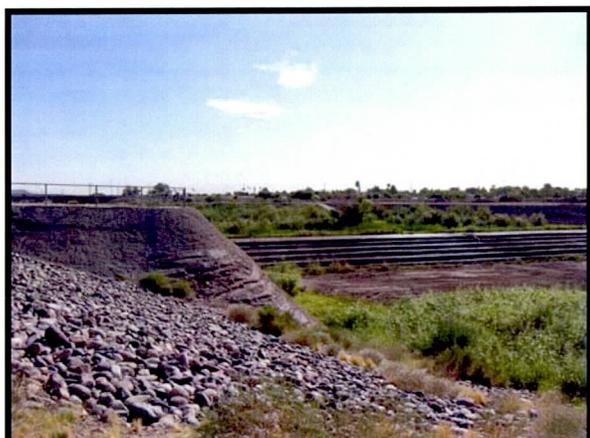


PHOTO #59NE



PHOTO #59S



PHOTO #59SW



PHOTO #59W



PHOTO INVENTORY SHEET

Location #60



PHOTO #60NW



PHOTO #60NE



PHOTO #60SE

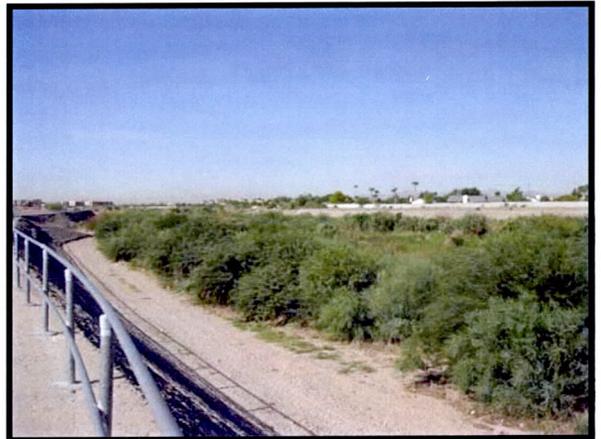


PHOTO #60SW



PHOTO INVENTORY SHEET

Location #61

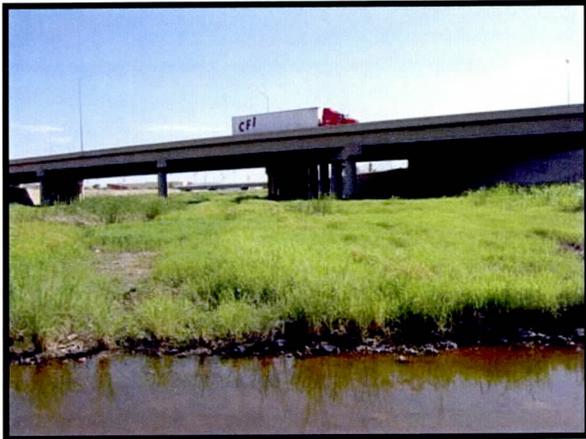


PHOTO #61NE



PHOTO #61NW



PHOTO #61SE



PHOTO #61SW



PHOTO INVENTORY SHEET

Location #62



PHOTO #62N

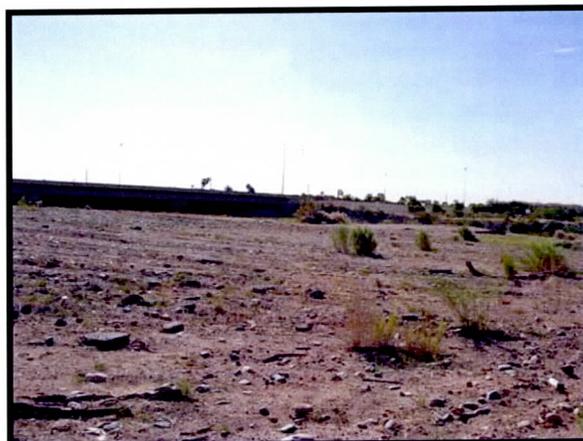


PHOTO #62E



PHOTO #62S



PHOTO #62W



PHOTO INVENTORY SHEET

Location #63



PHOTO #63N



PHOTO #63E



PHOTO #63S

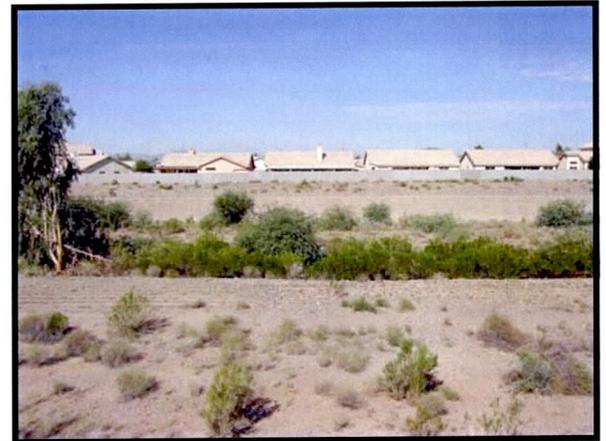


PHOTO #63W



PHOTO INVENTORY SHEET

Location #64



PHOTO #64N



PHOTO #64E



PHOTO #64S



PHOTO #64W



PHOTO INVENTORY SHEET

Location #65



PHOTO #65N



PHOTO #65E



PHOTO #65S



PHOTO #65W



PHOTO INVENTORY SHEET

Location #66



PHOTO #66N

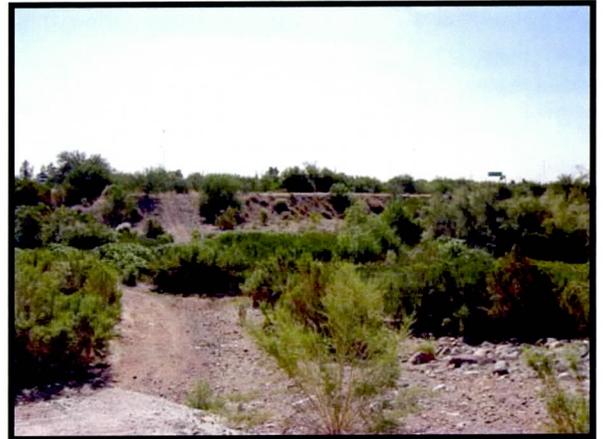


PHOTO #66E



PHOTO #66S



PHOTO #66W



PHOTO INVENTORY SHEET

Location #67



PHOTO #67N



PHOTO #67E



PHOTO #67S



PHOTO #67W



PHOTO INVENTORY SHEET

Location #68



PHOTO #68N



PHOTO #68E



PHOTO #68S



PHOTO #68W



PHOTO INVENTORY SHEET

Location #69



PHOTO #69N



PHOTO #69E



PHOTO #69S



PHOTO #69W



PHOTO INVENTORY SHEET

Location #70



PHOTO #70N



PHOTO #70E



PHOTO #70S

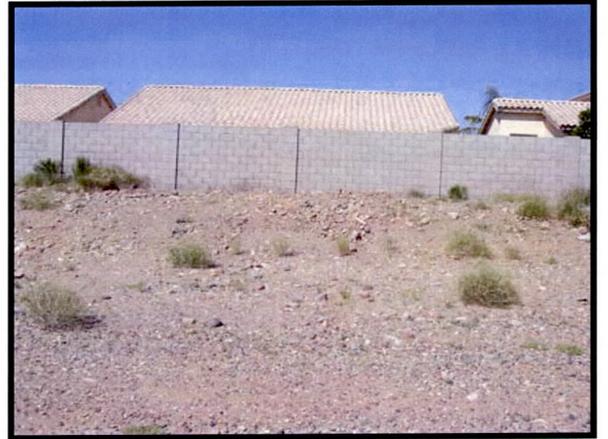


PHOTO #70W



PHOTO INVENTORY SHEET

Location #71

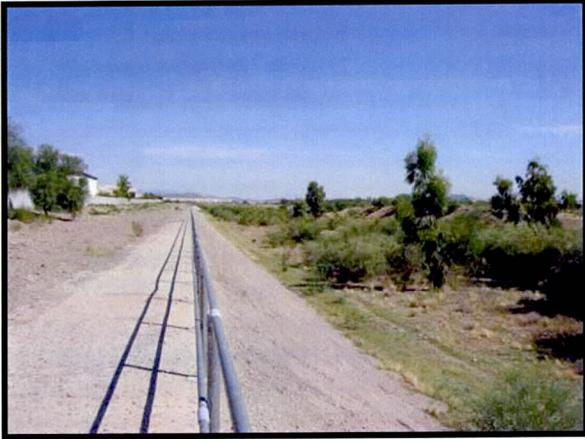


PHOTO #71N

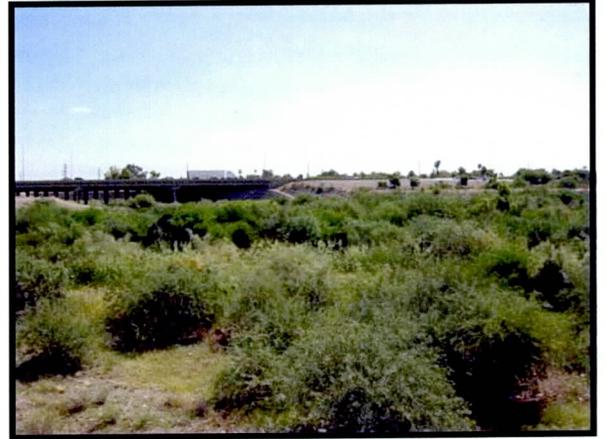


PHOTO #71E



PHOTO #71S



PHOTO #71W



PHOTO INVENTORY SHEET

Location #72



PHOTO #72N



PHOTO #72NE



PHOTO #72SE



PHOTO #72SW



PHOTO #72W



PHOTO INVENTORY SHEET

Location #73



PHOTO #73N



PHOTO #73E



PHOTO #73S

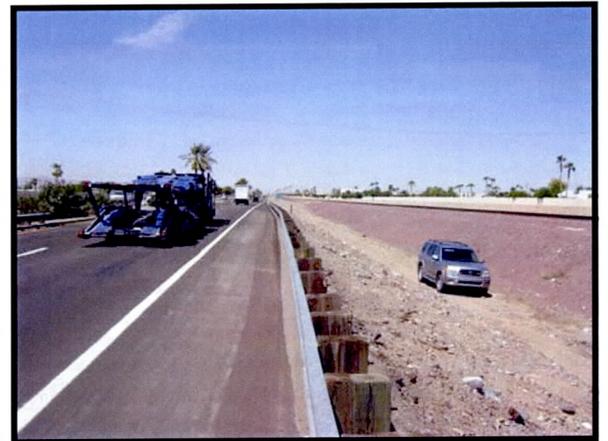


PHOTO #73W



PHOTO INVENTORY SHEET

Location #74

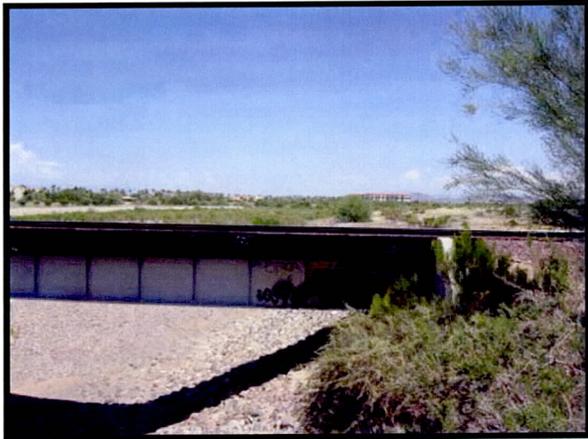


PHOTO #74N



PHOTO #74E



PHOTO #74S



PHOTO #74W



PHOTO INVENTORY SHEET

Location #75

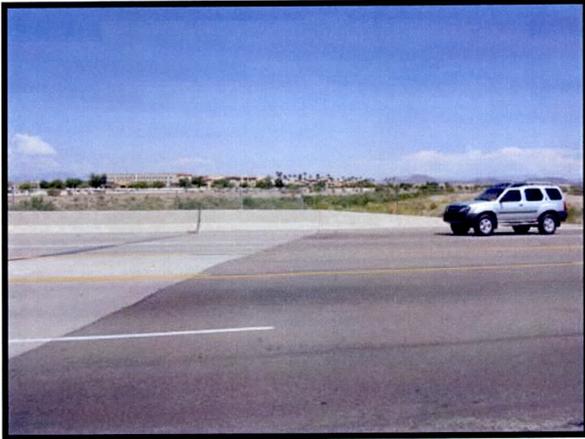


PHOTO #75N



PHOTO #75E



PHOTO #75S



PHOTO #75W



PHOTO INVENTORY SHEET

Location #76

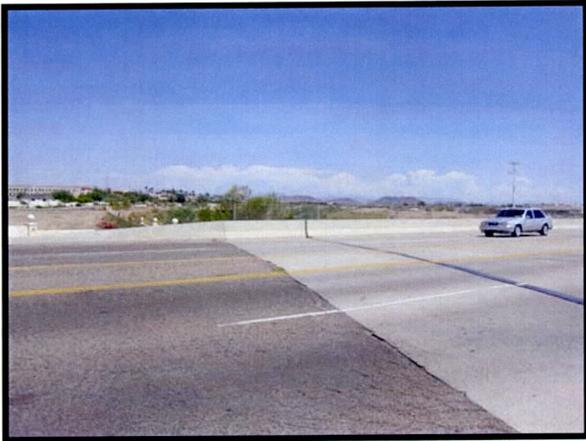


PHOTO #76N



PHOTO #76E



PHOTO #76S

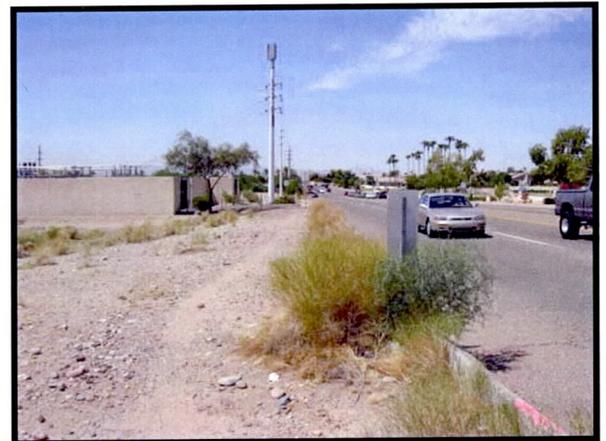


PHOTO #76W



PHOTO INVENTORY SHEET

Location #77



PHOTO #77N



PHOTO #77E



PHOTO #77S



PHOTO #77W



PHOTO INVENTORY SHEET

Location #78



PHOTO #78N



PHOTO #78NW

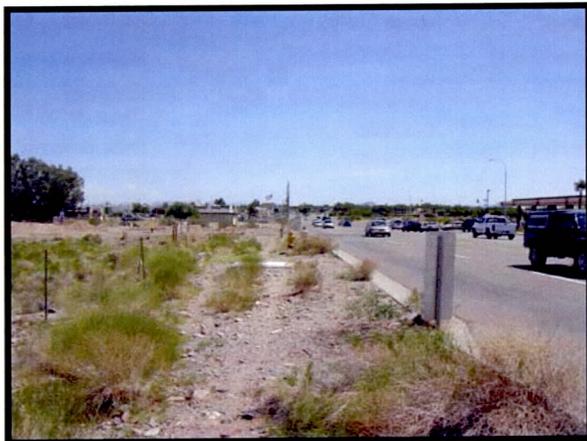


PHOTO #78E

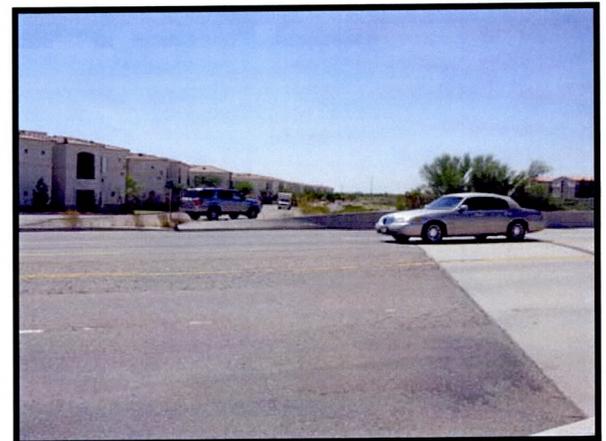


PHOTO #78S



PHOTO #78S



PHOTO INVENTORY SHEET

Location #79



PHOTO #79N



PHOTO #79NE



PHOTO #79S



PHOTO #79SW



PHOTO INVENTORY SHEET

Location #80



PHOTO #80N

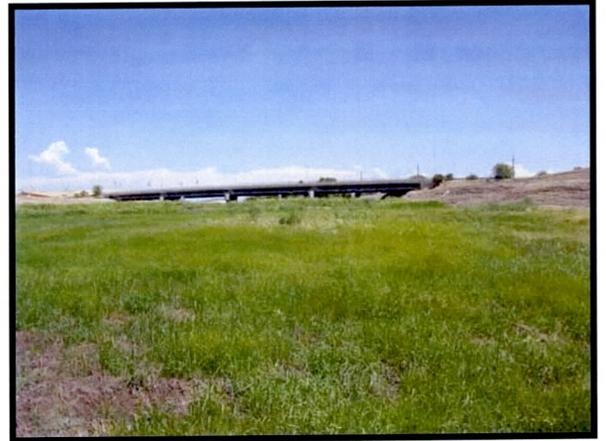


PHOTO #80NE



PHOTO #80SE



PHOTO #80SW



PHOTO INVENTORY SHEET

Location #81



PHOTO #81NW



PHOTO #81NE



PHOTO #81SE



PHOTO #81SW



PHOTO INVENTORY SHEET

Location #82



PHOTO #82N

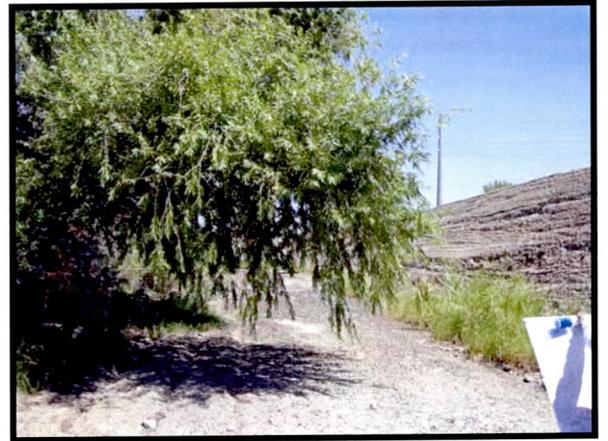


PHOTO #82NE



PHOTO #82SE

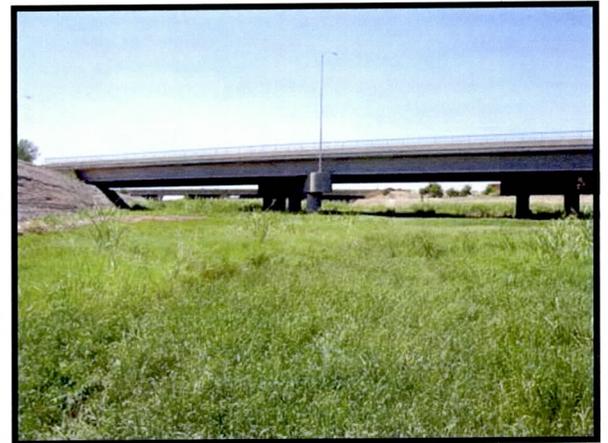


PHOTO #82SW



PHOTO INVENTORY SHEET

Location #83

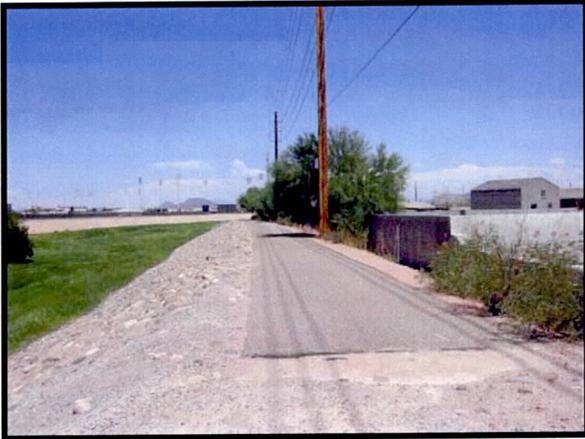


PHOTO #83NE



PHOTO #83NW



PHOTO #83S



PHOTO #83SW



PHOTO INVENTORY SHEET

Location #84



PHOTO #84N



PHOTO #84NE



PHOTO #84S



PHOTO #84SW



PHOTO INVENTORY SHEET

Location #85

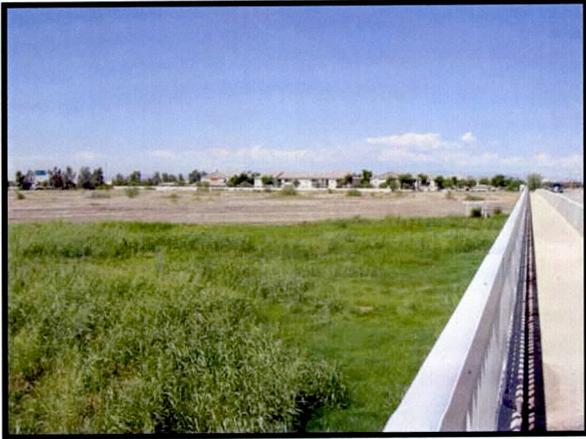


PHOTO #85N



PHOTO #85NE



PHOTO #85S



PHOTO #85SW



PHOTO #85NW



New River Channel Grand Avenue to Skunk Creek

SCENERY RESOURCES INVENTORY RATING FORMS



Scenery / Resources Inventory Rating Form



PROJECT NAME: New River Channel

PROJECT LOCATION: Grand Ave. to Skunk Creek & Paradise Shores

Evaluators:	Jason Long	Date: September 5, 2003
	Jeff Velasquez	J2 Job Number: 3033
		Client Project Number:

Scenery / Resources Rating Units

Photo Station	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
1N	3	4	2	3	3	4	2	21	C	FG - dense burrobrush / desert broom MG - New River corridor to NE BG - 101 ramp
1E	3	4	3	4	4	5	3	26	B	FG - dense burrobrush / desert broom MG - open space & 101 BG - indistinguishable
1S	4	4	2	3	3	4	2	22	C	FG - Sun City channel MG - dense burrobrush/des. broom/Mx. palo verde BG - mountain range
1W	2	4	1	3	2	3	2	17	C	FG - dense burrobrush / desert broom/ CSA banks MG - medical building BG - indistinguishable
2N	4	4	7	4	4	5	3	31	B	FG - standing H2O / burrobrush / des. broom MG - New River channel BG - Freedom Plaza / mountains
2E	2	4	7	4	3	5	3	28	B	FG - standing H2O / burrobrush / des. broom MG - palo verde buffer / CSA bank BG - indistinguishable
2S	3	2	6	2	2	3	2	20	C	FG - standing H2O / Grand Ave. MG - vegetation in New River BG - mountains
2W	2	2	1	2	2	3	2	14	C	FG - west CSA bank MG - desert trees in open space BG - indistinguishable
3N	2	2	5	2	2	1	2	16	C	FG - river rock low-flow MG - open water / minimal riparian plants BG - Freedom Plaza, mountains
3E	1	2	1	1	2	1	1	9	D	FG - river rock low-flow MG - river rock and CSA bank BG - adjacent trees on overbank and off site
3S	2	2	1	1	2	1	1	10	D	FG - river rock, concrete low-flow MG - Grand Ave. railroad bridge BG - bank trees
3W	1	1	1	1	2	1	1	8	D	FG - river rock low-flow MG - grouted riprap / CSA bank BG - various scattered trees

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
4N	2	2	2	1	1	1	1	10	D	FG - river rock low-flow MG - Grand Ave. bridge BG - distant low-flow and overbank trees
4E	2	2	1	2	2	1	1	11	C	FG - Native Mesquite and low-flow scrub plants MG - CSA bank BG - adjacent Eucalyptus trees
4S	3	3	1	2	2	1	1	13	C	FG - river rock low-flow, soil, low-flow plants MG - native trees at bank BG - adjacent Euc. Trees & Estrella Mountains
4W	1	2	1	2	1	1	1	9	D	FG - river rock low-flow and plants MG - CSA bank BG - billboard, automotive shop
5N	2	2	1	2	2	2	1	12	C	FG - CSA bank MG - Palo Verde, Parkinsonia trees & bridge BG - Freedom Plaza, distant mountains
5E	1	2	1	2	2	1	2	11	C	FG - Palo Verde and low-flow scrub plants MG - low-flow and CSA bank BG - distant vegetation
5S	3	3	1	3	3	1	2	16	C	FG - vegetated low-flow and CSA bank MG - Mesquite trees at overbank BG - Estrella Mountains
5W	1	4	0	3	3	1	3	15	C	FG - irrigation equipment enclosure MG - xeriscape planting & slump block wall BG - pine trees off site
6N	2	3	1	2	2	2	2	14	C	FG - CSA overbank w/ handrail MG - burrobrush/desert broom in low-flow BG - trees, Sun Health Development across river
6E	2	3	0	2	3	1	1	12	C	FG - bare ground, scrub plants MG - naturalized vegetation BG - ADOT trees along 101 frwy.
6S	3	3	0	3	3	1	2	15	C	FG - grouted riprap bank, bare ground MG - Desert Broom plants BG - Grand Ave. railroad bridge, trees
6W	2	2	1	2	2	2	1	12	C	FG - overbank planting, cobble groundplane MG - river rock low-flow BG - grouted riprap bank & Grand outfall channel
7N	2	4	1	3	3	2	3	18	C	FG - CSA overbank w/ handrail MG - burrobrush/desert broom in low-flow BG - trees across river, Freedom Plaza
7E	2	2	0	2	2	1	2	11	C	FG - bare ground, scrub plants MG - sparse naturalized vegetation BG - ADOT trees along 101 frwy.
7S	2	3	1	3	3	1	2	15	C	FG - CSA overbank w/ handrail, scrub plants MG - palo verdes, scrub plants / low-flow veg. BG - off-site trees, mountains
7W	4	3	5	3	3	4	4	26	B	FG - H2O / burrobrush / desert broom in low-flow MG - naturalized planting & CSA bank BG - native trees across river

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
8N	5	4	5	4	3	5	3	29	B	FG - CSA overbank w/ handrail / scrub plants MG - H2O / burrobrush / desert broom in low-flow BG - trees across river, Freedom Plaza
8E	2	2	0	2	2	1	2	11	C	FG - bare ground, scrub plants MG - sparse naturalized vegetation BG - ADOT trees along 101 frwy.
8S	3	5	5	4	3	5	3	28	B	FG - CSA overbank, handrail, d. willow specimen MG - moderate low-flow vegetation / H2O BG - Grand Ave. bridge
8W	4	4	5	4	3	5	3	28	B	FG - H2O / burrobrush / desert broom in low-flow MG - CSA bank BG - native trees across river
9N	4	4	4	4	3	4	3	26	B	FG - handrail / dense burrobrush & desert broom MG - H2O & vegetation in low-flow BG - trees across river, Freedom Plaza
9E	2	2	0	2	2	1	2	11	C	FG - bare ground, scrub plants MG - sparse naturalized vegetation BG - indistinguishable
9S	3	5	5	4	4	4	3	28	B	FG - CSA overbank, handrail MG - moderate low-flow vegetation / H2O BG - Grand Ave. bridge
9W	4	4	6	4	3	5	3	29	B	FG - H2O / burrobrush / desert broom in low-flow MG - CSA bank BG - native trees across river
10N	4	5	7	5	4	5	3	33	B	FG - water (low flow), burrobrush & desert broom MG - H2O & vegetation in low-flow BG - Freedom Plaza, mountains
10E	4	4	7	3	4	4	3	29	B	FG - water, river rock low flow MG - moderately dense vegetation BG - indistinguishable
10S	4	4	7	5	4	5	3	32	B	FG - water (low flow), burrobrush comm. MG - burrobrush, CSA bank BG - distant vegetation
10W	4	5	7	5	3	5	3	32	B	FG - H2O / burrobrush / desert broom in low-flow MG - vegetation BG - indistinguishable
11N	4	5	3	4	4	4	2	26	B	FG - river rock (low flow), burrobrush & d. broom MG - vegetation, Freedom Plaza BG - mountains
11E	4	4	4	4	3	3	2	24	B	FG - moderately dense vegetation on east bank MG - moderately dense vegetation BG - 101 ramp
11S	3	5	6	5	4	5	3	31	B	FG - river rock (low flow) MG - water, burrobrush BG - distant vegetation
11W	4	4	3	4	3	3	2	23	B	FG - river rock (low flow) MG - burrobrush / desert broom BG - indistinguishable

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
12N	5	5	7	5	5	5	3	35	A	FG - water (low flow), burrobrush & d. broom MG - vegetation, Freedom Plaza BG - mountains
12E	5	5	7	5	4	5	3	34	B	FG - water, channel MG - dense vegetation BG - indistinguishable
12S	4	5	7	5	5	5	3	34	B	FG - water (low flow), vegetation MG - water, dense vegetation BG - distant water, vegetation
12W	4	5	6	5	3	3	2	28	B	FG - river rock (low flow) MG - desert broom / palo verde BG - indistinguishable
13N	3	4	4	3	2	3	2	21	C	FG - concrete channel, open land w/ dg MG - plateau vegetation, F. Plaza, power poles BG - indistinguishable
13E	3	1	7	2	3	3	2	21	C	FG - water, concrete channel, 101 ramp MG - box culvert, 101 freeway BG - power poles
13S	3	1	4	2	2	2	2	16	C	FG - conc. Channel, MG - 101 ramp BG - date palms
13W	4	3	7	4	3	3	2	26	B	FG - water in concrete channel MG - conc. channel, vegetation BG - mountains
14N	4	4	2	3	4	3	2	22	C	FG - burrobrush MG - moderately dense veg., F. Plaza, p. poles BG - mountains
14E	2	2	0	3	2	2	2	13	C	FG - desert scrub MG - 101 ramp BG - distant vegetation
14S	3	4	1	4	3	3	2	20	C	FG - desert scrub MG - p verdes, burrobrush BG - mountains
14W	4	5	4	5	5	4	3	30	B	FG - burrobrush, d. broom MG - river corridor, veg. BG - distant landscape, buildings
15N	4	4	4	4	4	4	3	27	B	FG - burrobrush, etc. MG - moderately dense veg., F. Plaza BG - indistinguishable
15E	3	5	7	5	3	5	3	31	B	FG - dense vegetation MG - dense vegetation BG - indistinguishable
15S	4	4	4	4	4	4	3	27	B	FG - burrobrush, etc. MG - p verdes, burrobrush BG - indistinguishable
15W	4	5	7	5	4	5	3	33	B	FG - water channel, dense vegetation MG - river corridor (perpendicular), veg. BG - indistinguishable

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
16N	5	5	7	6	5	6	3	37	A	FG - water, dense burrobrush, etc. MG - dense veg., F. Plaza BG - mountains
16E	3	4	6	6	5	5	3	32	B	FG - hillside desert veg. med. density MG - mesquite, palo verde BG - indistinguishable
16S	4	5	7	5	4	5	3	33	B	FG - water, dense burrobrush, etc. MG - dense waterfront vegetation BG - distant vegetation
16W	4	5	7	5	4	5	3	33	B	FG - water channel, med. dense vegetation MG - palo verde stand, bank BG - indistinguishable
17N	4	4	2	4	4	3	3	24	B	FG - slight wash, dense burrobrush, etc. MG - dense veg., F. Plaza, 101 ramp BG - mountains
17E	3	3	0	3	3	3	2	17	C	FG - flat, desert scrub, med. density MG - desert trees, shrubs, med. density BG - distant veg., freeway light poles
17S	3	5	0	4	3	4	2	21	C	FG - flat, desert scrub, med. density MG - desert trees (pv), shrubs, med. density BG - distant veg.
17W	4	5	2	5	4	4	3	27	B	FG - slight wash, dense burrobrush, etc. MG - dense veg., river corridor BG - distant veg.
18N	4	5	2	5	5	4	3	28	B	FG - slight wash, dense burrobrush, etc. MG - dense veg., F. Plaza BG - mountains
18E	2	2	1	3	3	2	2	15	C	FG - flat, sparse shrubs, slight wash MG - manmade bank, sparse veg., open land BG - distant veg., freeway light poles
18S	3	3	1	2	3	3	2	17	C	FG - manmade swale, sparse veg. MG - desert trees (pv), shrubs, sparse BG - distant veg., mountains
18W	4	4	7	5	4	4	3	31	B	FG - water, river rock, veg. MG - med. dense veg., gentle slope BG - distant commercial veg., architecture
19N	4	5	5	5	5	4	3	31	B	FG - berm, med. density shrubs MG - water, dense veg., F. Plaza BG - mountains, power poles
19E	3	3	6	4	4	3	3	26	B	FG - water, sparse veg., river rock MG - east river bank, med. density veg, open field BG - distant veg., freeway light poles
19S	4	4	6	5	4	5	3	31	B	FG - west bank, dense veg MG - water, river bottom, dense veg BG - distant veg., mountains
19W	2	1	1	2	2	2	2	12	C	FG - flat open space, sparse veg MG - medical center, commercial bldgs BG - indistinguishable

FG = Foreground
MG = Middleground
BG = Background

Photo Station	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
										FG = Foreground MG = Middleground BG = Background
20N	3	5	0	3	3	3	2	19	C	FG - dirt road, palo verdes MG - palo verde stand BG - distant architecture, landscape
20E	2	3	0	2	3	2	2	14	C	FG - dirt road, sparse veg MG - open field, mounds, sparse veg. BG - neighborhood landscape, architecture
20S	3	5	0	4	4	3	2	21	C	FG - dirt road, sparse shrubs MG - palo verde stand, some shrubs BG - distant veg., mountains
20W	2	1	1	2	2	2	2	12	C	FG - flat open space, sparse veg MG - medical center, commercial bldgs BG - indistinguishable
21N	4	4	2	5	4	3	3	25	B	FG - dirt road, palo verdes MG - palo verde stand BG - Freedom Plaza
21E	4	4	4	4	4	3	2	25	B	FG - med veg, gentle slope MG - med veg, gentle slope BG - neighborhood landscape, architecture
21S	3	5	0	4	4	3	2	21	C	FG - dirt road, palo verdes MG - palo verde stand BG - indistinguishable
21W	3	4	0	4	3	2	2	18	C	FG - flat open space, dirt road, palo verdes MG - flat open space, palo verdes BG - indistinguishable
22N	3	5	1	5	3	3	2	22	C	FG - dirt road, palo verdes, sewer manhole MG - palo verde stand BG - indistinguishable
22E	3	4	2	4	4	3	2	22	C	FG - med density shrubs MG - med veg, gentle slope BG - 101 ramp, neighborhood landscape, arch.
22S	3	5	1	5	3	3	2	22	C	FG - dirt road, palo verdes MG - palo verde stand BG - indistinguishable
22W	3	4	0	4	3	2	2	18	C	FG - flat open space, dirt road, sparse shrubs MG - flat open space, palo verdes BG - distant veg
23N	3	4	1	3	3	3	2	19	C	FG - metering station, dirt road MG - sparse shrubs, trees BG - Freedom Plaza, mountains
23E	3	4	2	4	4	3	2	22	C	FG - med density shrubs, palo verdes MG - river bottom, med veg, gentle slope BG - 101 ramp, neighborhood landscape, arch.
23S	3	5	0	5	3	3	2	21	C	FG - dirt road, palo verdes MG - palo verde stand, dirt road BG - indistinguishable
23W	2	1	0	1	2	1	1	8	D	FG - flat open space, dirt road, sparse shrubs MG - open space, mounds BG - distant veg & architecture

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
24N	4	4	3	4	3	3	2	23	B	FG - gabion bank, gravel shoulder MG - med shrubs, river bottom, Tbird bridge BG - distant veg
24E	0	1	0	3	2	1	1	8	D	FG - asphalt road and gravel shoulder MG - apartment & landscape BG - indistinguishable
24S	3	5	0	5	3	3	2	21	C	FG - gravel shoulder, gabion bank MG - gabion, river bottom, med veg, apts BG - gabion, river bottom, med veg, apts, F. Plaza
24W	3	4	3	3	3	3	2	21	C	FG - sparse shrubs, river bottom MG - med veg, gabion bank, p verdes BG - neighborhood landscape, architecture
25N	4	4	3	4	4	3	2	24	B	FG - gabion bank, gravel shoulder MG - med shrubs, river bottom, Tbird bridge BG - distant veg
25E	0	1	0	3	2	1	1	8	D	FG - gravel shoulder wrought iron fence MG - apartment & landscape BG - indistinguishable
25S	3	5	3	4	4	3	2	24	B	FG - gravel shoulder, gabion bank MG - gabion, river bottom, med veg, apts BG - distant veg, river bottom, apts
25W	3	4	3	3	3	3	2	21	C	FG - med shrubs, river bottom MG - med veg, east bank, p verdes BG - power lines, palo verde stand
26N	4	4	3	4	4	3	2	24	B	FG - gabion bank, gravel shoulder MG - med shrubs, river bottom, fence, apts BG - distant veg, Tbird bridge, arch., mtns
26E	2	2	0	2	3	2	1	12	C	FG - open flat field, sparse veg MG - desert scrub, sparse BG - distant mature veg
26S	3	4	3	3	4	3	2	22	C	FG - gently sloping bank, med shrubs MG - gently sloping bank, med shrubs, p verdes BG - power lines, distant veg, bldgs
26W	4	4	3	4	4	3	2	24	B	FG - med shrubs, river bottom MG - p verde stand, Freedom Plaza BG - indistinguishable
27N	4	4	3	4	4	3	2	24	B	FG - dirt road, gentle slope, med shrubs MG - med shrubs, gentle slope, apts, river bottom BG - distant veg, Tbird bridge, arch., mtns
27E	3	4	0	4	3	3	2	19	C	FG - open flat field, med shrubs, p verdes MG - palo verde stand, med shrubs BG - distant mature veg (p verdes, etc.)
27S	3	4	3	3	4	3	2	22	C	FG - dirt road, gently sloping bank, med shrubs MG - dirt road, pow lines, gentle bank, med veg BG - power lines, distant veg
27W	4	3	3	3	3	3	2	21	C	FG - med shrubs, river bottom MG - Freedom Plaza, manmade landscape BG - commercial architecture, landscape

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
28N	3	3	0	3	3	2	1	15	C	FG - open flat field, sparse veg MG - p verde stand, med desert scrub BG - apts, distant veg
28E	3	4	0	4	3	3	2	19	C	FG - open flat field, med shrubs, p verdes MG - palo verde stand, med shrubs BG - indistinguishable
28S	3	4	0	3	3	3	2	18	C	FG - flat field, med shrubs MG - p verde stand, power lines BG - indistinguishable
28W	3	3	0	3	3	3	2	17	C	FG - p verdes, flat field MG - Freedom Plaza, manmade landscape, p lines BG - commercial architecture, landscape
29N	4	4	3	4	4	3	2	24	B	FG - med shrubs, p verdes, gentle slope MG - riv bottom, med veg, gentle slope, F Plaza BG - architecture, Tbird bridge, mountains
29E	3	4	0	4	3	3	2	19	C	FG - open flat field, med shrubs, p verdes MG - palo verde stand, med shrubs BG - power lines, wall, distant landscape
29S	4	5	3	4	4	3	2	25	B	FG - gentle slope, med veg MG - med veg, open views BG - distant architecture, landscape
29W	4	4	3	4	4	3	2	24	B	FG - med shrubs, gentle slope MG - river bottom, dense veg BG - commercial architecture, landscape
30N	4	5	4	4	4	3	2	26	B	FG - river bottom, dense waterfront shrubs MG - river bottom, dense H2Ofront shrubs, F Plaza BG - architecture, Tbird bridge, mountains
30E	3	4	3	3	3	3	2	21	C	FG - gentle slope, med veg MG - med veg, power lines BG - indistinguishable
30S	4	5	4	4	4	3	2	26	B	FG - river bottom, dense waterfront shrubs MG - river bottom, dense waterfront shrubs BG - distant landscape
30W	3	4	3	3	3	3	2	21	C	FG - gentle slope, med veg MG - med veg, gentle slope BG - indistinguishable
31N	3	4	1	3	4	3	2	20	C	FG - flat open field, sparse veg MG - F Plaza, manmade landscape BG - architecture, mountains
31E	4	4	3	3	4	3	2	23	B	FG - gentle berms, med veg (shrubs) MG - river bottom, med veg BG - 101 ramp, p verdes, power lines
31S	3	4	0	4	4	3	2	20	C	FG - med veg, flat land MG - dirt road, p verdes, med veg BG - distant landscape, mountains
31W	2	2	0	1	2	2	1	10	D	FG - vegetated swale, sparse veg MG - open flat field, swale, streetscape BG - commercial buildings, landscape

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
32N	3	3	1	2	4	3	2	18	C	FG - dirt field / slight mesa, sparse veg MG - F Plaza, manmade landscape BG - architecture, power lines, mountains
32E	4	4	3	3	4	3	2	23	B	FG - gentle slopes, med veg (shrubs) MG - river bottom, med veg, power lines BG - p verdes, power lines
32S	4	4	3	4	4	3	2	24	B	FG - med veg, gentle slope MG - med veg, p verdes, river bottom BG - distant landscape, bldgs, mountains
32W	1	1	0	1	2	1	1	7	D	FG - open flat field, no veg MG - open field, streetscape BG - commercial buildings, landscape
33N	4	5	3	4	4	3	2	25	B	FG - dirt path, dense veg, gentle slope MG - power lines, manmade landscape, riv bottom BG - apts, distant landscape
33E	4	4	3	3	4	3	2	23	B	FG - gentle slopes, med veg MG - river bottom, med veg, gentle slopes BG - p verdes, power lines
33S	4	3	3	4	4	3	2	23	B	FG - dirt road, med slope bank, med veg MG - med veg (shrubs), river bottom BG - distant landscape, 101 ramp, mountains
33W	2	2	0	2	2	1	1	10	D	FG - dirt road, manmade landscape MG - Freedom Plaza BG - indistinguishable
34N	4	4	4	3	4	3	2	24	B	FG - river bottom, med veg MG - med veg, apts, gentle slopes BG - Tbird bridge, mountains
34E	4	3	4	3	4	3	2	23	B	FG - river bottom, gentle slopes, med veg MG - med veg, gentle undulating slopes BG - indistinguishable
34S	4	4	4	4	4	3	2	25	B	FG - river bottom, med veg MG - med veg, gentle slopes, power poles BG - power poles, distant landscape
34W	2	5	4	4	3	3	2	23	B	FG - river bottom, dense veg MG - Freedom Plaza, palo verde stand, wash BG - indistinguishable
35N	4	5	4	3	4	3	2	25	B	FG - river bottom, med veg MG - med veg, apts, gentle slopes BG - Tbird bridge
35E	4	4	4	3	4	3	2	24	B	FG - river bottom, med veg (mesq, mex p verde) MG - med veg, gentle gabion slopes, apts BG - indistinguishable
35S	4	4	4	4	4	3	2	25	B	FG - river bottom, med veg MG - med veg, gentle slopes, F Plaza BG - power poles, distant landscape
35W	2	4	4	4	3	3	2	22	B	FG - river bottom, med veg MG - Freedom Plaza, p verde, med slope, p lines BG - indistinguishable

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
36N	4	5	4	3	4	3	2	25	B	FG - west bank, p verdes MG - med veg, gentle slopes BG - Tbird bridge, apts
36E	4	4	3	4	4	3	2	24	B	FG - gentle slope, med veg (p verdes, shrubs) MG - med veg, gentle gabion slopes, apts BG - indistinguishable
36S	4	4	3	4	4	3	2	24	B	FG - west bank, med veg MG - palo verde stand, gentle slopes, F Plaza BG - power poles, distant landscape, mountains
36W	2	5	1	4	3	3	2	20	C	FG - flat, p verdes MG - p verde stand, open flat land BG - indistinguishable
37N	4	4	3	4	4	3	2	24	B	FG - west bank, sparse veg MG - riv bottom, med veg, gent slopes, p verdes BG - Tbird bridge, apts, mountains
37E	4	4	6	4	5	4	3	30	B	FG - gentle slope, med veg (shrubs) MG - water, med veg, gentle gabion slopes, apts BG - indistinguishable
37S	4	4	3	4	4	3	2	24	B	FG - west bank, sparse veg MG - palo verde stand, gentle slopes, F Plaza BG - power poles, distant landscape, mountains
37W	2	4	0	4	3	3	2	18	C	FG - flat, dirt road MG - p verde stand, open flat land, power lines BG - indistinguishable
38N	4	4	6	5	5	4	3	31	B	FG - river bottom, med veg MG - riv bottom, med veg, gent slopes, Tbird bridge BG - New River to NE
38E	4	5	7	4	5	4	3	32	B	FG - water, river bottom, dense veg MG - med veg, gabion bank, apts BG - indistinguishable
38S	5	5	7	5	4	4	3	33	B	FG - river bottom, water, med veg MG - med veg, gentle slopes, F Plaza BG - power poles, distant landscape
38W	3	4	3	4	3	3	2	22	C	FG - river bottom, west bank, med veg MG - p verde stand, open flat land BG - indistinguishable
39N	2	6	2	4	3	4	3	24	B	FG - CSA overbank w/ handrail MG - Mesquite Bosque in low-flow BG - 101 frwy. Bridge over Skunk Creek
39E	2	3	0	4	3	2	2	16	C	FG - bare earth / new park construction MG - 101 embankment BG - 101 frwy. Trees
39S	3	5	2	4	4	4	3	25	B	FG - CSA bank, railing, & ramp to river MG - dense Mesquite Bosque in low-flow BG - future community park and low-flow
39W	3	5	3	3	3	5	3	25	B	FG - dense Mesquite Bosque in low-flow MG - CSA bank BG - Desert Harbor subdivision, planting

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
40N	4	6	3	5	5	7	5	35	A	FG - dense low-flow grasses / mesquites MG - dense low-flow grasses / mesquites BG - distant bank / grasses
40E	2	2	1	2	1	1	1	10	D	FG - concrete drop structure MG - CSA bank BG - Mesquite tree at future park
40S	3	6	2	5	3	6	2	27	B	FG - dense low-flow grasses / mesquites MG - dense low-flow grasses / mesquites BG - trees on distant banks
40W	2	2	1	2	2	3	2	14	C	FG - concrete drop structure MG - CSA bank BG - Desert Harbor subdivision, planting
41NE	4	6	3	5	3	6	2	29	B	FG - dense low-flow grasses MG - concrete drop structure BG - Mesquite bosque
41SE	4	4	3	5	3	6	2	27	B	FG - dense low-flow grasses MG - Salt Cedar and Mesquites BG - CSA bank
41SW	4	6	3	5	4	6	4	32	B	FG - dense low-flow grasses / aquatic plants MG - Salt Cedar and Mesquites BG - bank trees
41NW	3	5	3	3	2	6	3	25	B	FG - Salt Cedar and grasses MG - Salt Cedar BG - perimeter wall at overbank, pine and palms
42NE	5	5	3	5	3	6	2	29	B	FG - bare earth bank MG - concrete drop structure BG - distant low-flow and trees
42SE	3	3	1	4	6	2	6	25	B	FG - new park construction MG - new park construction BG - new park construction
42SW	4	4	1	3	3	6	3	24	B	FG - bare earth trail and naturalized bank MG - native trees in low-flow BG - residential neighborhood
42NW	4	5	2	6	3	6	2	28	B	FG - bare earth bank MG - dense low-flow vegetation BG - Desert Harbor subdivision
43NE	5	6	3	5	4	6	4	33	B	FG - Mesquite and naturalized bank MG - Palo Verde bosque in low-flow BG - naturalized bank, CSA bank, trees
43SE	3	3	1	4	6	2	6	25	B	FG - new park construction MG - new park construction BG - new park construction / sports field lighting
43SW	5	6	3	6	5	6	5	36	A	FG - Mesquite trees at overbank MG - Palo Verde bosque in low-flow BG - Desert Harbor subdivision
43NW	6	6	3	5	4	6	5	35	A	FG - Palo Verde bosque in low-flow MG - naturalized bank BG - Desert Harbor subdivision

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
44NE	5	5	2	5	3	5	3	28	B	FG - naturalized bank / desert scrub MG - Palo Verdes / desert broom in low-flow BG - distant mountains / Desert Harbor subdivision
44SE	3	3	1	4	6	2	6	25	B	FG - new park construction MG - new park construction BG - distant trees along 101 frwy.
44SW	5	6	3	5	4	6	4	33	B	FG - naturalized bank MG - Palo Verde, Mesquite bosque in low-flow BG - overbank trees
44NW	5	6	3	6	6	6	3	35	A	FG - naturalized low-flow MG - naturalized bank BG - Desert Harbor subdivision
45NE	6	6	3	5	4	6	3	33	B	FG - naturalized bank / desert scrub MG - Palo Verdes / Mesquites in low-flow BG - distant mountains / Desert Harbor subdivision
45SE	3	3	1	4	6	2	6	25	B	FG - new park construction, drainage headwall MG - new park construction BG - distant trees along 101 frwy.
45SW	6	5	3	5	4	6	3	32	B	FG - naturalized bank, construction disturbance MG - Palo Verde, Mesquite bosque in low-flow BG - 'Forum' Assisted Living Apts., Palm trees
45NW	4	5	3	4	3	5	3	27	B	FG - bare earth bank / outfall structure MG - Palo Verdes / Mesquites in low-flow BG - Desert Harbor subdivision
46NE	5	6	3	5	4	6	4	33	B	FG - desert scrub bank MG - dense Mesquite bosque in low-flow BG - distant mountains / Desert Harbor subdivision
46SE	3	3	1	4	6	2	6	25	B	FG - new park construction MG - new park construction BG - distant trees at park boundary
46SW	6	5	3	5	4	6	4	33	B	FG - naturalized bank MG - dense Mesquite bosque in low-flow BG - 'Forum' Assisted Living Apts., Palm trees
46NW	6	5	3	3	5	6	3	31	B	FG - bare earth bank MG - dense Mesquite bosque in low-flow BG - native trees across river on bank, overbank
47NE	5	6	3	5	4	6	4	33	B	FG - desert scrub bank MG - dense Mesquite bosque in low-flow BG - distant mountains / Desert Harbor subdivision
47SE	3	3	1	4	6	2	6	25	B	FG - new park construction MG - new park construction BG - new park construction
47SW	6	6	3	5	4	6	4	34	B	FG - naturalized bank MG - dense Mesquite bosque in low-flow BG - perimeter wall & Freedom Plaza high-rise
47NW	6	5	3	3	5	6	3	31	B	FG - dense Mesq. bosque, P. Verdes in low-flow MG - naturalized bank, desert scrub plants BG - 'Forum' Assisted Living Apts., Palm trees

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
48NE	5	6	4	5	5	6	3	34	B	FG - dense Mesq. bosque, P. Verdes in low-flow MG - naturalized bank, desert scrub plants BG - 'Forum' Assisted Living Apts., Palm trees
48SE	2	2	0	2	2	1	2	11	C	FG - new park construction MG - existing trees BG - adjacent commercial industrial buildings
48SW	5	5	3	4	4	6	3	30	B	FG - naturalized bank MG - moderate Mesquite bosque in low-flow BG - Thunderbird bridge / Riverview Apts.
48NW	6	5	3	3	5	6	3	31	B	FG - Mesquite bosque in low-flow MG - naturalized bank, drainage scupper BG - new subdivision, perimeter wall, trees
49N	6	6	7	7	6	7	6	45	A	FG - H2O, grasses, trees in low-flow MG - H2O, grasses, trees in low-flow BG - low-flow trees / Palm trees at Forum Apts.
49E	5	5	1	6	5	5	6	33	B	FG - Desert Broom habitat MG - naturalized bank BG - naturalized scrub planting
49S	6	6	7	7	6	7	3	42	A	FG - H2O, grasses, trees in low-flow MG - Thunderbird bridge BG - low-flow trees
49W	6	7	6	7	6	7	6	45	A	FG - H2O, river rock, sand in low-flow MG - aquatic plants and Salt Cedar in low-flow BG - bank plants
50NE	6	6	3	5	6	7	3	36	A	FG - low perimeter wall, naturalized bank MG - Mesquite bosque in low-flow BG - distant mountains / Palm trees at Forum Apts.
50SE	7	6	4	5	6	7	5	40	A	FG - Mesquites in low-flow MG - naturalized bank BG - trees, adjacent commercial industrial buildings
50SW	6	5	3	5	5	7	3	34	B	FG - low perimeter wall, naturalized bank MG - Mesquite bosque in low-flow BG - Thunderbird bridge / Riverview apartments
50NW	1	4	0	5	5	2	3	20	C	FG - asphalt road / Desert Harbor subdivision MG - streetscape planting BG - Desert Harbor subdivision
51NE	6	6	3	5	6	7	3	36	A	FG - low perimeter wall, naturalized bank MG - Mesquite bosque in low-flow BG - distant mountains
51SE	5	6	3	4	4	6	4	32	B	FG - Mesquites in low-flow MG - naturalized bank BG - trees, adjacent commercial industrial buildings
51SW	6	4	3	5	5	7	4	34	B	FG - low perimeter wall, naturalized bank MG - Mesquite bosque in low-flow BG - Thunderbird bridge / Riverview apartments
51NW	1	3	0	3	3	2	3	15	C	FG - asphalt road / Desert Harbor subdivision MG - streetscape planting, perimeter wall BG - Desert Harbor subdivision homes

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
										FG = Foreground MG = Middleground BG = Background
52NE	7	7	4	6	6	7	4	41	A	FG - naturalized bank MG - Mesquite bosque in low-flow BG - subdivision wall, planting
52SE	6	7	5	4	6	7	6	41	A	FG - Salt Cedar / river coble MG - Mesquite bosque in low-flow BG - dense Mesquite bosque in low-flow
52SW	7	7	4	7	6	7	6	44	A	FG - naturalized bank and low-flow MG - Mesquite bosque in low-flow BG - apartments / Mesquites
52NW	5	5	0	4	4	4	3	25	B	FG - naturalized bank MG - Mesquite, Palo Verde, Creosote BG - perimeter wall / street light
53NE	7	7	3	6	6	7	5	41	A	FG - naturalized bank, Desert Willow, Pine tree MG - dense Mesquite bosque in low-flow BG - bank / new park construction
53SE	6	7	4	6	5	7	5	40	A	FG - naturalized bank and Mesq. Bosque low-flow MG - partially naturalized bank BG - desert trees at overbank
53SW	6	7	3	6	5	5	4	36	A	FG - Palo Verde specimen MG - bank plants BG - perimeter wall / overbank plants
53NW	6	4	1	4	4	1	4	24	B	FG - rocky, desert scrub bank MG - perimeter wall BG - 'Forum' Assisted Living Apts. / Palm trees
54NE	7	7	4	7	7	7	7	46	A	FG - river cobble, low-flow channel and bosque MG - dense Mesquite bosque BG - trees
54SE	7	7	5	7	7	7	7	47	A	FG - Desert Broom / burrobrush MG - naturalized bank BG - indistinguishable
54SW	7	7	5	7	7	7	7	47	A	FG - river cobble, low-flow channel MG - dense Mesquite bosque BG - trees, vegetated banks
54NW	7	5	2	6	5	4	6	35	A	FG - rocky, desert scrub bank MG - desert scrub bank BG - Palo Verde trees
55NE	7	7	5	7	7	7	7	47	A	FG - river cobble, low-flow channel and bosque MG - dense Mesquite bosque BG - indistinguishable
55SE	7	7	4	6	6	7	5	42	A	FG - Desert Broom / burrobrush / Mesq. bosque MG - naturalized bank BG - overbank trees
55SW	7	7	5	7	7	7	7	47	A	FG - river cobble / low-flow plants MG - dense Mesquite bosque BG - overbank trees, Palms
55NW	5	4	2	4	4	3	2	24	B	FG - desert scrub bank / riprap outfall MG - desert scrub bank BG - Desert trees on overbank

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
										FG = Foreground MG = Middleground BG = Background
56NE	7	6	3	6	6	7	6	41	A	FG - Palo Verdes, naturalized bank MG - Mesquite bosque in low-flow BG - bank
56SE	6	6	3	7	5	7	5	39	A	FG - desert scrub bank MG - Mesquite bosque low-flow BG - sparse bank plants / outfall
56SW	7	7	3	5	6	7	5	40	A	FG - rocky, desert scrub bank MG - Mesquite bosque low-flow BG - bank
56NW	3	4	1	4	4	3	3	22	C	FG - desert scrub bank MG - perimeter wall and streetscape BG - Desert Harbor subdivision
57NE	6	6	2	6	6	7	5	38	A	FG - Palo Verdes, naturalized bank MG - perimeter wall and native trees BG - bank planting
57SE	6	6	3	7	5	7	5	39	A	FG - desert scrub bank MG - Mesquite bosque low-flow BG - sparse bank plants
57SW	7	6	4	6	6	7	6	42	A	FG - Palo Verdes, desert scrub bank MG - Mesquite bosque low-flow BG - 'Forum' Assisted Living Apts.
57NW	3	4	1	4	4	3	2	21	C	FG - desert scrub bank MG - perimeter wall and streetscape BG - Desert Harbor subdivision, light pole
58NE	6	6	3	6	6	7	6	40	A	FG - naturalized bank MG - Mesquite bosque in low-flow BG - bank / streetscape planting
58SE	6	7	3	7	6	7	6	42	A	FG - desert scrub bank MG - Mesquite bosque low-flow BG - sparse bank plants w/ specimen trees
58SW	7	6	3	6	6	7	7	42	A	FG - desert scrub bank MG - Mesquite bosque low-flow BG - bank and 'Forum' Assisted Living Apts.
58NW	3	4	1	4	4	3	2	21	C	FG - desert scrub bank MG - perimeter wall and streetscape BG - Desert Harbor subdivision
59N	5	4	1	4	5	3	2	24	B	FG - desert scrub and riprap bank MG - native plants at overbank BG - CSA bank / handrail
59NE	5	6	5	6	5	7	5	39	A	FG - riprap bank MG - CSA bank / handrail BG - Mesquite bosque low-flow
59E	6	7	4	7	6	7	5	42	A	FG - Mesquite bosque low-flow MG - riprap and naturalized bank BG - new park construction
59S	6	7	3	7	6	7	6	42	A	FG - desert scrub bank MG - Mesquite bosque low-flow BG - sparse bank plants

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
59SW	3	4	1	4	4	3	2	21	C	FG - cobble bank MG - Palo Verdes, desert scrub bank BG - Mesquite bosque low-flow
59W	4	4	1	3	3	2	2	19	C	FG - river cobble / desert scrub bank MG - naturalized landscape / perimeter wall BG - Desert Harbor subdivision planting
60NE	6	7	4	7	5	7	5	41	A	FG - gabion river cobble, stormdrain outfall MG - Mesquite bosque and grasses in low-flow BG - 101 frwy. Bridge and opposite bank
60SE	5	5	2	4	4	4	5	29	B	FG - desert scrub / Mesquite habitat MG - new park construction BG - 101 frwy. trees
60SW	6	7	5	7	6	7	6	44	A	FG - CSA bank / handrail / graded maint. road MG - dense Mesquite bosque BG - Desert Harbor subdivision
60NW	6	7	5	7	7	7	6	45	A	FG - dense Mesquite bosque MG - dense Mesquite bosque BG - Desert Harbor subdivision
61NE	6	7	7	7	6	7	5	45	A	FG - H2O / grasses MG - aquatic grasses in low-flow BG - 101 frwy. Bridge
61SE	6	7	6	7	6	7	5	44	A	FG - H2O / grasses MG - grasses / Mesquites BG - 101 frwy. Railing
61SW	7	7	7	7	7	7	7	49	A	FG - grasses in low-flow MG - dense Mesquite bosque BG - grasses / Mesquite bosque
61NW	6	5	6	6	6	6	5	40	A	FG - H2O / grasses MG - graded maintenance trail BG - desert scrub bank
62N	4	4	1	3	4	3	1	20	C	FG - desert scrub bank MG - Palo Verdes BG - 101 frwy. Trees
62E	4	1	1	2	2	2	1	13	C	FG - desert scrub fill slope MG - 101 frwy. bridge BG - 101 frwy. trees
62S	5	6	3	7	5	7	4	37	A	FG - desert scrub fill slope MG - dense Mesquite bosque BG - Desert Harbor subdivision
62W	4	4	3	3	2	4	2	22	C	FG - desert scrub fill slope MG - sparse Mesquite bosque BG - bank / Desert Harbor subdivision
63N	6	6	4	3	4	4	3	30	B	FG - Palo Verde bosque MG - Palo Verdes BG - native trees
63E	5	4	3	4	4	6	4	30	B	FG - Palo Verde bosque MG - desert scrub BG - 101 frwy. bridge and trees

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	Explanation / Comments FG = Foreground MG = Middleground BG = Background
63S	6	6	3	7	5	6	3	36	A	FG - desert scrub and Mesquite MG - dense low-flow plants BG - new park construction / Estrella Mts.
63W	4	3	2	3	3	3	2	20	C	FG - desert scrub overbank MG - low-flow vegetation / Eucalyptus trees BG - bank / Desert Harbor subdivision
64N	7	5	2	5	4	6	5	34	B	FG - Palo Verde habitat zone / overbank MG - low-flow vegetation BG - residential / commercial lots beyond
64E	5	5	2	6	5	5	4	32	B	FG - desert scrub plants MG - Palo Verde bosque BG - native trees
64S	5	5	3	4	3	6	2	28	B	FG - desert scrub overbank and slope MG - dense Salt Cedar in low-flow BG - bank / Desert Harbor subdivision
64W	6	5	3	4	3	5	2	28	B	FG - desert scrub bank MG - dense Salt Cedar in low-flow BG - bank / subdivision / Greenway Rd. outfall
65N	6	3	2	4	4	5	2	26	B	FG - Paradise Shores Trail MG - low-flow vegetation, bare earth along trail BG - subdivision streetscape
65E	6	5	5	6	5	7	3	37	A	FG - mixed vegetation in low-flow MG - desert scrub bank BG - native trees at overbank
65S	5	6	5	5	4	7	3	35	A	FG - vegetation in Greenway Rd. outfall MG - Salt Cedar / mixed vegetation BG - partially eroded CSA bank / railing
65W	1	1	4	1	2	1	1	11	C	FG - Greenway Rd. outfall channel MG - Greenway Rd. outfall channel BG - bare earth along subdivision walls
66N	5	3	3	3	3	5	3	25	B	FG - desert scrub low-flow MG - gabion bank BG - Antigua warehouse / hotel at overbank
66E	5	4	3	4	4	5	3	28	B	FG - desert scrub bank MG - mixed vegetation in low-flow BG - bank / 101 frwy. Trees
66S	6	3	3	3	3	6	4	28	B	FG - desert scrub low-flow and slope MG - desert scrub low-flow BG - Estrella Mts.
66W	6	3	3	3	3	3	3	24	B	FG - desert scrub low-flow and bank MG - Antigua warehouse BG - indistinguishable
67N	4	2	3	3	3	6	3	24	B	FG - Paradise Shores Trail MG - bare earth along trail / low-flow vegetation BG - Antigua warehouse
67E	6	3	3	3	3	5	3	26	B	FG - desert scrub low-flow MG - bank BG - Harkins Theater complex

<i>Photo Station</i>	<i>Landform</i>	<i>Vegetation</i>	<i>Water</i>	<i>Color</i>	<i>Adjacent Scenery</i>	<i>Scarcity</i>	<i>Cultural Modification</i>	<i>Total Score</i>	<i>CLASS RATING</i>	<i>Explanation / Comments</i>
67S	5	4	2	3	4	7	2	27	B	FG - Paradise Shores Trail MG - desert scrub bank / bare earth along trail BG - Trail tree plantings / Estrella Mts.
67W	4	1	1	3	3	1	2	15	C	FG - bare earth along trail MG - subdivision street / perimeter wall / homes BG - homes
68N	6	3	3	3	3	6	3	27	B	FG - desert scrub low-flow MG - desert scrub bank BG - Antigua warehouse / 101 frwy. Trees
68E	6	3	3	3	3	5	3	26	B	FG - desert scrub low-flow MG - bank BG - Harkins Theater complex
68S	4	4	2	3	3	6	3	25	B	FG - river cobble / desert scrub low-flow MG - overbank trees BG - Estrella Mts.
68W	4	2	1	3	3	2	2	17	C	FG - desert scrub low-flow MG - desert scrub bank BG - Paradise Shores subdivision
69N	5	3	3	4	2	4	2	23	B	FG - vegetation in Greenway Rd. outfall channel MG - concrete channel and railing BG - Paradise Shores Trail
69E	6	5	4	7	4	7	6	39	A	FG - Salt Cedar, mixed vegetation in low-flow MG - desert scrub bank BG - 101 frwy. Trees
69S	6	5	4	6	3	7	3	34	B	FG - railing / gate to low-flow MG - Palo Verde bosque in low-flow BG - distant overbank trees / Estrella Mts.
69W	2	1	1	3	3	1	1	12	C	FG - desert scrub / cleared maintenance trail MG - perimeter wall, backyard landscape BG - Desert Harbor subdivision
70N	4	3	3	3	3	6	2	24	B	FG - railing / CSA bank MG - desert scrub along overbank BG - perimeter wall, homes / distant trees
70E	5	5	4	5	4	7	4	34	B	FG - mixed vegetation in low-flow MG - desert scrub bank BG - overbank and 101 frwy. Trees
70S	5	5	4	5	3	7	3	32	B	FG - railing / CSA bank MG - mixed vegetation in low-flow BG - perimeter wall, homes / distant trees
70W	3	1	1	2	2	1	2	12	C	FG - desert scrub / river cobble MG - perimeter wall BG - Desert Harbor subdivision
71N	5	4	3	4	3	6	3	28	B	FG - railing / CSA bank MG - Palo Verde bosque and Eucs. in low-flow BG - desert scrub / trees along overbank
71E	6	6	4	5	4	7	4	36	A	FG - Mesquite bosque low-flow MG - 101 frwy. bridge BG - 101 frwy. Trees

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
71S	6	5	4	4	3	7	3	32	B	FG - railing / CSA bank MG - Mesquite bosque low-flow BG - desert scrub / river cobble at overbank
71W	2	2	1	2	2	1	1	11	C	FG - desert scrub / river cobble / Acacia trees MG - perimeter wall BG - Desert Harbor subdivision trees
72N	4	4	3	4	3	6	2	26	B	FG - railing / CSA bank MG - desert scrub / wall along overbank BG - Palo Verde bosque in low-flow
72NE	6	6	4	6	4	7	4	37	A	FG - railing / CSA bank MG - desert scrub / bosque in low-flow BG - Palo Verde bosque in low-flow
72SE	6	6	4	4	4	7	3	34	B	FG - Mesquite bosque low-flow MG - CSA Bank BG - new park construction
72SW	5	5	4	4	3	7	3	31	B	FG - railing / CSA bank / desert scrub MG - drop structure BG - Mesquite bosque low-flow
72W	3	2	1	2	2	1	1	12	C	FG - desert scrub / river cobble MG - perimeter wall BG - Desert Harbor subdivision
73N	2	1	3	1	2	6	1	16	C	FG - Grand Ave. railroad bridge MG - low-flow and overbank vegetation BG - Freedom Plaza retirement center
73E	3	1	5	1	2	6	1	19	C	FG - Grand Ave. auto bridge MG - river rock low-flow BG - Grand Ave. railroad bridge
73S	2	1	1	2	2	1	1	10	D	FG - Grand Ave. median barrier MG - distant trees BG - Estrella Mts.
73W	1	1	1	1	2	1	1	8	D	FG - Grand Ave. MG - bare earth swale, railroad berm BG - Sun City subdivision
74N	3	3	3	2	2	6	2	21	C	FG - Grand Ave. railroad bridge, Palo Verde tree MG - low-flow and overbank vegetation BG - Freedom Plaza retirement center, vegetation
74E	2	2	1	3	2	1	1	12	C	FG - Grand Ave. MG - bare earth shoulder BG - Grand Ave. railroad berm
74S	2	1	1	2	2	1	1	10	D	FG - Grand Ave. median barrier MG - distant Eucalyptus trees BG - distant trees
74W	2	1	3	1	1	3	1	12	C	FG - Grand Ave. MG - river rock low-flow BG - Grand Ave. railroad bridge
75E	2	2	0	1	1	1	1	8	D	FG - Tbird, no sidewalk MG - Tbird, sidewalk, streetscape BG - development

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
75N	2	1	1	2	2	3	3	14	C	FG - Tbird MG - river bottom, mesquites, med veg BG - bldgs, mountains
75S	5	5	6	6	5	6	6	39	A	FG - med veg, gentle slopes MG - gabions banks, apts, river bottom, med veg BG - apts, gabion banks, F. Plaza, mountains
75W	1	2	0	2	2	2	1	10	D	FG - Tbird, sidewalk MG - Tbird, sidewalk BG - bldgs, LS, mtns
76E	2	1	0	1	1	1	1	7	D	FG - Tbird, sidewalk MG - Tbird, sidewalk BG - development
76N	2	1	1	2	2	3	3	14	C	FG - scrub med veg, gentle slopes MG - river bottom, mesquites, med veg BG - bldgs, mountains
76S	5	5	6	6	5	6	6	39	A	FG - med veg, gentle slopes MG - water, river bottom, med veg BG - apts, gabion banks, mountains
76W	1	2	0	2	2	2	1	10	D	FG - Tbird, no sidewalk MG - Tbird, no sidewalk, manmade landscape BG - bldgs, power lines, mtns
77E	2	1	0	1	1	1	1	7	D	FG - Tbird, sidewalk MG - Tbird, sidewalk BG - development
77N	5	5	4	4	4	5	4	31	B	FG - scrub med veg, gentle slopes MG - river bottom, mesquites, med veg BG - bldgs, mountains
77S	3	2	3	2	2	3	3	18	C	FG - Tbird MG - water, mesq, med riparian veg BG - multi family bldgs, landscape
77W	1	3	0	2	2	2	1	11	C	FG - Tbird, no sidewalk MG - Tbird, no sidewalk, manmade landscape BG - bldgs, power lines, mtns
78E	2	1	0	1	1	1	1	7	D	FG - Tbird, weeds, no sidewalk MG - Tbird, bldgs, Escape Hatch BG - adj bldgs, landscape
78N	5	5	4	4	4	5	4	31	B	FG - scrub med veg, gentle slopes MG - river bottom, mesquites, med veg BG - bldgs, mountains
78NW	5	5	4	4	4	5	5	32	B	FG - med veg (shrubs) MG - water, mesq, med riparian veg BG - single family bldgs, landscape
78S	3	3	2	3	3	3	2	19	C	FG - Tbird MG - apts, gravel road, asphalt road, river BG - river veg, F. Plaza
78W	4	5	4	5	5	5	4	32	B	FG - Tbird, sidewalk MG - Tbird, sidewalk, river bottom, med veg BG - bldgs, landscape, mountains

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
79N	5	6	6	6	6	6	5	40	A	FG - river bottom, grasses MG - 101 bridge, N bank, ch link fence, grasses BG - indistinguishable
79NE	5	6	6	6	5	6	5	39	A	FG - river bottom, grasses, reeds, 101 bridge MG - river bottom, grasses, CSA banks BG - 83rd Ave. bridge, development
79S	5	6	6	6	6	6	5	40	A	FG - river bottom, grasses MG - 101 bridge, S bank, ch link fence, grasses BG - indistinguishable
79SW	6	6	7	6	6	6	6	43	A	FG - river bottom, grasses, reeds MG - river bottom, mesquites, grasses, CSA banks BG - dense veg, development
80N	5	6	6	6	5	6	5	39	A	FG - river bottom, grasses MG - 101 bridge, CSA bank, adj channel, grasses BG - 101 landscape
80NE	6	6	6	6	6	6	6	42	A	FG - river bottom, grasses MG - riv bottom, grasses, CSA banks, 83rd Ave BG - dense veg, Peoria Sports Complex
80SE	5	5	6	4	4	5	4	33	B	FG - river bottom, grasses MG - CSA bank, ramp BG - indistinguishable
80SW	5	6	6	6	6	6	5	40	A	FG - river bottom, grasses, reeds MG - river bottom, 101 bridge, CSA banks BG - distant dense veg
81NE	6	6	7	6	6	6	6	43	A	FG - river bottom, tall grasses MG - 83rd Ave bridge, tall grasses BG - dense riparian stand, Peoria Sports Complex
81NW	5	6	6	5	5	6	5	38	A	FG - drop structure, grasses, riv rock dissipator MG - CSA bank, tall grasses BG - distant veg
81SE	5	6	6	5	5	6	5	38	A	FG - drop structure, grasses, riv rock dissipator MG - CSA bank, tall grasses, 83rd Ave. BG - distant veg
81SW	6	6	7	6	6	6	6	43	A	FG - river bottom, tall grasses MG - 101 bridge, tall grasses, CSA banks BG - grasses, dense veg
82N	6	6	7	6	5	7	7	44	A	FG - river bottom, dense tall grasses MG - CSA bank, 83rd Ave bridge, tall grasses BG - distant landscape
82NE	6	7	7	7	6	7	7	47	A	FG - river bottom, cotwood/willow stand, grasses MG - CSA bank, grasses, cotwood/willow stand BG - power lines
82SE	5	6	6	4	4	5	5	35	A	FG - grasses, river bottom MG - CSA bank, veg on bank BG - indistinguishable
82SW	6	6	7	6	6	6	6	43	A	FG - river bottom, tall grasses MG - 83rd Ave bridge, tall grasses, CSA banks BG - 101 bridge, dense grasses

FG = Foreground
MG = Middleground
BG = Background

<i>Photo Station</i>	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	CLASS RATING	Explanation / Comments
83N	6	7	7	7	6	7	7	47	A	FG - grasses, river bottom MG - dense cot/willow riparian stand BG - CSA bank, bldgs
83NE	5	5	5	5	6	6	6	38	A	FG - CSA riprap bank, asphalt path ends MG - asphalt path, grasses, p verdes, p lines BG - Peoria Sports Complex, bldgs, mountains
83S	2	2	0	2	4	2	3	15	C	FG - low wall, dirt path, open flat land MG - stables, private property BG - neighborhood landscape, bldgs
83SW	6	5	6	5	5	5	5	37	A	FG - stabilized road, ramp MG - CSA banks, riparian veg, adj scrub veg BG - 83rd Ave bridge, power lines
84N	5	6	6	5	5	6	5	38	A	FG - 83rd Ave bridge/sw, CSA bank MG - 83rd Ave bridge/sw, dense grasses, riv bot BG - P Sports Complex, bldgs, landscape
84NE	6	6	6	6	6	6	6	42	A	FG - CSA bank, p verde, mesq MG - riv bottom, riparian veg, sparse veg (top) BG - P Sports Complex, power lines, bldgs
84S	3	4	1	4	3	3	2	20	C	FG - sidewalk, manmade landscape (desert) MG - sidewalk, manmade LS (desert), 83rd Ave. BG - distant bldgs, power lines, mountains
84SW	5	4	5	5	5	6	5	35	A	FG - 83rd Ave. MG - river bottom, grasses, open fields (top) BG - 101 bridge, bldgs, mountains
85N	6	6	6	6	6	6	6	42	A	FG - 83rd Ave bridge, sidewalk MG - river bottom, tall grasses, 83rd Ave., CSA BG - bldgs, landscape
85NE	5	4	5	5	5	6	5	35	A	FG - 83rd Ave MG - riv bottom, riparian veg, sparse veg (top) BG - P Sports Complex, power lines, bldgs
85NW	5	6	6	5	6	6	6	40	A	FG - drop structure, grasses, dissipator MG - d structure, grasses, dissipator, CSA bank BG - adj landscape, bldgs
85S	3	4	1	4	3	3	2	20	C	FG - 83rd Ave, no sidewalk MG - 83rd Ave, power lines, adj LS BG - bldgs, landscape, mountains
85SW	5	6	5	5	6	5	5	37	A	FG - CSA banks, sparse veg. MG - 101 bridge, CSA banks, dense grasses BG - adj landscape, bldgs, mtns

FG = Foreground
MG = Middleground
BG = Background

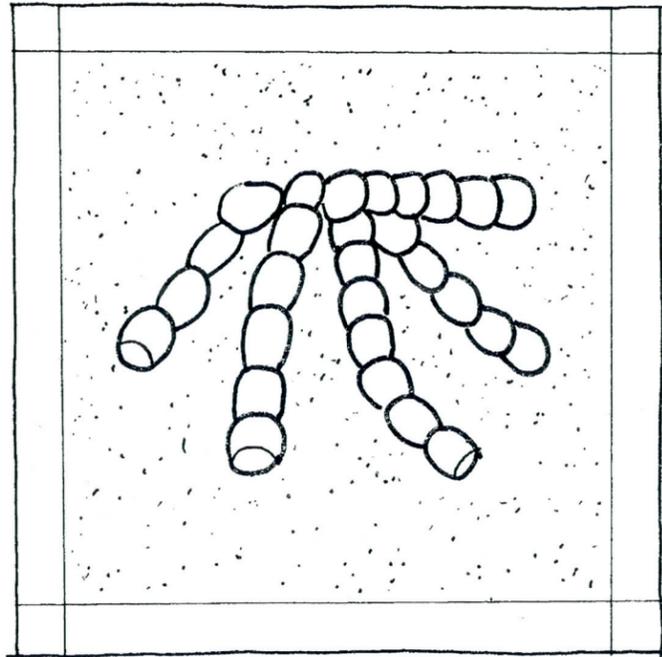


Contract FCD 2003C001 New River Channel
Grand Avenue to Skunk Creek Including Paradise Shores

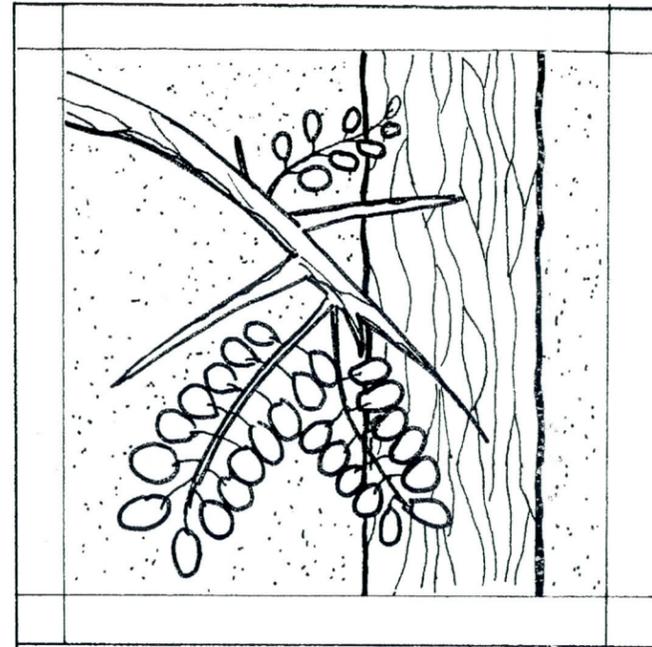
New River Channel Grand Avenue to Skunk Creek

PRE-DESIGN CONCEPT DETAILS

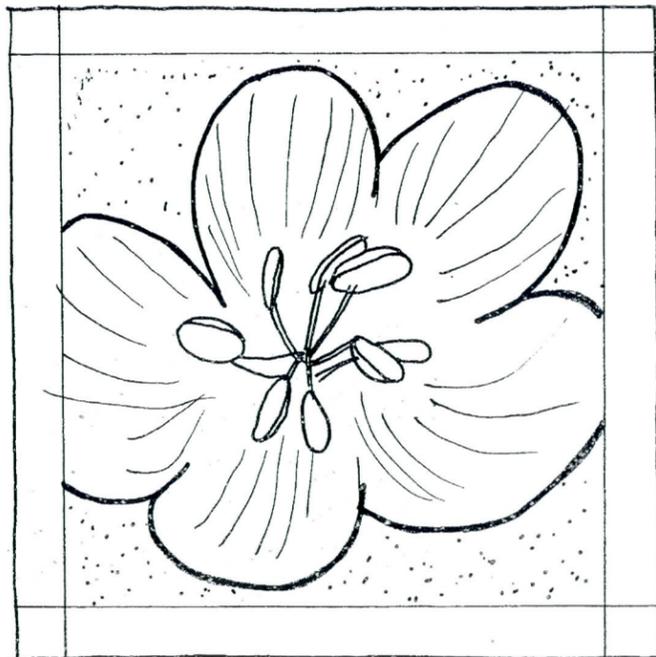




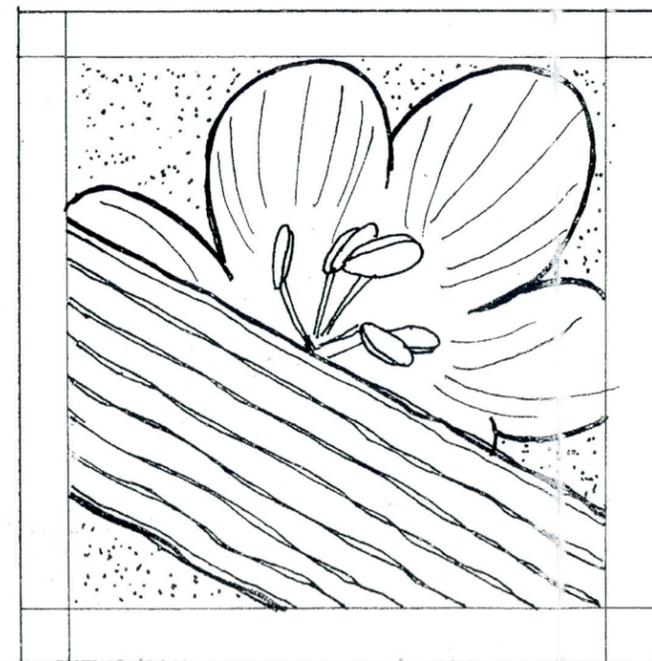
MESQUITE



MESQUITE/GRAIN

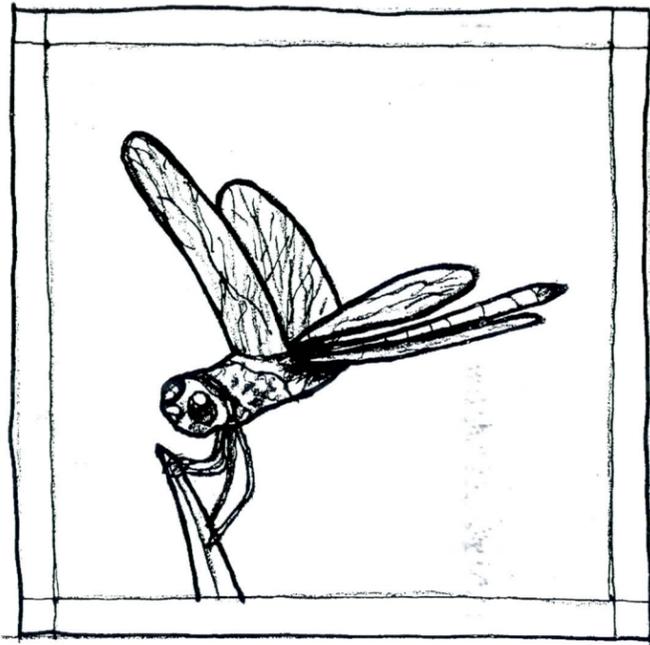


POPPY

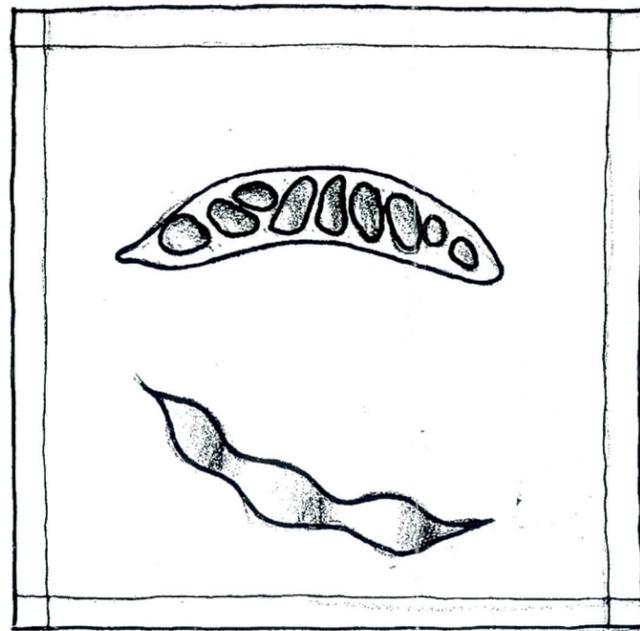


SAGUARO/POPPY

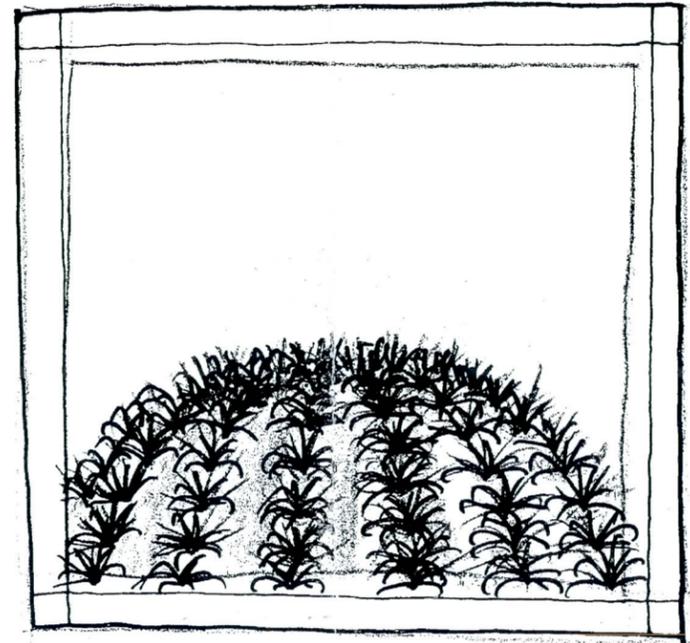
PROJECT ICONS
(FORM-LINERS)
H.T.S.



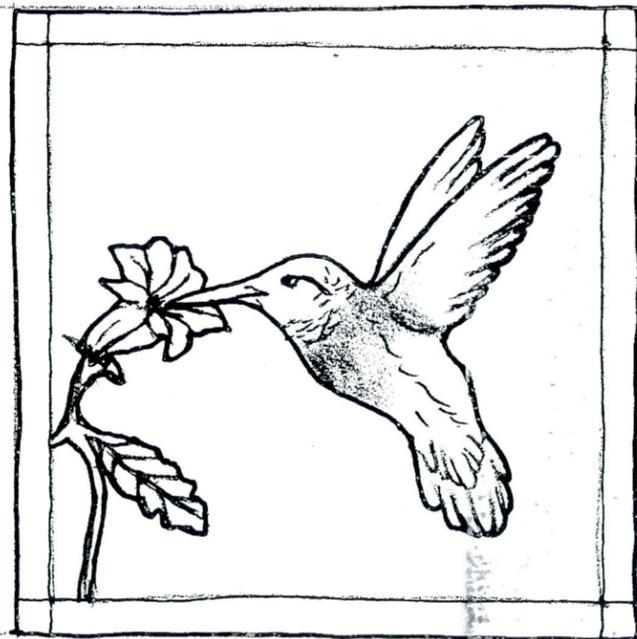
WILDLIFE



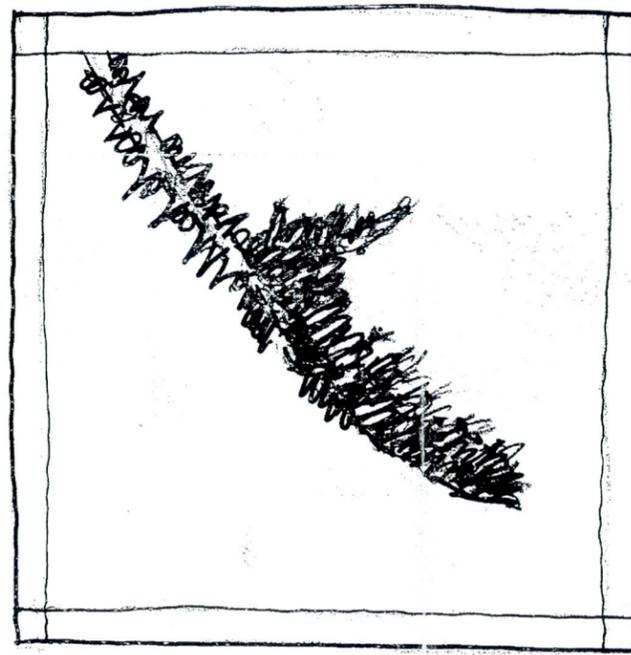
LEGUMES



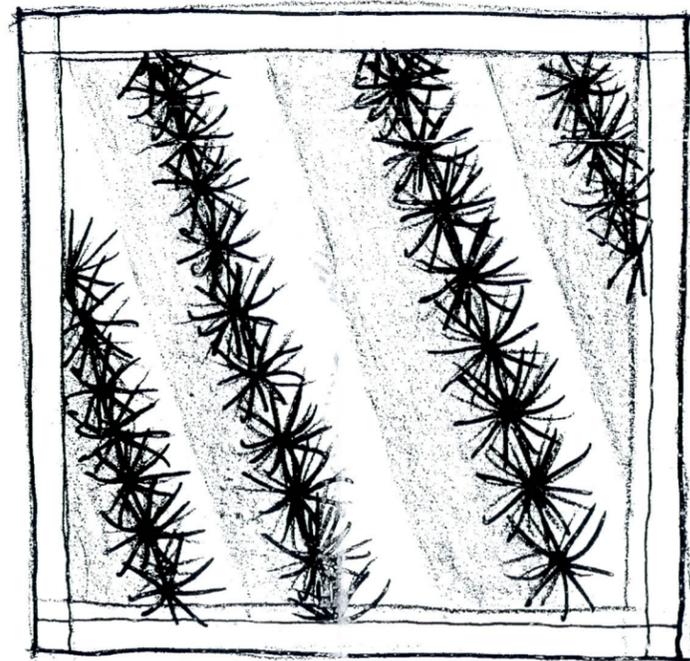
CACTI



WILDLIFE



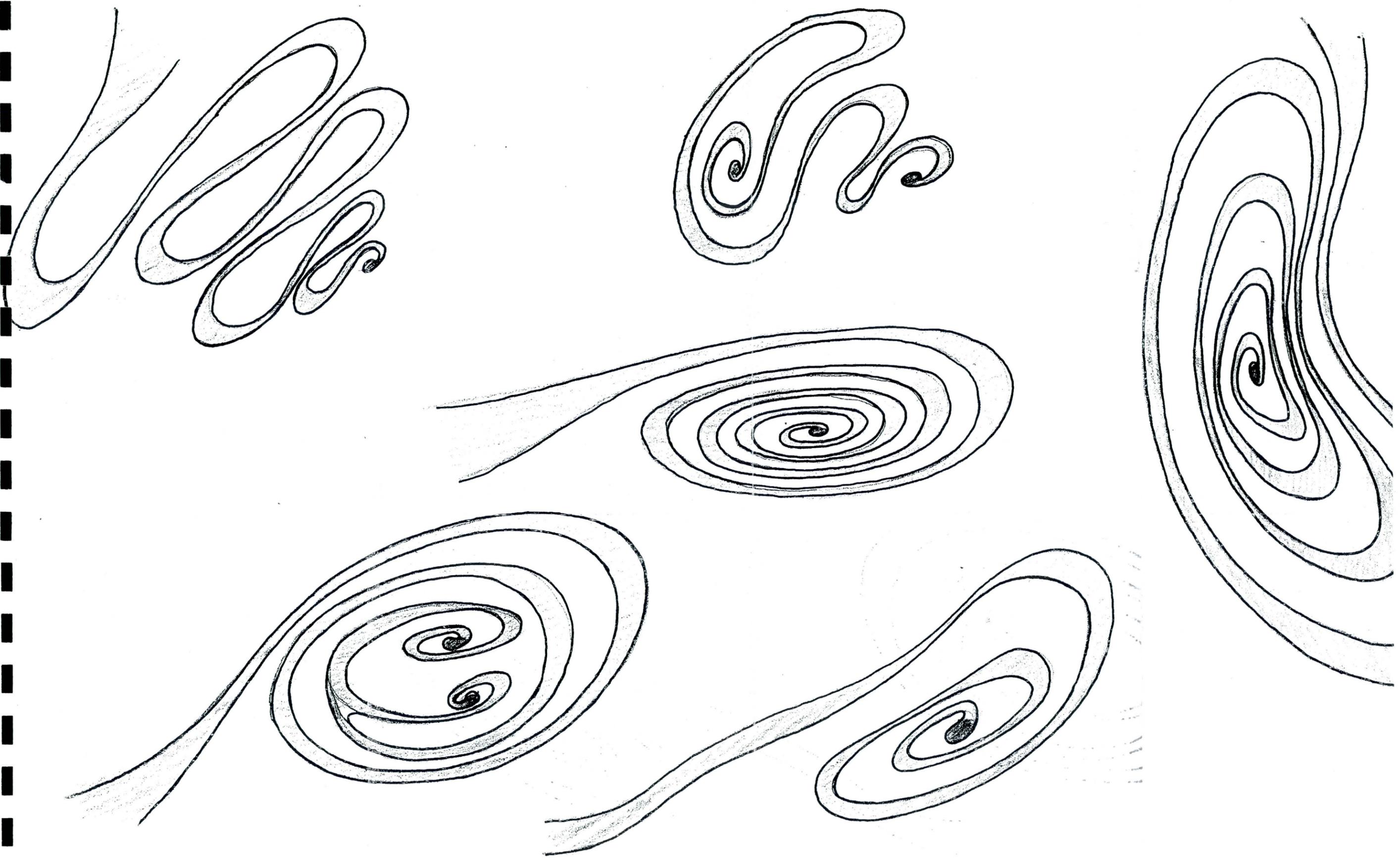
OCOTILLO



CACTI

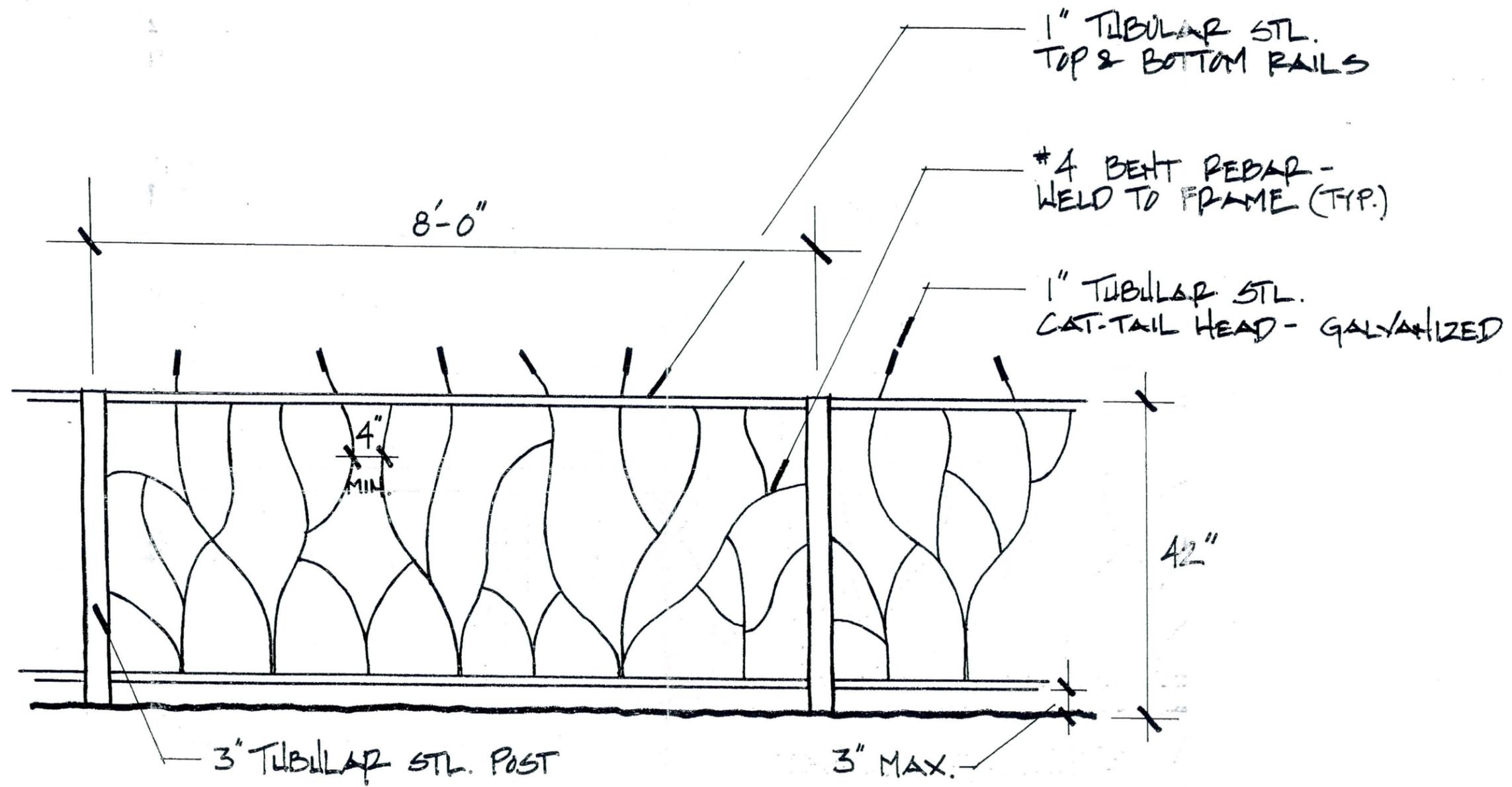
PROJECT ICONS

N.T.S.

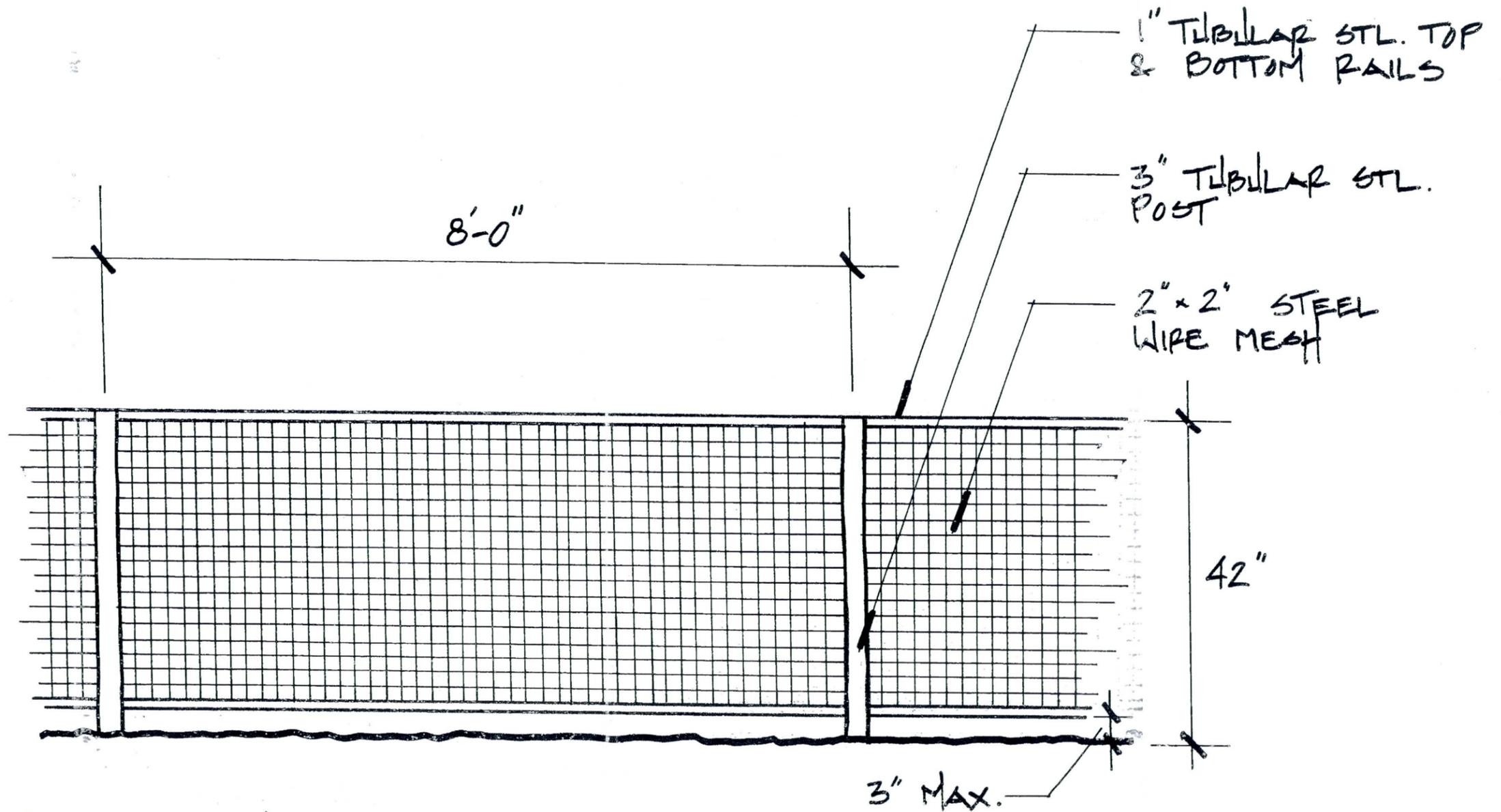


ORGANIC PATTERNS

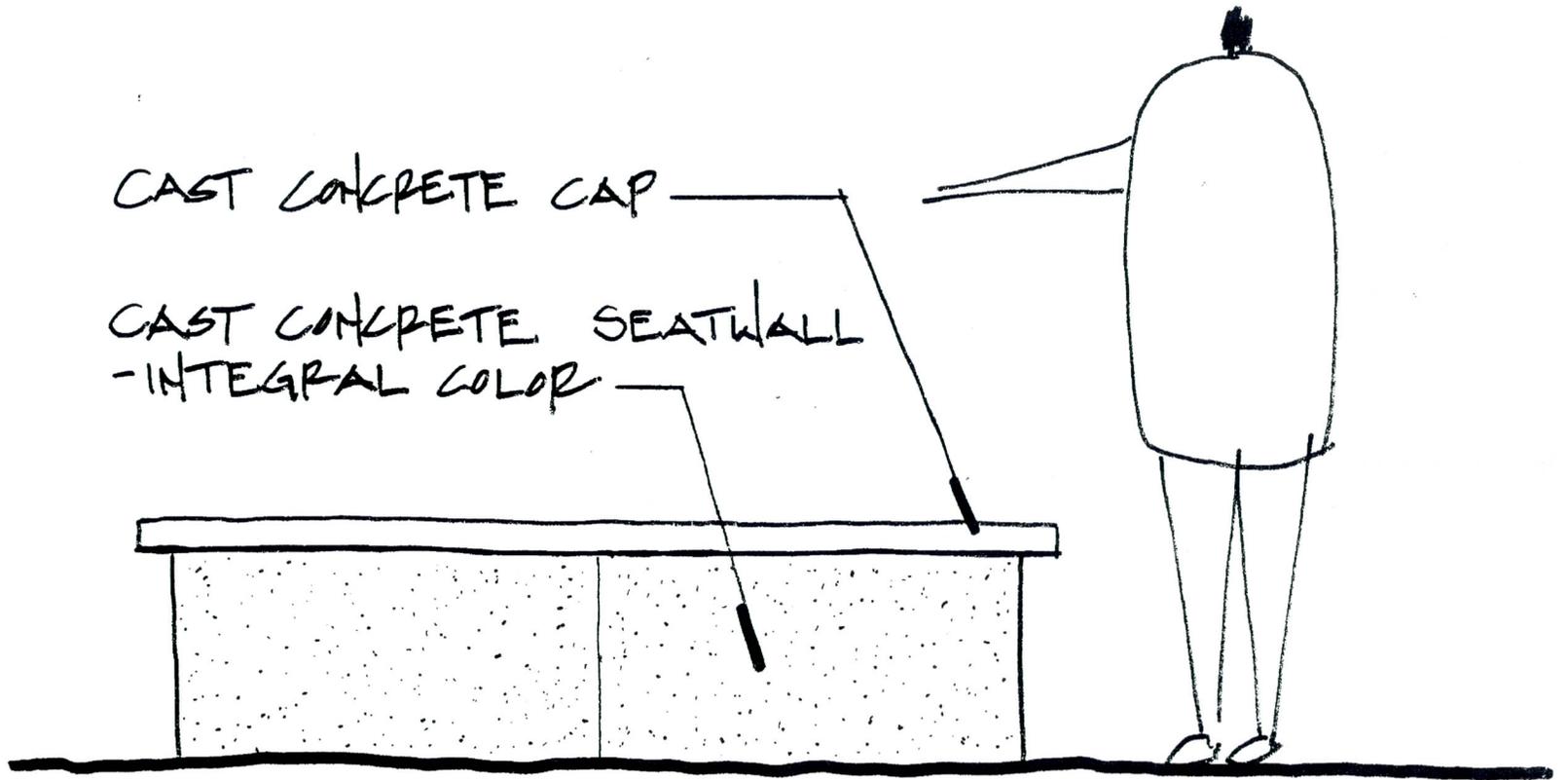
N.T.S.



ENHANCED GUARDRAIL
ELEVATION $\frac{3}{4}'' = 1'-0''$



STANDARD PROJECT GUARDRAIL
 ELEVATION $\frac{3}{4}" = 1'-0"$



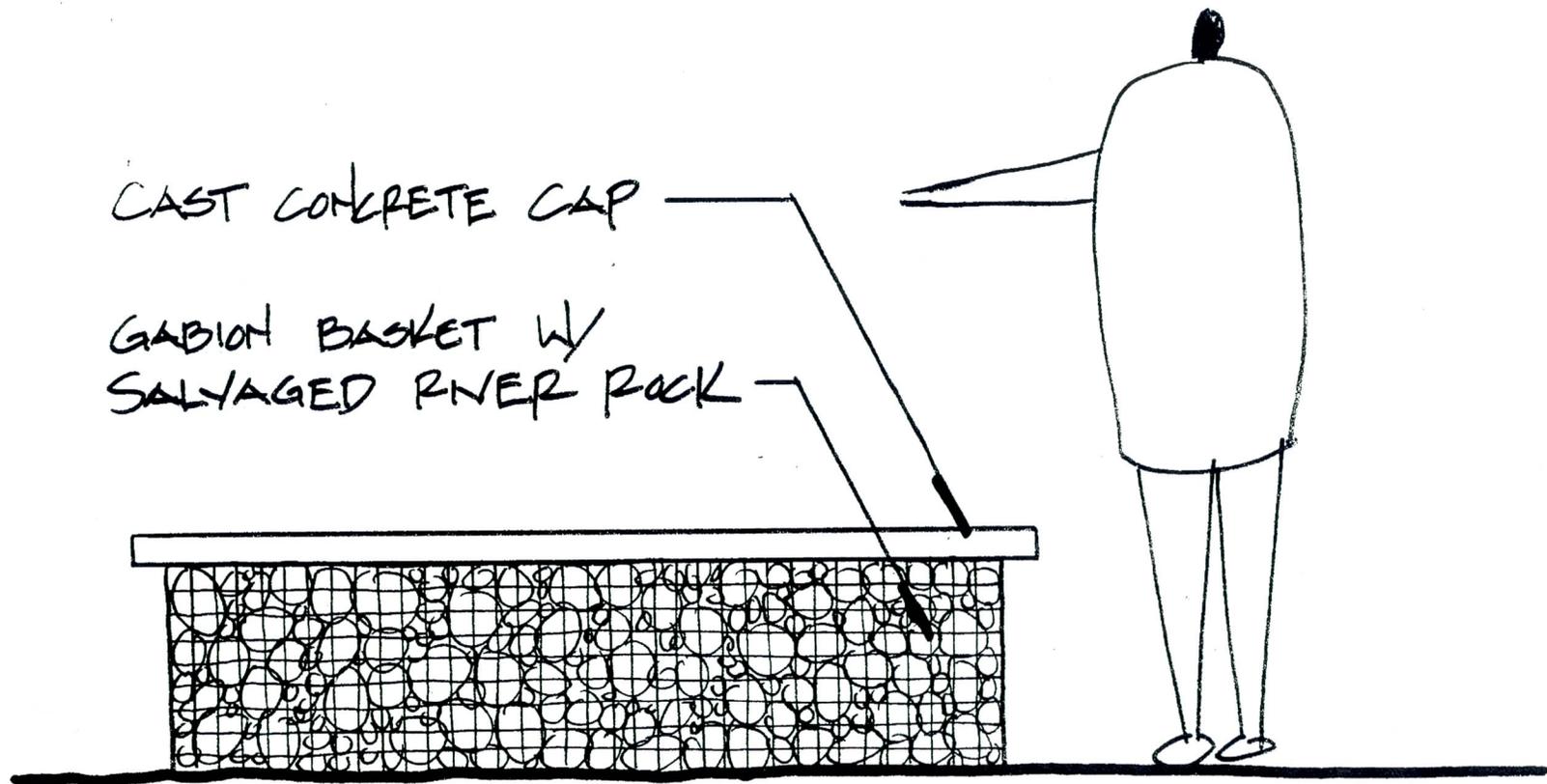
CAST CONCRETE CAP

CAST CONCRETE SEATWALL
- INTEGRAL COLOR

SEATWALL CONCEPT - CONCRETE

ELEVATION

$\frac{3}{4}'' = 1'-0''$



CAST CONCRETE CAP

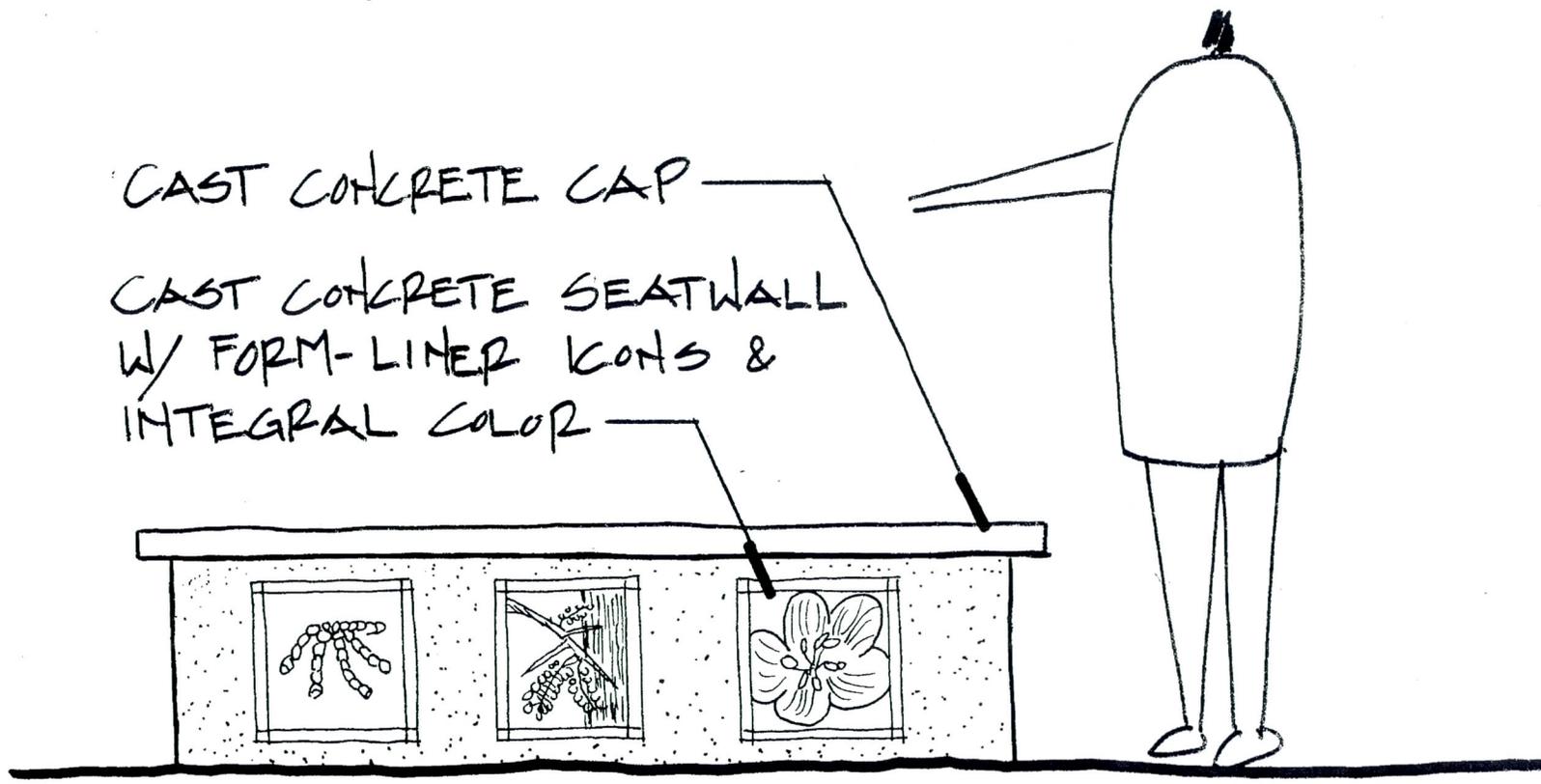
GABION BASKET W/
SALVAGED RIVER ROCK

SEATWALL CONCEPT - GABION

ELEVATION

$3/4" = 1'-0"$

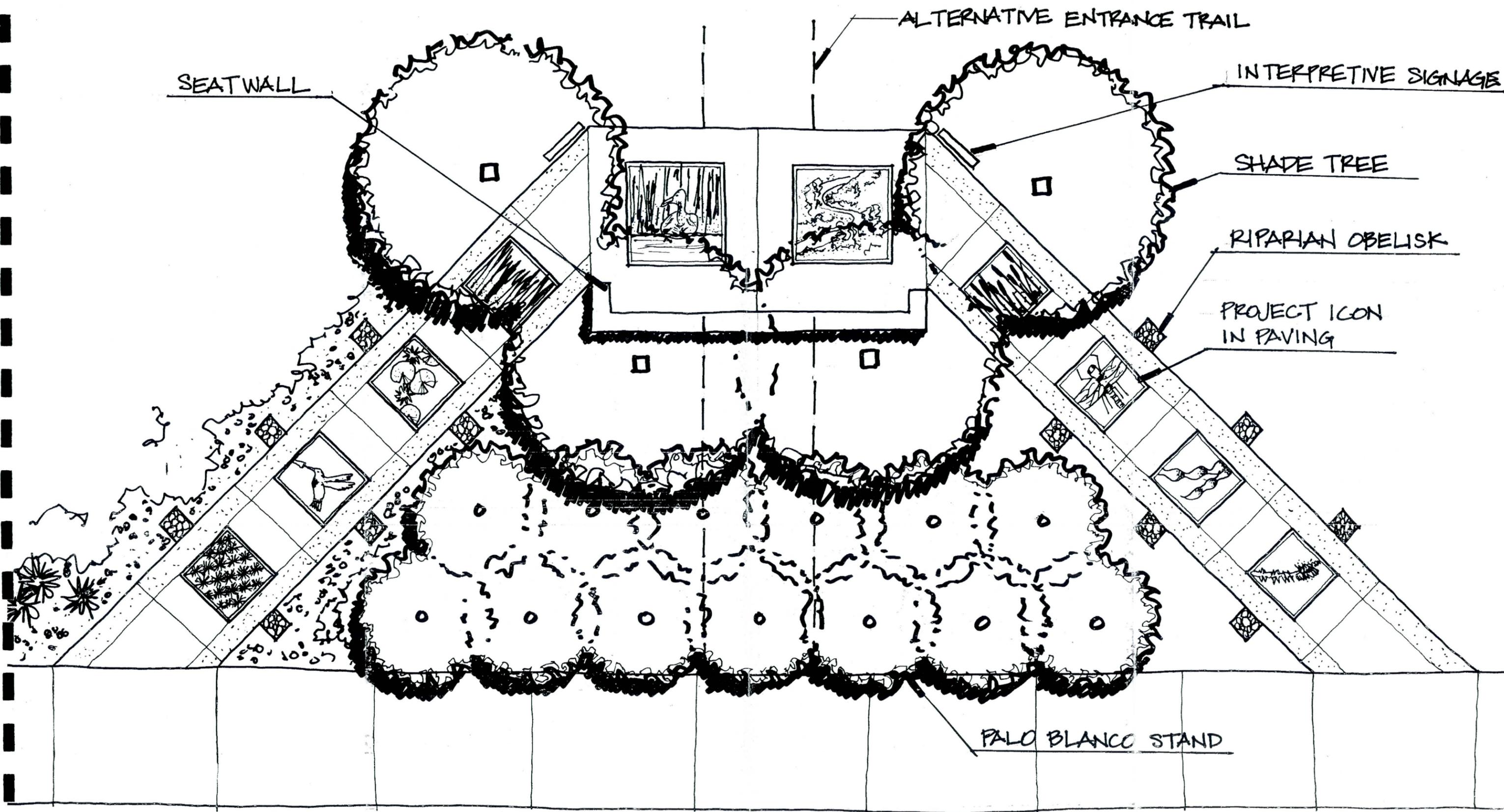
CAST CONCRETE CAP
CAST CONCRETE SEATWALL
W/ FORM-LINER ICONS &
INTEGRAL COLOR



SEATWALL CONCEPT - ICONS

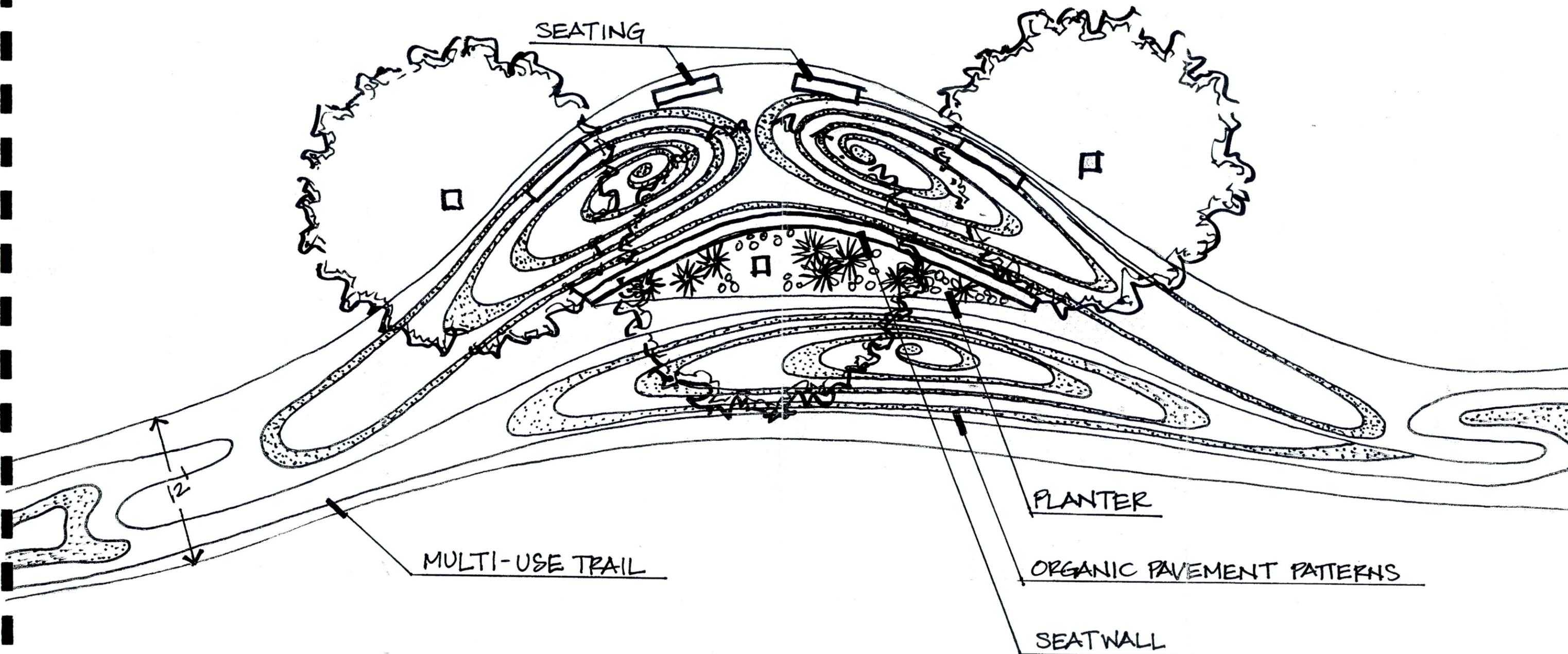
ELEVATION

$\frac{3}{4}'' = 1'-0''$



SEATING / ENTRANCE NODE
 PLAN VIEW
 $\frac{1}{8}'' = 1'-0''$

↑ VIEW OF RIVER ↑



SEATING

12'

MULTI-USE TRAIL

PLANTER

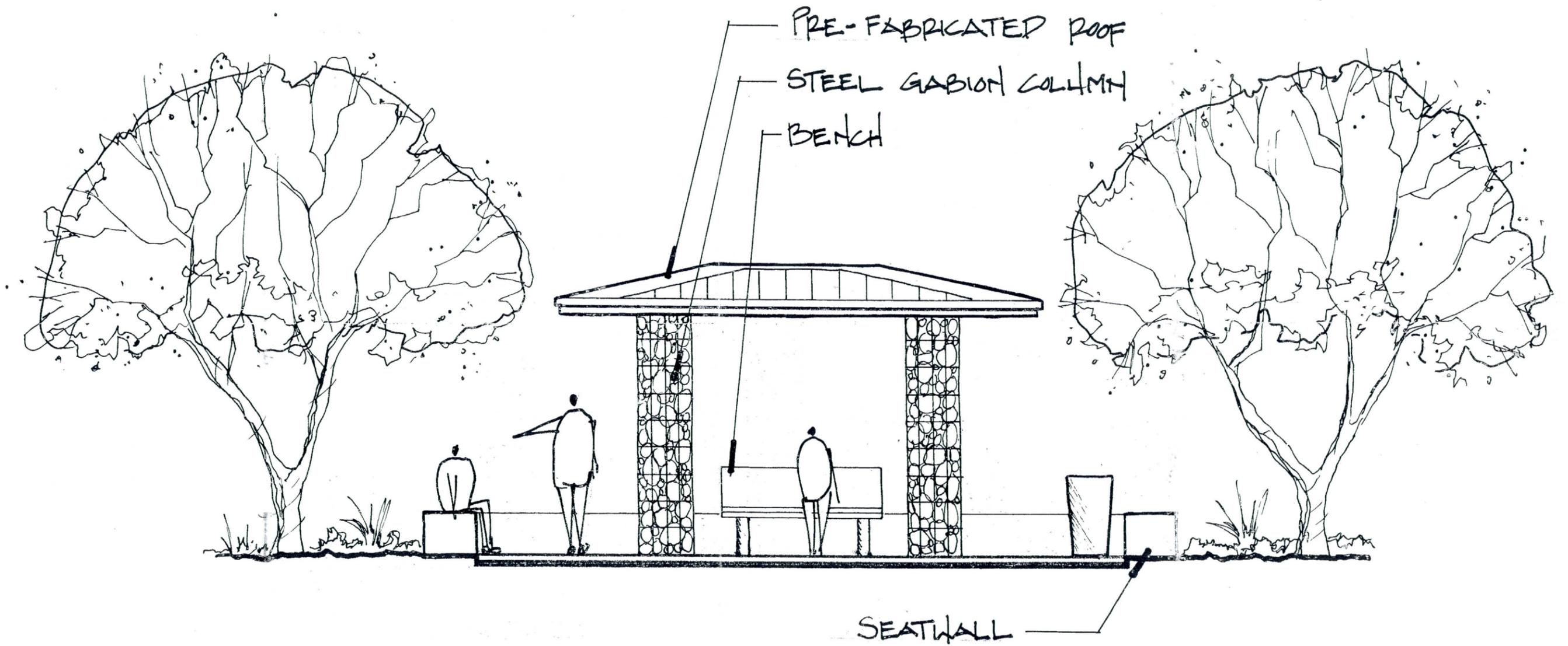
ORGANIC PAVEMENT PATTERNS

SEATWALL

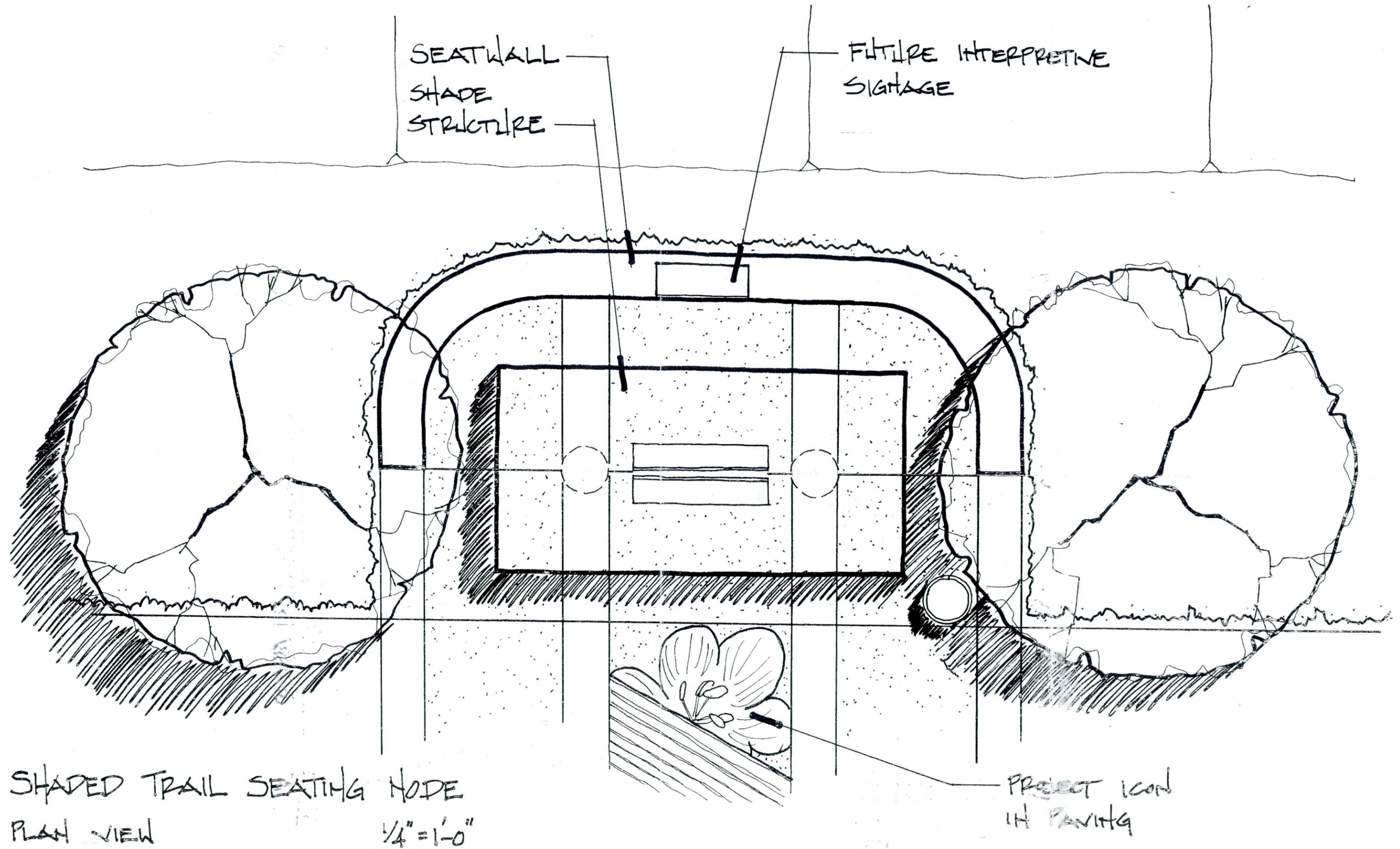
SHADED TRAIL SEATING NODE

PLAN VIEW

$\frac{1}{8}'' = 1'-0''$



SHADED TRAIL SEATING NODE
ELEVATION $\frac{1}{4}'' = 1'-0''$



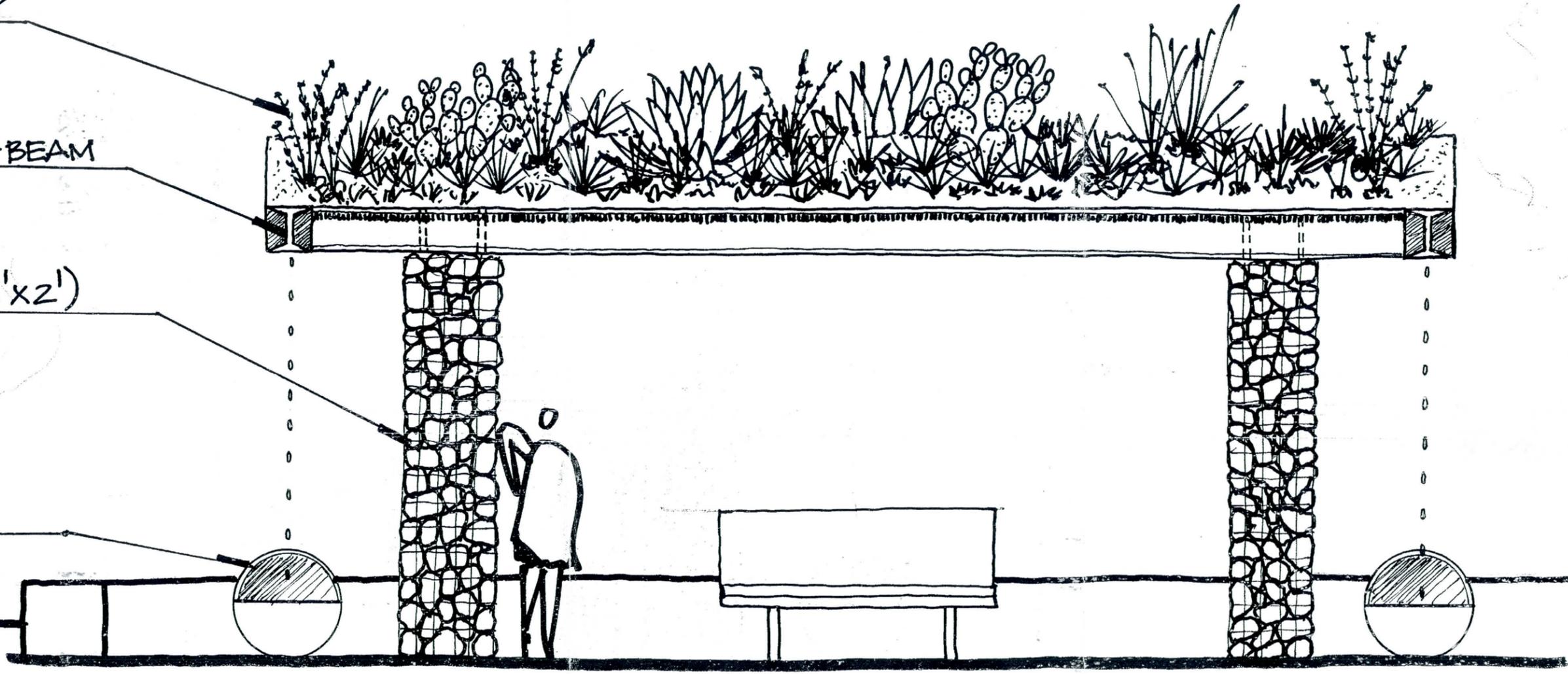
VEGETATED ROOFTOP

OXIDIZED STEEL I-BEAM

GABION COLUMN (2'x2')

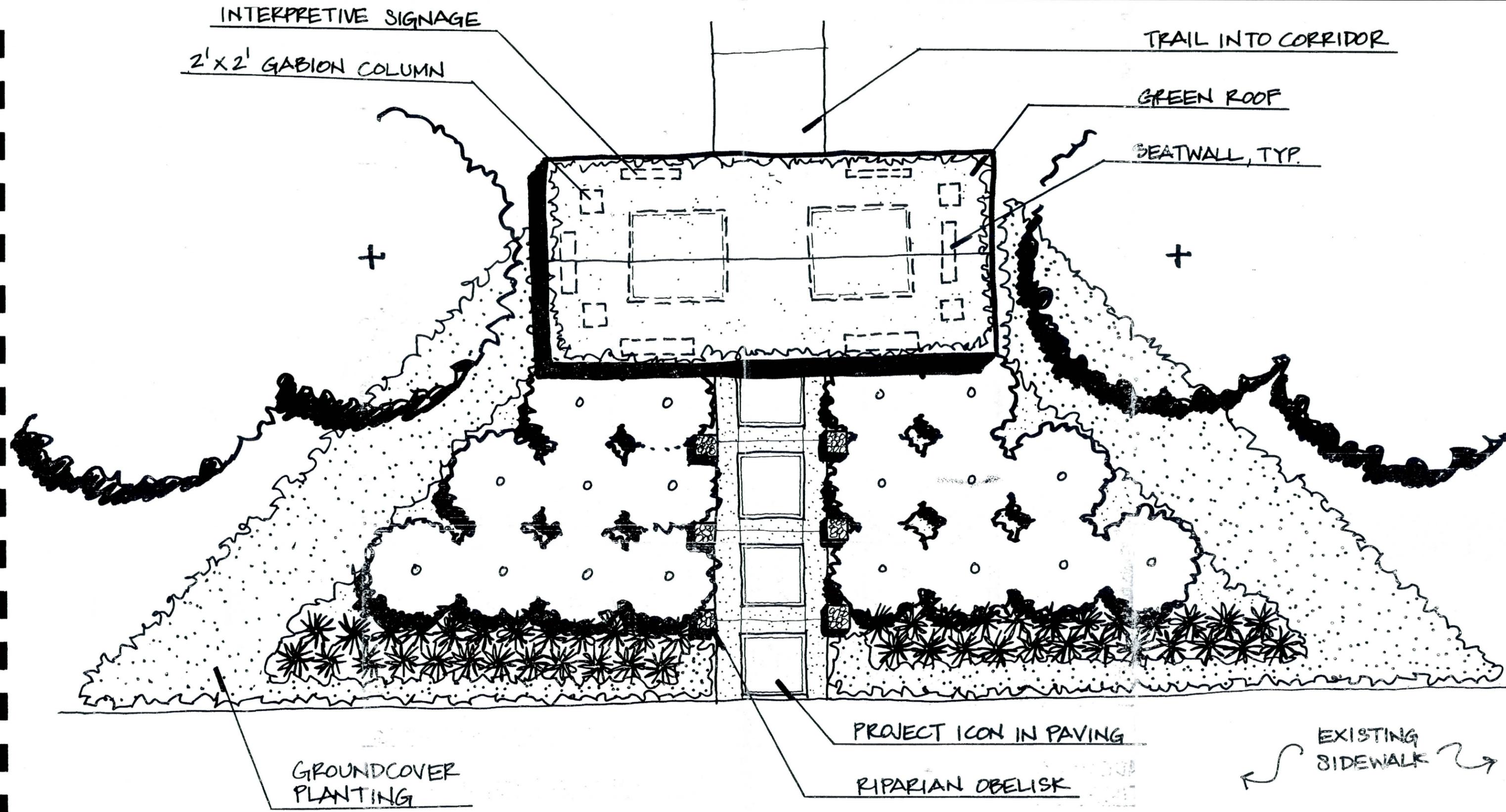
STAINLESS STEEL
RAIN AMPLIFIER

SEATWALL



GREEN SEATING NODE

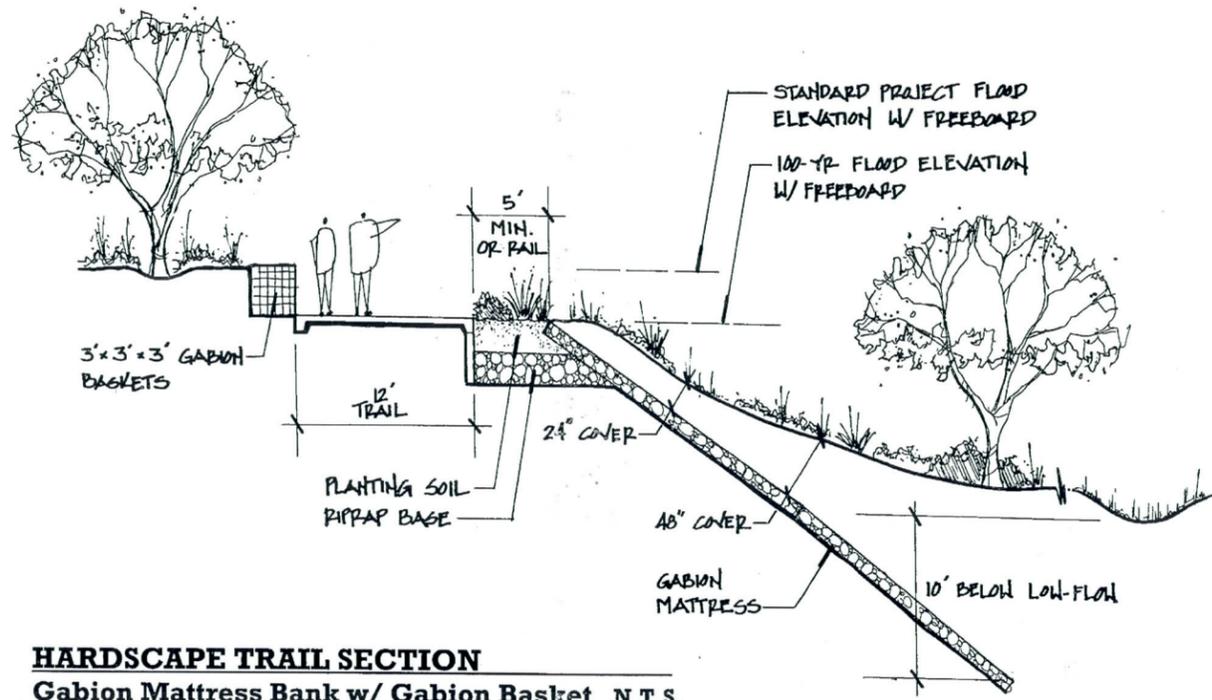
FRONT ELEVATION $\frac{3}{8}'' = 1'-0''$



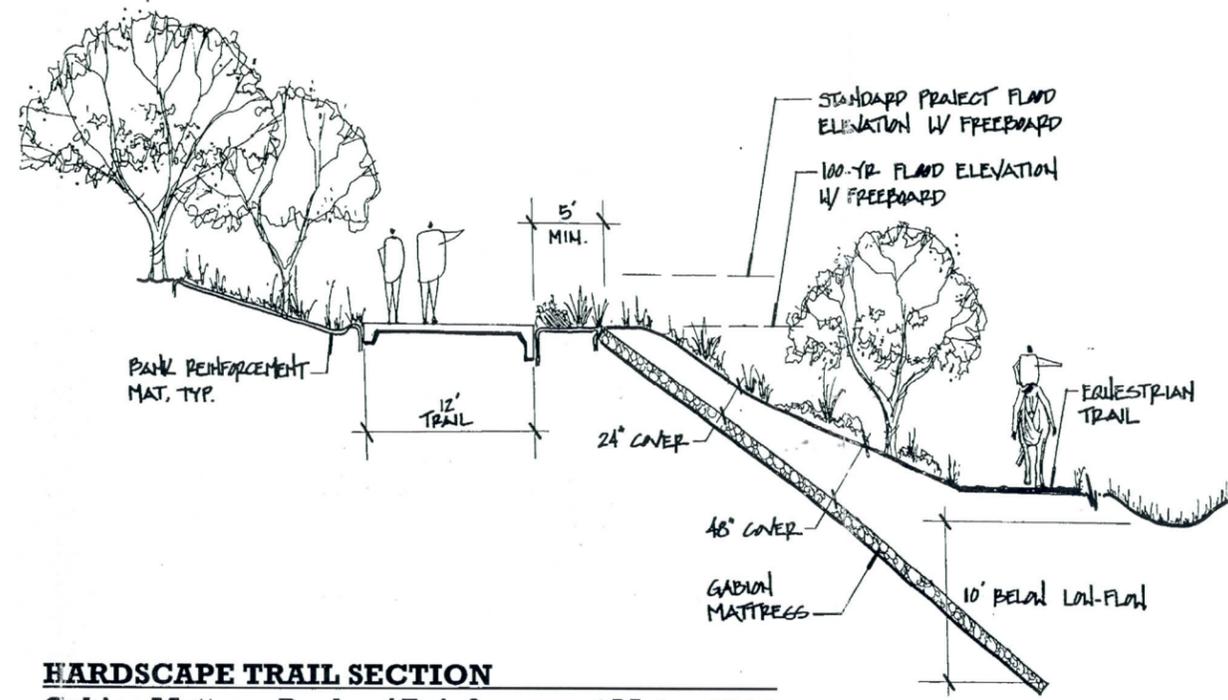
PRIMARY GATEWAY ENTRY

PLAN VIEW

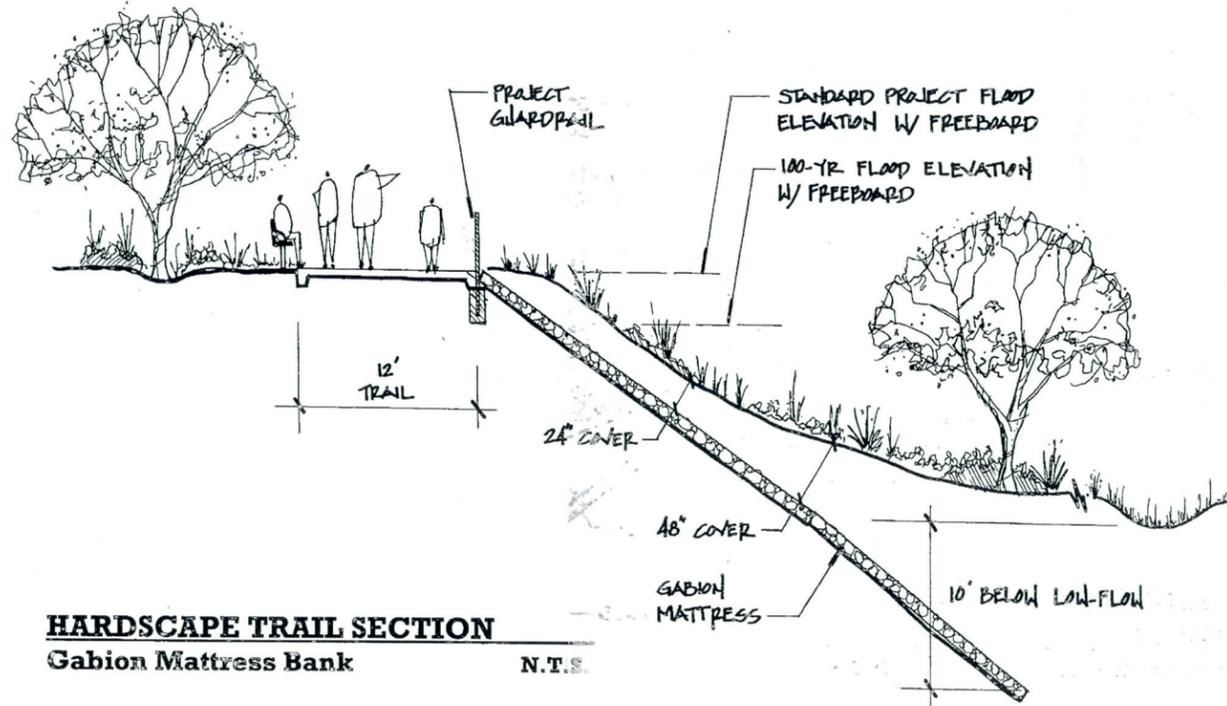
1/8" = 1'-0"



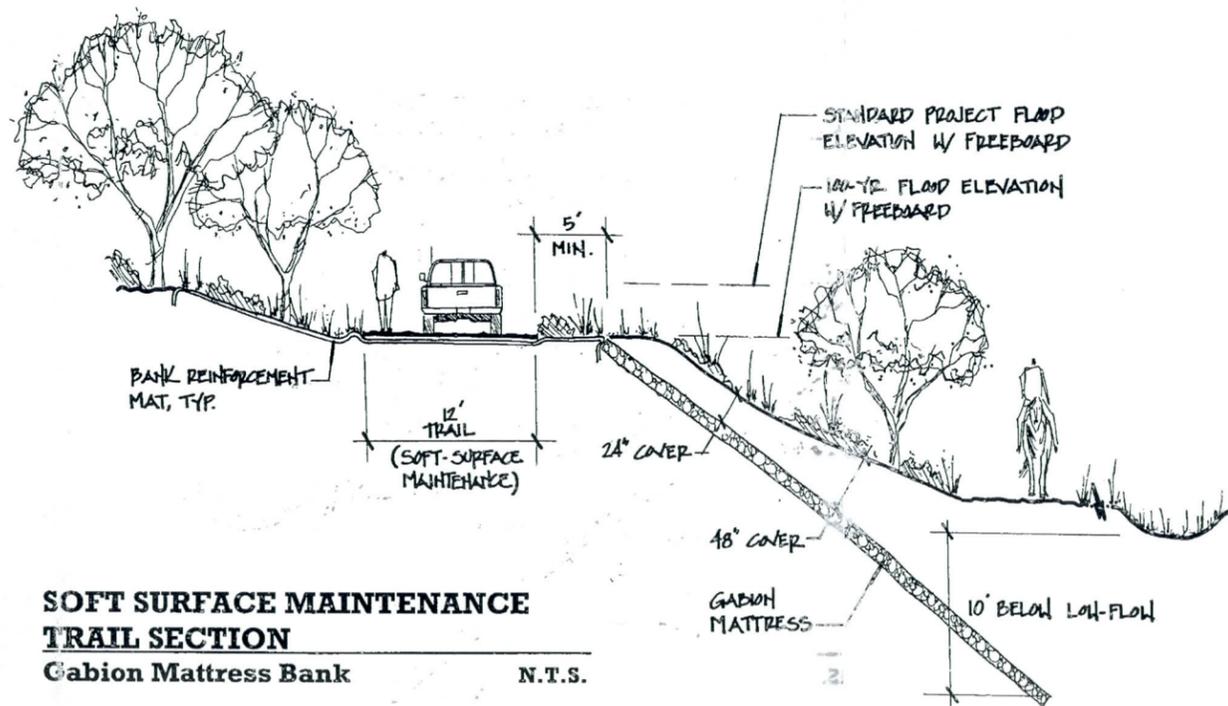
HARDSCAPE TRAIL SECTION
 Gabion Mattress Bank w/ Gabion Basket N.T.S.



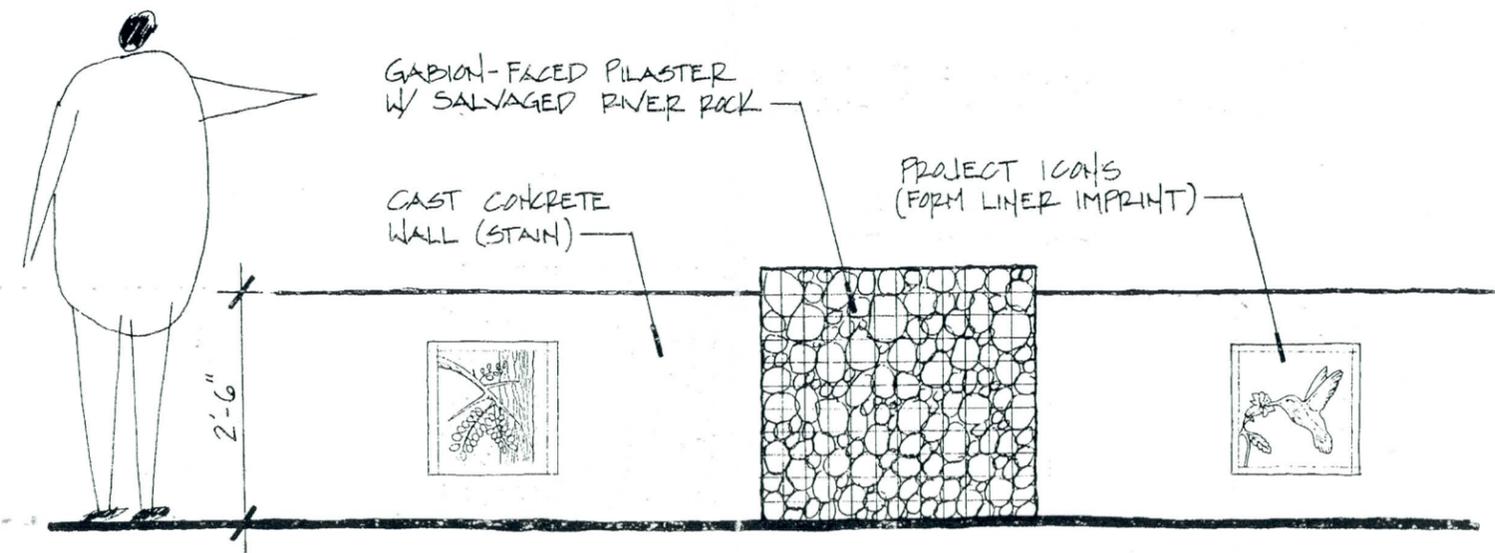
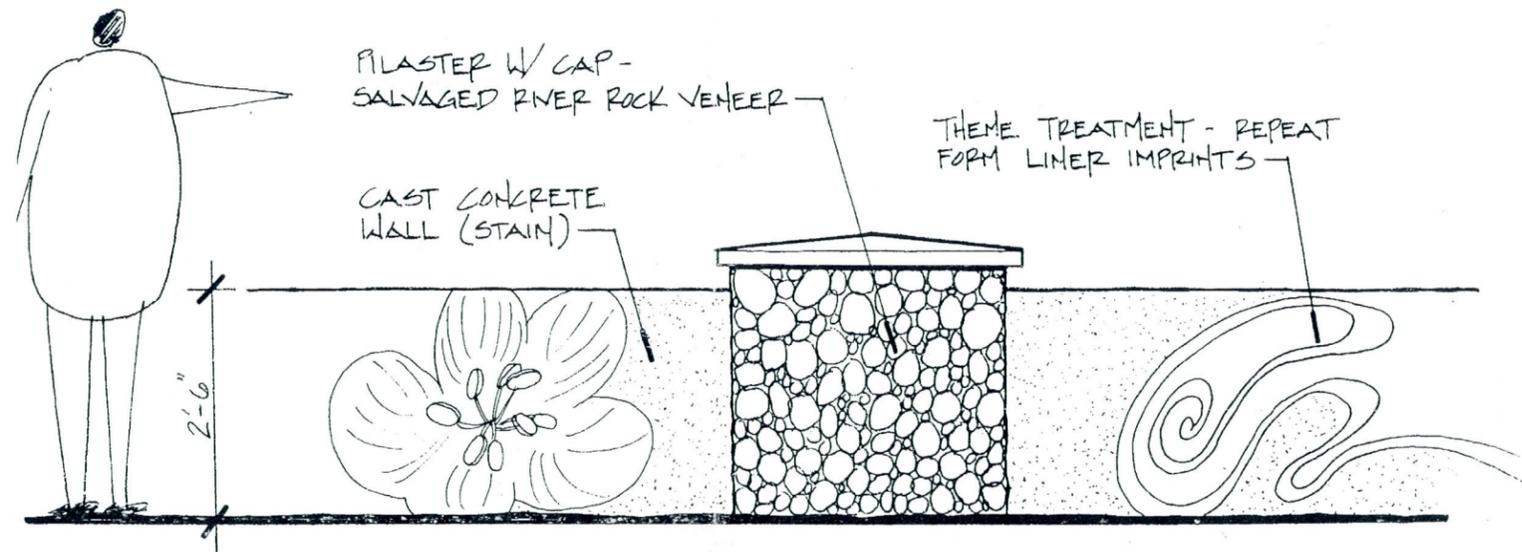
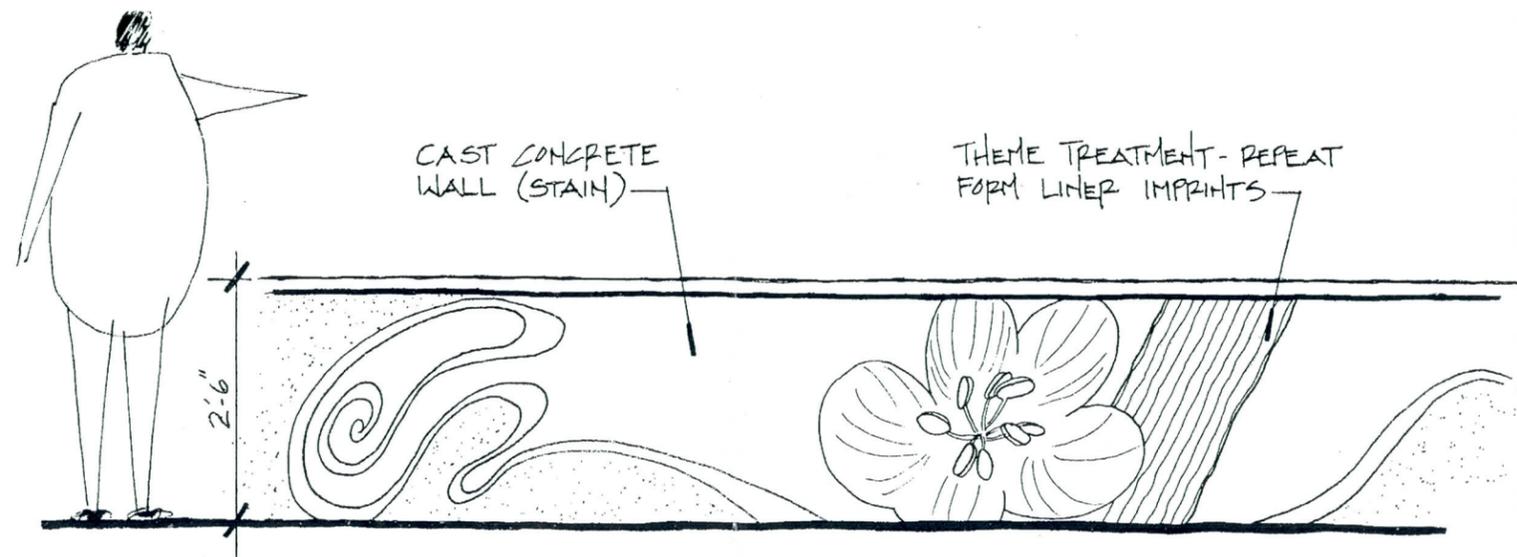
HARDSCAPE TRAIL SECTION
 Gabion Mattress Bank w/ Reinforcement Mats N.T.S.



HARDSCAPE TRAIL SECTION
 Gabion Mattress Bank N.T.S.

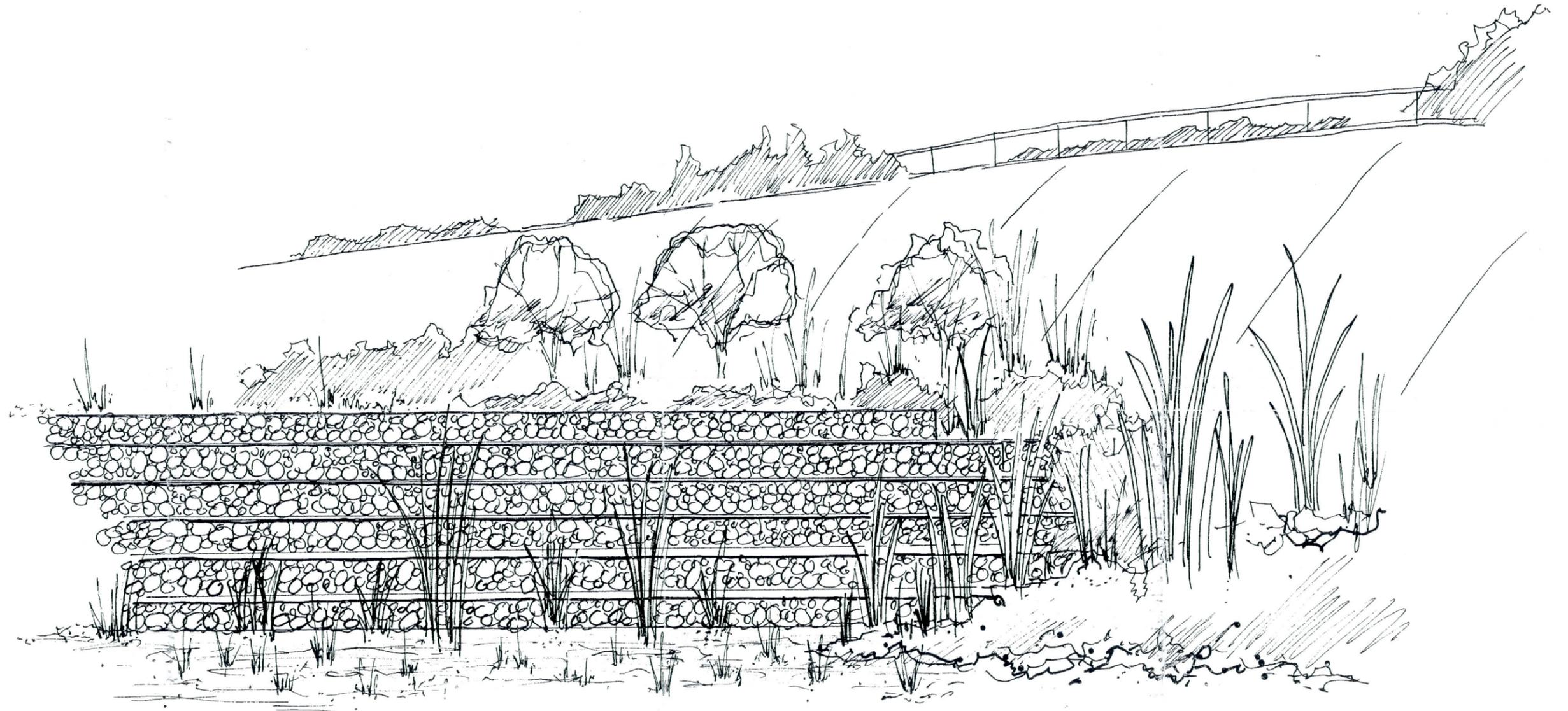


SOFT SURFACE MAINTENANCE TRAIL SECTION
 Gabion Mattress Bank N.T.S.

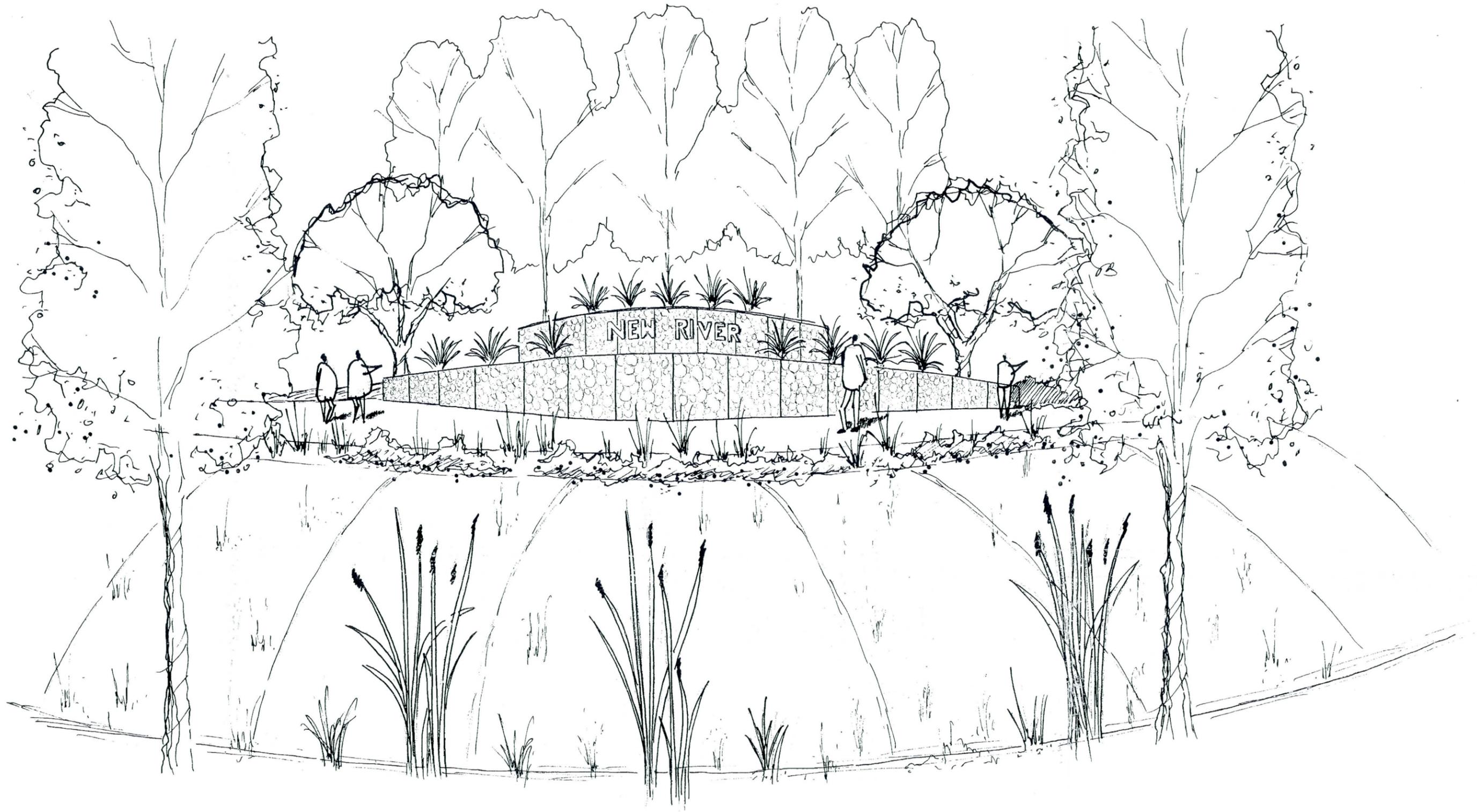


S.P.F. FLOODWALL ALTERNATIVES

CONCEPTS NTS



DROP STRUCTURE - NATIVE ROCK VENEER



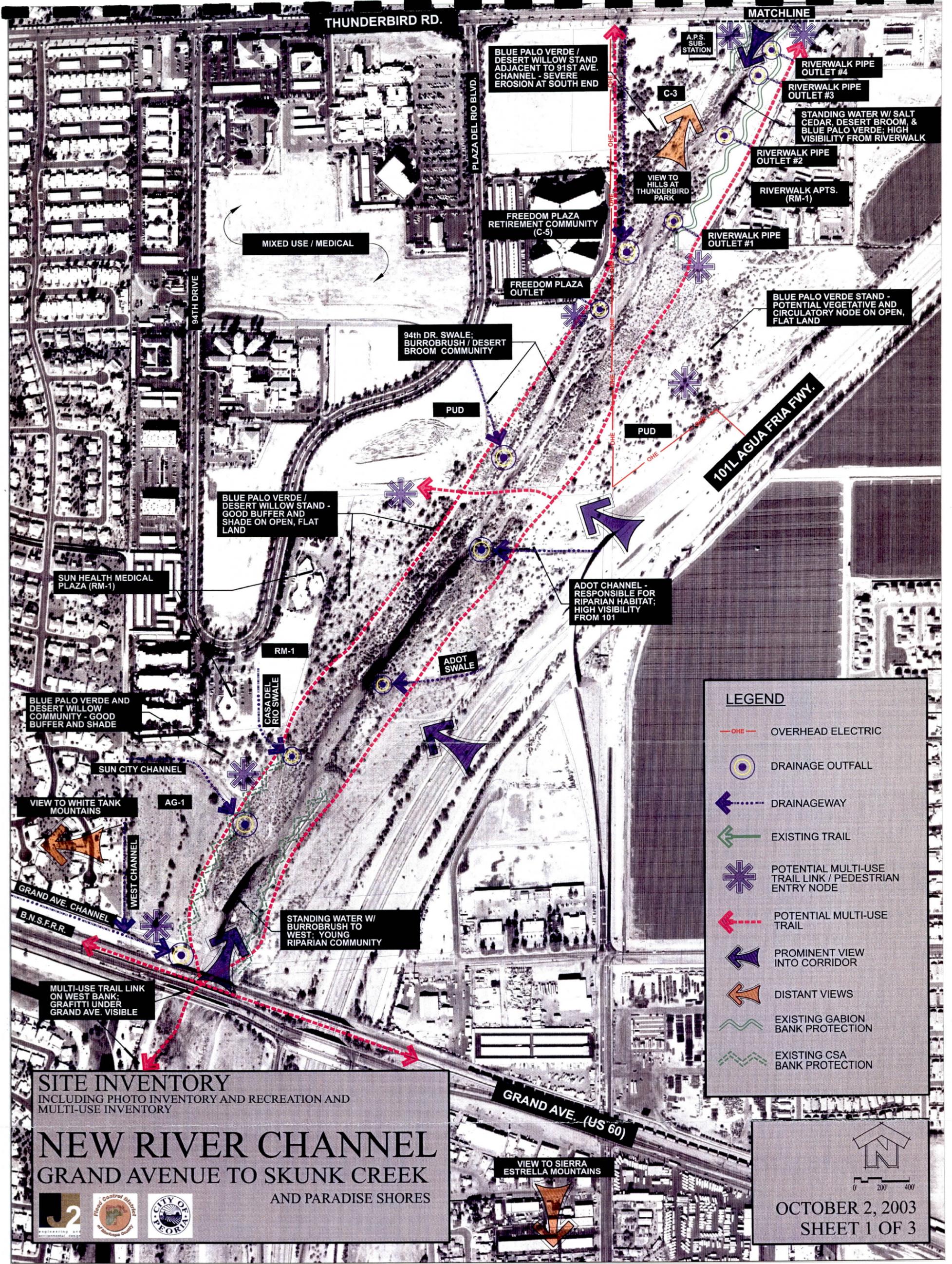
GABIION BASKETS/PROJECT SIGNAGE



New River Channel Grand Avenue to Skunk Creek

PRE-DESIGN GRAPHIC BOARDS





THUNDERBIRD RD.

MATCHLINE

BLUE PALO VERDE /
DESERT WILLOW STAND
ADJACENT TO 91ST AVE.
CHANNEL - SEVERE
EROSION AT SOUTH END

A.P.S.
SUB-
STATION

RIVERWALK PIPE
OUTLET #4

RIVERWALK PIPE
OUTLET #3

STANDING WATER W/ SALT
CEDAR, DESERT BROOM, &
BLUE PALO VERDE; HIGH
VISIBILITY FROM RIVERWALK

RIVERWALK PIPE
OUTLET #2

RIVERWALK APTS.
(RM-1)

RIVERWALK PIPE
OUTLET #1

BLUE PALO VERDE STAND -
POTENTIAL VEGETATIVE AND
CIRCULATORY NODE ON OPEN,
FLAT LAND

MIXED USE / MEDICAL

FREEDOM PLAZA
RETIREMENT COMMUNITY
(C-5)

FREEDOM PLAZA
OUTLET

94th DR. SWALE;
BURROBRUSH / DESERT
BROOM COMMUNITY

PUD

PUD

101L AGUA FRIA FWY.

BLUE PALO VERDE /
DESERT WILLOW STAND -
GOOD BUFFER AND
SHADE ON OPEN, FLAT
LAND

ADOT CHANNEL -
RESPONSIBLE FOR
RIPARIAN HABITAT;
HIGH VISIBILITY
FROM 101

SUN HEALTH MEDICAL
PLAZA (RM-1)

RM-1

ADOT
SWALE

BLUE PALO VERDE AND
DESERT WILLOW
COMMUNITY - GOOD
BUFFER AND SHADE

CASA DEL
RIO SWALE

SUN CITY CHANNEL

VIEW TO WHITE TANK
MOUNTAINS

AG-1

WEST CHANNEL

GRAND AVE. CHANNEL

B.N.S.F.R.R.

STANDING WATER W/
BURROBRUSH TO
WEST: YOUNG
RIPARIAN COMMUNITY

MULTI-USE TRAIL LINK
ON WEST BANK;
GRAFFITI UNDER
GRAND AVE. VISIBLE

GRAND AVE. (US 60)

VIEW TO SIERRA
ESTRELLA MOUNTAINS

LEGEND

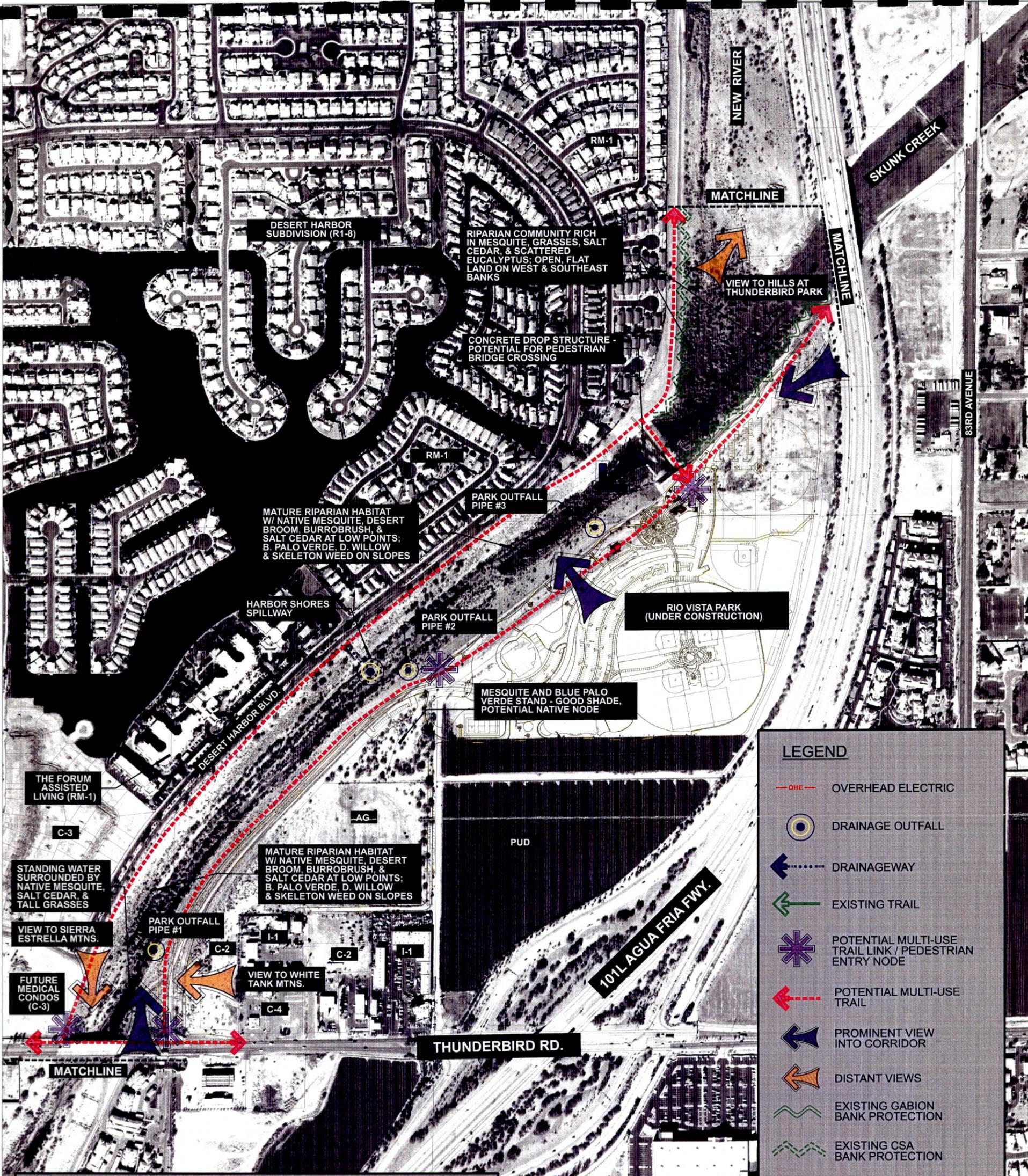
- OVERHEAD ELECTRIC
- DRAINAGE OUTFALL
- DRAINAGWAY
- EXISTING TRAIL
- POTENTIAL MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- POTENTIAL MULTI-USE TRAIL
- PROMINENT VIEW INTO CORRIDOR
- DISTANT VIEWS
- EXISTING GABION BANK PROTECTION
- EXISTING CSA BANK PROTECTION

SITE INVENTORY
INCLUDING PHOTO INVENTORY AND RECREATION AND
MULTI-USE INVENTORY

NEW RIVER CHANNEL
GRAND AVENUE TO SKUNK CREEK
AND PARADISE SHORES

OCTOBER 2, 2003
SHEET 1 OF 3

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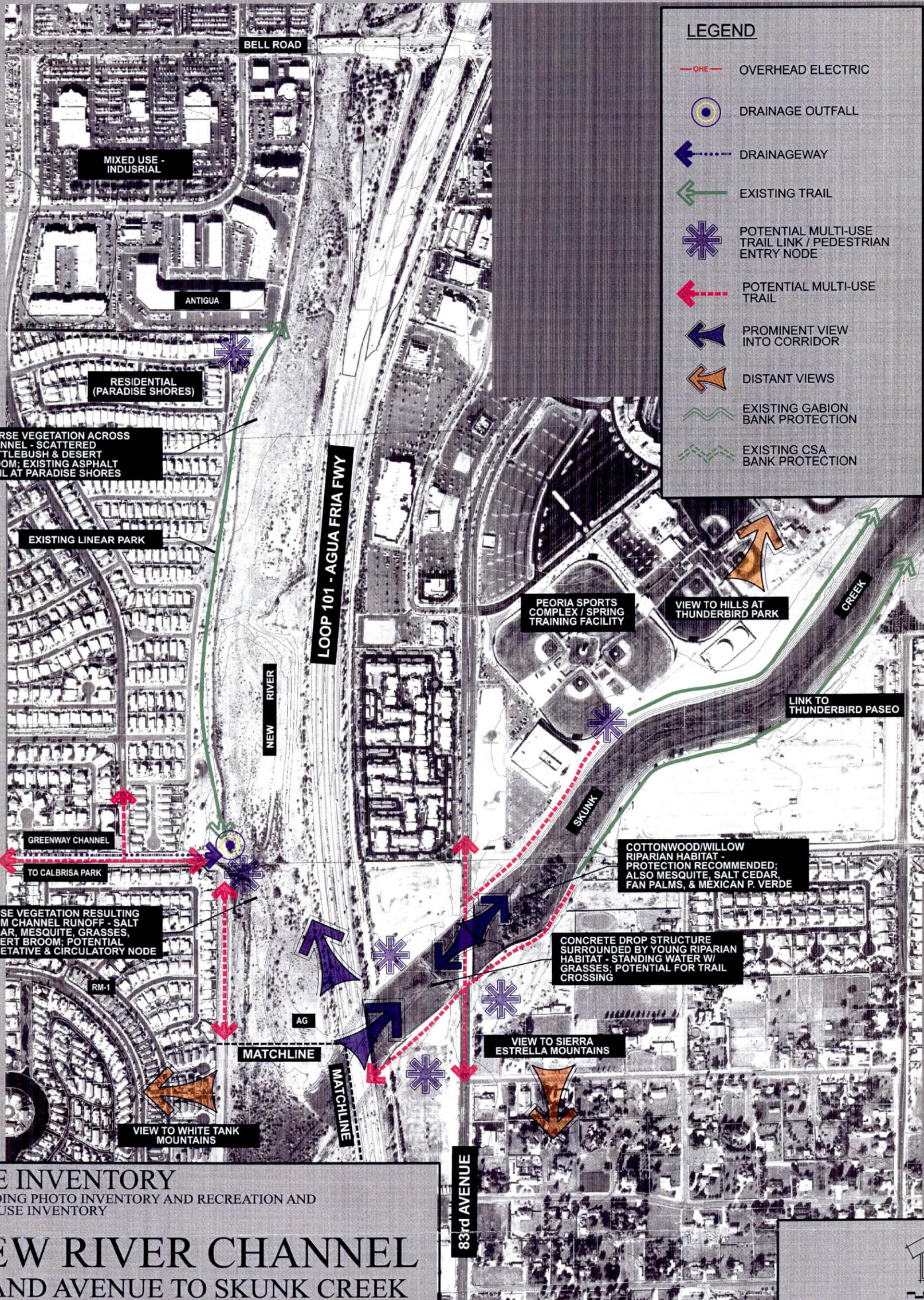
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- DRAINAGEWAY
- EXISTING TRAIL
- POTENTIAL MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- POTENTIAL MULTI-USE TRAIL
- PROMINENT VIEW INTO CORRIDOR
- DISTANT VIEWS
- EXISTING GABION BANK PROTECTION
- EXISTING CSA BANK PROTECTION

SITE INVENTORY
 INCLUDING PHOTO INVENTORY AND RECREATION AND
 MULTI-USE INVENTORY

NEW RIVER CHANNEL
 GRAND AVENUE TO SKUNK CREEK
 AND PARADISE SHORES

OCTOBER 2, 2003
 SHEET 2 OF 3

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LEGEND

- OVERHEAD ELECTRIC
- DRAINAGE OUTFALL
- DRAINAGEWAY
- EXISTING TRAIL
- POTENTIAL MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- POTENTIAL MULTI-USE TRAIL
- PROMINENT VIEW INTO CORRIDOR
- DISTANT VIEWS
- EXISTING GABION BANK PROTECTION
- EXISTING CSA BANK PROTECTION

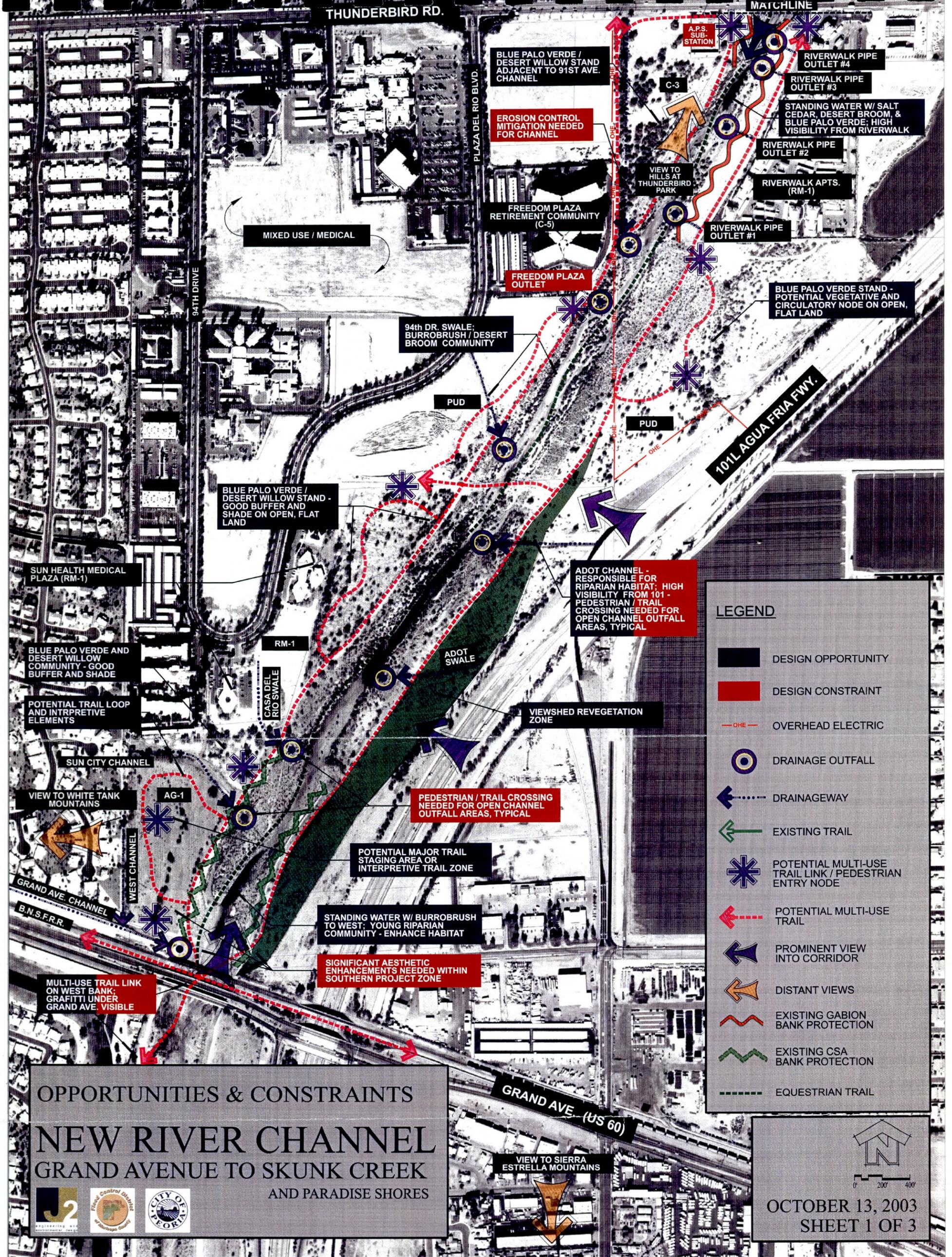
SITE INVENTORY
 INCLUDING PHOTO INVENTORY AND RECREATION AND
 MULTI-USE INVENTORY

NEW RIVER CHANNEL
GRAND AVENUE TO SKUNK CREEK
 AND PARADISE SHORES



0' 200' 400'
 OCTOBER 2, 2003
 SHEET 3 OF 3

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THUNDERBIRD RD.

MATCHLINE

BLUE PALO VERDE / DESERT WILLOW STAND ADJACENT TO 91ST AVE. CHANNEL

EROSION CONTROL MITIGATION NEEDED FOR CHANNEL

FREEDOM PLAZA RETIREMENT COMMUNITY (C-5)

FREEDOM PLAZA OUTLET

94th DR. SWALE; BURROBRUSH / DESERT BROOM COMMUNITY

PUD

PUD

BLUE PALO VERDE / DESERT WILLOW STAND - GOOD BUFFER AND SHADE ON OPEN, FLAT LAND

BLUE PALO VERDE STAND - POTENTIAL VEGETATIVE AND CIRCULATORY NODE ON OPEN, FLAT LAND

SUN HEALTH MEDICAL PLAZA (RM-1)

BLUE PALO VERDE AND DESERT WILLOW COMMUNITY - GOOD BUFFER AND SHADE

POTENTIAL TRAIL LOOP AND INTRPRETIVE ELEMENTS

SUN CITY CHANNEL

VIEW TO WHITE TANK MOUNTAINS

AG-1

PEDESTRIAN / TRAIL CROSSING NEEDED FOR OPEN CHANNEL OUTFALL AREAS, TYPICAL

POTENTIAL MAJOR TRAIL STAGING AREA OR INTERPRETIVE TRAIL ZONE

STANDING WATER W/ BURROBRUSH TO WEST; YOUNG RIPARIAN COMMUNITY - ENHANCE HABITAT

SIGNIFICANT AESTHETIC ENHANCEMENTS NEEDED WITHIN SOUTHERN PROJECT ZONE

MULTI-USE TRAIL LINK ON WEST BANK; GRAFFITI UNDER GRAND AVE. VISIBLE

ADOT CHANNEL - RESPONSIBLE FOR RIPARIAN HABITAT; HIGH VISIBILITY FROM 101 - PEDESTRIAN / TRAIL CROSSING NEEDED FOR OPEN CHANNEL OUTFALL AREAS, TYPICAL

VIEWSHED REVEGETATION ZONE

LEGEND

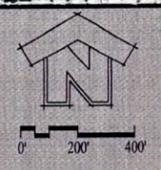
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- DESIGN CONSTRAINT
- OVERHEAD ELECTRIC
- DRAINAGE OUTFALL
- DRAINAGEWAY
- EXISTING TRAIL
- POTENTIAL MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- POTENTIAL MULTI-USE TRAIL
- PROMINENT VIEW INTO CORRIDOR
- DISTANT VIEWS
- EXISTING GABION BANK PROTECTION
- EXISTING CSA BANK PROTECTION
- EQUESTRIAN TRAIL

OPPORTUNITIES & CONSTRAINTS
NEW RIVER CHANNEL
 GRAND AVENUE TO SKUNK CREEK
 AND PARADISE SHORES



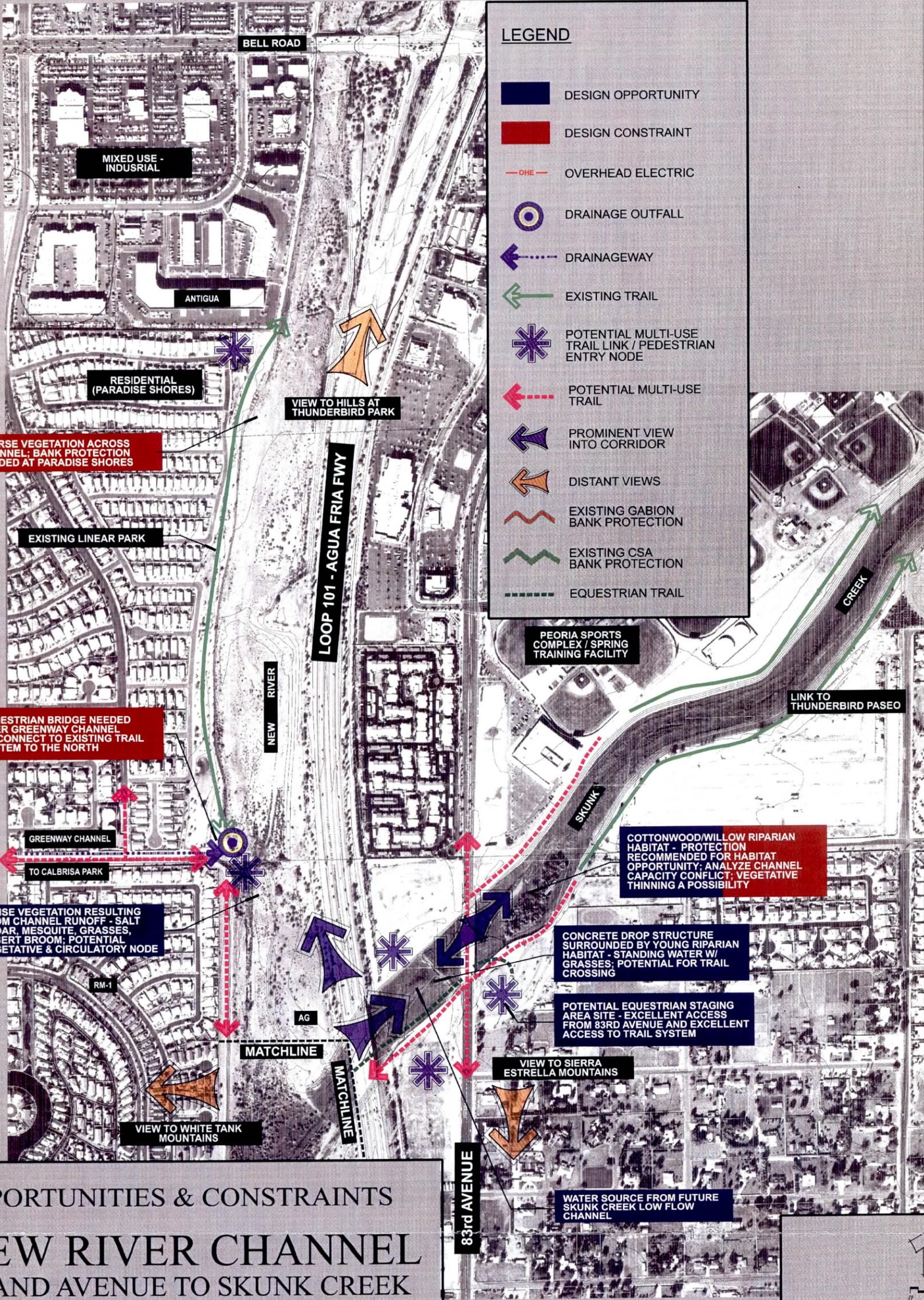
GRAND AVE. (US 60)

VIEW TO SIERRA ESTRELLA MOUNTAINS



OCTOBER 13, 2003
 SHEET 1 OF 3

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LEGEND

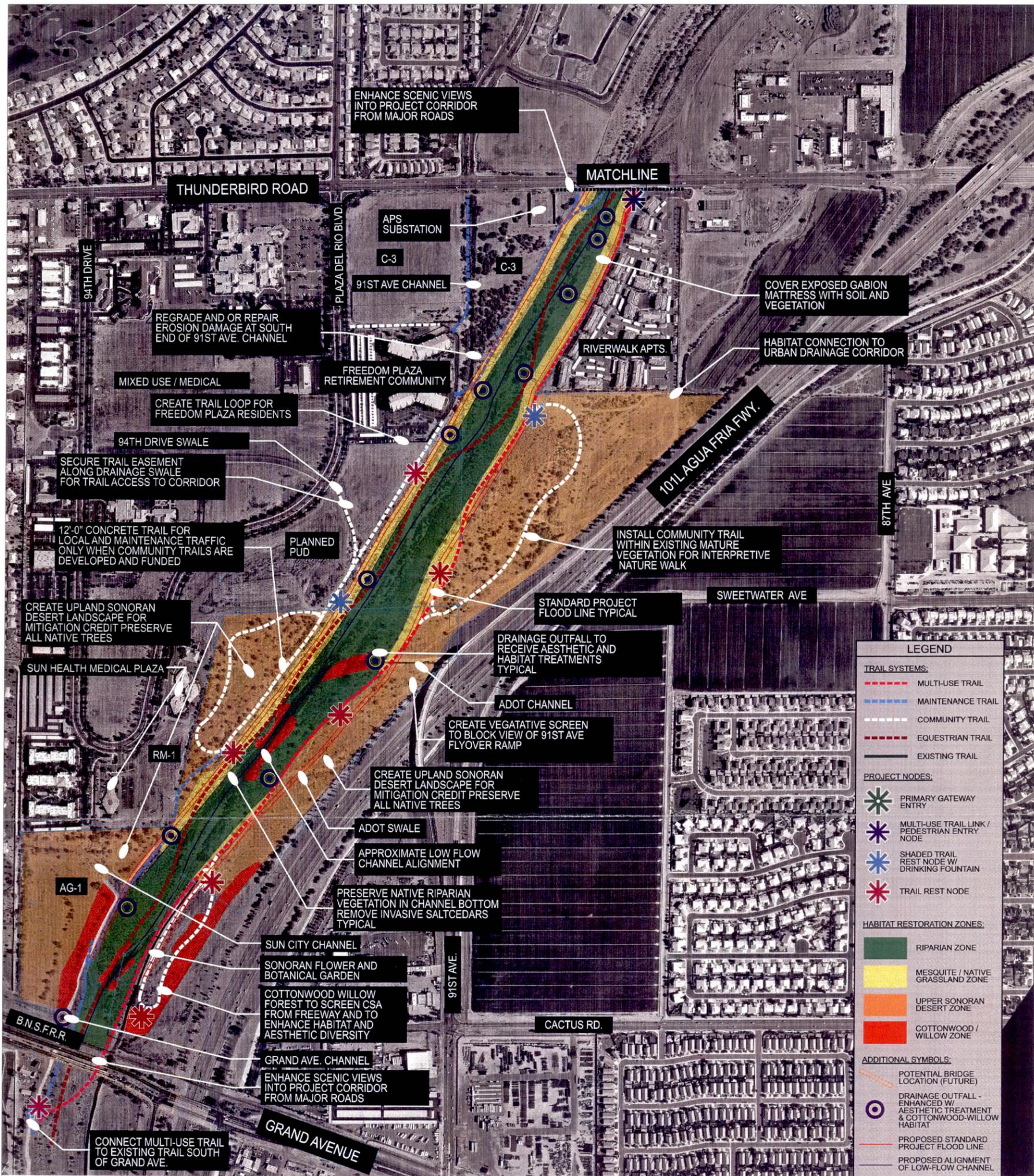
- DESIGN OPPORTUNITY
- DESIGN CONSTRAINT
- OVERHEAD ELECTRIC
- DRAINAGE OUTFALL
- DRAINAGEWAY
- EXISTING TRAIL
- POTENTIAL MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- POTENTIAL MULTI-USE TRAIL
- PROMINENT VIEW INTO CORRIDOR
- DISTANT VIEWS
- EXISTING GABION BANK PROTECTION
- EXISTING CSA BANK PROTECTION
- EQUESTRIAN TRAIL

OPPORTUNITIES & CONSTRAINTS
NEW RIVER CHANNEL
 GRAND AVENUE TO SKUNK CREEK
 AND PARADISE SHORES



OCTOBER 13, 2003
 SHEET 3 OF 3

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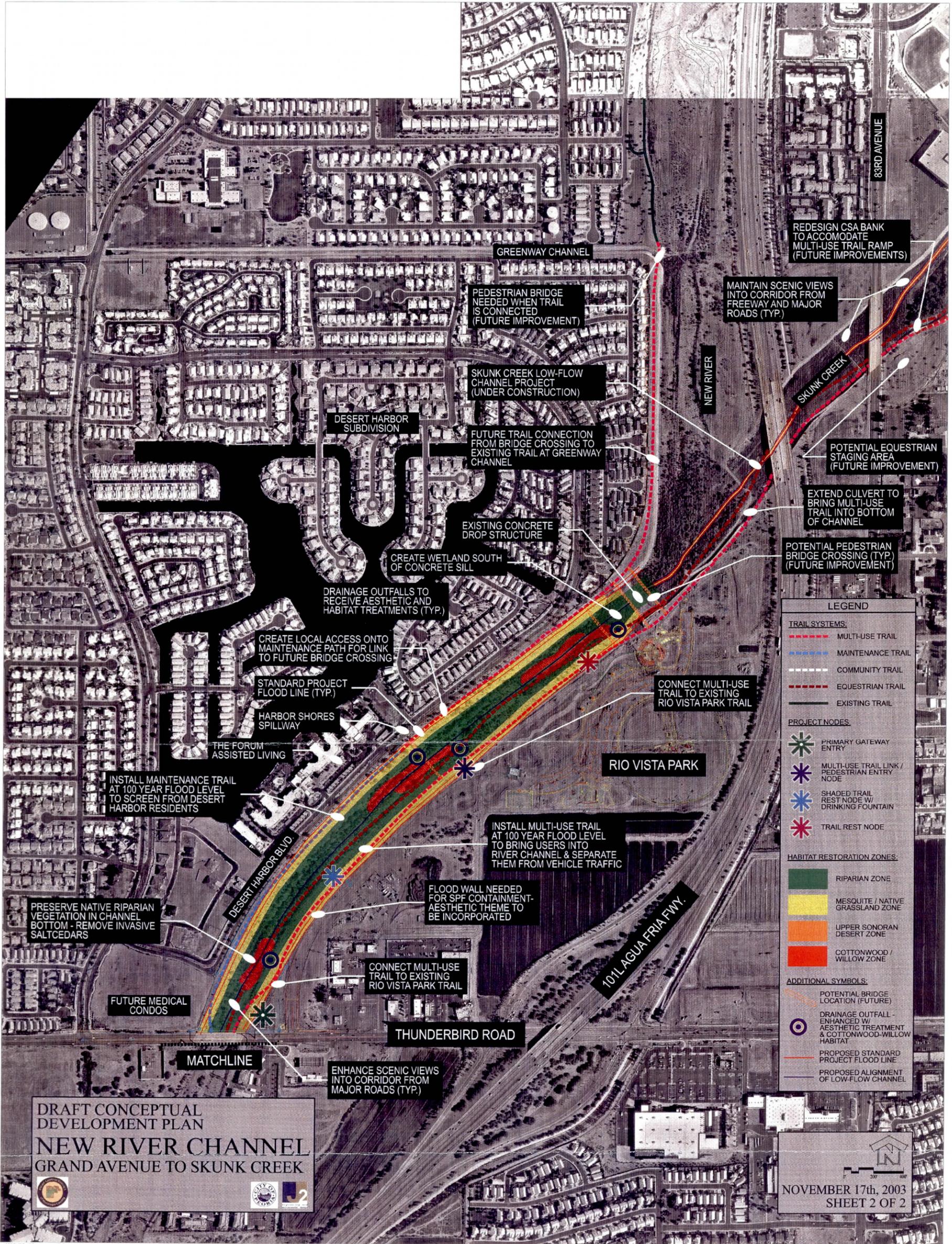


DRAFT CONCEPTUAL DEVELOPMENT PLAN
NEW RIVER CHANNEL
 GRAND AVENUE TO SKUNK CREEK



NOVEMBER 17th, 2003
 SHEET 1 OF 2

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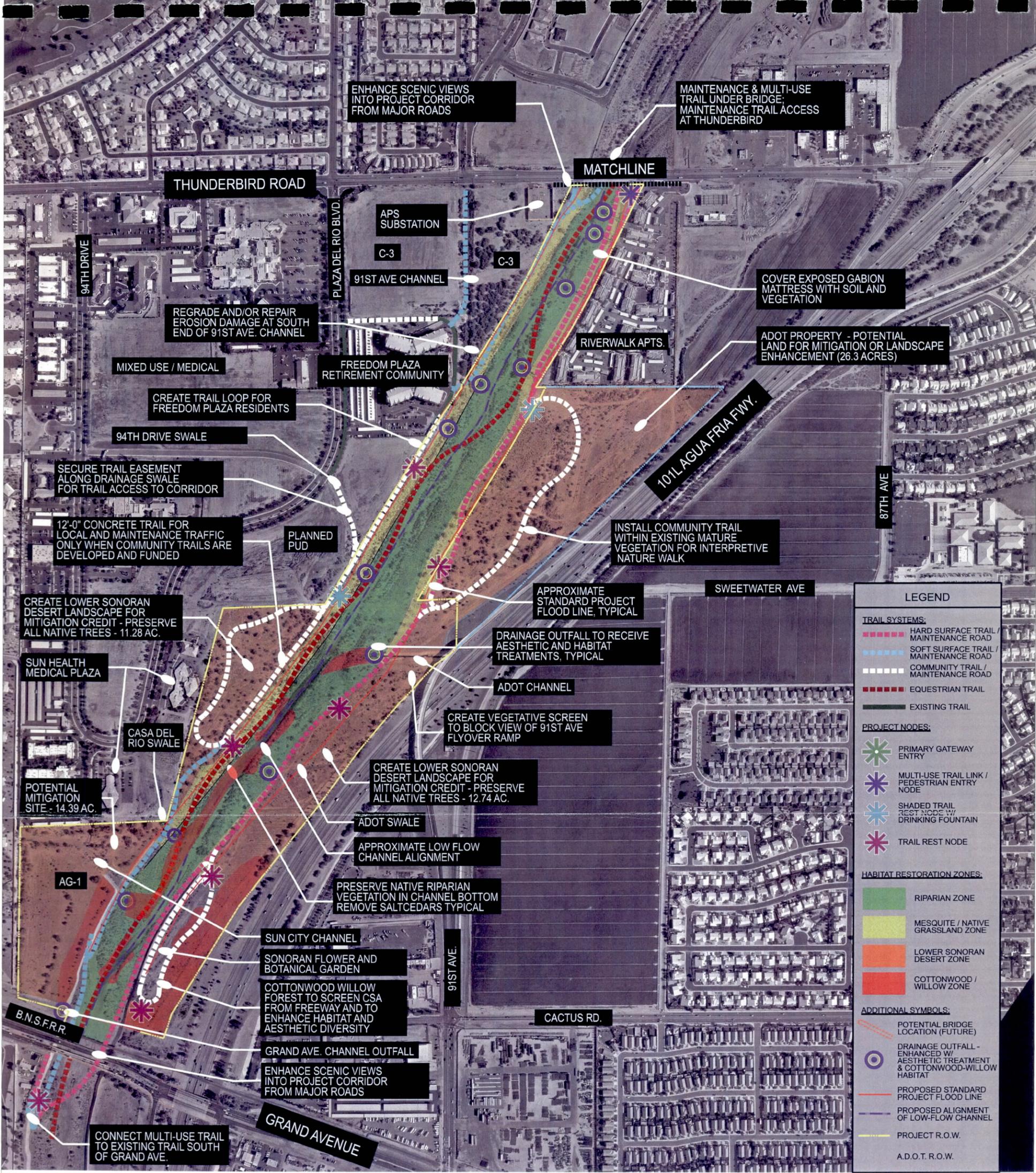


**DRAFT CONCEPTUAL DEVELOPMENT PLAN
NEW RIVER CHANNEL
GRAND AVENUE TO SKUNK CREEK**



NOVEMBER 17th, 2003
SHEET 2 OF 2

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ENHANCE SCENIC VIEWS INTO PROJECT CORRIDOR FROM MAJOR ROADS

MAINTENANCE & MULTI-USE TRAIL UNDER BRIDGE; MAINTENANCE TRAIL ACCESS AT THUNDERBIRD

THUNDERBIRD ROAD

MATCHLINE

APS SUBSTATION

C-3

91ST AVE CHANNEL

C-3

COVER EXPOSED GABION MATTRESS WITH SOIL AND VEGETATION

REGRADE AND/OR REPAIR EROSION DAMAGE AT SOUTH END OF 91ST AVE. CHANNEL

RIVERWALK APTS.

ADOT PROPERTY - POTENTIAL LAND FOR MITIGATION OR LANDSCAPE ENHANCEMENT (26.3 ACRES)

MIXED USE / MEDICAL

FREEDOM PLAZA RETIREMENT COMMUNITY

CREATE TRAIL LOOP FOR FREEDOM PLAZA RESIDENTS

94TH DRIVE SWALE

SECURE TRAIL EASEMENT ALONG DRAINAGE SWALE FOR TRAIL ACCESS TO CORRIDOR

12'-0" CONCRETE TRAIL FOR LOCAL AND MAINTENANCE TRAFFIC ONLY WHEN COMMUNITY TRAILS ARE DEVELOPED AND FUNDED

PLANNED PUD

INSTALL COMMUNITY TRAIL WITHIN EXISTING MATURE VEGETATION FOR INTERPRETIVE NATURE WALK

CREATE LOWER SONORAN DESERT LANDSCAPE FOR MITIGATION CREDIT - PRESERVE ALL NATIVE TREES - 11.28 AC.

SUN HEALTH MEDICAL PLAZA

APPROXIMATE STANDARD PROJECT FLOOD LINE, TYPICAL

DRAINAGE OUTFALL TO RECEIVE AESTHETIC AND HABITAT TREATMENTS, TYPICAL

ADOT CHANNEL

CASA DEL RIO SWALE

CREATE VEGETATIVE SCREEN TO BLOCK VIEW OF 91ST AVE FLYOVER RAMP

POTENTIAL MITIGATION SITE - 14.39 AC.

CREATE LOWER SONORAN DESERT LANDSCAPE FOR MITIGATION CREDIT - PRESERVE ALL NATIVE TREES - 12.74 AC.

ADOT SWALE

APPROXIMATE LOW FLOW CHANNEL ALIGNMENT

PRESERVE NATIVE RIPARIAN VEGETATION IN CHANNEL BOTTOM REMOVE SALT CEDARS TYPICAL

AG-1

SUN CITY CHANNEL

SONORAN FLOWER AND BOTANICAL GARDEN

COTTONWOOD WILLOW FOREST TO SCREEN CSA FROM FREEWAY AND TO ENHANCE HABITAT AND AESTHETIC DIVERSITY

91ST AVE.

GRAND AVE. CHANNEL OUTFALL

ENHANCE SCENIC VIEWS INTO PROJECT CORRIDOR FROM MAJOR ROADS

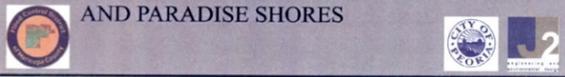
CACTUS RD.

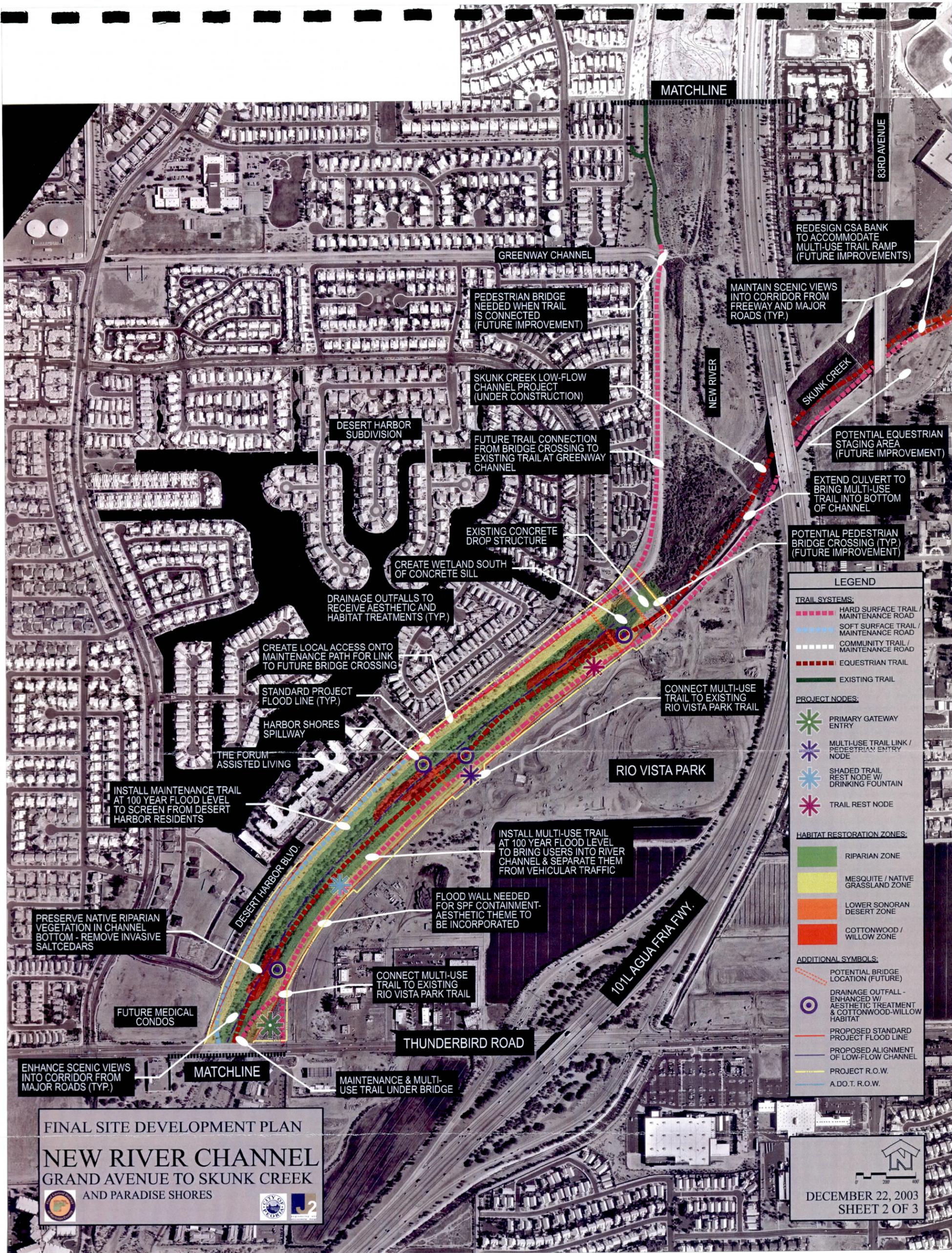
CONNECT MULTI-USE TRAIL TO EXISTING TRAIL SOUTH OF GRAND AVE.

GRAND AVENUE

LEGEND	
TRAIL SYSTEMS:	
	HARD SURFACE TRAIL / MAINTENANCE ROAD
	SOFT SURFACE TRAIL / MAINTENANCE ROAD
	COMMUNITY TRAIL / MAINTENANCE ROAD
	EQUESTRIAN TRAIL
	EXISTING TRAIL
PROJECT NODES:	
	PRIMARY GATEWAY ENTRY
	MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
	SHADED TRAIL REST NODE W/ DRINKING FOUNTAIN
	TRAIL REST NODE
HABITAT RESTORATION ZONES:	
	RIPARIAN ZONE
	MESQUITE / NATIVE GRASSLAND ZONE
	LOWER SONORAN DESERT ZONE
	COTTONWOOD / WILLOW ZONE
ADDITIONAL SYMBOLS:	
	POTENTIAL BRIDGE LOCATION (FUTURE)
	DRAINAGE OUTFALL - ENHANCED W/ AESTHETIC TREATMENT & COTTONWOOD-WILLOW HABITAT
	PROPOSED STANDARD PROJECT FLOOD LINE
	PROPOSED ALIGNMENT OF LOW-FLOW CHANNEL
	PROJECT R.O.W.
	A.D.O.T. R.O.W.

FINAL SITE DEVELOPMENT PLAN
NEW RIVER CHANNEL
 GRAND AVENUE TO SKUNK CREEK
 AND PARADISE SHORES





MATCHLINE

83RD AVENUE

GREENWAY CHANNEL

NEW RIVER

SKUNK CREEK

RIO VISTA PARK

101L AGUA FRIA FWY.

THUNDERBIRD ROAD

MATCHLINE

DESERT HARBOR BLVD

LEGEND

TRAIL SYSTEMS:

- HARD SURFACE TRAIL / MAINTENANCE ROAD
- SOFT SURFACE TRAIL / MAINTENANCE ROAD
- COMMUNITY TRAIL / MAINTENANCE ROAD
- EQUESTRIAN TRAIL
- EXISTING TRAIL

PROJECT NODES:

- PRIMARY GATEWAY ENTRY
- MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- SHADED TRAIL REST NODE W/ DRINKING FOUNTAIN
- TRAIL REST NODE

HABITAT RESTORATION ZONES:

- RIPARIAN ZONE
- MESQUITE / NATIVE GRASSLAND ZONE
- LOWER SONORAN DESERT ZONE
- COTTONWOOD / WILLOW ZONE

ADDITIONAL SYMBOLS:

- POTENTIAL BRIDGE LOCATION (FUTURE)
- DRAINAGE OUTFALL - ENHANCED W/ AESTHETIC TREATMENT & COTTONWOOD-WILLOW HABITAT
- PROPOSED STANDARD PROJECT FLOOD LINE
- PROPOSED ALIGNMENT OF LOW-FLOW CHANNEL
- PROJECT R.O.W.
- A.D.O.T. R.O.W.

DECEMBER 22, 2003
SHEET 2 OF 3

FINAL SITE DEVELOPMENT PLAN
NEW RIVER CHANNEL
GRAND AVENUE TO SKUNK CREEK
AND PARADISE SHORES

PEDESTRIAN BRIDGE NEEDED WHEN TRAIL IS CONNECTED (FUTURE IMPROVEMENT)

SKUNK CREEK LOW-FLOW CHANNEL PROJECT (UNDER CONSTRUCTION)

DESERT HARBOR SUBDIVISION

FUTURE TRAIL CONNECTION FROM BRIDGE CROSSING TO EXISTING TRAIL AT GREENWAY CHANNEL

EXISTING CONCRETE DROP STRUCTURE

CREATE WETLAND SOUTH OF CONCRETE SILL

DRAINAGE OUTFALLS TO RECEIVE AESTHETIC AND HABITAT TREATMENTS (TYP.)

CREATE LOCAL ACCESS ONTO MAINTENANCE PATH FOR LINK TO FUTURE BRIDGE CROSSING

STANDARD PROJECT FLOOD LINE (TYP.)

HARBOR SHORES SPILLWAY

THE FORUM ASSISTED LIVING

INSTALL MAINTENANCE TRAIL AT 100 YEAR FLOOD LEVEL TO SCREEN FROM DESERT HARBOR RESIDENTS

PRESERVE NATIVE RIPARIAN VEGETATION IN CHANNEL BOTTOM - REMOVE INVASIVE SALT CEDARS

FUTURE MEDICAL CONDOS

ENHANCE SCENIC VIEWS INTO CORRIDOR FROM MAJOR ROADS (TYP.)

MAINTENANCE & MULTI-USE TRAIL UNDER BRIDGE

INSTALL MULTI-USE TRAIL AT 100 YEAR FLOOD LEVEL TO BRING USERS INTO RIVER CHANNEL & SEPARATE THEM FROM VEHICULAR TRAFFIC

FLOOD WALL NEEDED FOR SPF CONTAINMENT - AESTHETIC THEME TO BE INCORPORATED

CONNECT MULTI-USE TRAIL TO EXISTING RIO VISTA PARK TRAIL

REDESIGN CSA BANK TO ACCOMMODATE MULTI-USE TRAIL RAMP (FUTURE IMPROVEMENTS)

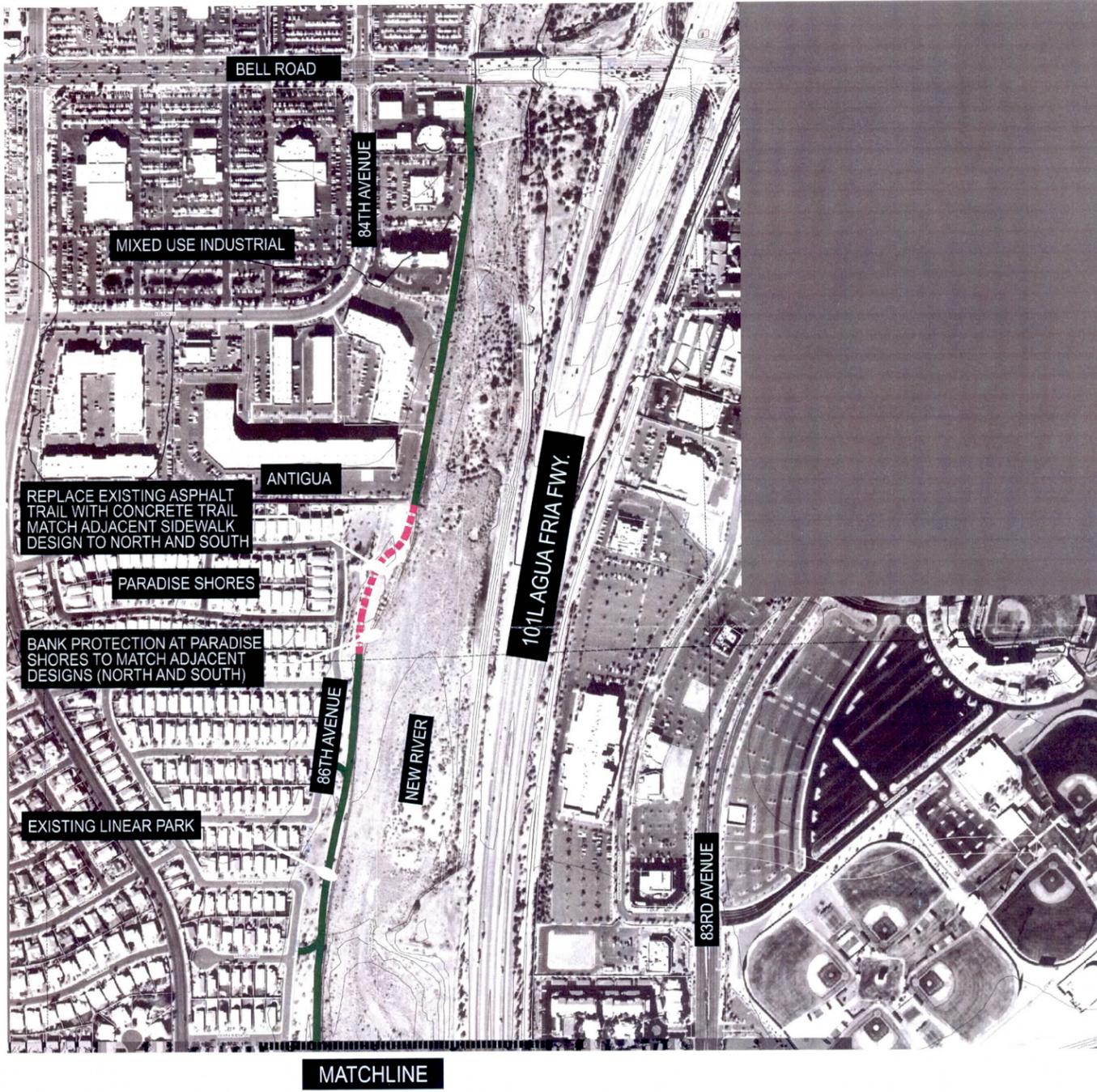
MAINTAIN SCENIC VIEWS INTO CORRIDOR FROM FREEWAY AND MAJOR ROADS (TYP.)

POTENTIAL EQUESTRIAN STAGING AREA (FUTURE IMPROVEMENT)

EXTEND CULVERT TO BRING MULTI-USE TRAIL INTO BOTTOM OF CHANNEL

POTENTIAL PEDESTRIAN BRIDGE CROSSING (TYP.) (FUTURE IMPROVEMENT)

CONNECT MULTI-USE TRAIL TO EXISTING RIO VISTA PARK TRAIL



LEGEND

TRAIL SYSTEMS:

- HARD SURFACE TRAIL / MAINTENANCE ROAD
- SOFT SURFACE TRAIL / MAINTENANCE ROAD
- COMMUNITY TRAIL / MAINTENANCE ROAD
- EQUESTRIAN TRAIL
- EXISTING TRAIL

PROJECT NODES:

- PRIMARY GATEWAY ENTRY
- MULTI-USE TRAIL LINK / PEDESTRIAN ENTRY NODE
- SHADED TRAIL REST NODE W/ DRINKING FOUNTAIN
- TRAIL REST NODE

HABITAT RESTORATION ZONES:

- RIPARIAN ZONE
- MESQUITE / NATIVE GRASSLAND ZONE
- LOWER SONORAN DESERT ZONE
- COTTONWOOD / WILLOW ZONE

ADDITIONAL SYMBOLS:

- POTENTIAL BRIDGE LOCATION (FUTURE)
- DRAINAGE OUTFALL - ENHANCED W/ AESTHETIC TREATMENT & COTTONWOOD-WILLOW HABITAT
- PROPOSED STANDARD PROJECT FLOOD LINE
- PROPOSED ALIGNMENT OF LOW-FLOW CHANNEL
- PROJECT R.O.W.
- A.D.O.T. R.O.W.

FINAL SITE DEVELOPMENT PLAN

NEW RIVER CHANNEL

GRAND AVENUE TO SKUNK CREEK
AND PARADISE SHORES

DECEMBER 22, 2003
SHEET 3 OF 3

NEW RIVER CHANNEL

Grand Avenue to Skunk Creek and Paradise Shores



Peoria, Arizona
October 29, 2003

Introduction

The Flood Control District of Maricopa County (District), in partnership with the City of Peoria, is improving New River from Grand Avenue to Skunk Creek. A segment (approximately 800 feet) of New River adjacent to the Paradise Shores subdivision will also be improved. Bank protection, channelization, trails, and landscape enhancements will be consistent with adjacent corridors.

Project Objectives

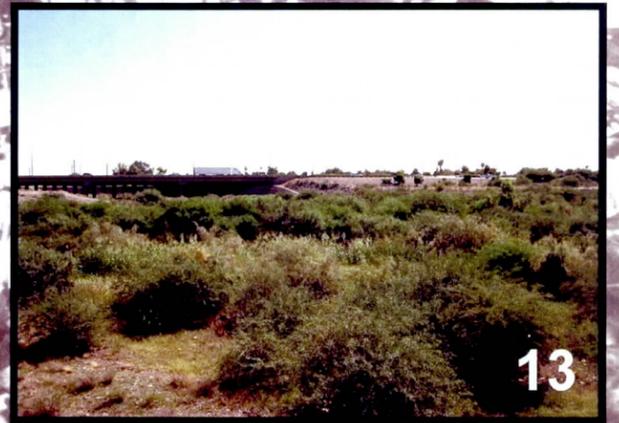
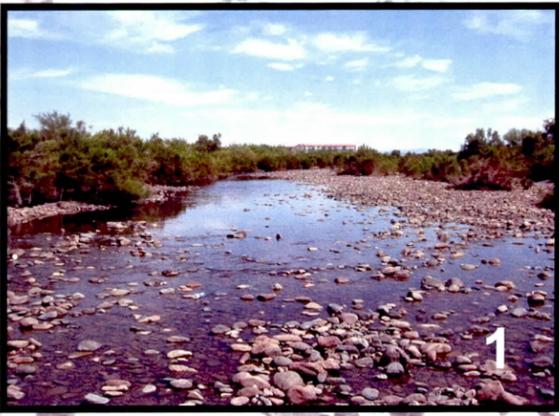
The primary goal of the New River Project is to protect the surrounding developments through the containment of the Standard Project Flood (SPF), while respecting the existing native riverine ecosystem by preserving and enhancing the landscape through strategic ecological design. Many factors have altered the river's environment, including natural occurrences and the growth and development of adjacent areas. Urban corridors like this one can serve as an important:

- **Circulatory Network**
- **Preservation / Conservation Area**
- **Multi-use Corridor**
- **Recreational and Educational Opportunity**
- **Open Space Corridor**
- **Regional Trail System**
- **Historical and Cultural Opportunity**

Project Theme / Mission Statement

A Connected Riparian Desert. This theme originates from the basis that we are **connected** to the river in many ways. The **connectivity** stems from the basis of our civilization that was formed around thriving riverine ecosystems. These rivers provided the basis for a connected life and community that has expanded beyond the confines of the river banks to the civilization we see today. This theme will allow us to **reconnect** to the **riparian desert** in multiple ways. The **connectivity** includes multi-use trails that connect into and become a part of the environment, educational zones utilized to re-familiarize the public with the history and importance of the river ecosystem, and the re-establishment of **riparian desert habitats** that flourished and thrived throughout these corridors. This theme will become a part of the urban ecological fabric in the metropolitan Phoenix area by fostering and promoting rivers as a place to be connected to. The theme of ***A Connected Riparian Desert*** will be blended into the ecological, hydrological, recreational, and cultural aspects of the project.

Riparian Desert



Landscape Design Imagery Board

NEW RIVER CHANNEL

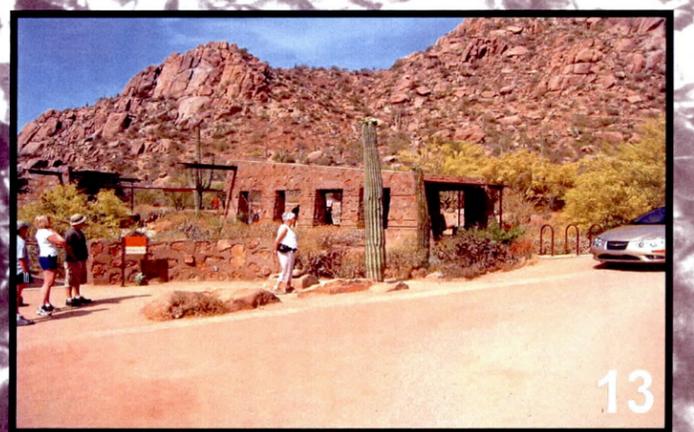
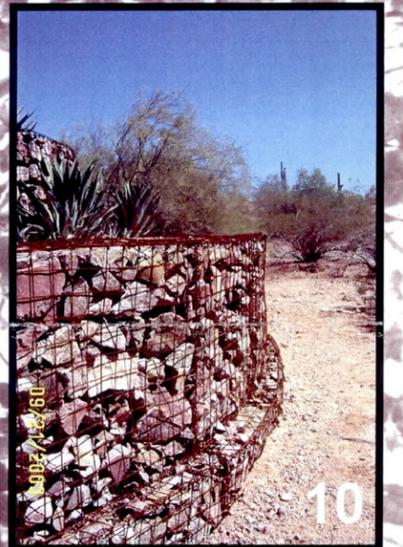
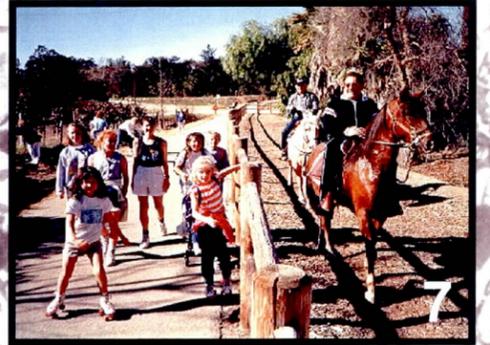
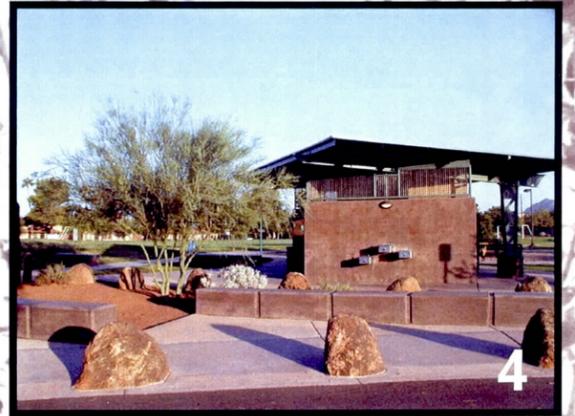
Grand Avenue to Skunk Creek and Paradise Shores



Peoria, Arizona
October 29, 2003



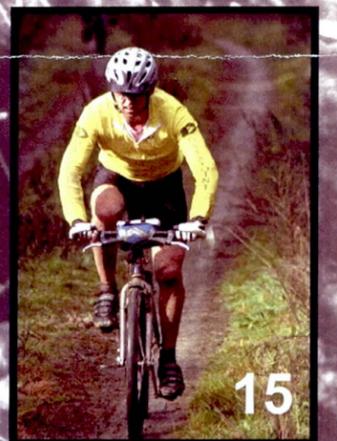
Riparian Desert

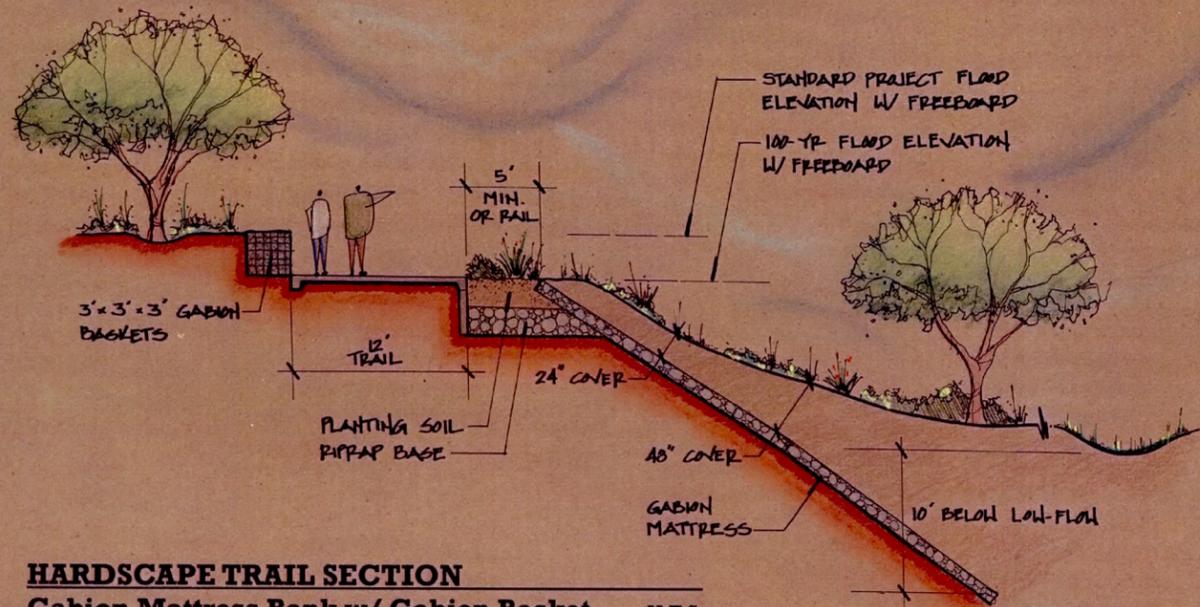


Multi-Use Design Imagery Board NEW RIVER CHANNEL Grand Avenue to Skunk Creek and Paradise Shores

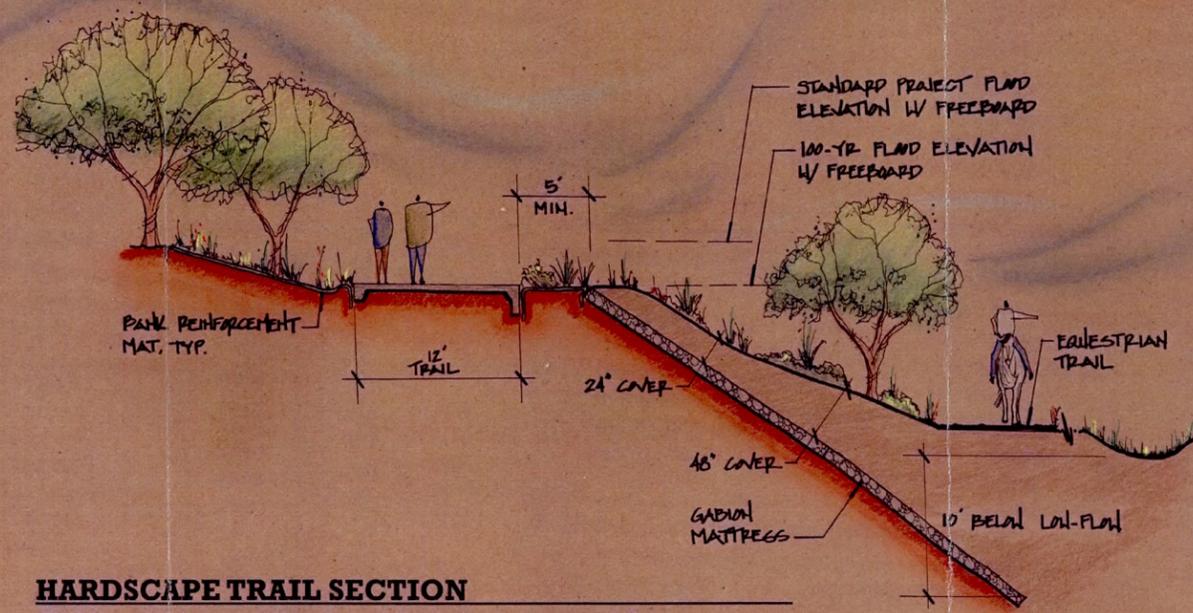


Peoria, Arizona
October 29, 2003

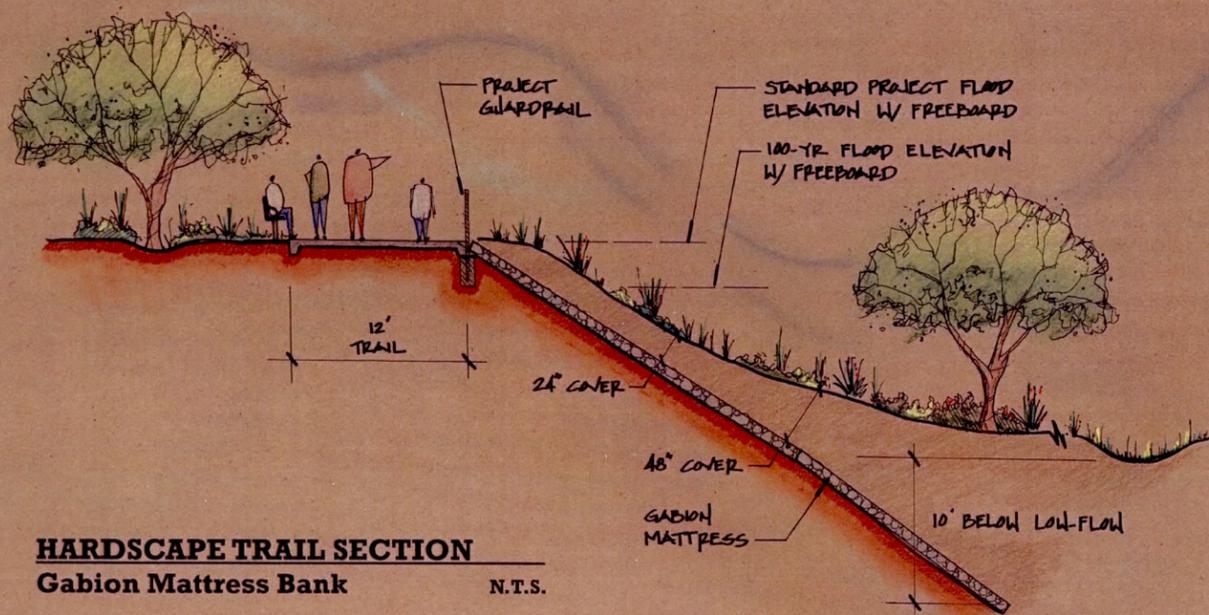




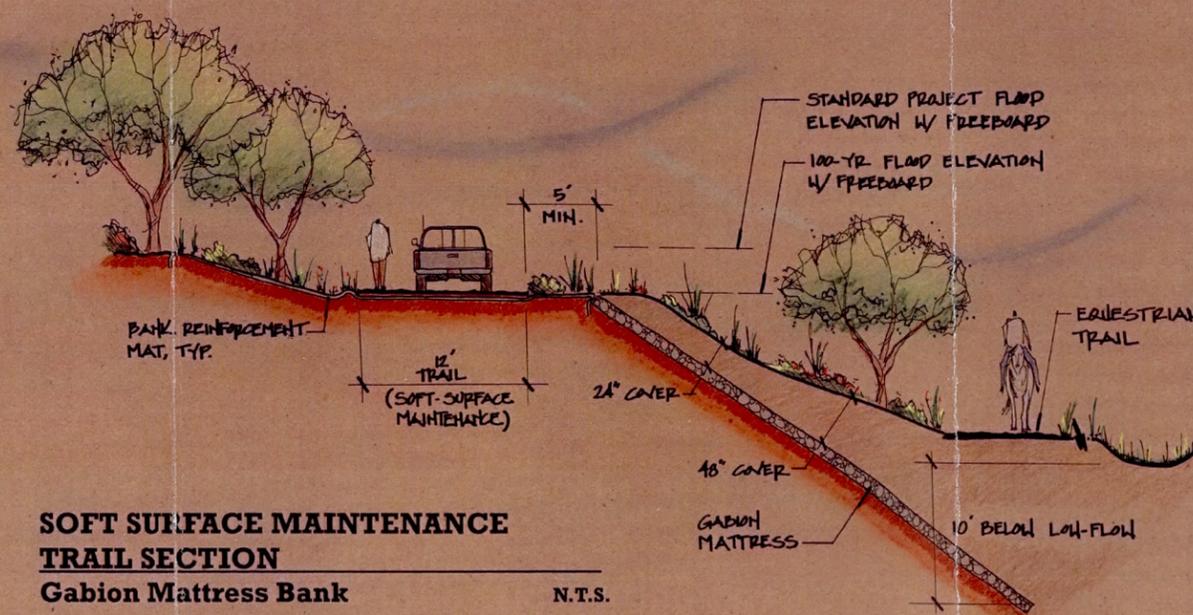
HARDSCAPE TRAIL SECTION
 Gabion Mattress Bank w/ Gabion Basket N.T.S.



HARDSCAPE TRAIL SECTION
 Gabion Mattress Bank w/ Reinforcement Mats N.T.S.



HARDSCAPE TRAIL SECTION
 Gabion Mattress Bank N.T.S.



SOFT SURFACE MAINTENANCE TRAIL SECTION
 Gabion Mattress Bank N.T.S.

Slope Treatment Alternatives
NEW RIVER CHANNEL
 Grand Avenue to Skunk Creek and Paradise Shores





Peoria, Arizona
 October 29, 2003



NEW RIVER CHANNEL

Grand Avenue to Skunk Creek and Paradise Shores



ID	Task Name	Duration	Start	Finish
1	Project Setup	266 days	Fri 8/1/03	Mon 8/9/04
2	Kickoff Meeting	1 day	Fri 8/1/03	Fri 8/1/03
4	Pre-Design	97 days	Fri 8/1/03	Mon 12/15/03
5	Data Collection	32 days	Fri 8/1/03	Mon 9/15/03
6	PAAC Meeting #1	0 days	Thu 10/2/03	Thu 10/2/03
7	Opportunities & Constraints	52 days	Fri 8/1/03	Mon 10/13/03
8	Newsletter	0 days	Fri 10/3/03	Fri 10/3/03
9	Public Meeting	0 days	Wed 10/29/03	Wed 10/29/03
10	Preliminary Concept Development	56 days	Mon 9/1/03	Mon 11/17/03
11	Final Concept Development	21 days	Mon 11/17/03	Mon 12/15/03
13	Design Phase	253 days	Wed 8/20/03	Mon 8/9/04
14	30% Design	98 days	Wed 8/20/03	Mon 1/5/04
15	Meetings	4 days	Tue 9/2/03	Mon 12/1/03
16	Survey Control	13 days	Thu 8/28/03	Mon 9/15/03
17	Photogrammetric Mapping	58 days	Thu 8/28/03	Mon 11/17/03
18	Public Involvement	9 days	Thu 11/6/03	Wed 11/19/03
19	Newsletter	0 days	Wed 11/19/03	Wed 11/19/03
20	PAAC Meeting #2	0 days	Thu 11/6/03	Thu 11/6/03
21	R/W Easement	78 days	Wed 8/20/03	Fri 12/5/03
22	Geotechnical	38 days	Wed 10/15/03	Fri 12/5/03
23	Hydrologic Analyses	23 days	Mon 9/15/03	Wed 10/15/03
24	Hydraulic Analyses	82 days	Fri 8/22/03	Mon 12/15/03
25	Open Channel Hydraulics	82 days	Fri 8/22/03	Mon 12/15/03
26	Channel Stabilization Design	43 days	Thu 10/16/03	Mon 12/15/03
27	Floodplain Delineation	33 days	Thu 10/30/03	Mon 12/15/03
28	Utilities	61 days	Mon 9/22/03	Mon 12/15/03
29	Potholing	18 days	Mon 11/3/03	Wed 11/26/03
30	30% Design Submittal	0 days	Mon 12/15/03	Mon 12/15/03
31	30% Review Meeting	0 days	Mon 1/5/04	Mon 1/5/04
33	Value Engineering Meeting	0 days	Mon 1/12/04	Mon 1/12/04
35	60% Design	77 days	Mon 12/1/03	Wed 3/17/04
36	Meetings	2 days	Mon 1/5/04	Mon 2/16/04
37	Public Involvement	1 day	Mon 2/2/04	Mon 2/2/04
38	PAAC Meeting #3	1 day	Mon 2/2/04	Mon 2/2/04
39	R/W Easement	42 days	Tue 12/23/03	Wed 2/18/04
40	Hydraulic Analyses	42 days	Tue 12/23/03	Wed 2/18/04
41	Open Channel Hydraulics	42 days	Tue 12/23/03	Wed 2/18/04
42	Channel Stabilization Design	42 days	Tue 12/23/03	Wed 2/18/04
43	Floodplain Delineation	42 days	Tue 12/23/03	Wed 2/18/04
44	Utilities	58 days	Mon 12/1/03	Wed 2/18/04
45	60% Design Submittal	0 days	Wed 2/18/04	Wed 2/18/04
46	60% Review Meeting	0 days	Wed 3/17/04	Wed 3/17/04
48	Constructability Analysis Meeting	0 days	Wed 3/24/04	Wed 3/24/04
49	CLOMR Submittal	64 days	Wed 3/31/04	Mon 6/28/04
51	90% Design	70 days	Wed 2/18/04	Wed 5/26/04
52	Meetings	3 days	Tue 2/24/04	Tue 4/27/04
53	Public Involvement	1 day	Wed 4/21/04	Wed 4/21/04
54	R/W Easement	46 days	Wed 2/25/04	Wed 4/28/04
55	Hydraulic Analyses	46 days	Wed 2/25/04	Wed 4/28/04
56	Open Channel Hydraulics	46 days	Wed 2/25/04	Wed 4/28/04
57	Channel Stabilization Design	46 days	Wed 2/25/04	Wed 4/28/04
58	Floodplain Delineation	46 days	Wed 2/25/04	Wed 4/28/04
59	Utilities	51 days	Wed 2/18/04	Wed 4/28/04
60	Maintenance Plan	28 days	Mon 3/22/04	Wed 4/28/04
61	90% Design Submittal	0 days	Wed 4/28/04	Wed 4/28/04
62	90% Review Meeting	0 days	Wed 5/26/04	Wed 5/26/04
64	100% Design	93 days	Wed 3/31/04	Mon 8/9/04
65	Meetings	2 days	Wed 5/5/04	Tue 6/29/04
66	Public Involvement	60 days	Thu 4/15/04	Wed 7/7/04
67	R/W Easement	60 days	Thu 4/15/04	Wed 7/7/04
68	Hydraulic Analyses	60 days	Thu 4/15/04	Wed 7/7/04
69	Open Channel Hydraulics	60 days	Thu 4/15/04	Wed 7/7/04
70	Channel Stabilization Design	60 days	Thu 4/15/04	Wed 7/7/04
71	Floodplain Delineation	60 days	Thu 4/15/04	Wed 7/7/04
72	Utilities	71 days	Wed 3/31/04	Wed 7/7/04
73	Maintenance Plan	71 days	Wed 3/31/04	Wed 7/7/04
74	Final Design Submittal	0 days	Wed 7/7/04	Wed 7/7/04
76	Final Review Meeting	0 days	Mon 8/9/04	Mon 8/9/04

Project Schedule / Milestones

- NTP - August 11, 2003
- Pre-Design Data Collection - September 15, 2003
- PAAC Meeting No. 1 - October 2, 2003
- Pre-Design Opportunities and Constraints - October 14, 2003
- Public Meeting - October 29, 2003
- PAAC Meeting No. 2 - November 6th, 2003
- Preliminary Pre-Design Concept Development - November 17, 2003
- 30% Design Submittal & Final Pre-Design Concept Development - December 15, 2003
- PAAC Meeting No. 3 - Late Jan / Early February, 2004 (tentative)
- 60% Design Submittal - February 18, 2004
- 90% Design Submittal - April 28, 2004
- CLOMR Submittal - June 28, 2004 (tentative)
- 100% Design Submittal - July 7, 2004
- Final Review Meeting - August 9, 2004



ii. Rational Method Calculations





Rational Runoff Method FCDMC Rational Method

Project: New River	By: MAL
Basin: ADOT Swale	Date: Dec-03
ID: _____	Checked: _____
Contrib. A: 9.7 Acres	Project No.: 3033

Storm	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	
Q =	7	11	13	18	23	28	cfs

Note:

Runoff Coefficient, C and Basin Area, A

Min Tc: 10 min (5 or 10 minutes)
 Watershed Classification: desert
 P10-Yr 6-Hour Precipitation:

Phx	Specific
2.07	1.94

 inches

Subarea	Area, A acres	Land Use/ Classification	% Cover	2-Year C	5-Year C	10-Year C	25-Year C	50-Year C	100-Year C
1	9.70	desert	10%	0.40	0.40	0.40	0.44	0.48	0.50
2				0.00	0.00		0.00	0.00	0.00
3				0.00	0.00		0.00	0.00	0.00
4				0.00	0.00		0.00	0.00	0.00
5				0.00	0.00		0.00	0.00	0.00
6				0.00	0.00		0.00	0.00	0.00
7				0.00	0.00		0.00	0.00	0.00
Total:	9.7								

Weighted C =

2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
0.40	0.40	0.40	0.44	0.48	0.50

Time of Concentration, Tc / Rainfall intensity, i

Note: Minimum Tc = 10 min
 Rainfall intensity for Tc = 10 minutes =

2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
2.63	3.66	4.22	5.16	5.82	6.57

 in/hour
 Tc is a function of intensity and vice-versa thus solution is iterative.

1) Longest flowpath length: L, and slope, S

Segment	Length, d, ft	Elevation, ft			Slope, ft/ft	d*(3/H) ^{1/2}
		High Pt.	Low Pt.	Change, H		
1	1450	1145.0	1132.0	13.0	0.009	15314
2				0.0		0
3				0.0		0
4				0.0		0
5				0.0		0
d_r =	1450		Sum =	13		j = 15314

L, miles = d_r/5280 = 0.275 miles
 S, ft/mi = 5280/(d_r/j)² = 47.3 ft/mi 0.009 ft/ft
 Corr S, ft/mi = 5280/(d_r/j)² = 47.3 ft/mi (See Figure 5.4)

2) Roughness Coefficient, Kb (Table 3.1)

Landform: Undeveloped desert
 Runoff Character: Medium to high
 Type: B A-D Refer to Table 3.1
 m: -0.01375
 b: 0.08
 Kb = 0.0664
 User Specified Kb = _____ (If a number is used this overrides the calculated value in calculations)

3) Tc / i iteration:

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	
Assume Tc:	21.10	18.05	16.66	15.23	14.38	13.67	minutes
Try i:	1.81	2.74	3.38	4.28	4.98	5.69	inches/hour
Calc Tc:	0.35	0.30	0.28	0.25	0.24	0.23	hours
Calc Tc:	21.10	18.05	16.66	15.23	14.38	13.67	minutes
Min Tc:	10	10	10	10	10	10	
Final i =	1.81	2.74	3.38	4.28	4.98	5.69	inches/hour

Note: ** If Calculated Tc was less than 5 minutes use 5-minute rainfall intensity

Discharge Q

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	
C	0.40	0.40	0.40	0.44	0.48	0.50	
i	1.81	2.74	3.38	4.28	4.98	5.69	inches/hour
A	9.7	9.7	9.7	9.7	9.7	9.7	acre
Add. Q							
Q = CIA	7.0	10.6	13.1	18.3	23.2	27.6	cfs
Q/A ratio =	0.7	1.1	1.4	1.9	2.4	2.8	cfs/ac



iii. HEC-RAS Analysis





New River Channel Grand Avenue to Skunk Creek

HEC-RAS ANALYSIS PROPOSED CONDITION



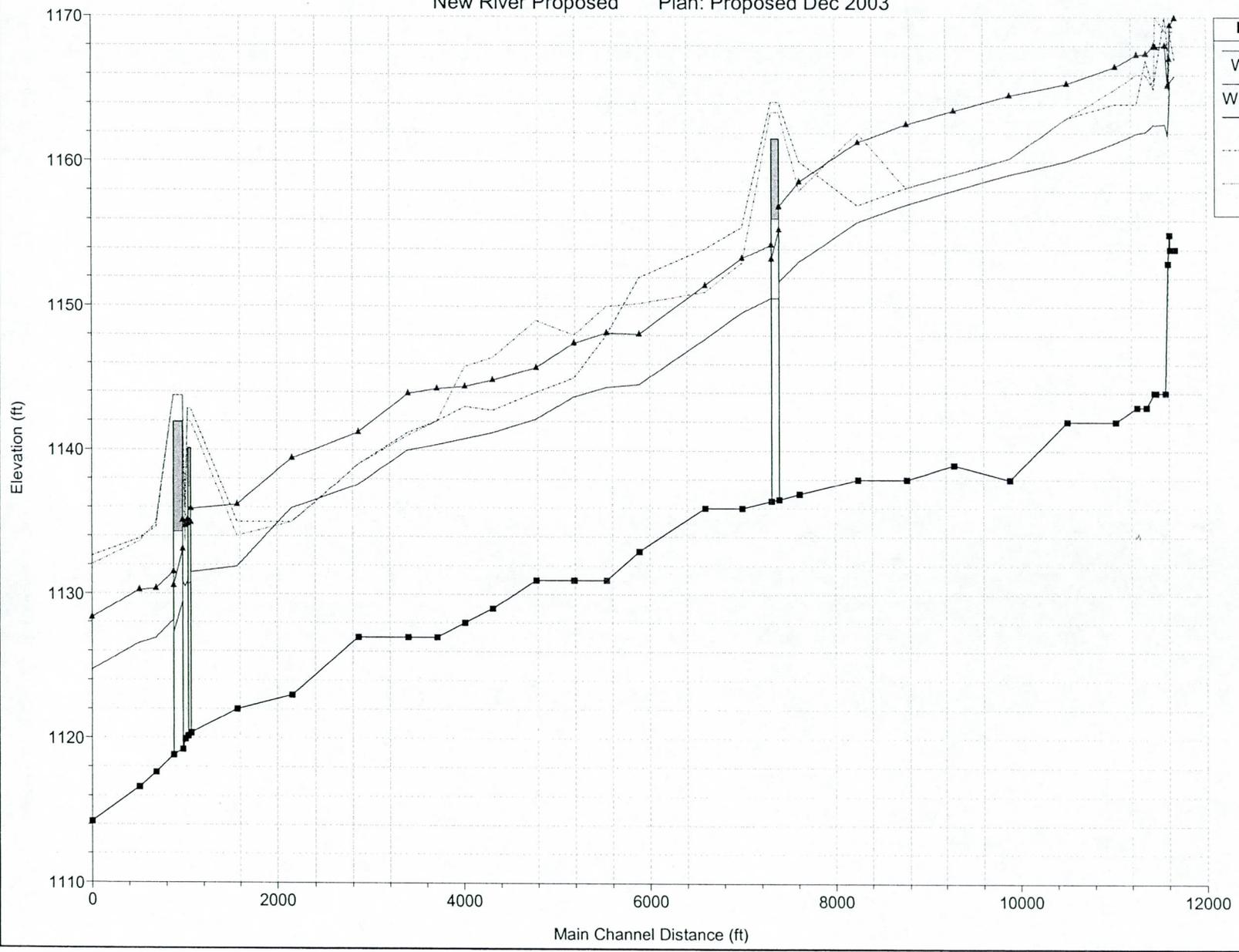
HEC-RAS Plan Proposed River New River Reach Grand Ave - Drop

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpth (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	453.23	100-Yr	41000.00	1154.00	1165.91	11.91		1168.26	0.002650	12.30	3332.69	308.23	0.66
Grand Ave - Drop	453.23	SPF	68000.00	1154.00	1169.91	15.91		1173.30	0.002627	14.78	4624.27	363.48	0.69
Grand Ave - Drop	452.73	100-Yr	41000.00	1154.00	1165.51	11.51		1168.09	0.003062	12.90	3177.98	303.96	0.70
Grand Ave - Drop	452.73	SPF	68000.00	1154.00	1169.41	15.41	1166.67	1173.13	0.003054	15.47	4397.67	331.67	0.73
Grand Ave - Drop	452.65	100-Yr	41000.00	1155.00	1163.68	8.68	1163.68	1167.89	0.006700	16.47	2488.75	297.82	1.00
Grand Ave - Drop	452.65	SPF	68000.00	1155.00	1167.11	12.11	1167.11	1172.89	0.006003	19.30	3526.20	307.69	1.00
Grand Ave - Drop	452.5	100-Yr	41000.00	1153.00	1161.80	8.80	1161.80	1166.06	0.006633	16.56	2476.52	291.29	1.00
Grand Ave - Drop	452.5	SPF	68000.00	1153.00	1165.28	12.28	1165.28	1171.13	0.006020	19.42	3501.98	299.15	1.00
Grand Ave - Drop	452.23	100-Yr	41000.00	1144.00	1162.62	18.61		1163.76	0.000759	8.59	4772.58	288.47	0.37
Grand Ave - Drop	452.23	SPF	68000.00	1144.00	1168.00	24.00		1169.77	0.000860	10.70	6356.25	300.01	0.41
Grand Ave - Drop	451.23	100-Yr	41000.00	1144.00	1162.55	18.55		1163.68	0.000737	8.55	4798.08	285.35	0.37
Grand Ave - Drop	451.23	SPF	68000.00	1144.00	1167.91	23.91		1169.69	0.000839	10.70	6359.09	296.71	0.41
Grand Ave - Drop	451.05	100-Yr	41000.00	1144.00	1162.59	18.59		1163.64	0.001260	8.24	4976.04	295.26	0.35
Grand Ave - Drop	451.05	SPF	68000.00	1144.00	1167.98	23.98		1169.63	0.001411	10.30	6617.72	314.06	0.39
Grand Ave - Drop	450.23	100-Yr	41000.00	1143.00	1162.10	19.10		1163.48	0.001954	9.42	4350.85	288.59	0.43
Grand Ave - Drop	450.23	SPF	68000.00	1143.00	1167.44	24.44		1169.45	0.002133	11.38	5994.95	360.63	0.46
Grand Ave - Drop	449.05	100-Yr	41000.00	1143.00	1161.99	18.99		1163.26	0.001807	9.05	4530.85	301.92	0.41
Grand Ave - Drop	449.05	SPF	68000.00	1143.00	1167.37	24.37		1169.20	0.001868	10.88	6351.40	378.93	0.43
Grand Ave - Drop	446.87	100-Yr	41000.00	1142.00	1161.30	19.30		1162.79	0.002078	9.80	4182.34	283.79	0.45
Grand Ave - Drop	446.87	SPF	68000.00	1142.00	1166.55	24.54		1168.70	0.002169	11.80	5843.94	377.90	0.48
Grand Ave - Drop	441.6	100-Yr	41000.00	1142.00	1160.05	18.05		1161.60	0.002471	9.98	4108.15	329.21	0.48
Grand Ave - Drop	441.6	SPF	68000.00	1142.00	1165.39	23.38		1167.50	0.002353	11.71	5901.57	440.12	0.48
Grand Ave - Drop	435.37	100-Yr	41000.00	1138.00	1159.12	21.12	1150.94	1160.26	0.001599	8.54	4801.57	316.74	0.39
Grand Ave - Drop	435.37	SPF	68000.00	1138.00	1164.58	26.58	1154.75	1166.17	0.001555	10.21	6925.28	435.70	0.40
Grand Ave - Drop	429.37	100-Yr	41000.00	1139.00	1158.03	19.03	1150.52	1159.24	0.001767	8.81	4651.52	318.20	0.41
Grand Ave - Drop	429.37	SPF	68000.00	1139.00	1163.52	24.52	1154.25	1165.20	0.001664	10.45	6694.66	402.88	0.41
Grand Ave - Drop	424.17	100-Yr	41000.00	1138.00	1157.05	19.05	1149.39	1158.31	0.001809	8.99	4561.40	306.31	0.41
Grand Ave - Drop	424.17	SPF	68000.00	1138.00	1162.57	24.57	1153.23	1164.29	0.001830	10.55	6568.91	391.50	0.43
Grand Ave - Drop	418.97	100-Yr	41000.00	1138.00	1155.87	17.86	1149.14	1157.27	0.002143	9.51	4312.04	304.19	0.45
Grand Ave - Drop	418.97	SPF	68000.00	1138.00	1161.32	23.32	1152.98	1163.25	0.002087	11.19	6182.21	366.92	0.46
Grand Ave - Drop	412.76	100-Yr	41000.00	1137.00	1153.11	16.10	1149.28	1155.40	0.003884	12.16	3371.22	274.63	0.61
Grand Ave - Drop	412.76	SPF	68000.00	1137.00	1158.61	21.60	1153.25	1161.51	0.003390	13.67	4995.12	348.71	0.60
Grand Ave - Drop	410.54	100-Yr	41000.00	1136.62	1151.71	15.09	1148.74	1154.62	0.002777	13.69	2993.93	243.02	0.69
Grand Ave - Drop	410.54	SPF	68000.00	1136.62	1156.92	20.30	1152.95	1160.77	0.002563	15.73	4322.69	266.78	0.69
Grand Ave - Drop	410.02		Bridge										
Grand Ave - Drop	409.5	100-Yr	41000.00	1136.52	1150.59	14.07	1148.67	1154.00	0.003611	14.82	2766.48	243.95	0.78
Grand Ave - Drop	409.5	SPF	68000.00	1136.52	1154.28	17.76	1152.81	1159.52	0.004162	18.37	3701.49	261.75	0.86
Grand Ave - Drop	406.5	100-Yr	41000.00	1136.00	1149.56	13.56		1152.42	0.004785	13.57	3021.56	283.36	0.73
Grand Ave - Drop	406.5	SPF	68000.00	1136.00	1153.34	17.34		1157.54	0.005194	16.44	4146.46	337.07	0.79
Grand Ave - Drop	402.5	100-Yr	41000.00	1136.00	1147.73	11.72		1150.47	0.004803	13.29	3086.08	301.35	0.73
Grand Ave - Drop	402.5	SPF	68000.00	1136.00	1151.44	15.44		1155.42	0.005074	16.01	4257.56	348.30	0.78
Grand Ave - Drop	395.5	100-Yr	41000.00	1133.00	1144.56	11.56	1142.42	1147.09	0.004539	12.75	3216.04	323.38	0.71
Grand Ave - Drop	395.5	SPF	68000.00	1133.00	1148.07	15.07	1145.83	1151.80	0.004909	15.50	4387.29	344.40	0.77
Grand Ave - Drop	392	100-Yr	41000.00	1131.00	1144.35	13.35		1145.69	0.002108	9.30	4410.44	402.07	0.49
Grand Ave - Drop	392	SPF	68000.00	1131.00	1148.14	17.14		1150.15	0.002294	11.37	5983.69	523.73	0.53
Grand Ave - Drop	388.5	100-Yr	41000.00	1131.00	1143.68	12.68	1139.10	1144.95	0.001989	9.05	4528.92	411.07	0.48
Grand Ave - Drop	388.5	SPF	68000.00	1131.00	1147.44	16.44	1142.04	1149.35	0.002130	11.10	6168.20	495.24	0.52
Grand Ave - Drop	384.5	100-Yr	41000.00	1131.00	1142.14	11.14		1143.89	0.003228	10.62	3859.56	399.83	0.60
Grand Ave - Drop	384.5	SPF	68000.00	1131.00	1145.71	14.71		1148.23	0.003234	12.75	5368.68	445.28	0.63
Grand Ave - Drop	379.75	100-Yr	41000.00	1129.00	1141.21	12.21	1137.13	1142.52	0.002179	9.18	4465.54	428.28	0.50
Grand Ave - Drop	379.75	SPF	68000.00	1129.00	1144.85	15.85	1139.95	1146.79	0.002290	11.21	6113.25	721.02	0.53
Grand Ave - Drop	376.75	100-Yr	41000.00	1128.00	1140.78	12.78		1141.88	0.001715	8.44	4858.01	439.67	0.45
Grand Ave - Drop	376.75	SPF	68000.00	1128.00	1144.39	16.39		1146.09	0.001908	10.47	6572.98	626.46	0.49
Grand Ave - Drop	373.75	100-Yr	41000.00	1127.00	1140.37	13.37	1135.56	1141.35	0.001593	8.02	5299.71	589.55	0.43
Grand Ave - Drop	373.75	SPF	68000.00	1127.00	1144.22	17.22	1138.21	1145.46	0.001436	9.21	8516.46	1034.80	0.43
Grand Ave - Drop	370.65	100-Yr	41000.00	1127.00	1139.99	12.99	1134.04	1140.88	0.001250	7.57	5498.55	590.72	0.39
Grand Ave - Drop	370.65	SPF	68000.00	1127.00	1143.90	16.90	1136.76	1145.02	0.001172	8.77	8822.60	918.68	0.39
Grand Ave - Drop	365.4	100-Yr	41000.00	1127.00	1137.61	10.61	1135.42	1139.65	0.004096	11.48	3571.97	395.65	0.67
Grand Ave - Drop	365.4	SPF	68000.00	1127.00	1141.20	14.20	1138.33	1143.85	0.003574	13.22	5484.17	659.42	0.66
Grand Ave - Drop	358.25	100-Yr	41000.00	1123.00	1135.97	12.97	1132.21	1137.67	0.001875	10.45	3941.66	518.36	0.55

HEC-RAS Plan Proposed River New River Reach Grand Ave - Drop (Continued)

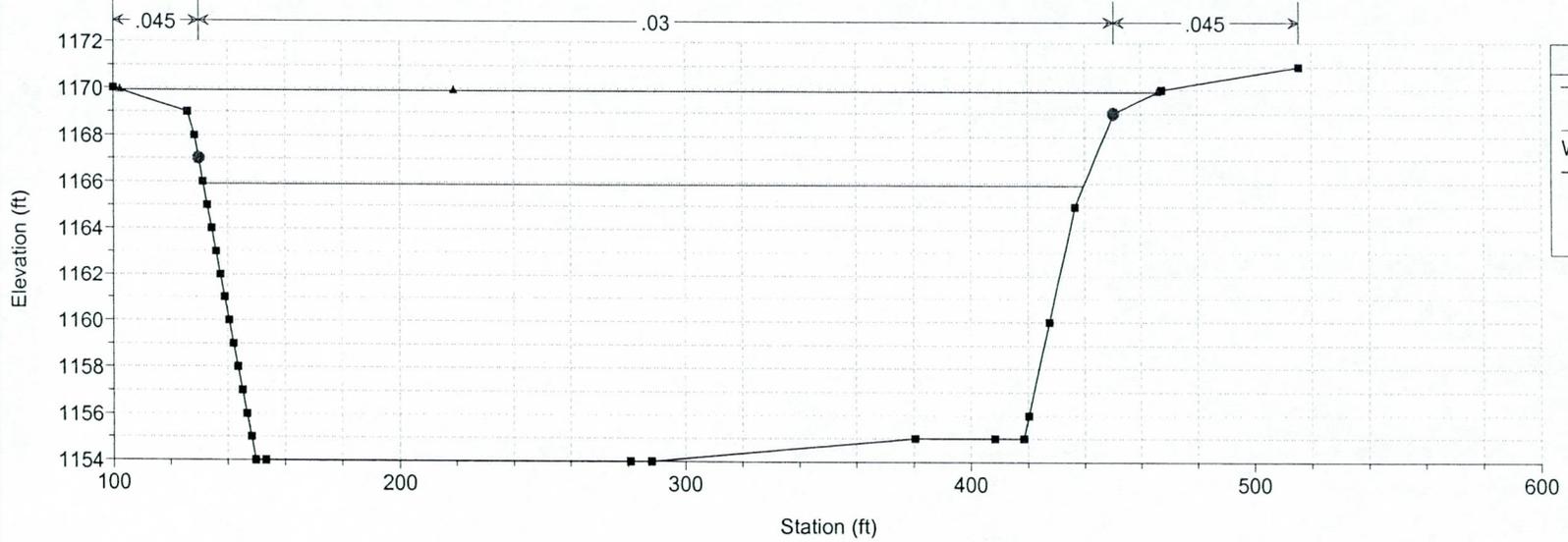
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpth (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	358.25	SPF	68000.00	1123.00	1139.40	16.40	1135.34	1141.96	0.002025	12.97	5484.41	737.84	0.60
Grand Ave - Drop	352.4	100-Yr	41000.00	1122.00	1131.90	9.90	1131.89	1135.56	0.006896	15.34	2672.30	360.48	0.99
Grand Ave - Drop	352.4	SPF	68000.00	1122.00	1136.19	14.19	1134.88	1140.16	0.004206	16.01	4310.34	432.63	0.83
Grand Ave - Drop	347.41	100-Yr	41000.00	1120.32	1131.49	11.17		1133.29	0.002042	10.76	3810.90	352.37	0.58
Grand Ave - Drop	347.41	SPF	68000.00	1120.32	1135.89	15.57		1138.37	0.001863	12.64	5379.03	361.17	0.58
Grand Ave - Drop	347.4	100-Yr	41000.00	1120.32	1130.78	10.46	1128.52	1133.22	0.004084	12.53	3271.53	323.45	0.69
Grand Ave - Drop	347.4	SPF	68000.00	1120.32	1134.93	14.61	1131.79	1138.28	0.004044	14.68	4630.80	331.95	0.69
Grand Ave - Drop	347.255												
Grand Ave - Drop	347.11	100-Yr	41000.00	1120.12	1130.68	10.56		1133.08	0.003968	12.41	3303.21	323.40	0.68
Grand Ave - Drop	347.11	SPF	68000.00	1120.12	1134.83	14.71		1138.13	0.003973	14.59	4660.24	331.80	0.69
Grand Ave - Drop	347.1	100-Yr	41000.00	1120.12	1130.91	10.79	1127.90	1132.84	0.002292	11.15	3675.73	351.29	0.61
Grand Ave - Drop	347.1	SPF	68000.00	1120.12	1135.14	15.02	1130.98	1137.82	0.002101	13.13	5178.00	359.63	0.61
Grand Ave - Drop	346.8	100-Yr	41000.00	1119.92	1130.46	10.54		1132.73	0.002885	12.09	3389.94	344.47	0.68
Grand Ave - Drop	346.8	SPF	68000.00	1119.92	1134.70	14.78		1137.71	0.002500	13.92	4883.52	358.04	0.66
Grand Ave - Drop	346.4	100-Yr	41000.00	1119.22	1130.83	11.61	1127.00	1132.49	0.001803	10.36	3957.10	351.91	0.54
Grand Ave - Drop	346.4	SPF	68000.00	1119.22	1135.06	15.86	1130.08	1137.48	0.001758	12.43	5470.28	359.93	0.56
Grand Ave - Drop	345.96												
Grand Ave - Drop	345.5	100-Yr	41000.00	1118.82	1128.15	9.33	1126.60	1130.77	0.003725	12.97	3160.07	347.21	0.76
Grand Ave - Drop	345.5	SPF	68000.00	1118.82	1131.52	12.69	1129.67	1135.33	0.003687	15.68	4337.88	353.41	0.79
Grand Ave - Drop	343.7	100-Yr	41000.00	1117.62	1126.91	9.29	1125.90	1129.88	0.004573	13.84	2962.68	346.20	0.83
Grand Ave - Drop	343.7	SPF	68000.00	1117.62	1130.35	12.73	1129.03	1134.48	0.004192	16.31	4168.18	355.33	0.84
Grand Ave - Drop	342	100-Yr	41000.00	1116.62	1126.56	9.94	1124.87	1129.00	0.003533	12.54	3269.42	364.32	0.74
Grand Ave - Drop	342	SPF	68000.00	1116.62	1130.24	13.62	1127.90	1133.60	0.003179	14.70	4625.72	372.59	0.74
Grand Ave - Drop	337	100-Yr	41000.00	1114.22	1124.69	10.47	1122.57	1127.00	0.004201	12.21	3356.82	351.61	0.70
Grand Ave - Drop	337	SPF	69000.00	1114.22	1128.30	14.08	1125.76	1131.73	0.004203	14.86	4643.81	360.23	0.73

New River Proposed Plan: Proposed Dec 2003



Legend	
▲	WS SPF
■	WS 100-Yr
—	Ground
- - -	LOB
· · ·	ROB

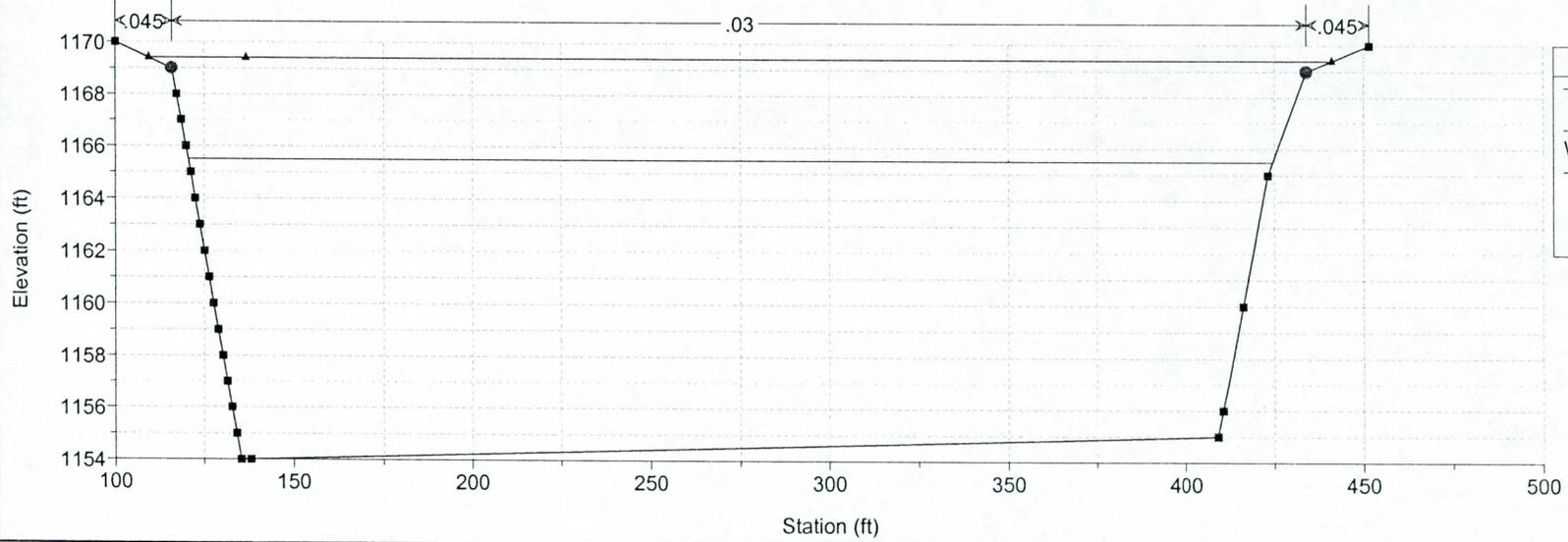
New River Proposed Plan: Proposed Dec 2003
RS = 453.23



Legend

- WS SPF
- WS 100-Yr
- Ground
- Bank Sta

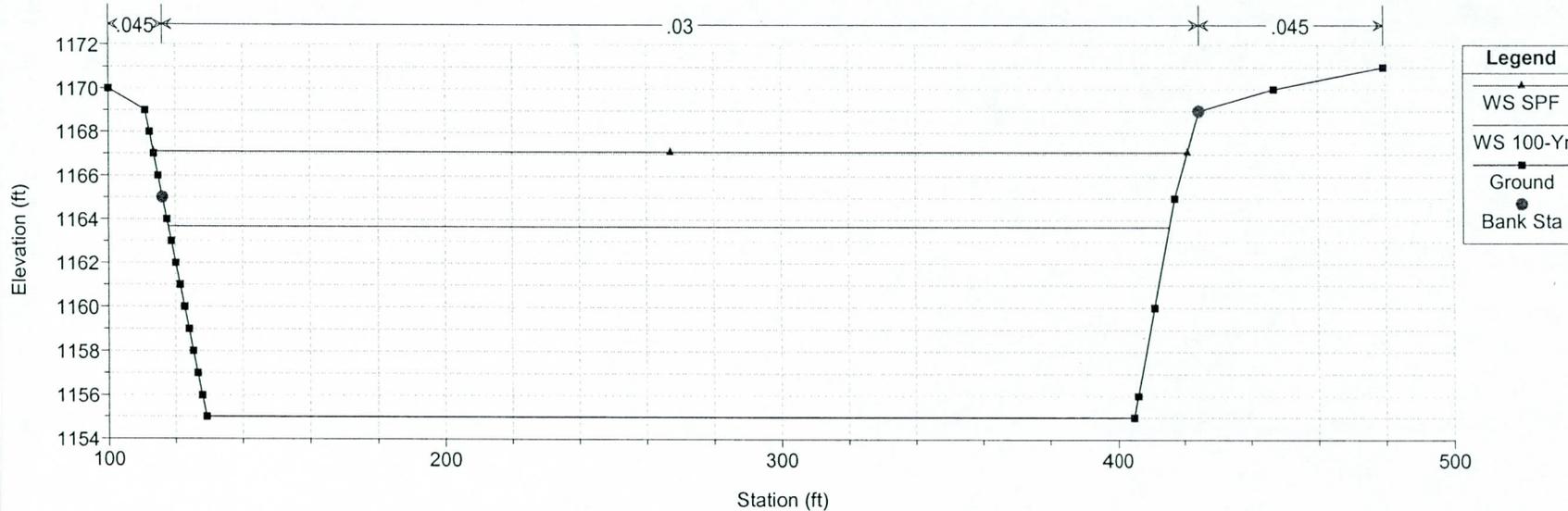
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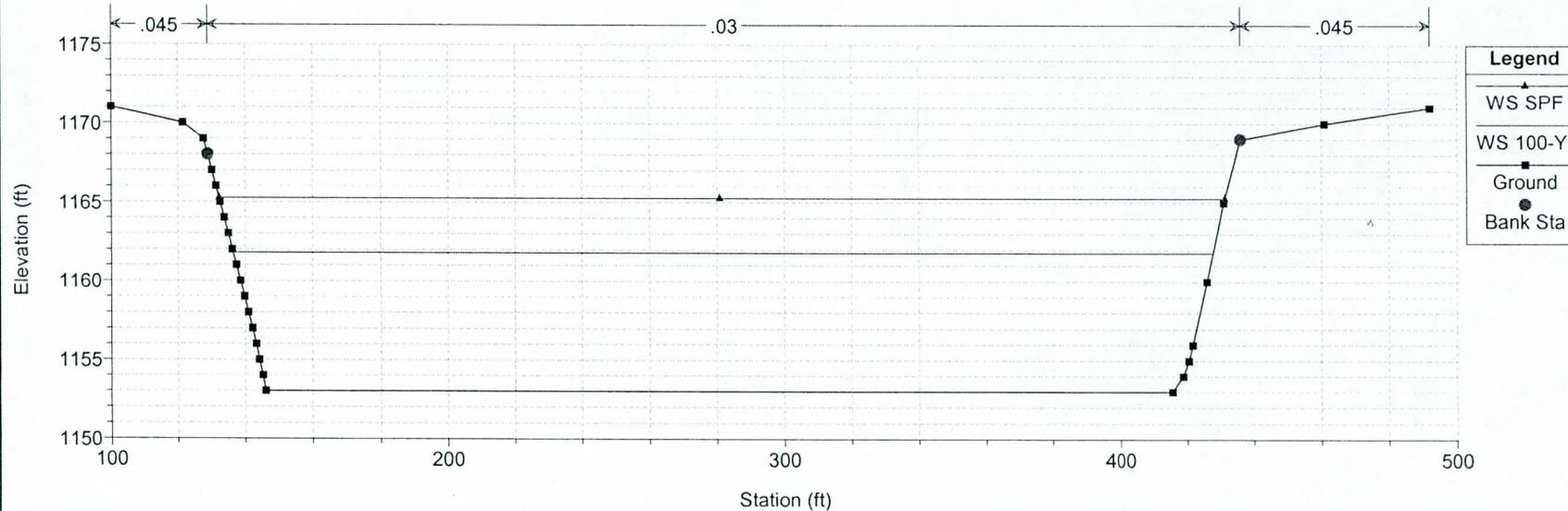
Legend

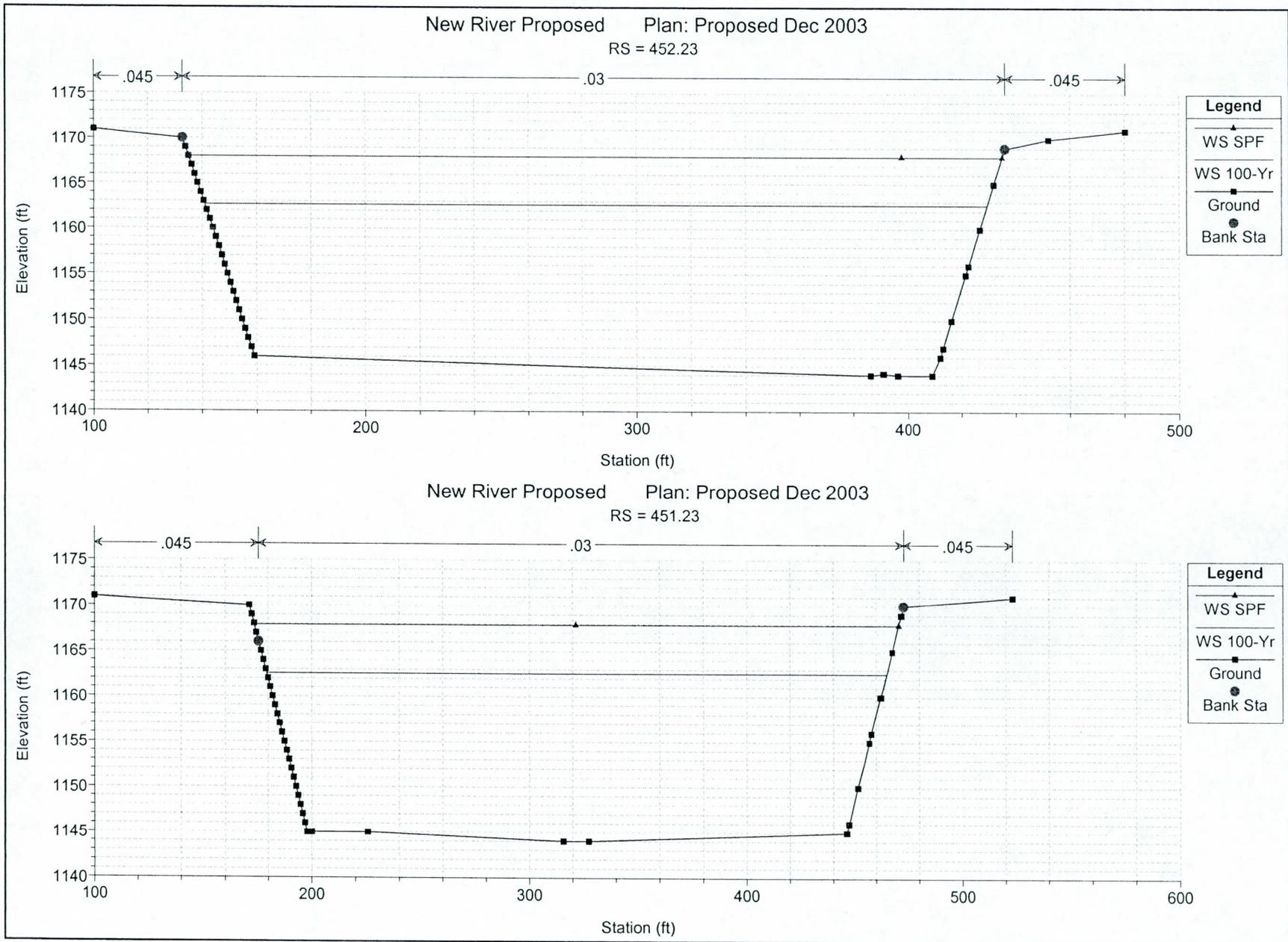
- WS SPF
- WS 100-Yr
- Ground
- Bank Sta

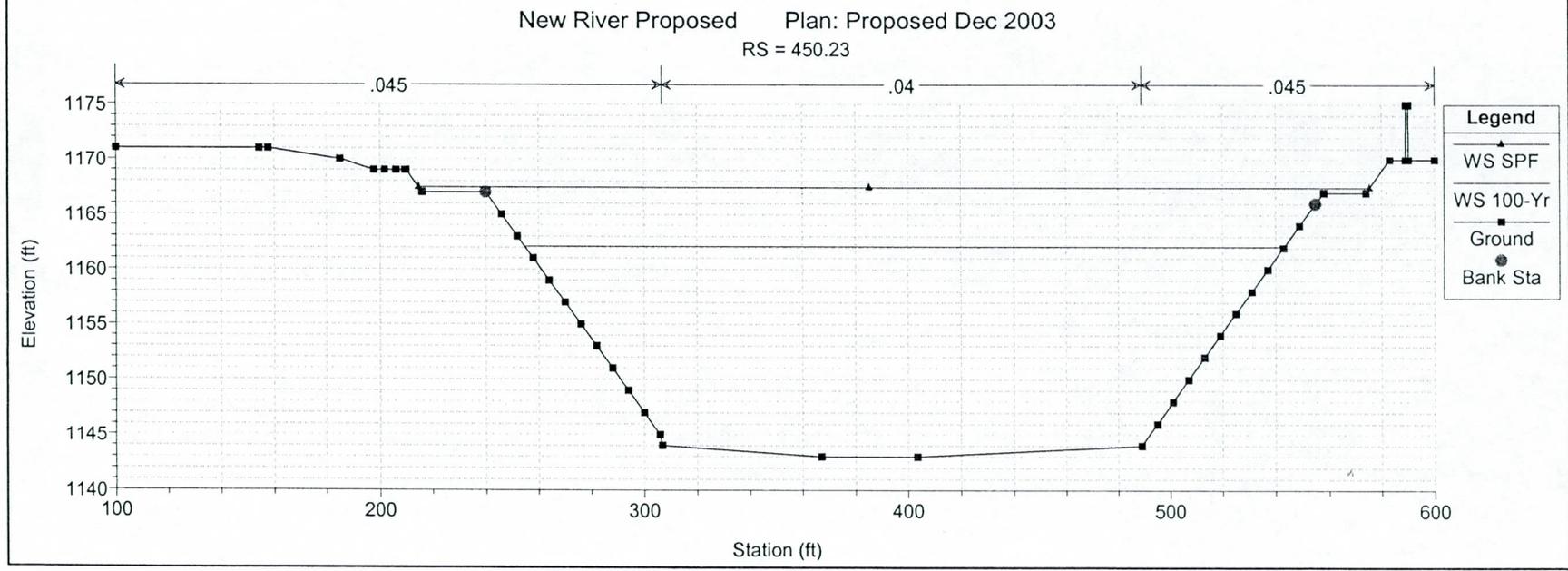
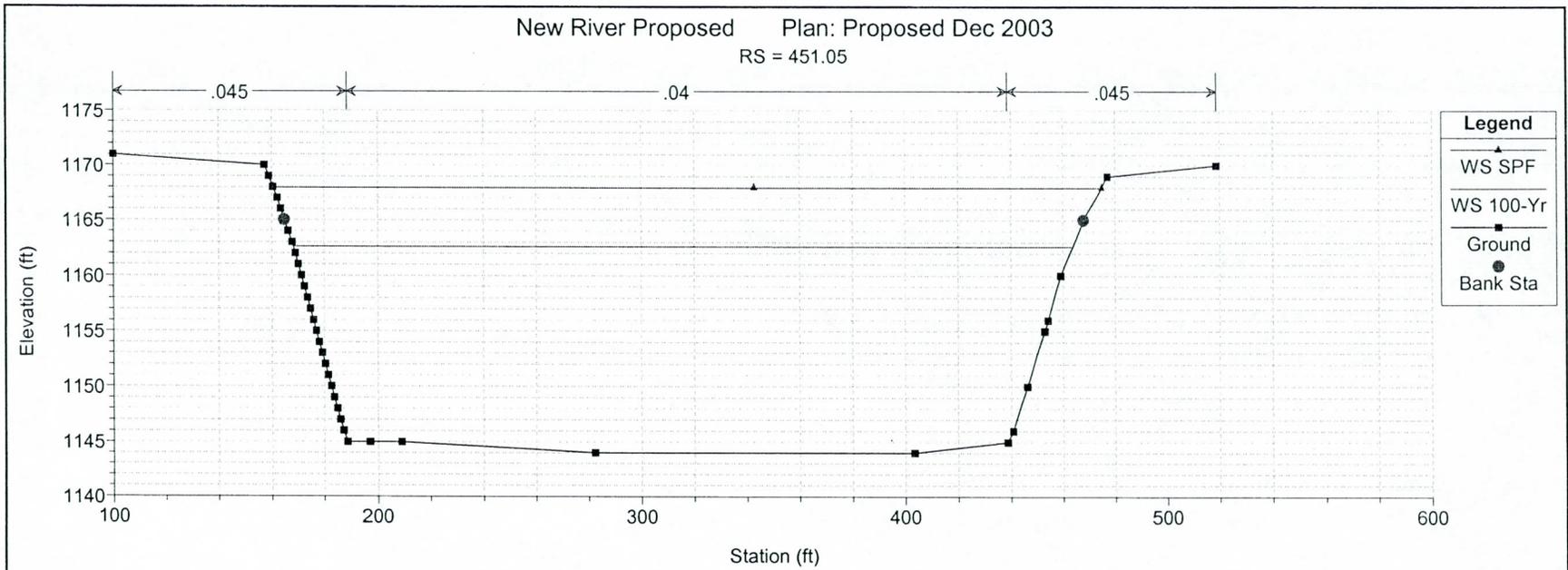
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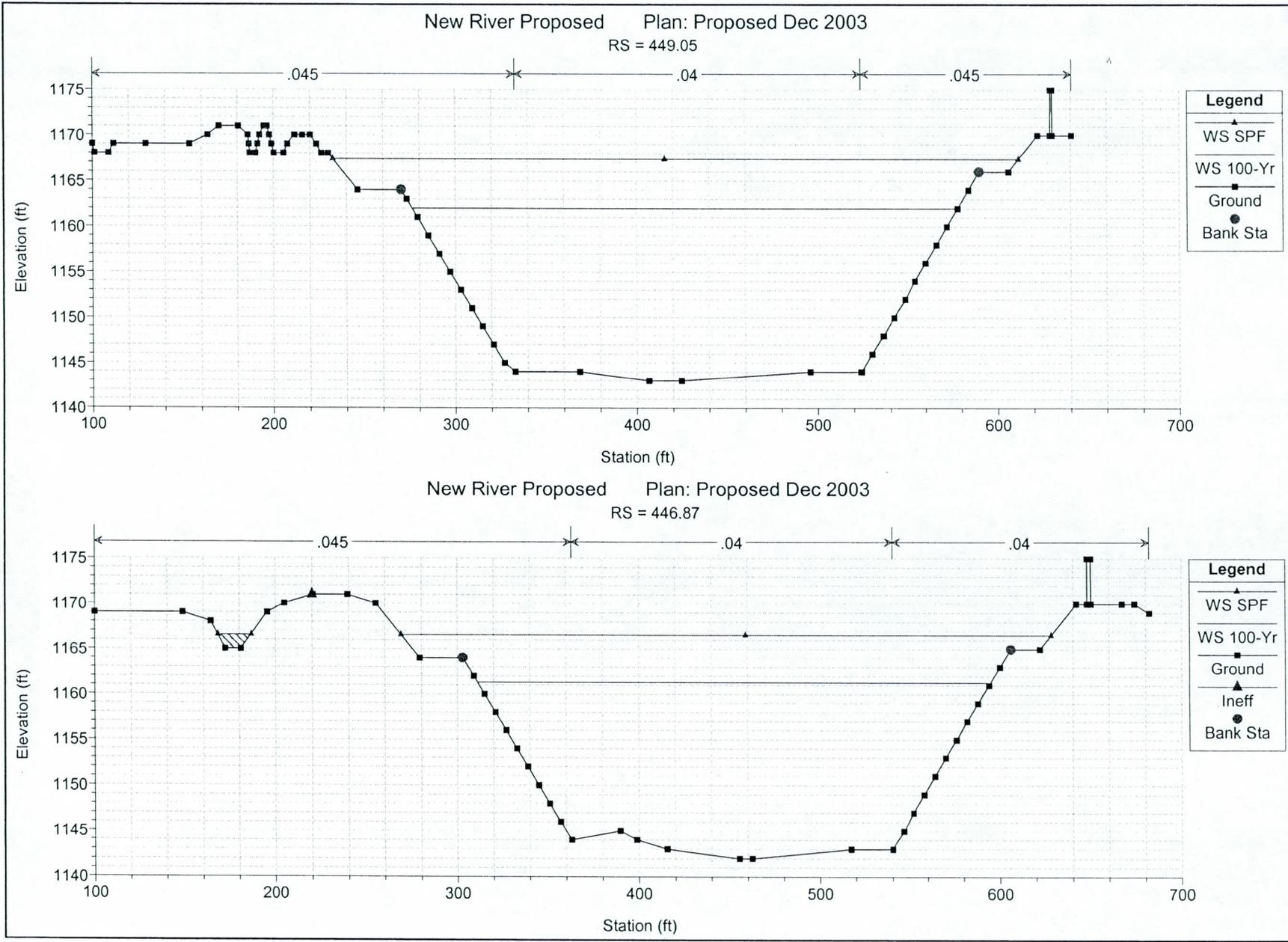


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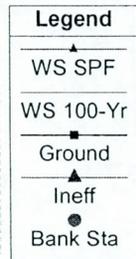
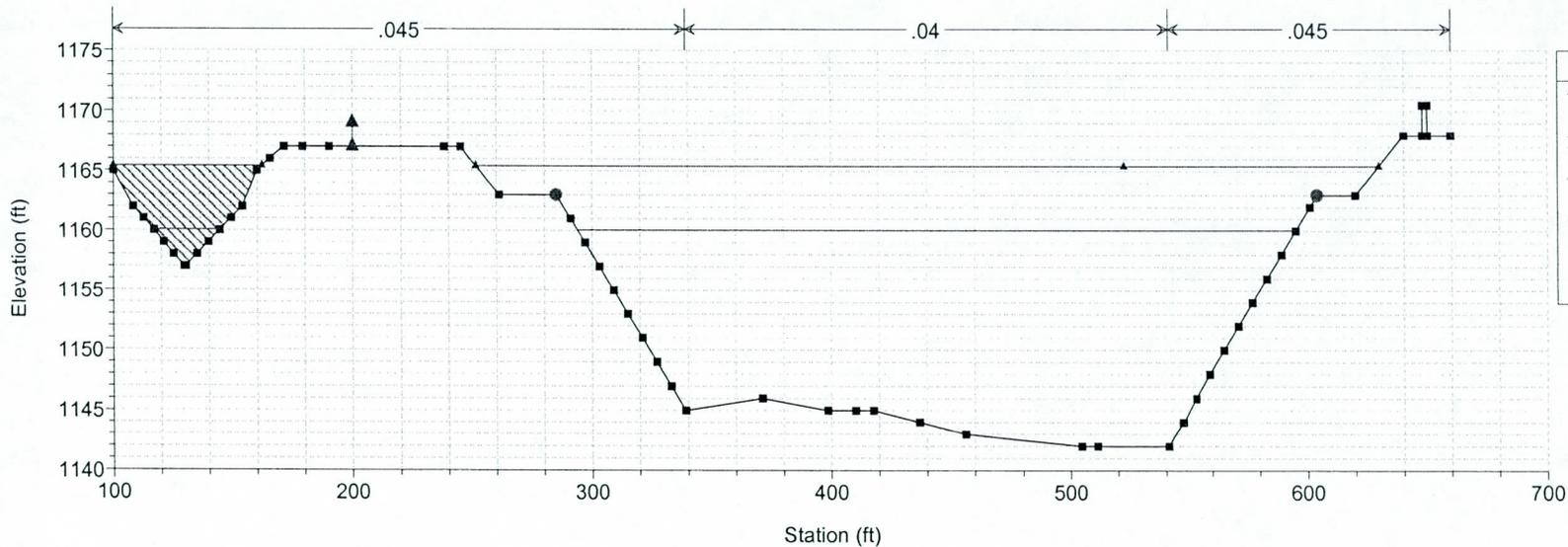




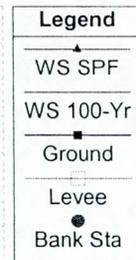
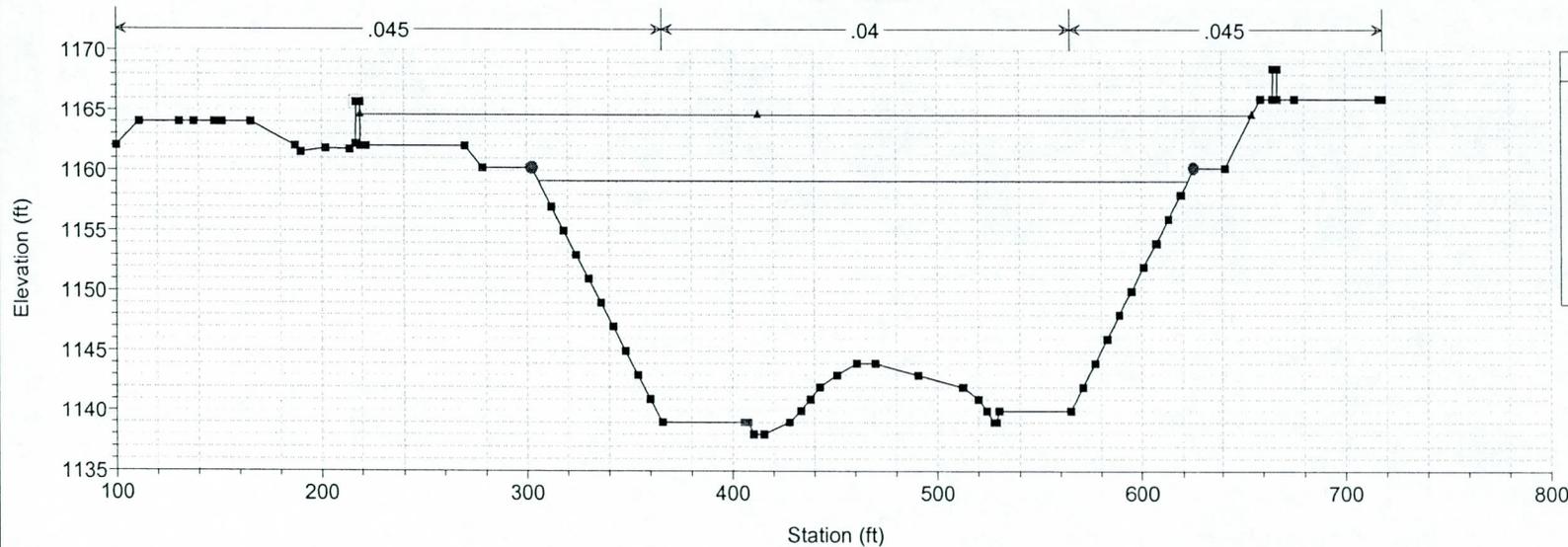




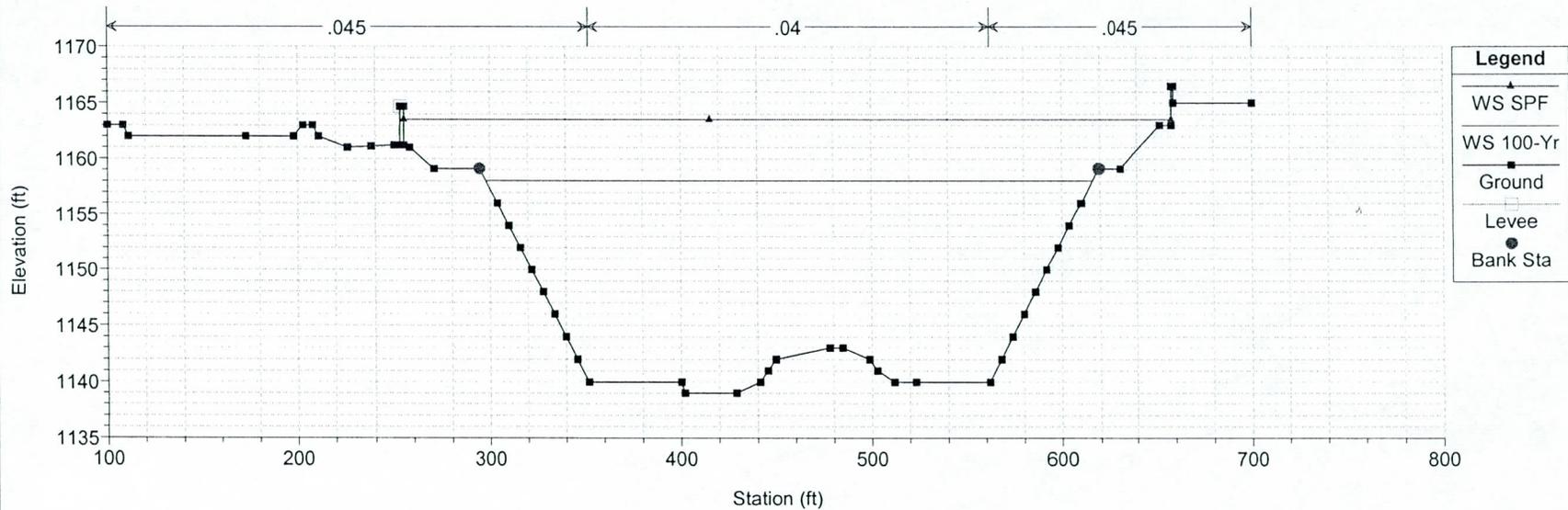
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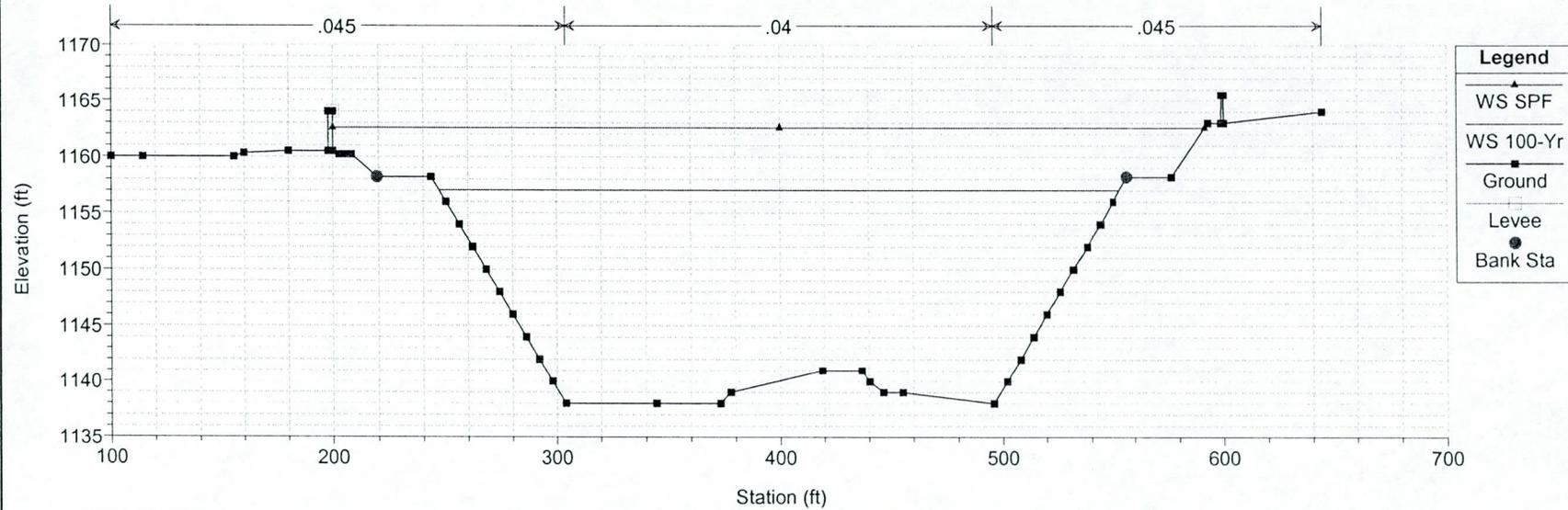
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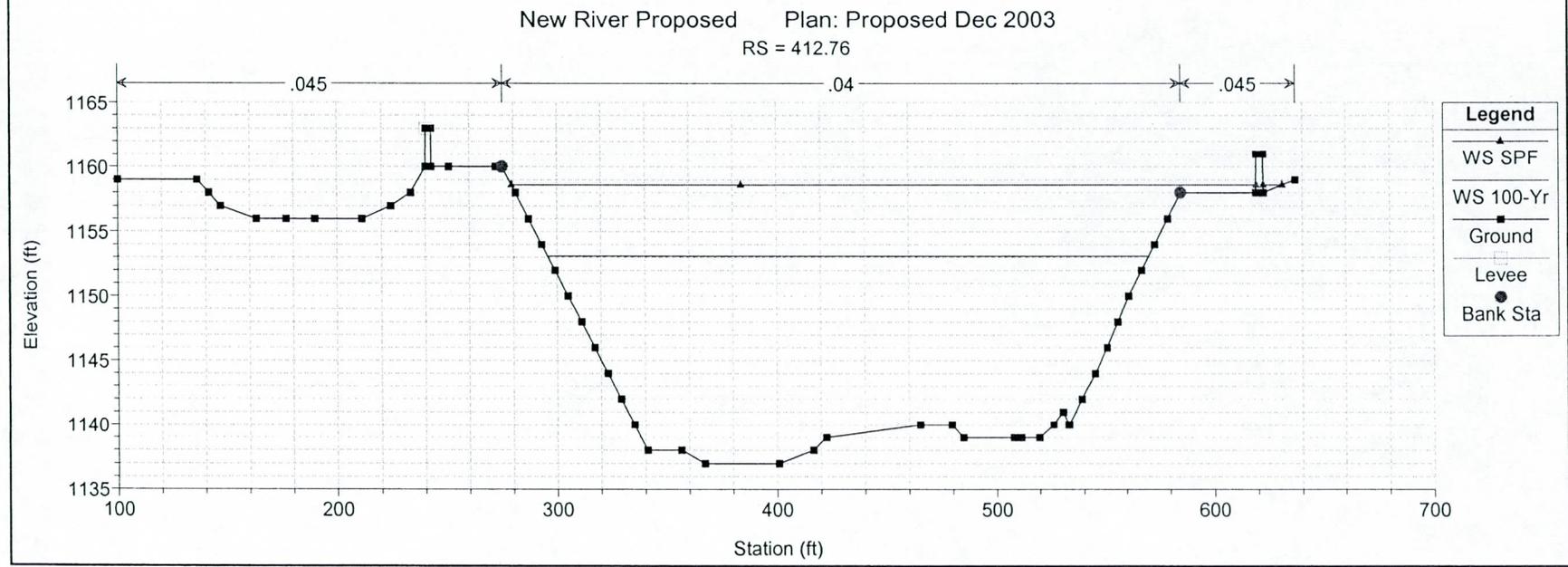
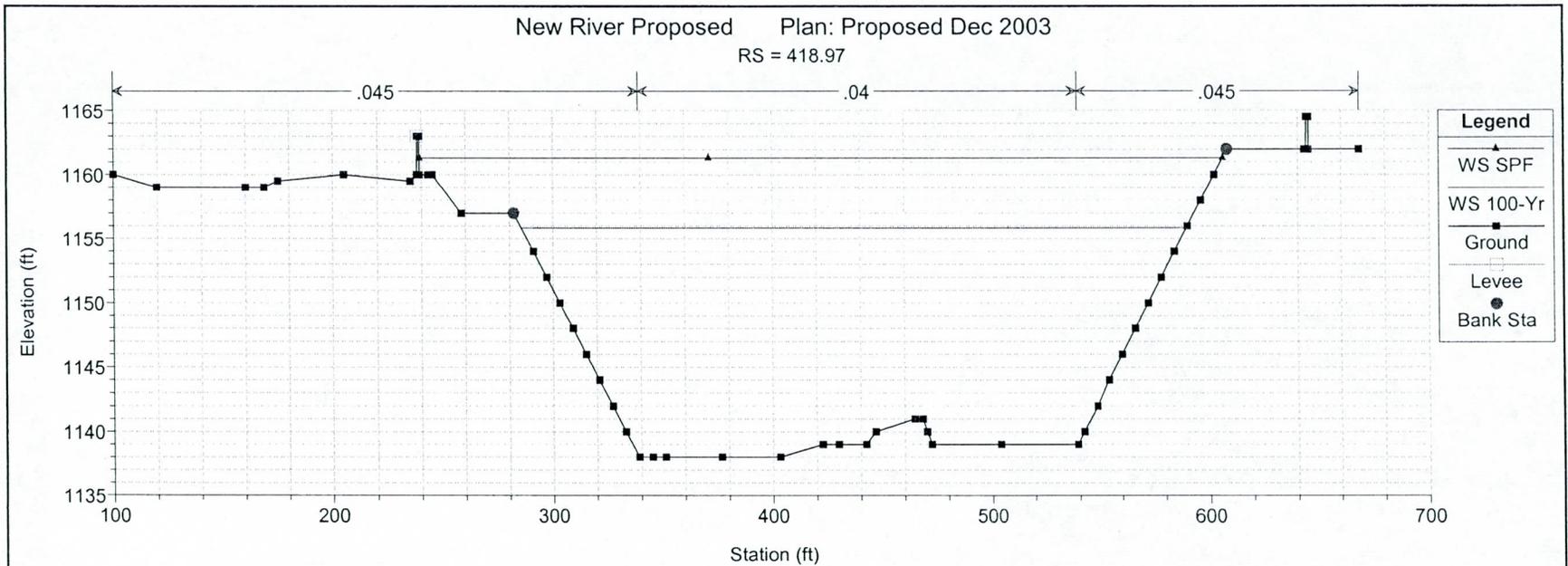


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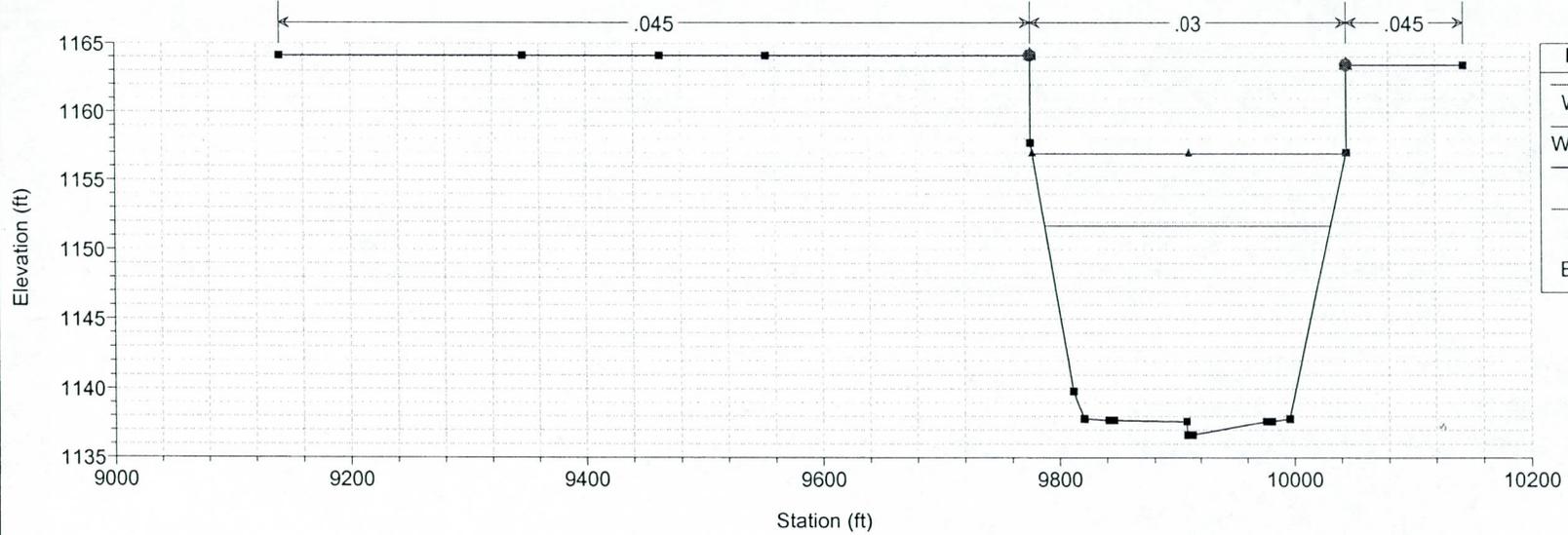


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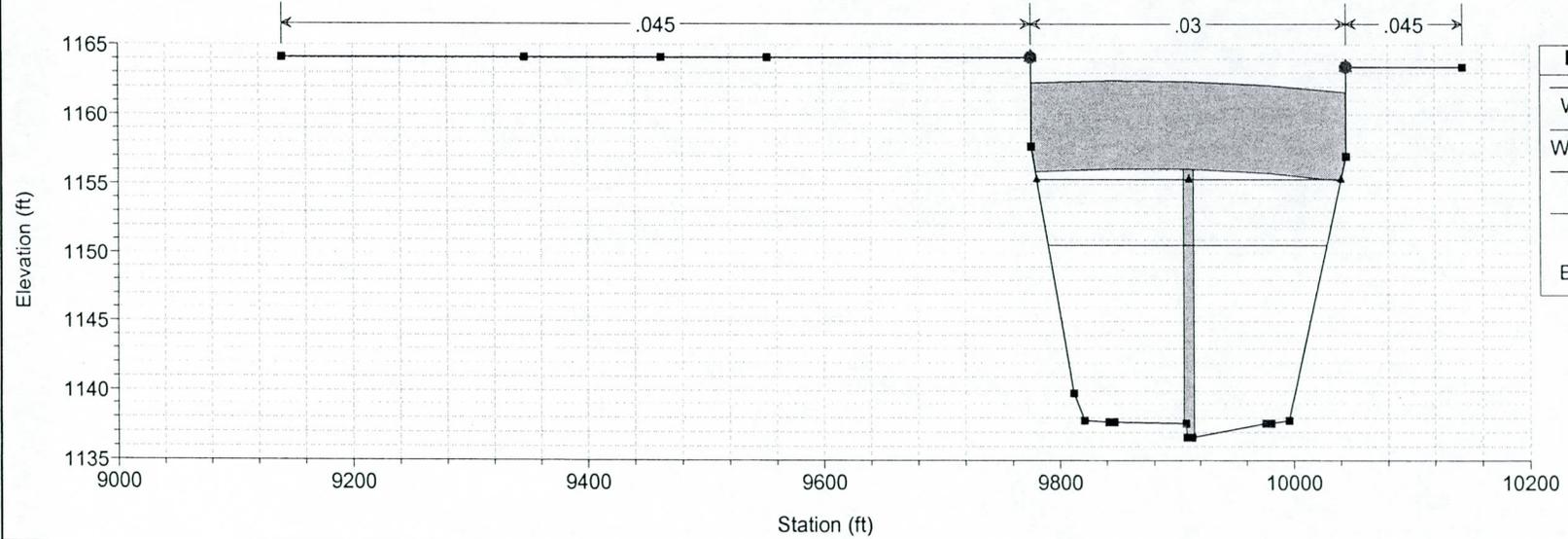




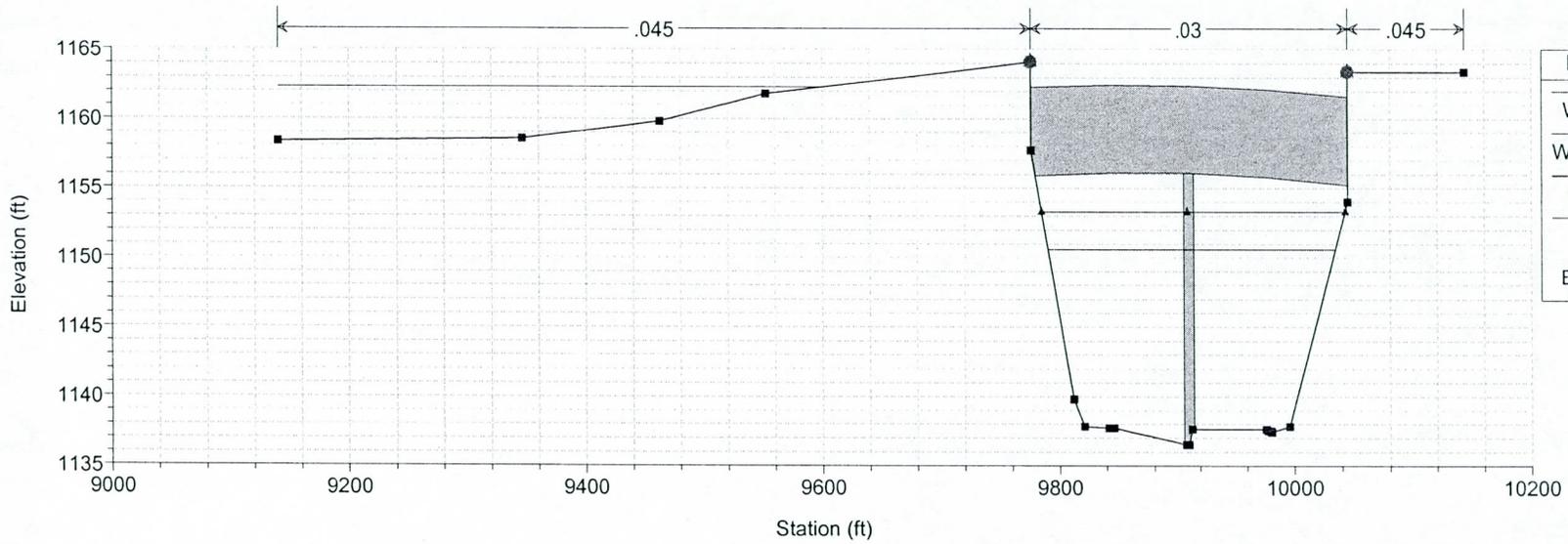
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RS = 410.54



New River Proposed Plan: Proposed Dec 2003
RS = 410.02 BR

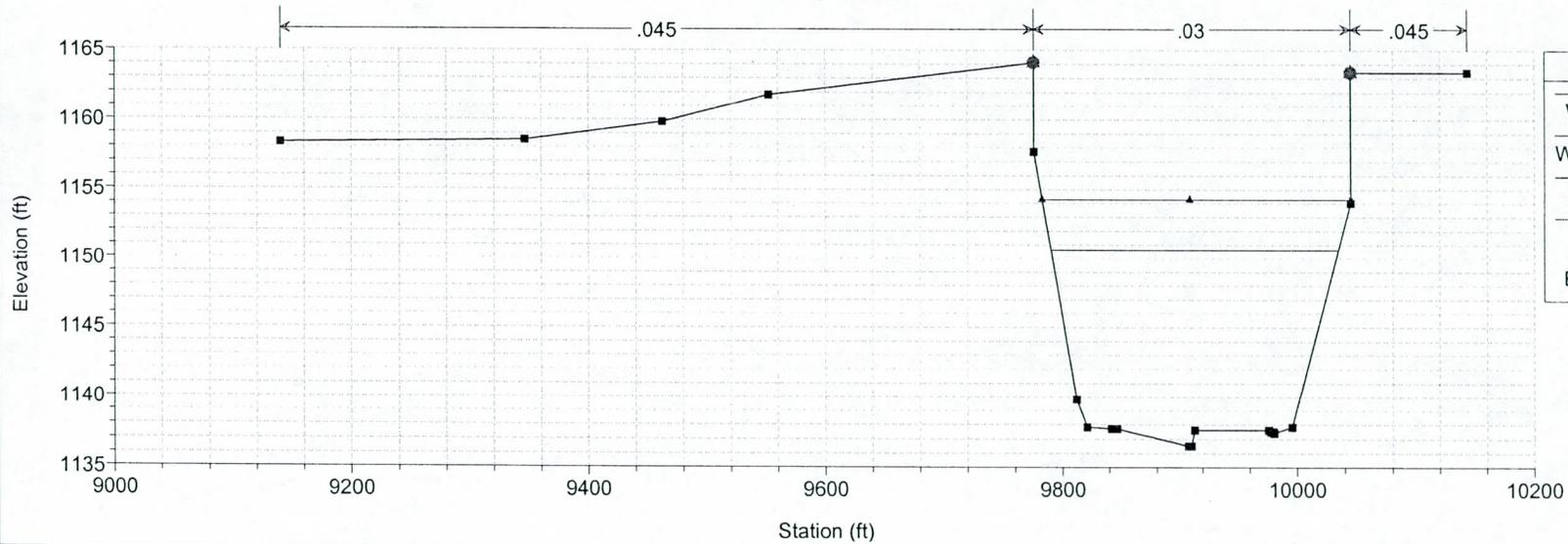


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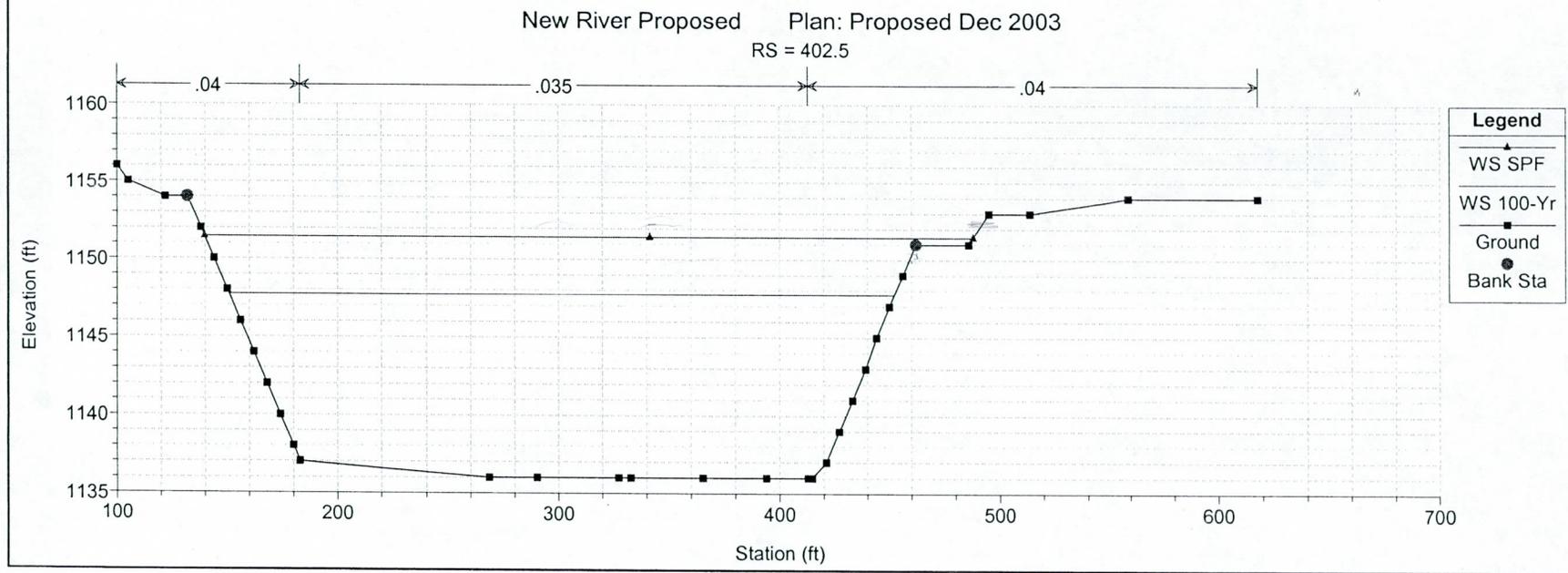
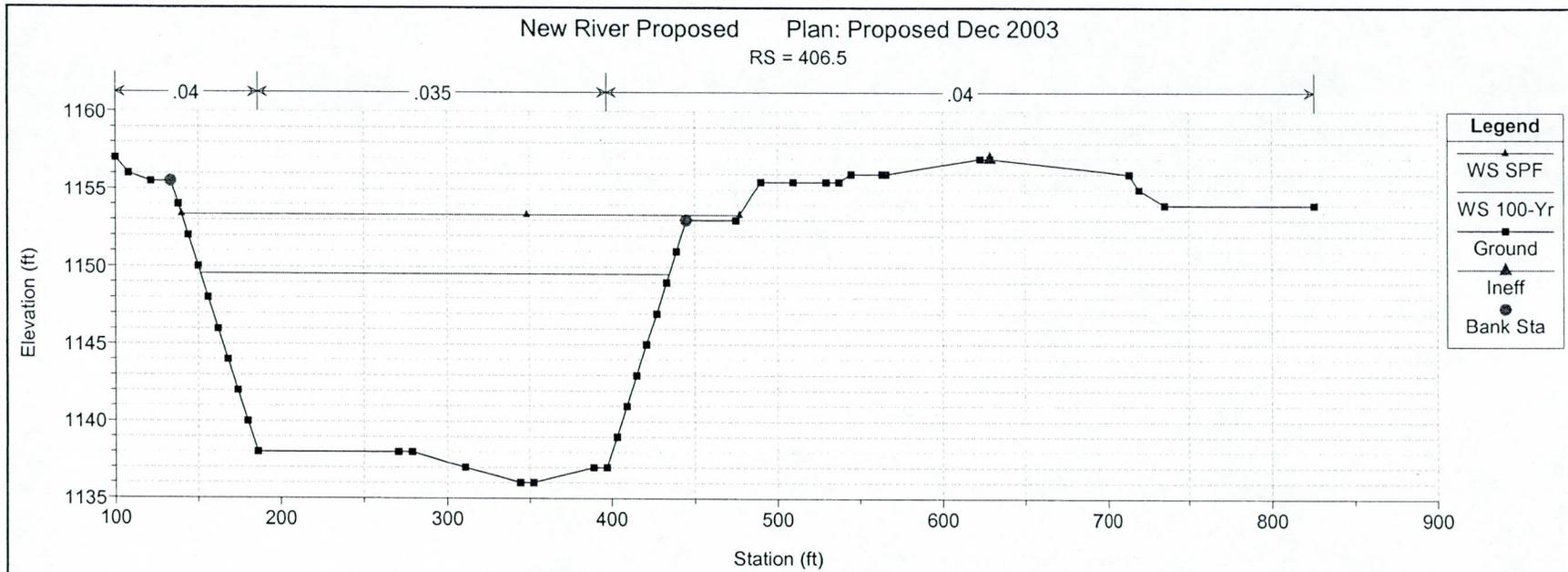


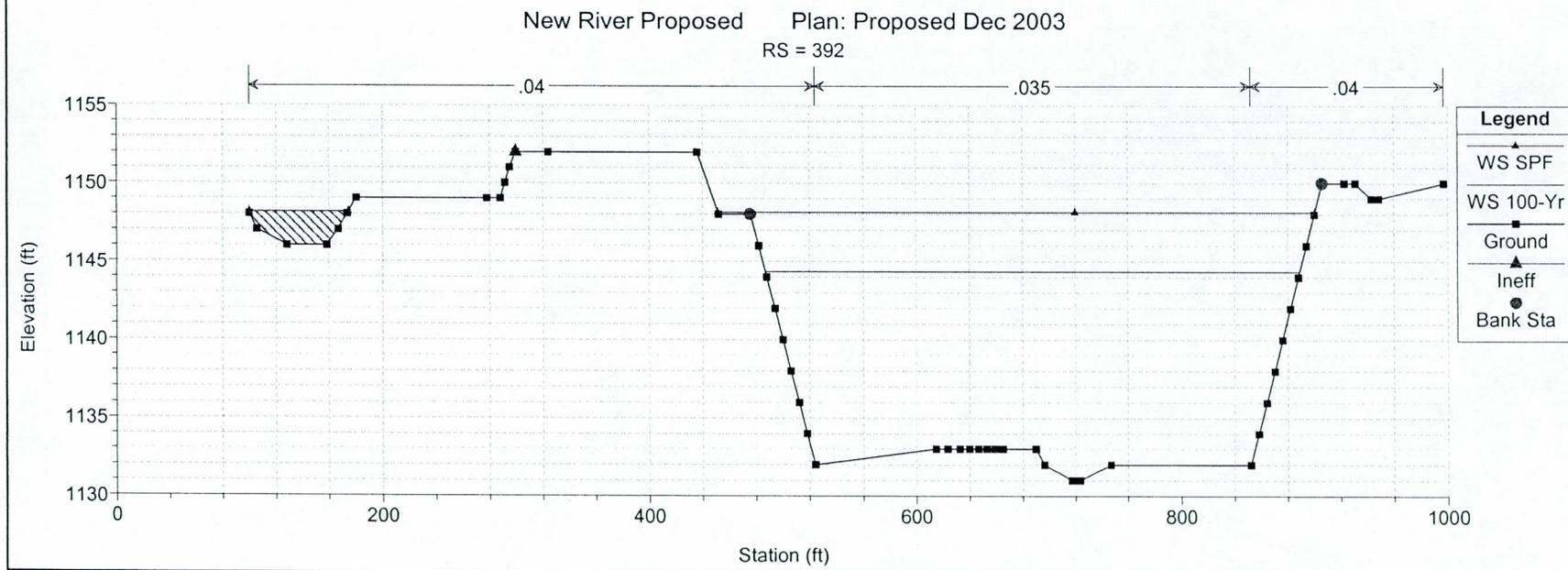
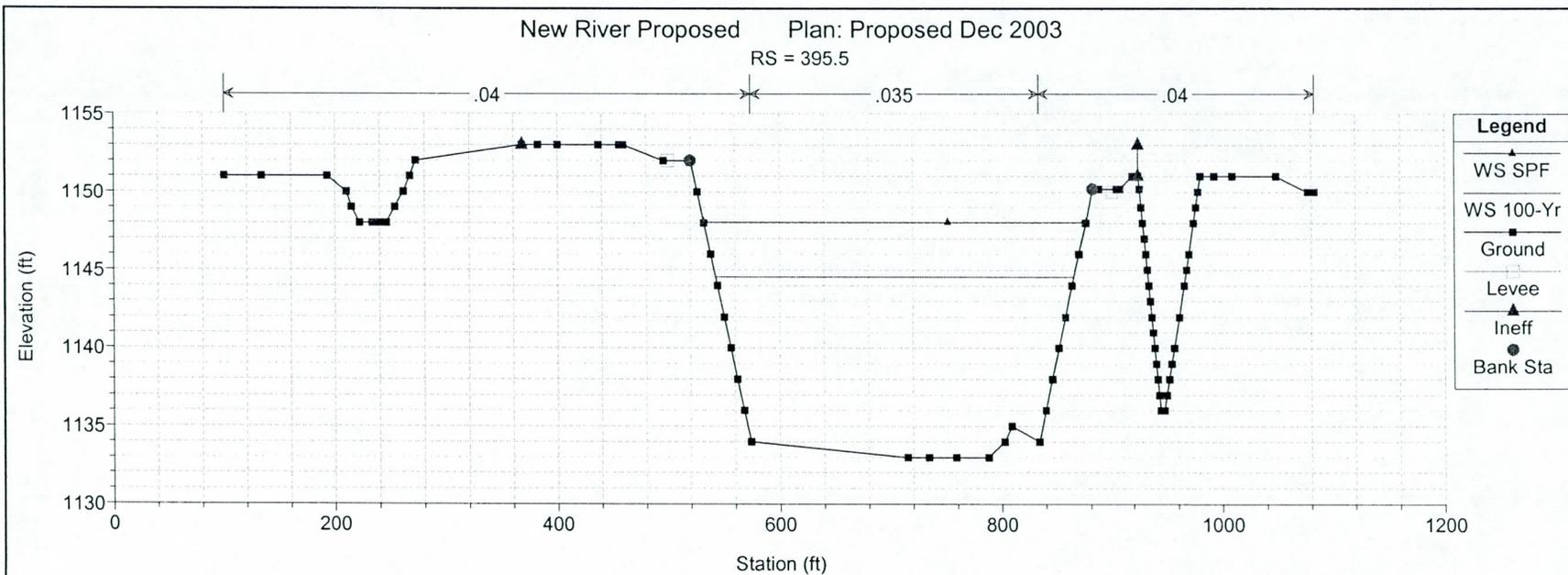
- Legend**
- WS SPF
 - WS 100-Yr
 - Ground
 - Ineff
 - Bank Sta

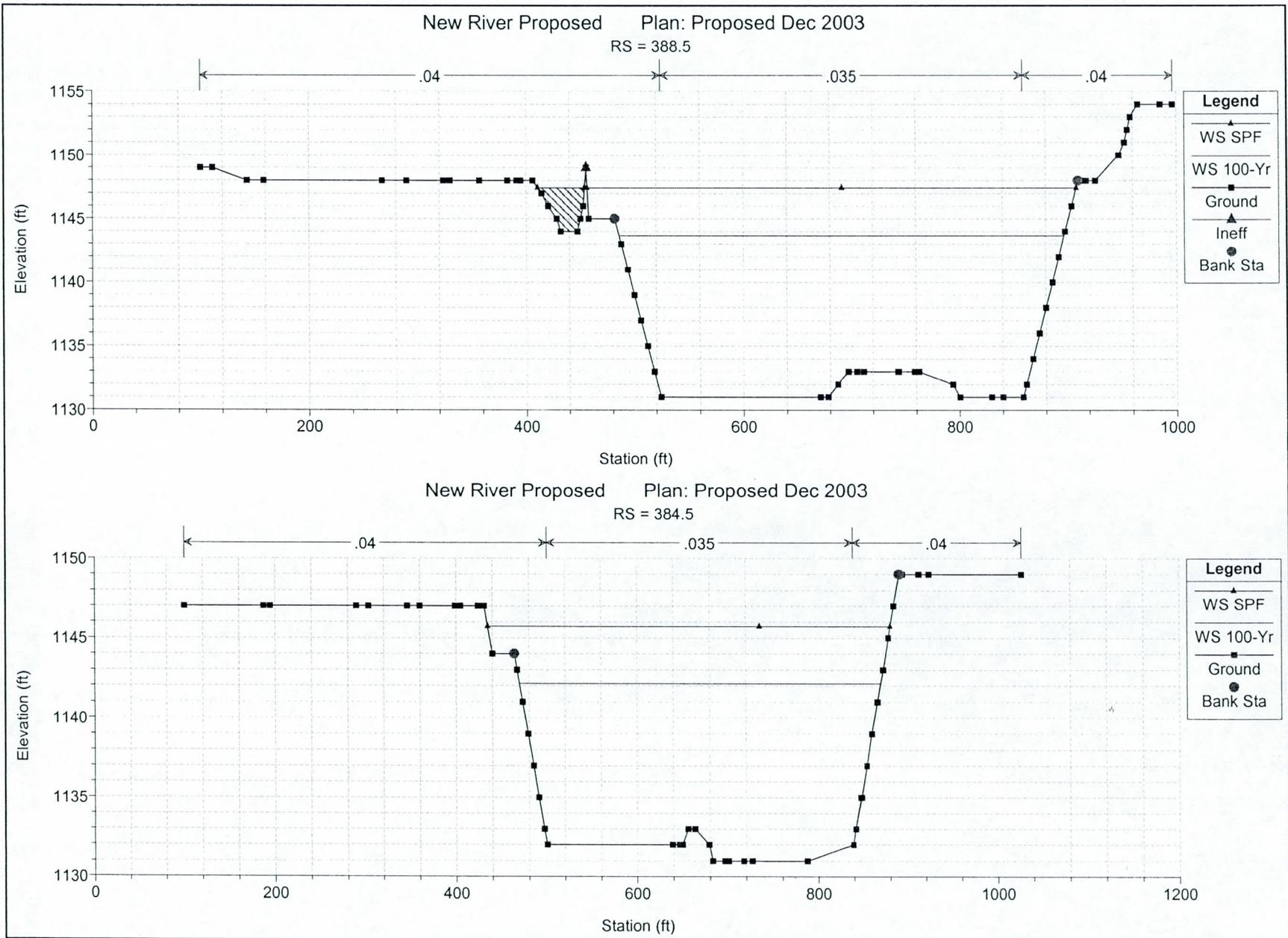
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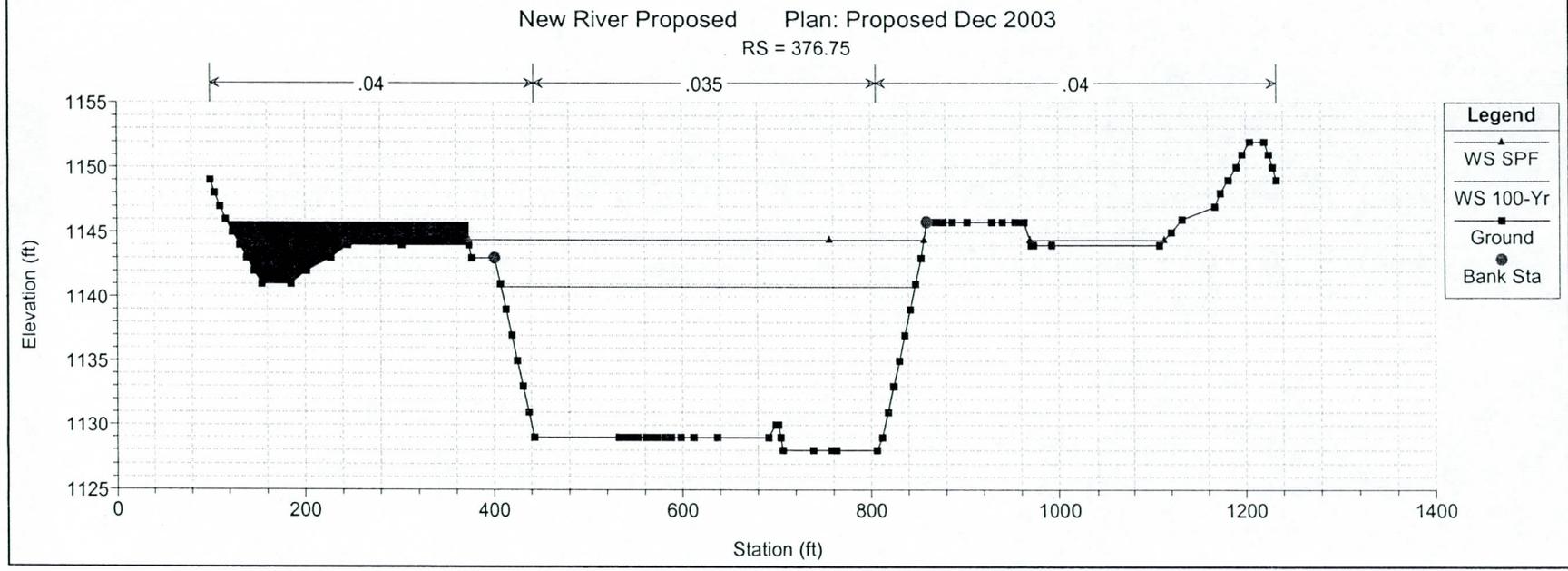
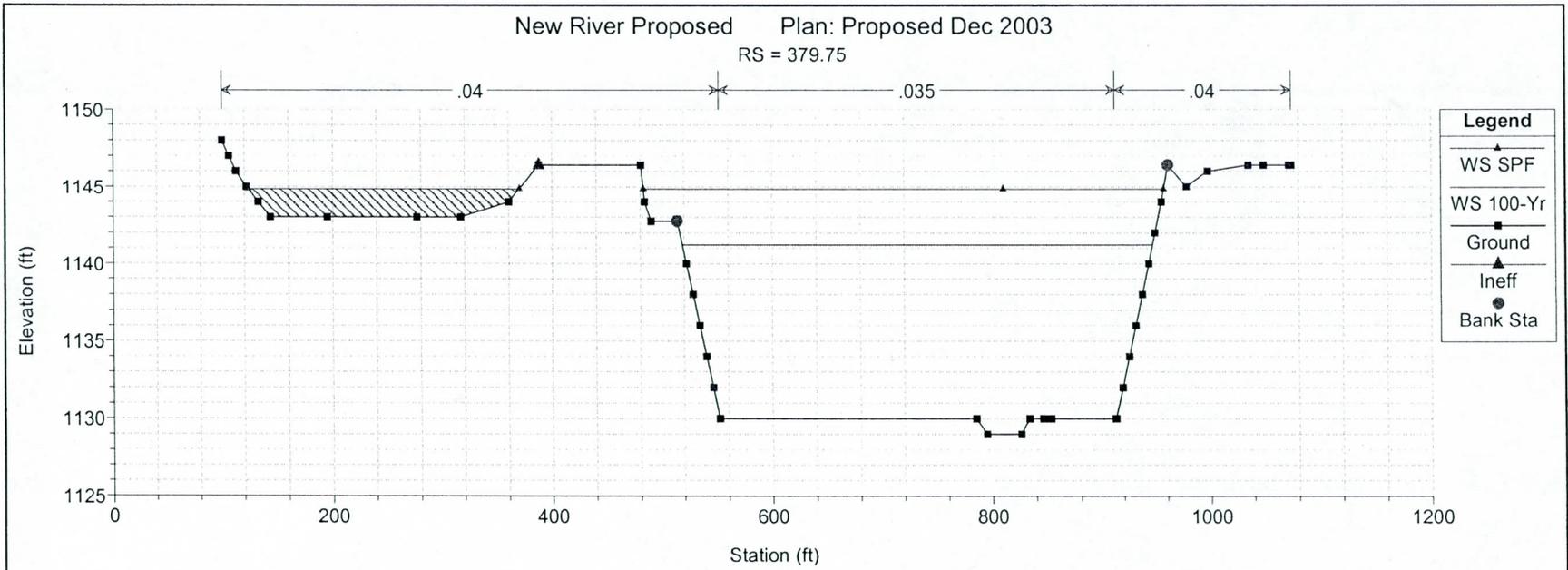


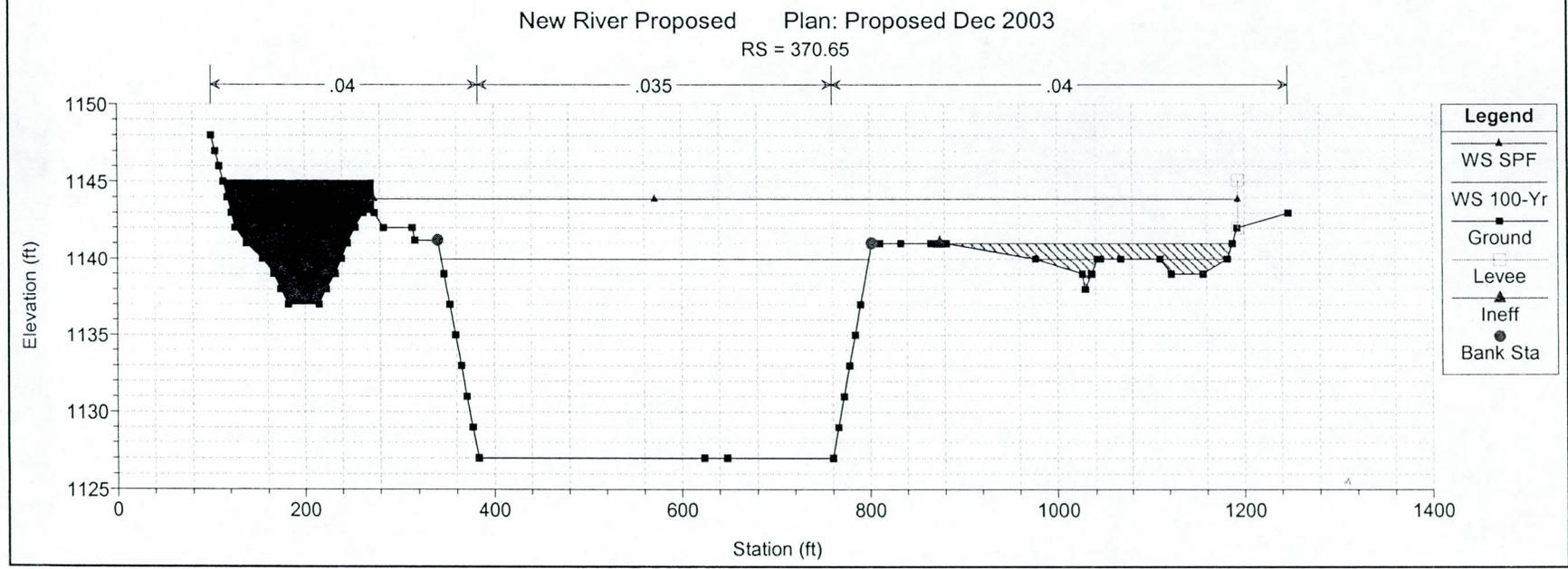
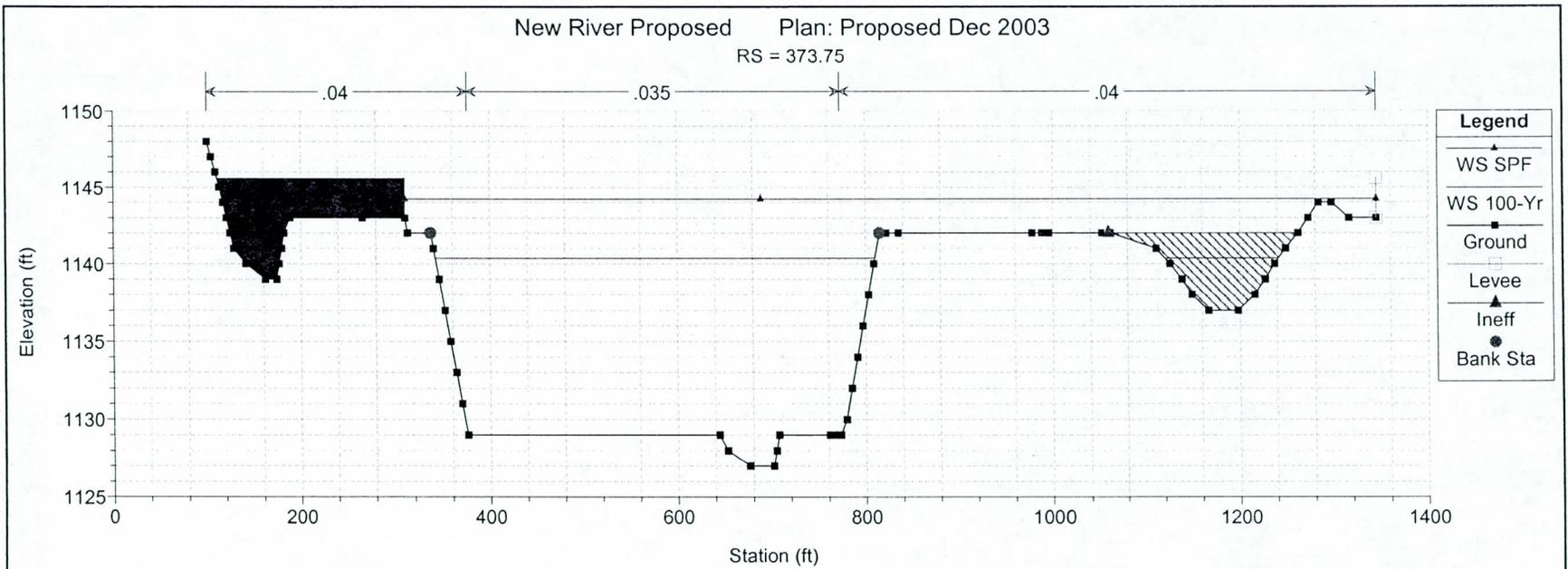
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 - WS 100-Yr
 - Ground
 - Ineff
 - Bank Sta





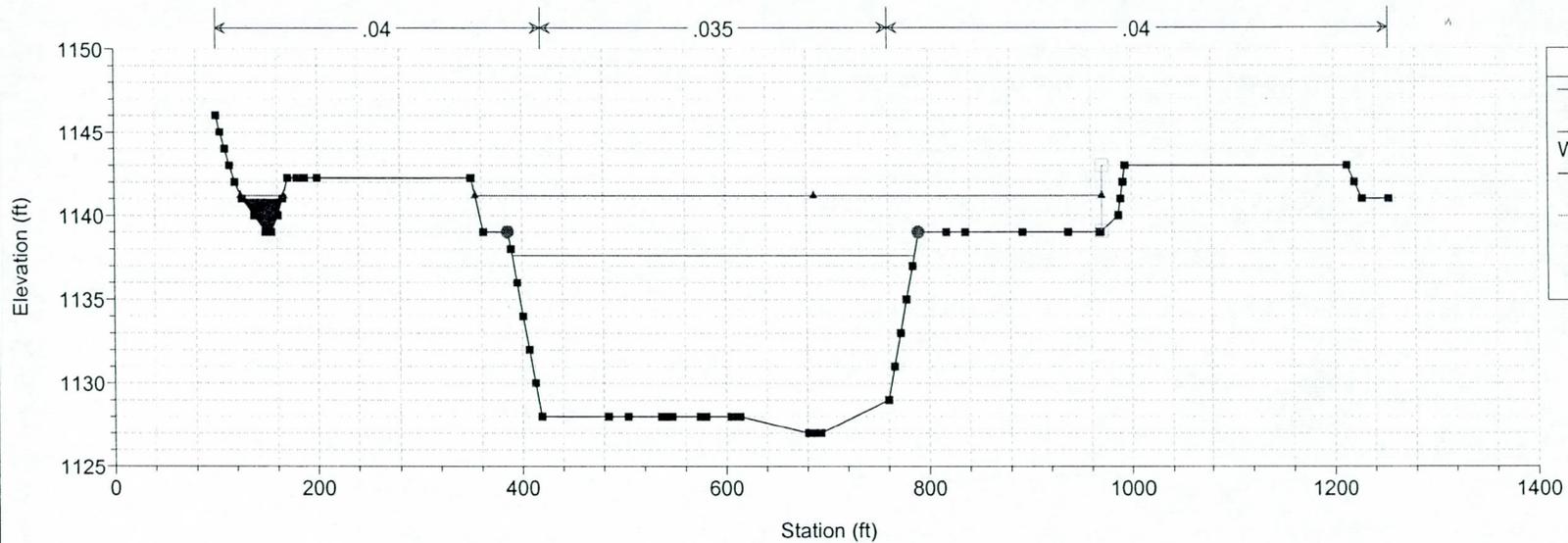






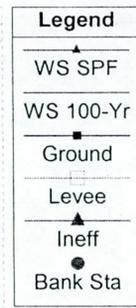
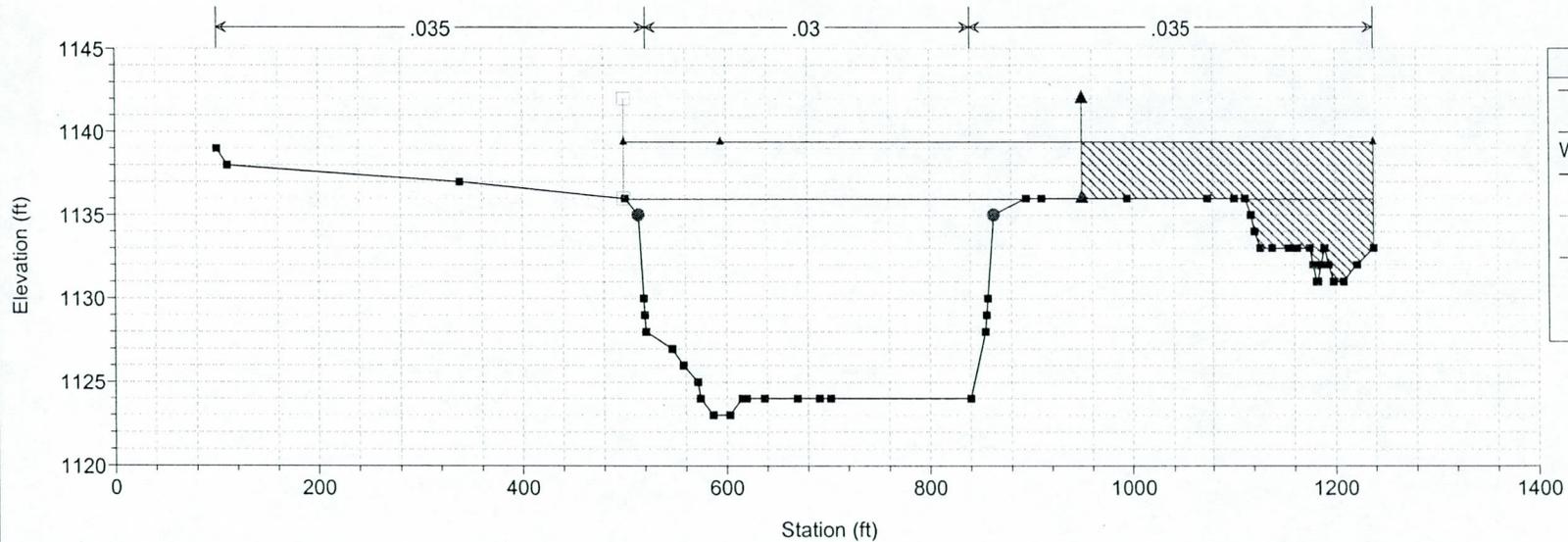
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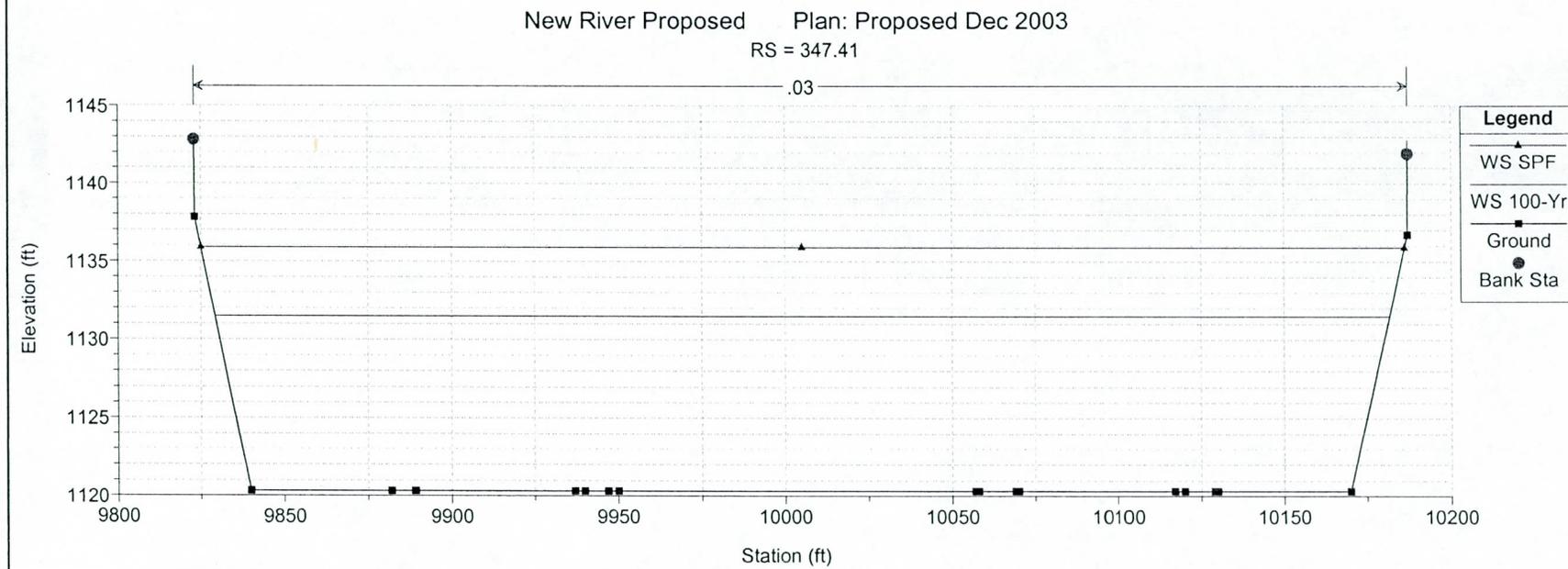
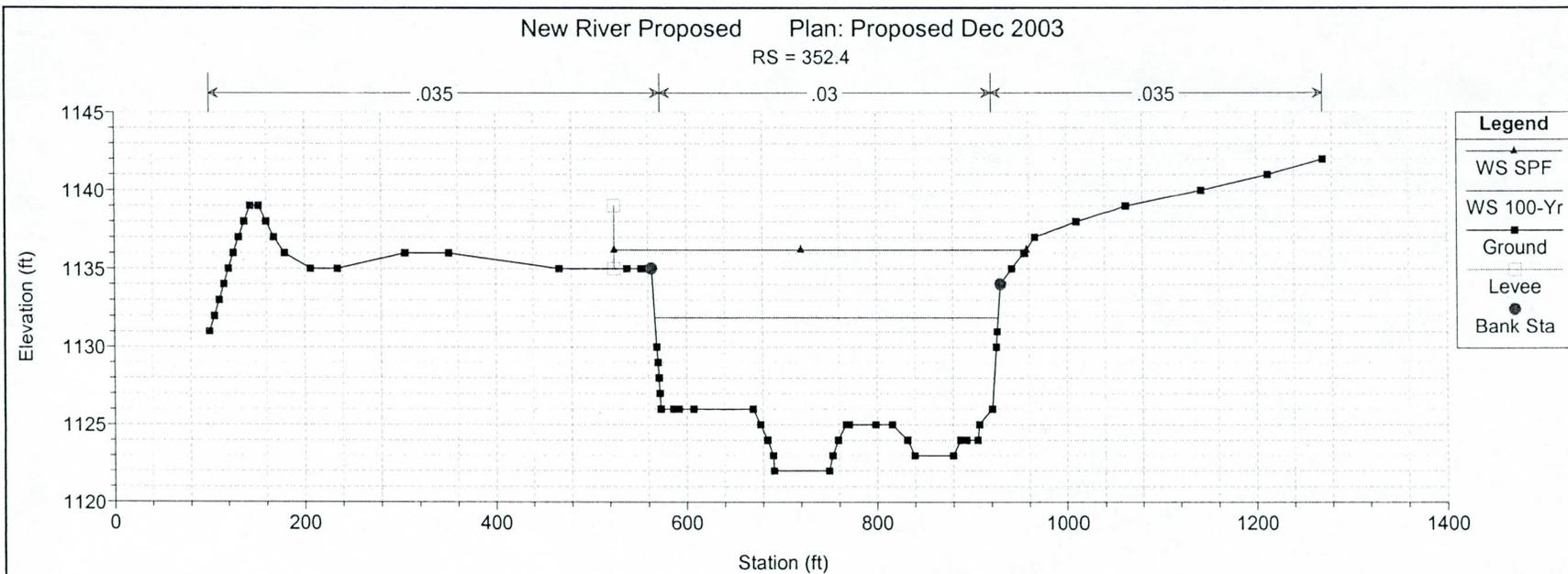
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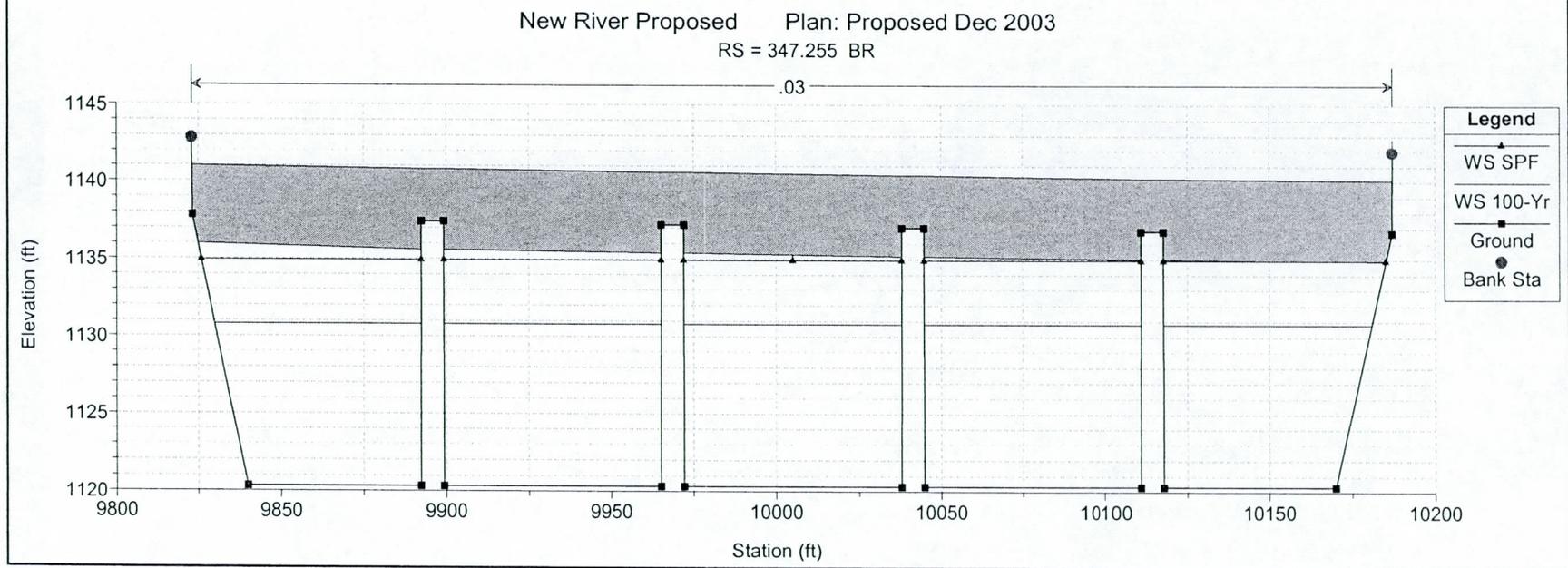
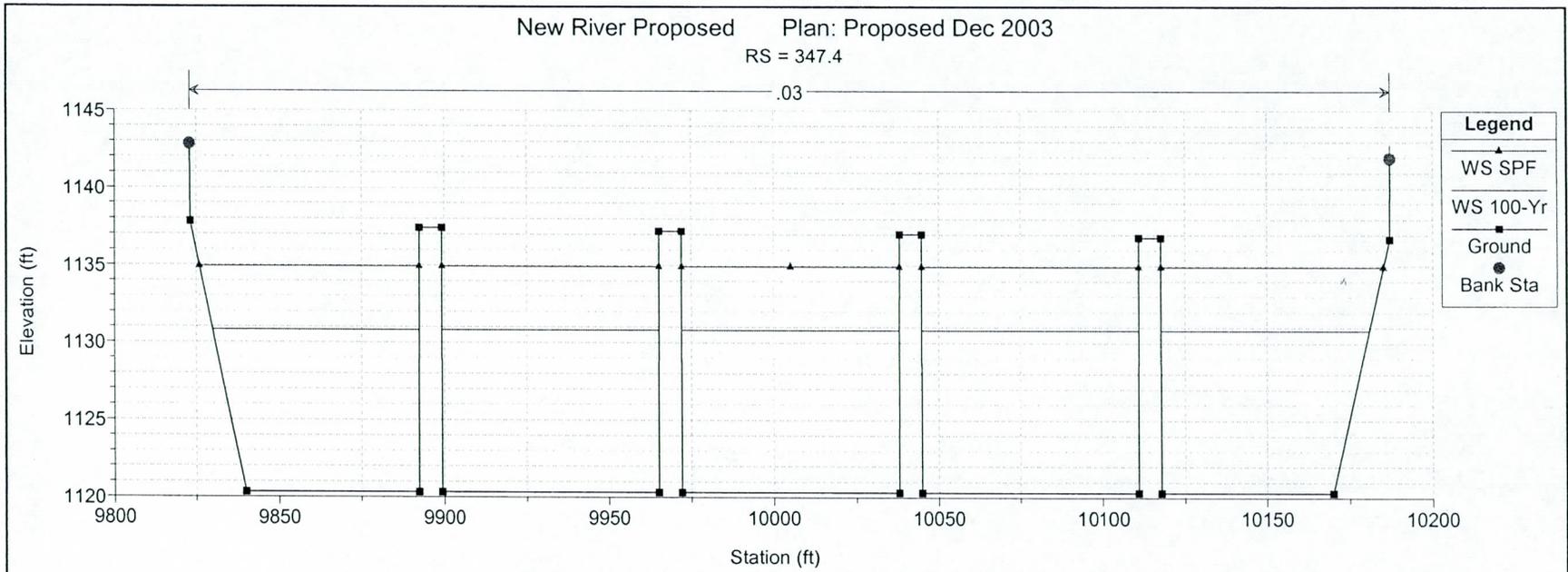


New River Proposed Plan: Proposed Dec 2003

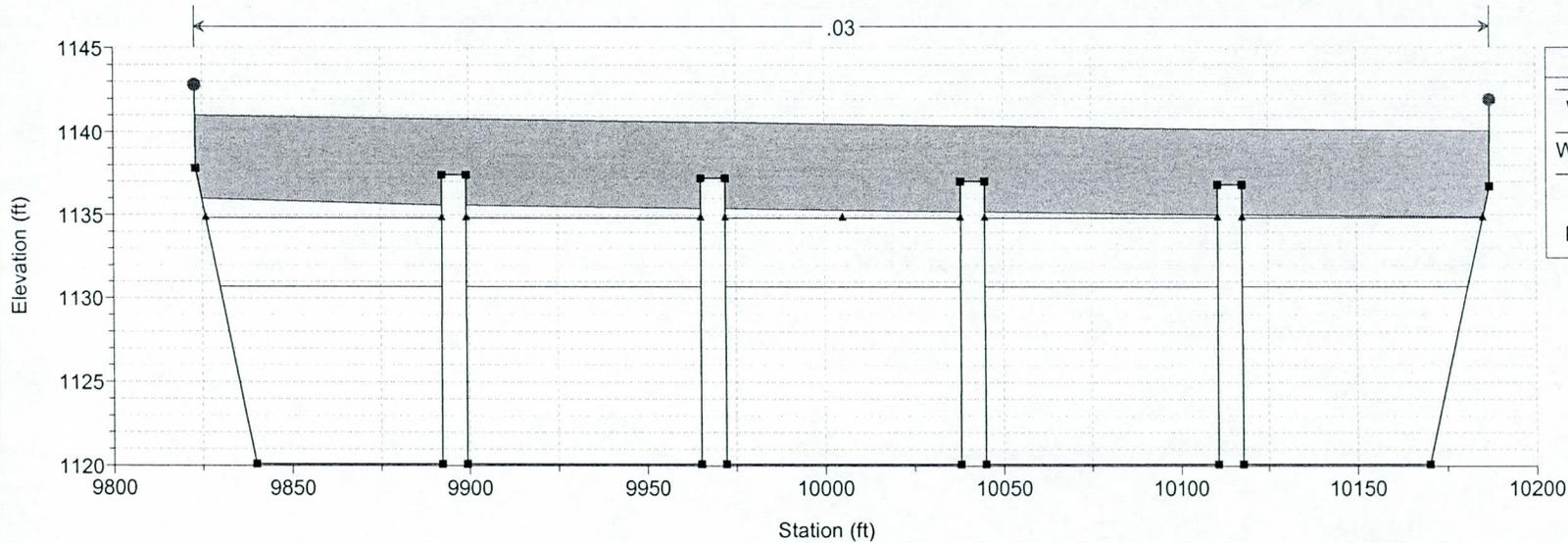
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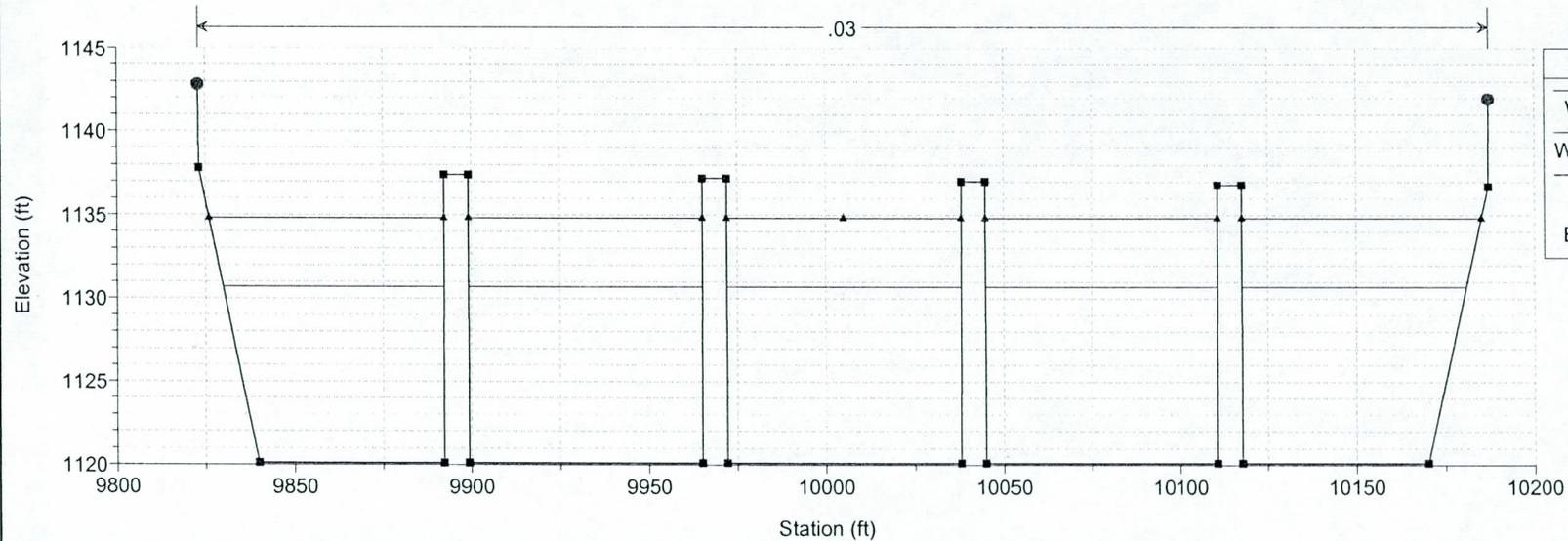


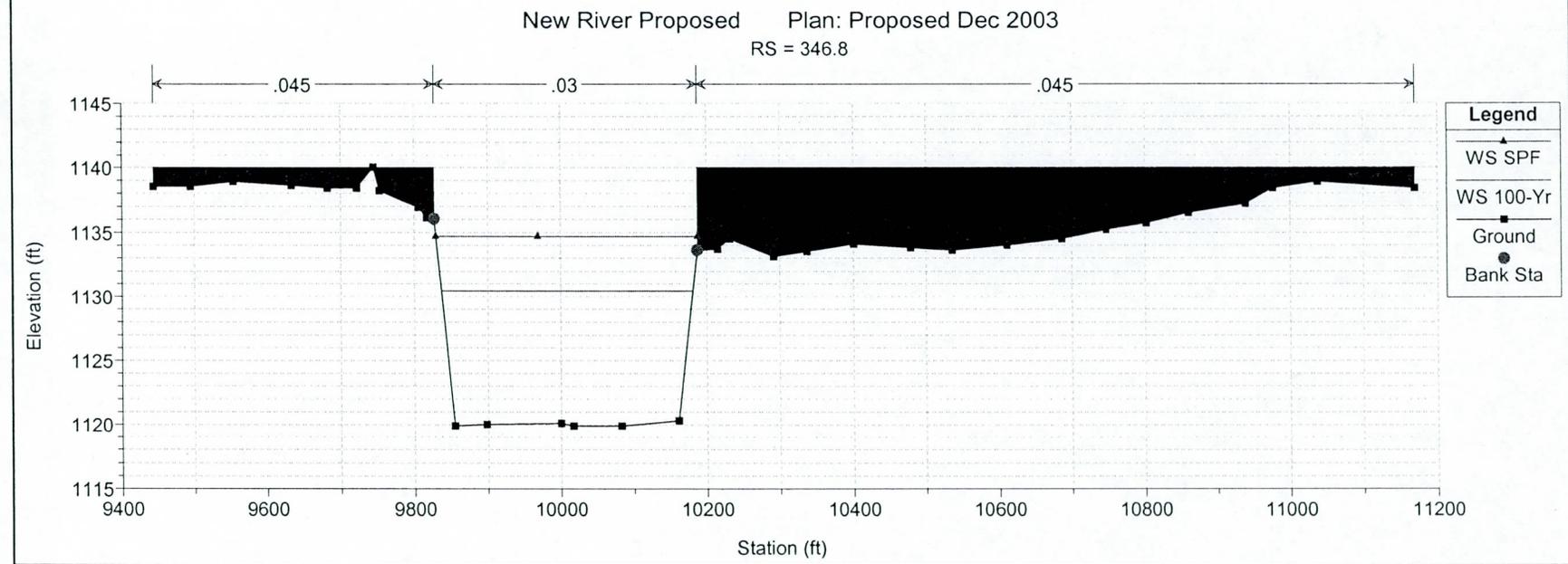
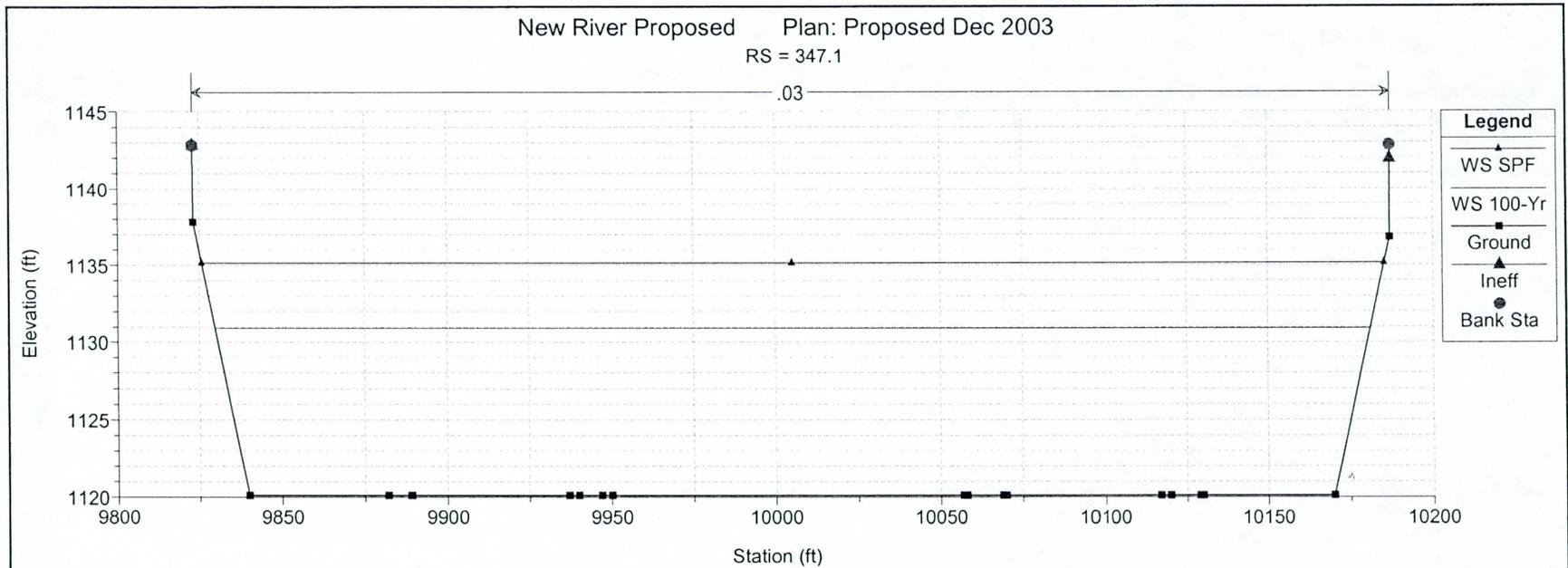


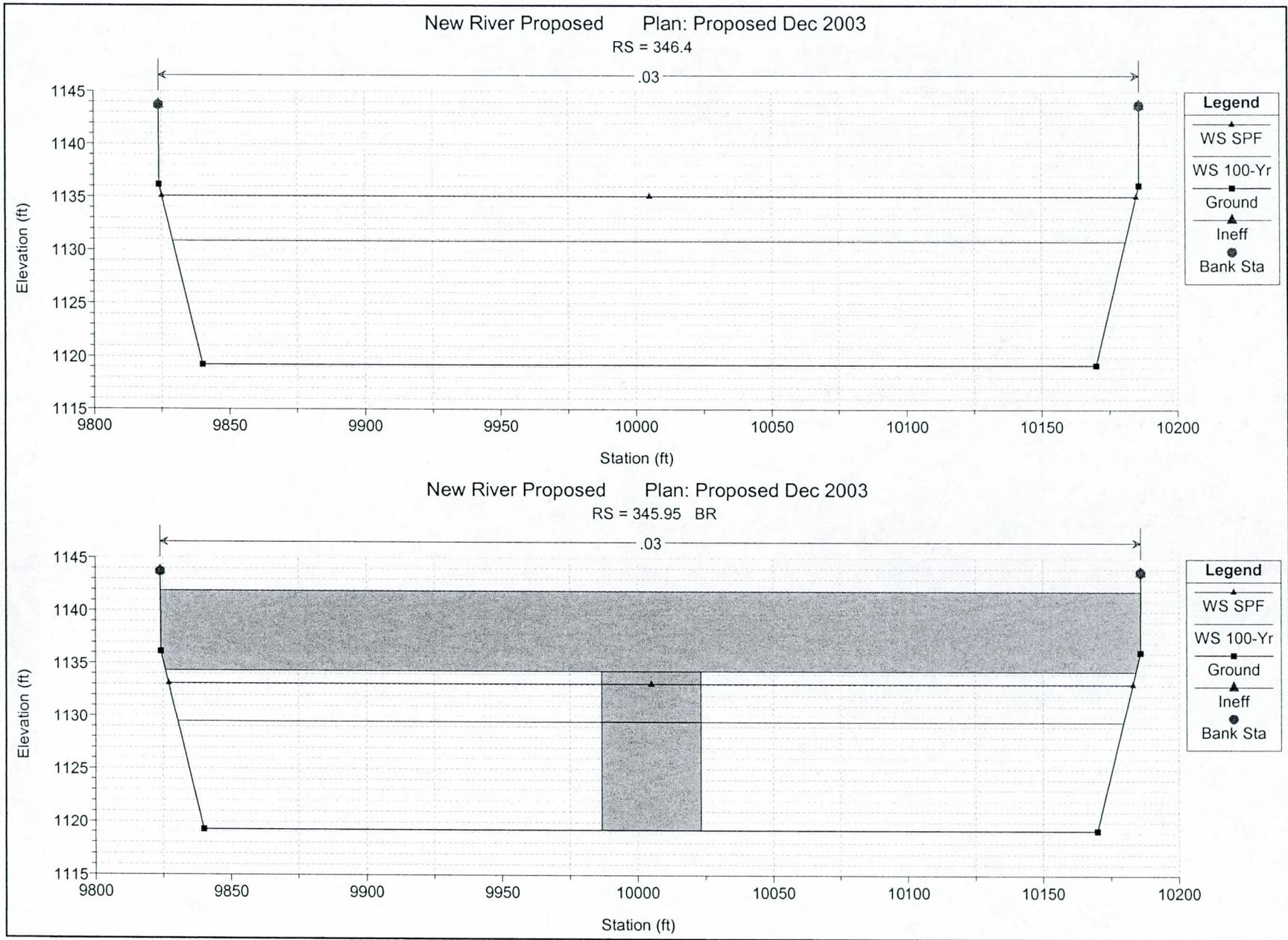
New River Proposed Plan: Proposed Dec 2003
 RS = 347.255 BR



New River Proposed Plan: Proposed Dec 2003
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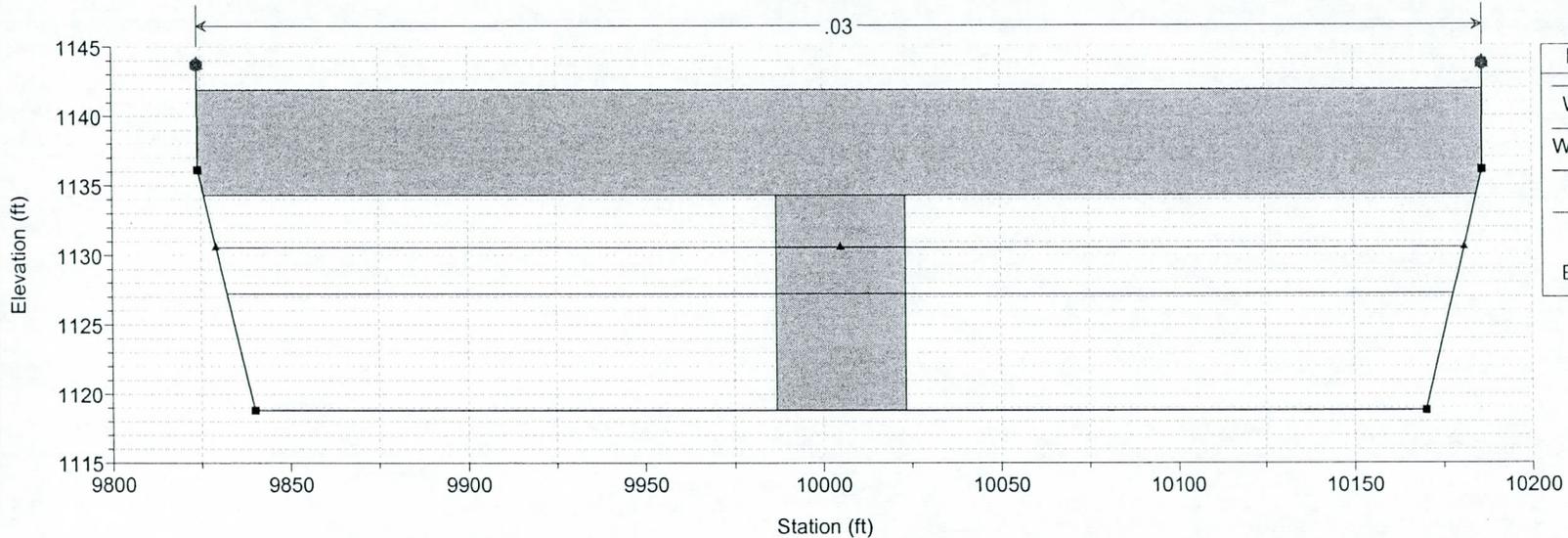






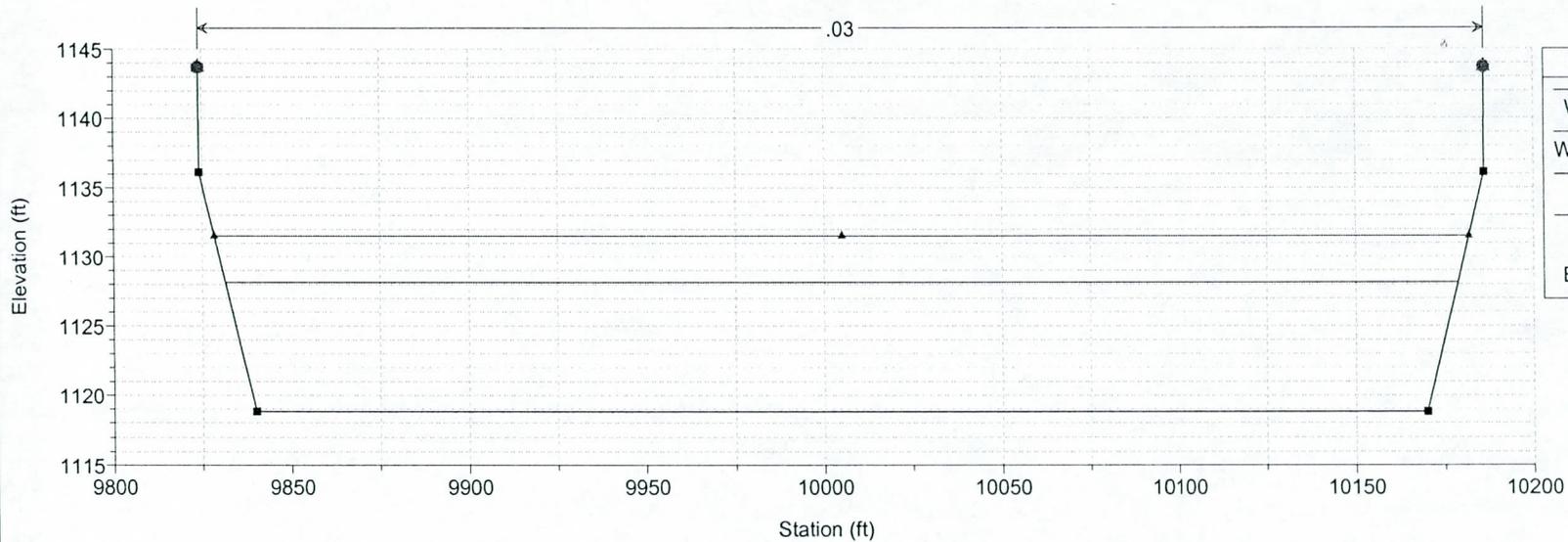
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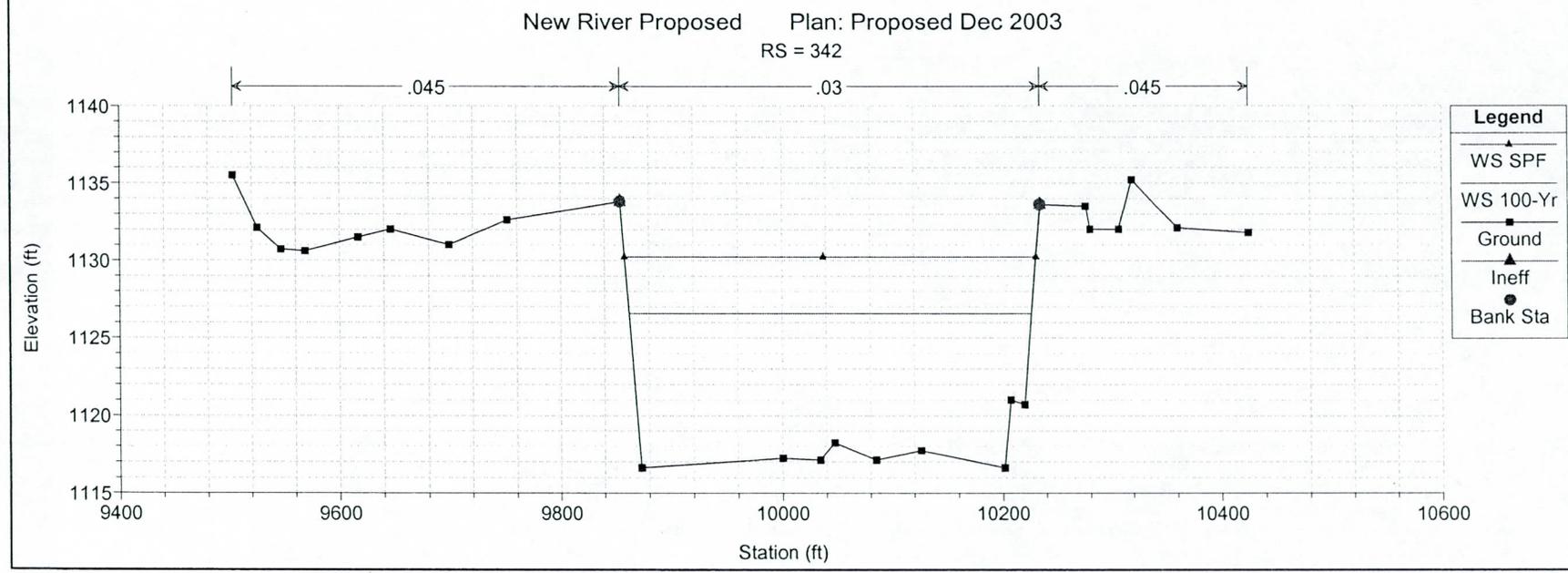
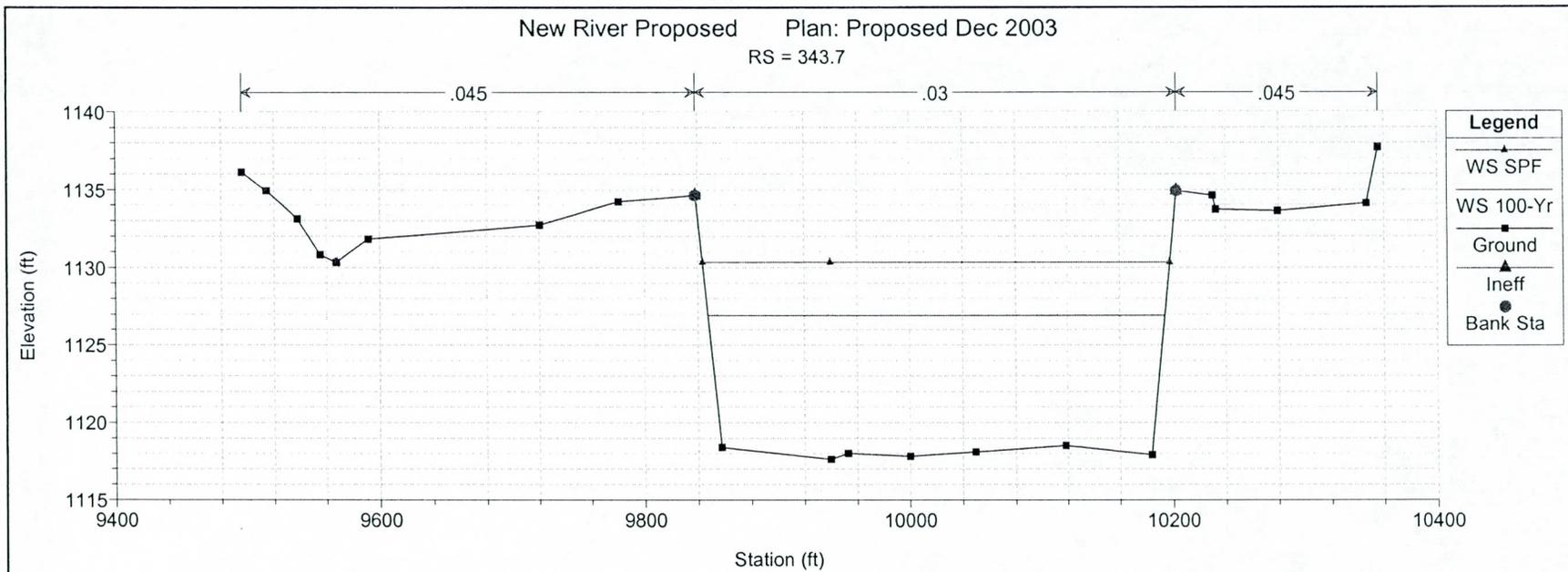
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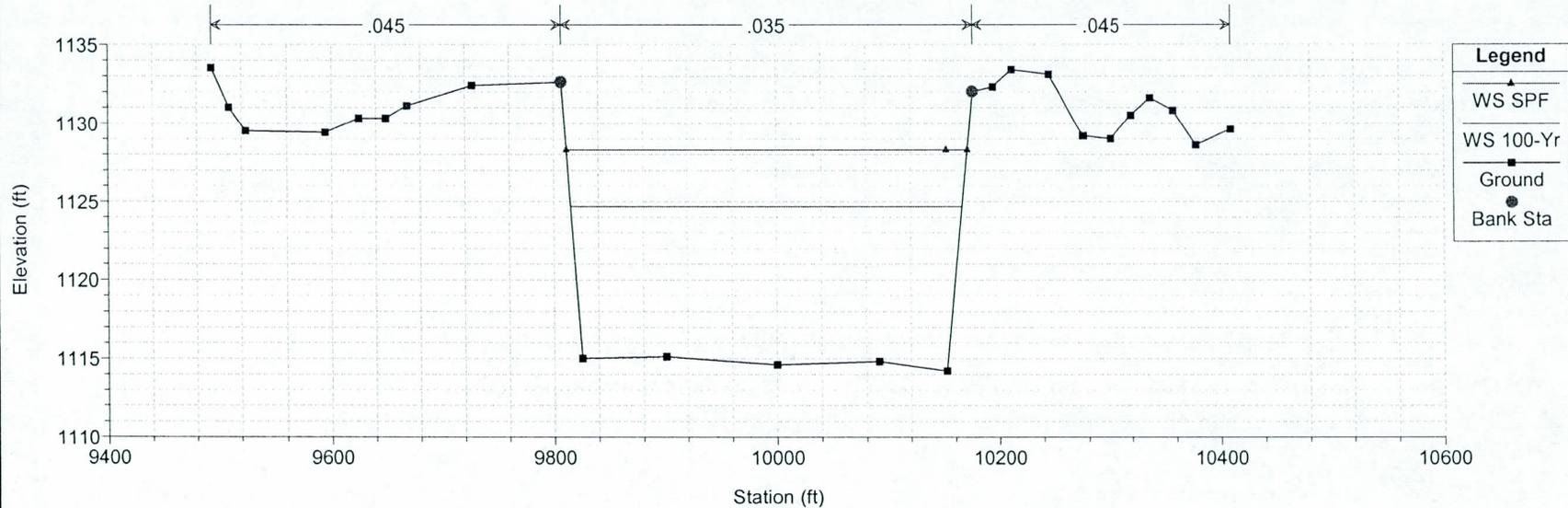
New River Proposed Plan: Proposed Dec 2003

RS = 345.5





New River Proposed Plan: Proposed Dec 2003
RS = 337





New River Channel Grand Avenue to Skunk Creek

HEC-RAS ANALYSIS

PROPOSED CONDITION WITH LOW FLOW CHANNEL



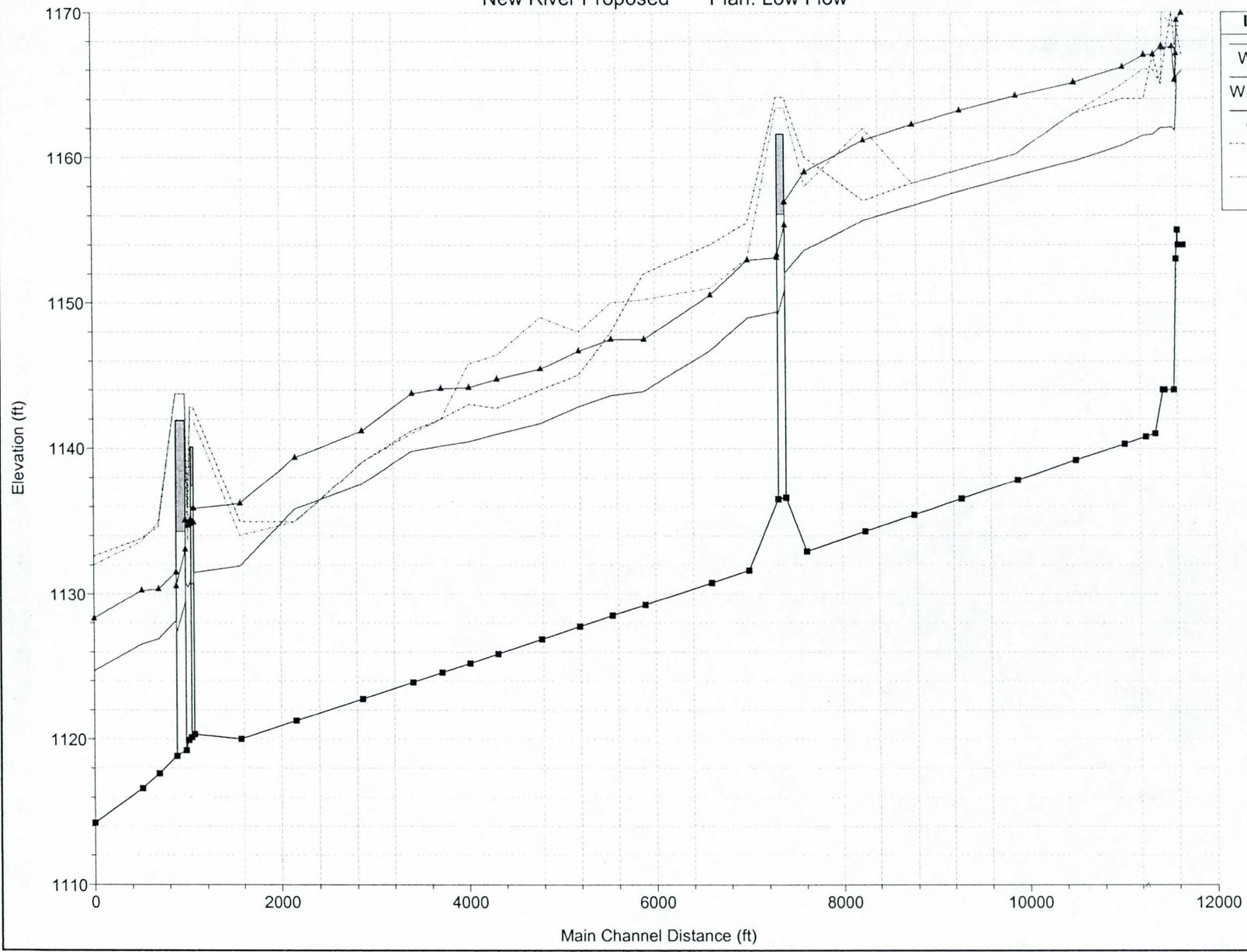
HEC-RAS Plan Low Flow River New River Reach Grand Ave - Drop

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Max Chl Dpth (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	453.23	100-Yr	41000.00	1154.00	1165.91	11.91		1168.26	0.002650	12.30	3332.84	308.23	0.66
Grand Ave - Drop	453.23	SPF	68000.00	1154.00	1169.91	15.91		1173.30	0.002627	14.78	4624.27	363.48	0.69
Grand Ave - Drop	452.73	100-Yr	41000.00	1154.00	1165.51	11.51		1168.09	0.003062	12.90	3178.13	303.96	0.70
Grand Ave - Drop	452.73	SPF	68000.00	1154.00	1169.41	15.41	1166.67	1173.13	0.003054	15.47	4397.67	331.67	0.73
Grand Ave - Drop	452.65	100-Yr	41000.00	1155.00	1163.67	8.67	1163.67	1167.89	0.006705	16.48	2488.21	297.81	1.00
Grand Ave - Drop	452.65	SPF	68000.00	1155.00	1167.11	12.11	1167.11	1172.89	0.006003	19.30	3526.20	307.69	1.00
Grand Ave - Drop	452.5	100-Yr	41000.00	1153.00	1161.81	8.81	1161.81	1166.06	0.006626	16.55	2477.23	291.30	1.00
Grand Ave - Drop	452.5	SPF	68000.00	1153.00	1165.28	12.28	1165.28	1171.13	0.006020	19.42	3501.98	299.15	1.00
Grand Ave - Drop	452.23	100-Yr	41000.00	1144.00	1162.07	18.07		1163.30	0.000843	8.88	4616.15	287.31	0.39
Grand Ave - Drop	452.23	SPF	68000.00	1144.00	1167.57	23.57		1169.42	0.000915	10.92	6228.96	299.10	0.42
Grand Ave - Drop	451.23	100-Yr	41000.00	1144.00	1162.00	18.00		1163.21	0.000817	8.83	4641.51	284.18	0.39
Grand Ave - Drop	451.23	SPF	68000.00	1144.00	1167.48	23.48		1169.33	0.000895	10.91	6231.61	295.79	0.42
Grand Ave - Drop	451.05	100-Yr	41000.00	1144.00	1162.04	18.04		1163.17	0.001393	8.52	4814.85	293.70	0.37
Grand Ave - Drop	451.05	SPF	68000.00	1144.00	1167.56	23.56		1169.27	0.001508	10.50	6483.86	312.38	0.40
Grand Ave - Drop	450.23	100-Yr	41000.00	1141.00	1161.58	20.57		1163.00	0.002029	9.57	4286.22	285.45	0.44
Grand Ave - Drop	450.23	SPF	68000.00	1141.00	1167.05	26.05		1169.09	0.002187	11.45	5940.57	358.29	0.46
Grand Ave - Drop	449.05	100-Yr	41000.00	1140.79	1161.50	20.71		1162.76	0.001761	9.01	4551.37	298.99	0.41
Grand Ave - Drop	449.05	SPF	68000.00	1140.79	1167.01	26.23		1168.82	0.001826	10.79	6385.11	376.11	0.43
Grand Ave - Drop	446.87	100-Yr	41000.00	1140.29	1160.80	20.51		1162.29	0.002158	9.80	4182.08	280.77	0.45
Grand Ave - Drop	446.87	SPF	68000.00	1140.29	1166.18	25.89		1168.32	0.002266	11.75	5853.74	372.62	0.47
Grand Ave - Drop	441.6	100-Yr	41000.00	1139.17	1159.72	20.55		1161.14	0.002138	9.57	4286.32	324.29	0.45
Grand Ave - Drop	441.6	SPF	68000.00	1139.17	1165.13	25.97		1167.12	0.002121	11.33	6084.53	436.69	0.46
Grand Ave - Drop	435.37	100-Yr	41000.00	1137.84	1158.69	20.85	1150.87	1159.88	0.001726	8.76	4679.08	314.14	0.40
Grand Ave - Drop	435.37	SPF	68000.00	1137.84	1164.20	26.37	1154.68	1165.86	0.001654	10.40	6776.77	434.57	0.41
Grand Ave - Drop	429.37	100-Yr	41000.00	1136.55	1157.66	21.11	1149.93	1158.85	0.001726	8.76	4679.72	315.93	0.40
Grand Ave - Drop	429.37	SPF	68000.00	1136.55	1163.21	26.66	1153.71	1164.88	0.001641	10.39	6718.27	402.86	0.41
Grand Ave - Drop	424.17	100-Yr	41000.00	1135.44	1156.66	21.23	1148.93	1157.92	0.001809	9.01	4552.18	303.97	0.41
Grand Ave - Drop	424.17	SPF	68000.00	1135.44	1162.24	26.81	1152.84	1163.97	0.001845	10.57	6548.57	390.36	0.43
Grand Ave - Drop	418.97	100-Yr	41000.00	1134.32	1155.65	21.33	1148.19	1156.95	0.001898	9.17	4471.17	302.89	0.42
Grand Ave - Drop	418.97	SPF	68000.00	1134.32	1161.15	26.83	1152.11	1162.98	0.001915	10.90	6341.61	366.37	0.44
Grand Ave - Drop	412.76	100-Yr	41000.00	1132.97	1153.64	20.67	1148.14	1155.47	0.002757	10.87	3773.30	277.83	0.52
Grand Ave - Drop	412.76	SPF	68000.00	1132.97	1158.97	26.00	1152.23	1161.48	0.002728	12.73	5377.04	355.07	0.54
Grand Ave - Drop	410.54	100-Yr	41000.00	1136.62	1152.02	15.40	1148.74	1154.79	0.002575	13.35	3070.24	244.44	0.66
Grand Ave - Drop	410.54	SPF	68000.00	1136.62	1156.92	20.30	1152.95	1160.77	0.002563	15.73	4322.69	266.78	0.69
Grand Ave - Drop	410.02		Bridge										
Grand Ave - Drop	409.5	100-Yr	41000.00	1136.52	1149.37	12.85	1148.67	1153.64	0.005055	16.57	2474.30	237.85	0.91
Grand Ave - Drop	409.5	SPF	68000.00	1136.52	1153.10	16.57	1152.81	1159.33	0.005395	20.04	3394.06	256.57	0.97
Grand Ave - Drop	406.5	100-Yr	41000.00	1131.64	1148.97	17.33		1151.41	0.003511	12.55	3266.97	279.81	0.65
Grand Ave - Drop	406.5	SPF	68000.00	1131.64	1152.92	21.28		1156.60	0.003976	15.38	4420.73	303.55	0.71
Grand Ave - Drop	402.5	100-Yr	41000.00	1130.79	1146.73	15.95		1149.65	0.005366	13.71	2990.84	295.39	0.76
Grand Ave - Drop	402.5	SPF	68000.00	1130.79	1150.51	19.72		1154.68	0.005561	16.39	4149.55	318.06	0.80
Grand Ave - Drop	395.5	100-Yr	41000.00	1129.26	1143.89	14.63	1141.21	1146.23	0.003948	12.28	3338.21	319.32	0.67
Grand Ave - Drop	395.5	SPF	68000.00	1129.26	1147.49	18.23	1144.72	1150.99	0.004373	15.02	4526.62	340.92	0.73
Grand Ave - Drop	392	100-Yr	41000.00	1128.51	1143.61	15.10		1144.96	0.002044	9.32	4399.76	397.88	0.49
Grand Ave - Drop	392	SPF	68000.00	1128.51	1147.48	18.97		1149.49	0.002200	11.37	5981.30	488.09	0.53
Grand Ave - Drop	388.5	100-Yr	41000.00	1127.76	1142.85	15.09	1138.64	1144.22	0.002198	9.37	4374.48	406.13	0.50
Grand Ave - Drop	388.5	SPF	68000.00	1127.76	1146.70	18.94	1141.57	1148.70	0.002288	11.36	6016.06	486.40	0.53
Grand Ave - Drop	384.5	100-Yr	41000.00	1126.89	1141.72	14.83		1143.24	0.002554	9.92	4132.96	397.29	0.54
Grand Ave - Drop	384.5	SPF	68000.00	1126.89	1145.44	18.55		1147.68	0.002658	12.02	5686.85	443.61	0.57
Grand Ave - Drop	379.75	100-Yr	41000.00	1125.89	1140.97	15.08	1136.17	1142.14	0.001797	8.66	4732.13	426.82	0.46
Grand Ave - Drop	379.75	SPF	68000.00	1125.89	1144.71	18.82	1139.02	1146.47	0.001950	10.67	6418.10	717.41	0.50
Grand Ave - Drop	376.75	100-Yr	41000.00	1125.24	1140.45	15.21		1141.59	0.001793	8.56	4790.37	437.71	0.46
Grand Ave - Drop	376.75	SPF	68000.00	1125.24	1144.15	18.91		1145.87	0.001952	10.54	6497.84	621.85	0.49
Grand Ave - Drop	373.75	100-Yr	41000.00	1124.60	1140.16	15.56	1134.68	1141.05	0.001341	7.63	5547.75	582.76	0.40
Grand Ave - Drop	373.75	SPF	68000.00	1124.60	1144.07	19.47	1137.37	1145.24	0.001275	8.92	8728.80	1034.80	0.41
Grand Ave - Drop	370.65	100-Yr	41000.00	1123.92	1139.78	15.85	1133.64	1140.65	0.001198	7.48	5538.93	569.59	0.38
Grand Ave - Drop	370.65	SPF	68000.00	1123.92	1143.73	19.81	1136.38	1144.84	0.001142	8.72	8834.32	918.68	0.39
Grand Ave - Drop	365.4	100-Yr	41000.00	1122.78	1137.54	14.77	1135.10	1139.49	0.003800	11.19	3663.92	395.26	0.65
Grand Ave - Drop	365.4	SPF	68000.00	1122.78	1141.17	18.39	1138.04	1143.72	0.003377	12.96	5583.94	659.03	0.64
Grand Ave - Drop	358.25	100-Yr	41000.00	1121.27	1135.87	14.61	1132.14	1137.58	0.001900	10.48	3925.80	513.28	0.55

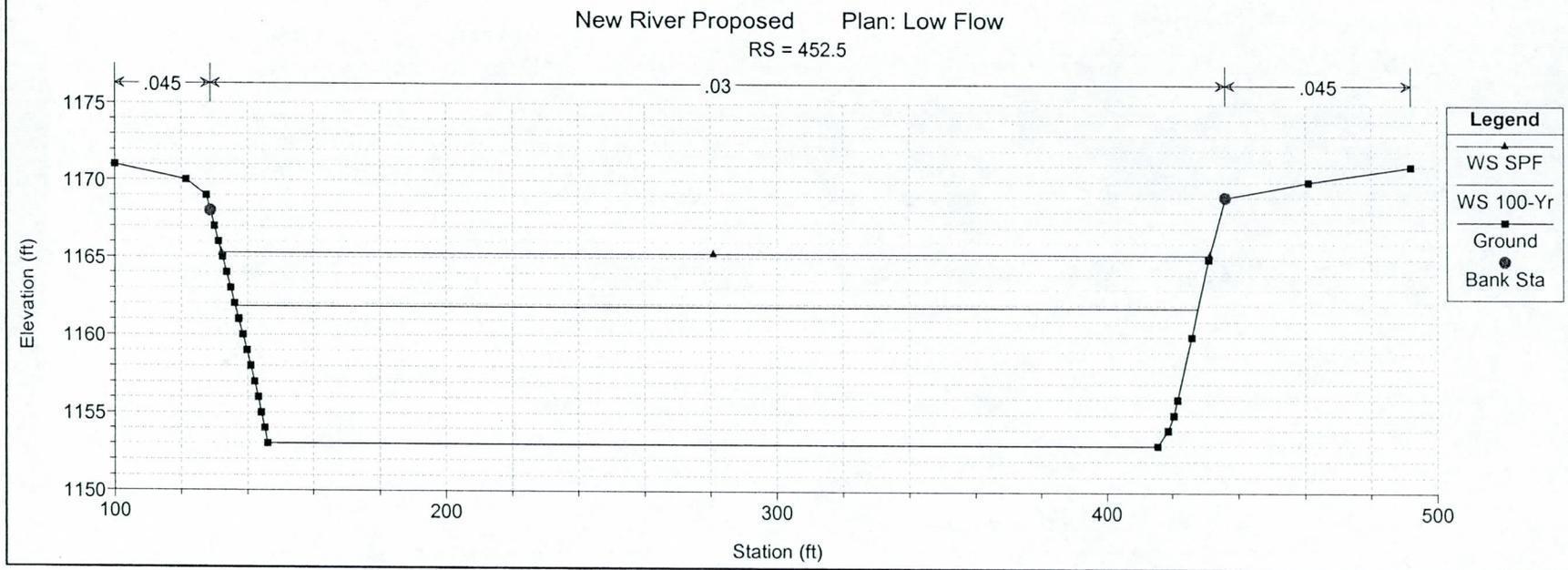
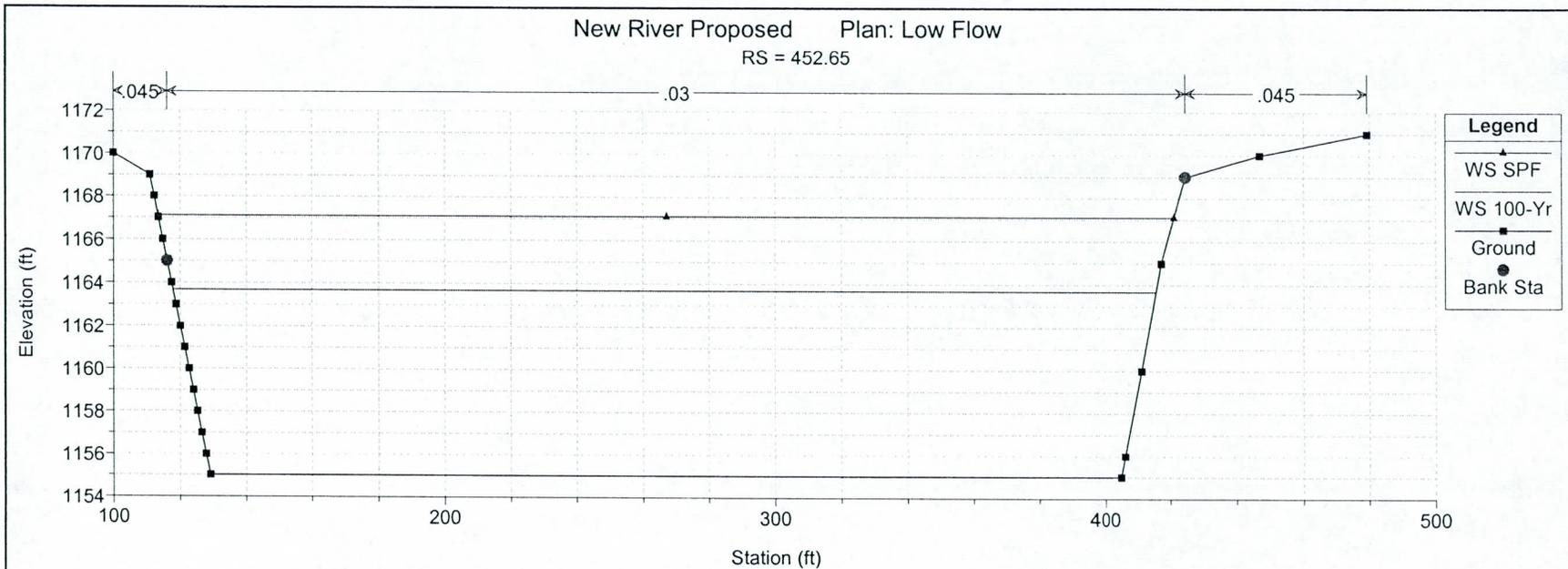
HEC-RAS Plan Low Flow River New River Reach Grand Ave - Drop (Continued)

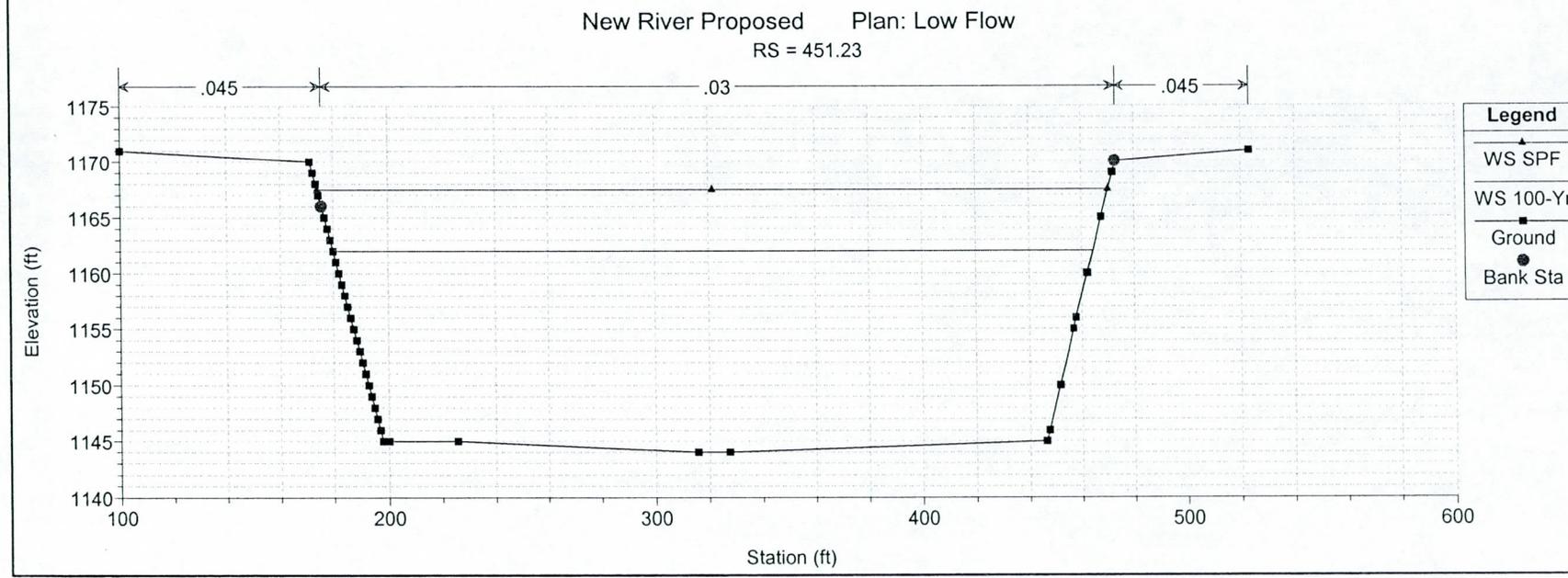
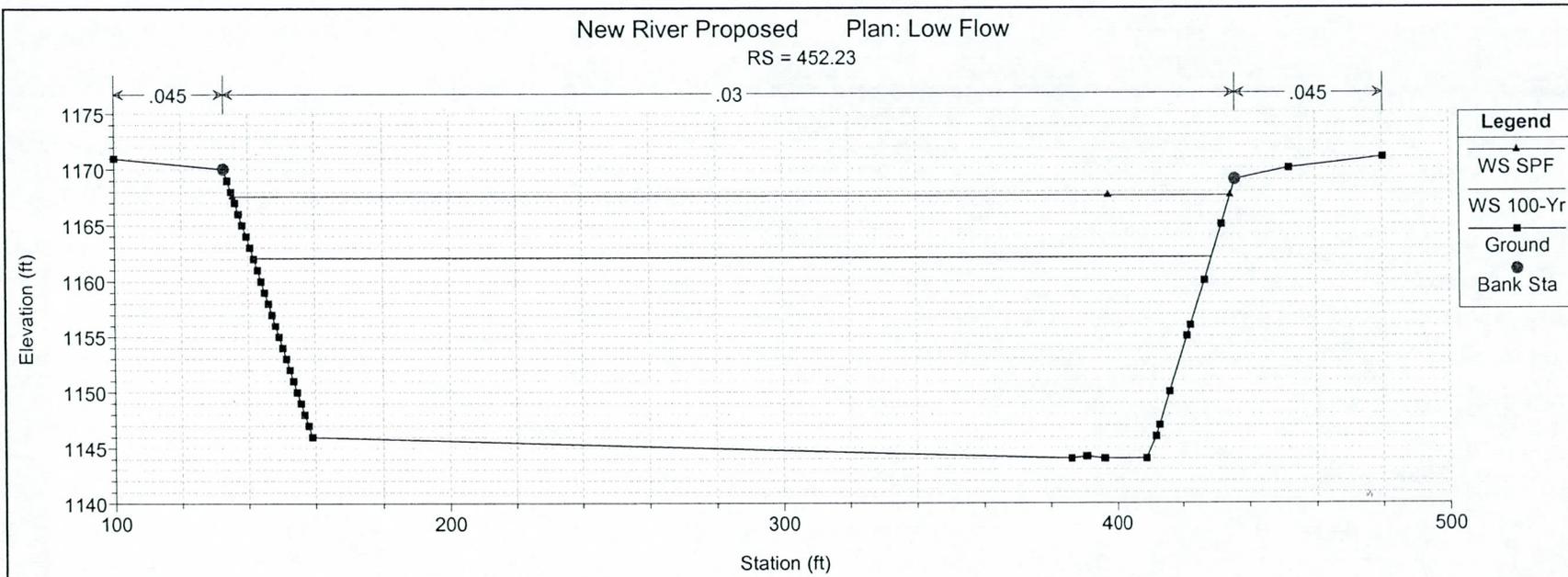
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpth (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	358.25	SPF	68000.00	1121.27	1139.34	18.08	1135.26	1141.90	0.002029	12.97	5480.92	737.84	0.60
Grand Ave - Drop	352.4	100-Yr	41000.00	1120.00	1131.95	11.95	1131.82	1135.50	0.006575	15.11	2712.76	360.58	0.97
Grand Ave - Drop	352.4	SPF	68000.00	1120.00	1136.22	16.22	1134.82	1140.12	0.004095	15.87	4348.50	432.99	0.82
Grand Ave - Drop	347.41	100-Yr	41000.00	1120.32	1131.49	11.17		1133.29	0.002042	10.76	3810.90	352.37	0.58
Grand Ave - Drop	347.41	SPF	68000.00	1120.32	1135.89	15.57		1138.37	0.001853	12.64	5379.03	361.17	0.58
Grand Ave - Drop	347.4	100-Yr	41000.00	1120.32	1130.78	10.46	1128.52	1133.22	0.004084	12.53	3271.53	323.45	0.69
Grand Ave - Drop	347.4	SPF	68000.00	1120.32	1134.93	14.61	1131.79	1138.28	0.004044	14.68	4630.80	331.95	0.69
Grand Ave - Drop	347.255	Bridge											
Grand Ave - Drop	347.11	100-Yr	41000.00	1120.12	1130.68	10.56		1133.08	0.003968	12.41	3303.21	323.40	0.68
Grand Ave - Drop	347.11	SPF	68000.00	1120.12	1134.83	14.71		1138.13	0.003973	14.59	4660.24	331.80	0.69
Grand Ave - Drop	347.1	100-Yr	41000.00	1120.12	1130.91	10.79	1127.90	1132.84	0.002292	11.15	3675.73	351.29	0.61
Grand Ave - Drop	347.1	SPF	68000.00	1120.12	1135.14	15.02	1130.98	1137.82	0.002101	13.13	5178.00	359.63	0.61
Grand Ave - Drop	346.8	100-Yr	41000.00	1119.92	1130.46	10.54		1132.73	0.002885	12.09	3389.94	344.47	0.68
Grand Ave - Drop	346.8	SPF	68000.00	1119.92	1134.70	14.78		1137.71	0.002500	13.92	4883.52	358.04	0.66
Grand Ave - Drop	346.4	100-Yr	41000.00	1119.22	1130.83	11.61	1127.00	1132.49	0.001803	10.36	3957.10	351.91	0.54
Grand Ave - Drop	346.4	SPF	68000.00	1119.22	1135.08	15.86	1130.08	1137.48	0.001758	12.43	5470.28	359.93	0.56
Grand Ave - Drop	345.95	Bridge											
Grand Ave - Drop	345.5	100-Yr	41000.00	1118.82	1128.15	9.33	1126.60	1130.77	0.003725	12.97	3160.07	347.21	0.76
Grand Ave - Drop	345.5	SPF	68000.00	1118.82	1131.52	12.69	1129.67	1135.33	0.003687	15.68	4337.88	353.41	0.79
Grand Ave - Drop	343.7	100-Yr	41000.00	1117.62	1126.91	9.29	1125.90	1129.88	0.004573	13.84	2962.68	346.20	0.83
Grand Ave - Drop	343.7	SPF	68000.00	1117.62	1130.35	12.73	1129.03	1134.48	0.004192	16.31	4168.18	355.33	0.84
Grand Ave - Drop	342	100-Yr	41000.00	1116.62	1126.56	9.94	1124.87	1129.00	0.003533	12.54	3269.42	364.32	0.74
Grand Ave - Drop	342	SPF	68000.00	1116.62	1130.24	13.62	1127.90	1133.60	0.003179	14.70	4625.72	372.59	0.74
Grand Ave - Drop	337	100-Yr	41000.00	1114.22	1124.69	10.47	1122.57	1127.00	0.004201	12.21	3356.82	351.61	0.70
Grand Ave - Drop	337	SPF	69000.00	1114.22	1128.30	14.08	1125.76	1131.73	0.004203	14.86	4643.81	360.23	0.73

New River Proposed Plan: Low Flow

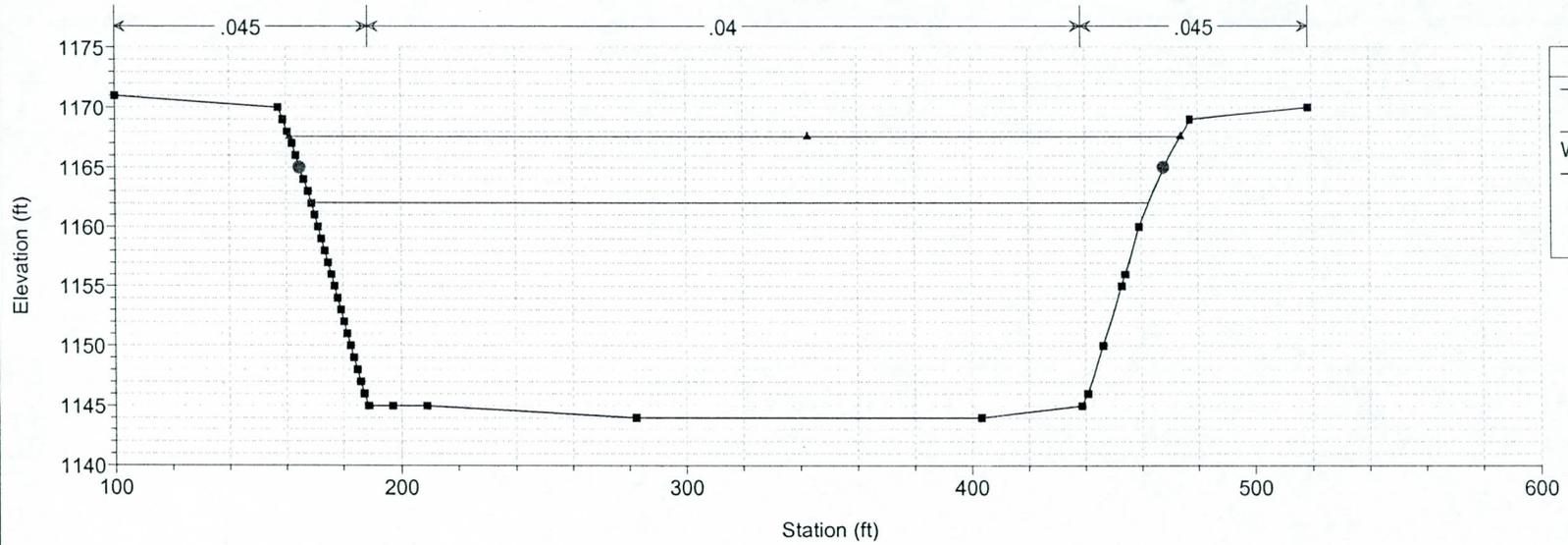


Legend	
▲	WS SPF
—	WS 100-Yr
■	Ground
- - -	LOB
- - -	ROB





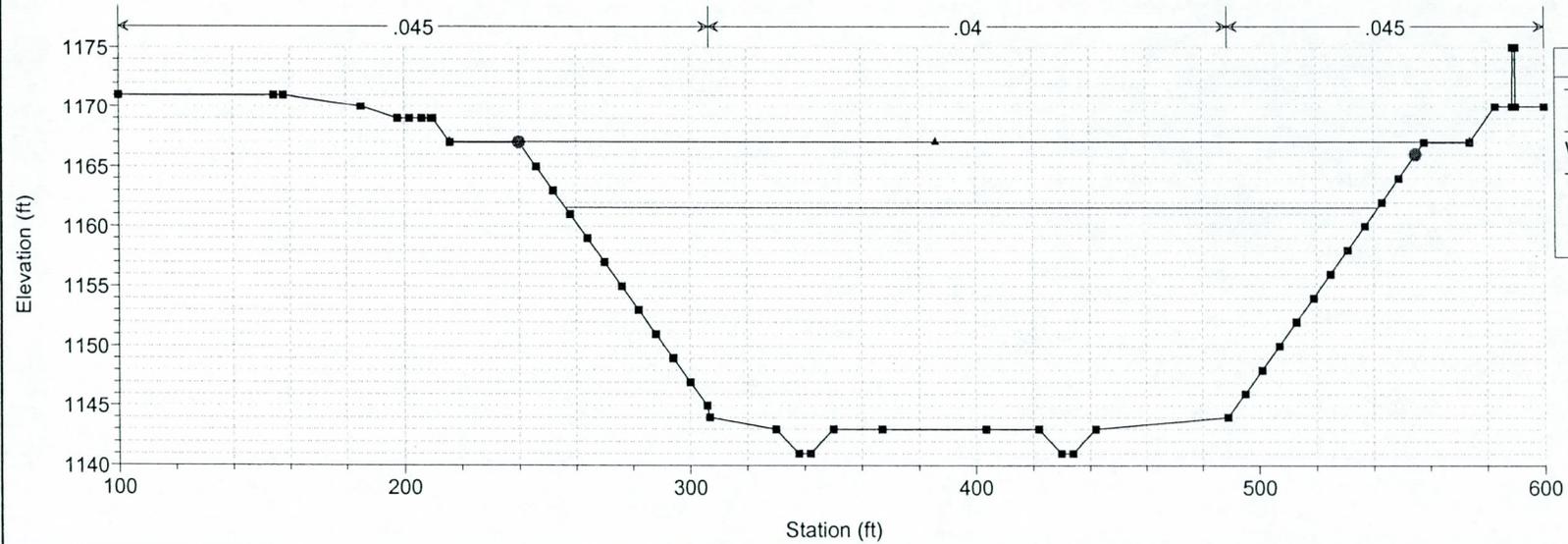
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Legend

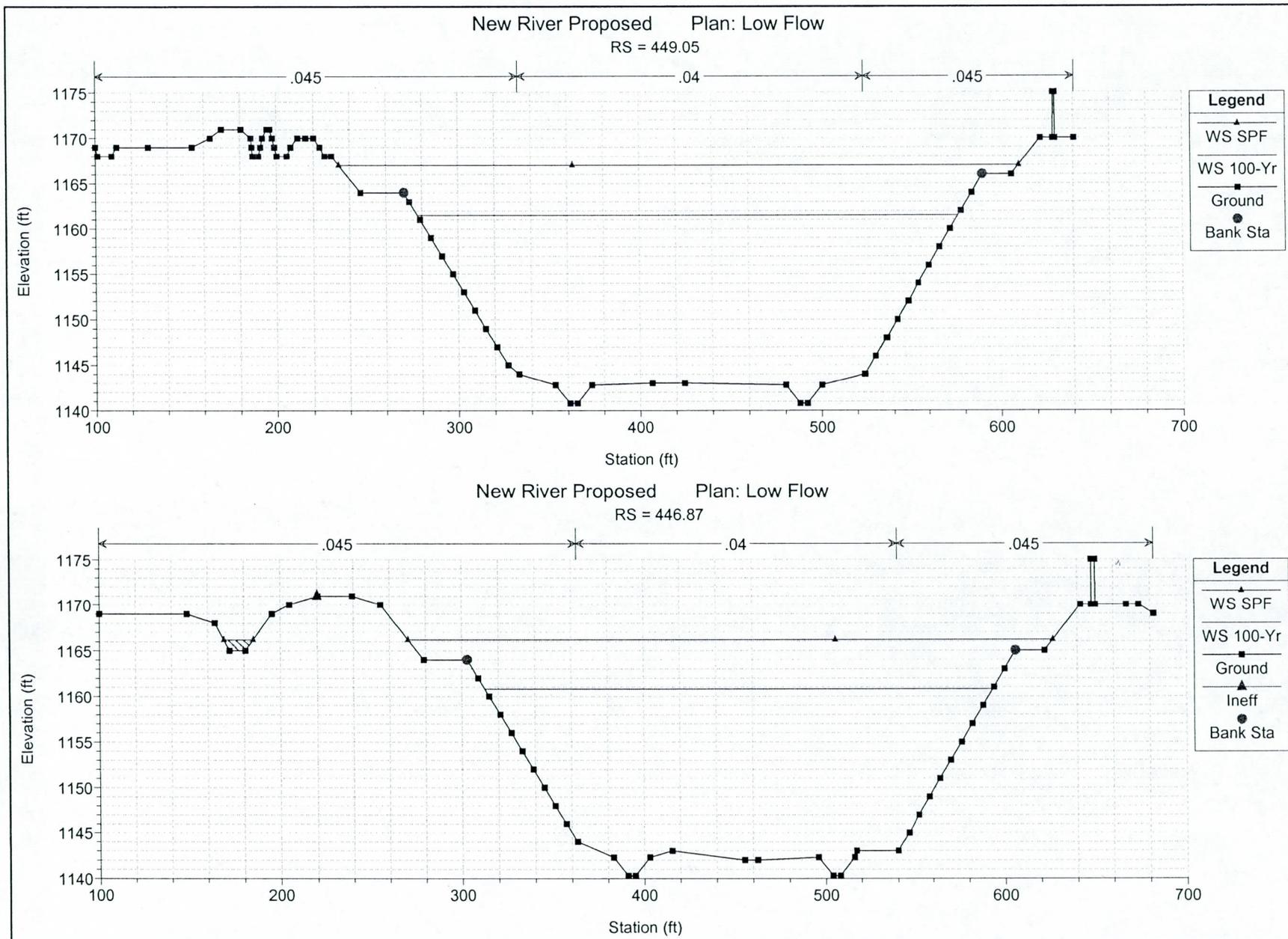
- ▲ WS SPF
- WS 100-Yr
- Ground
- Bank Sta

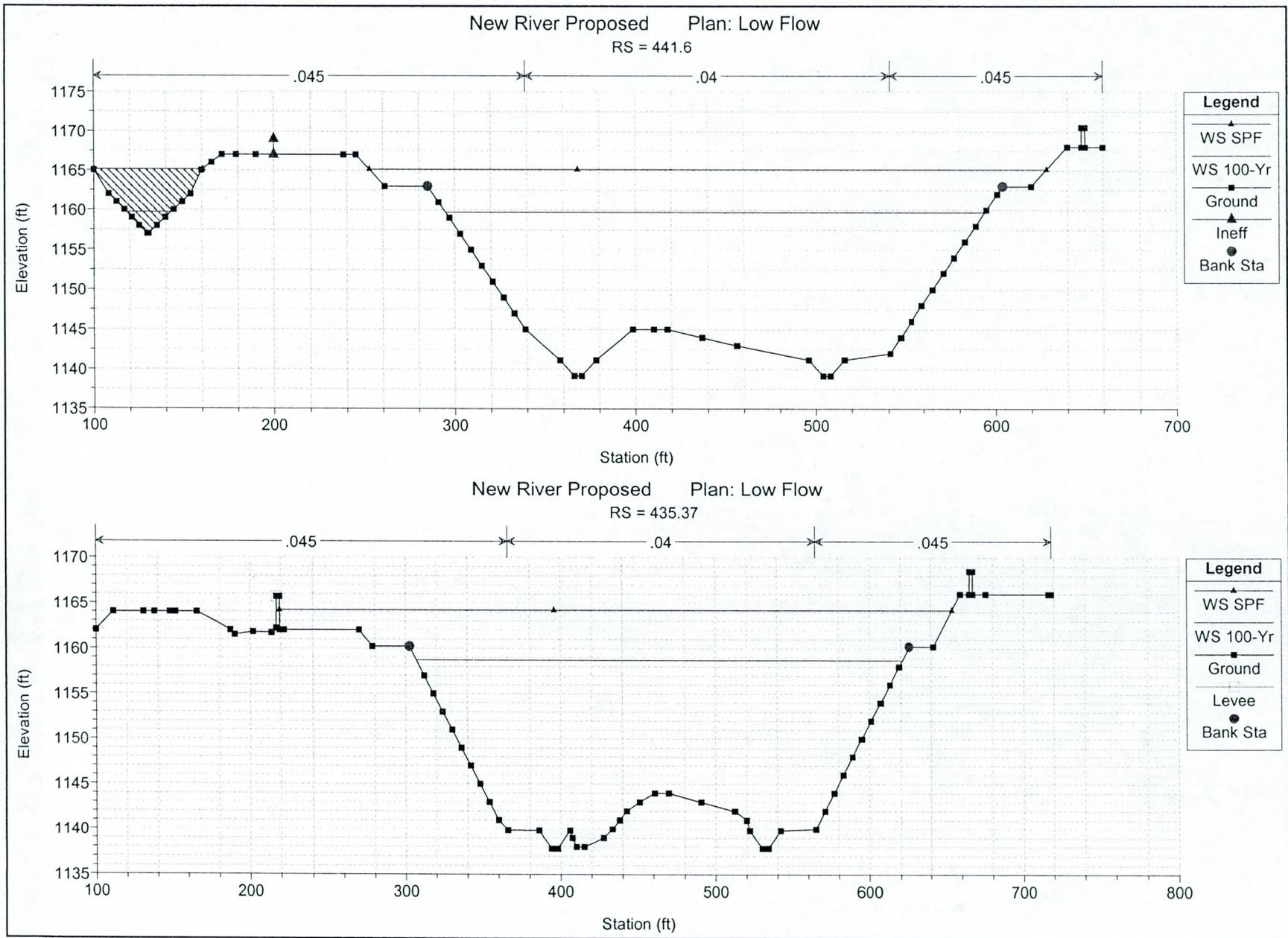
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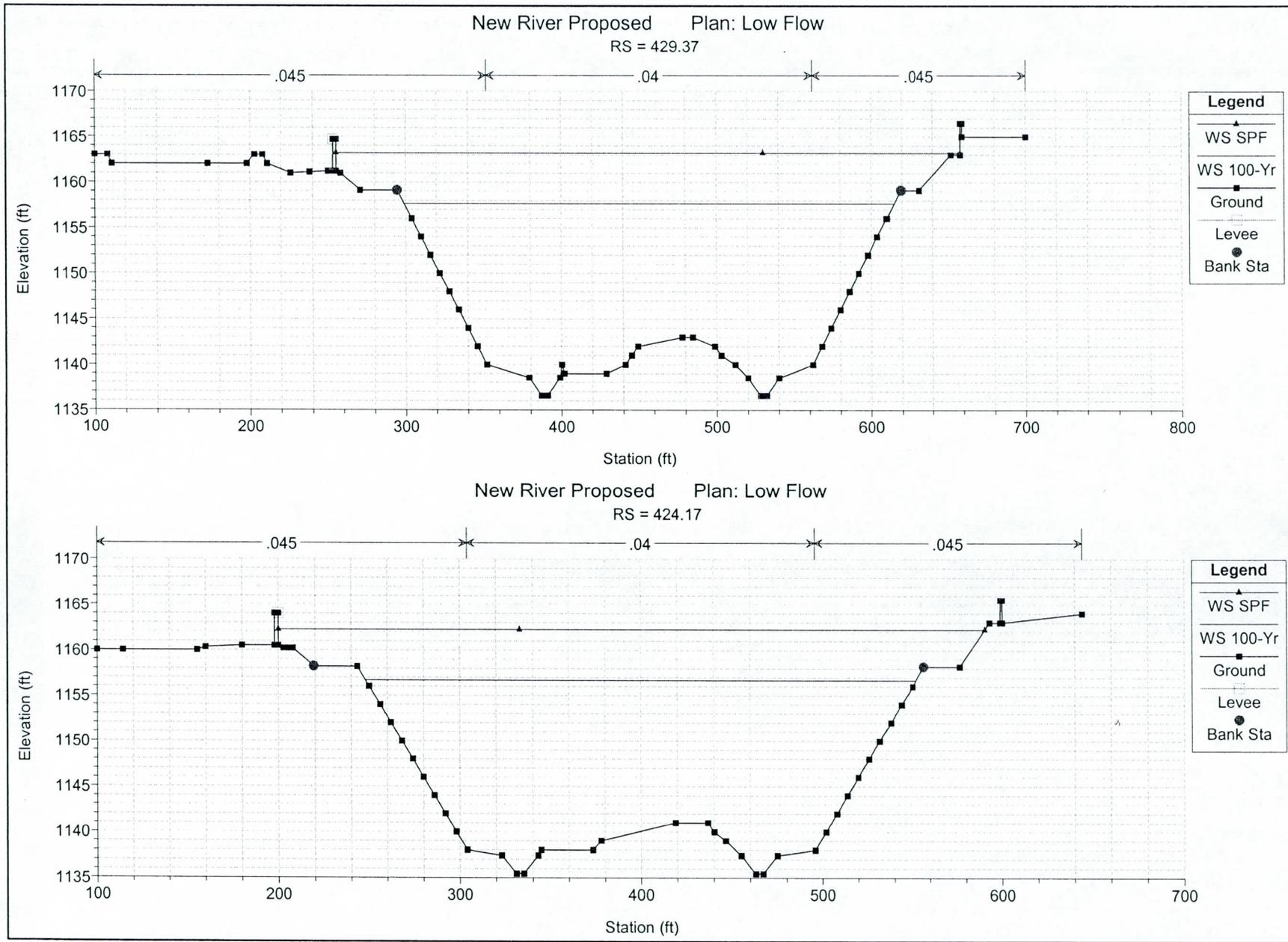


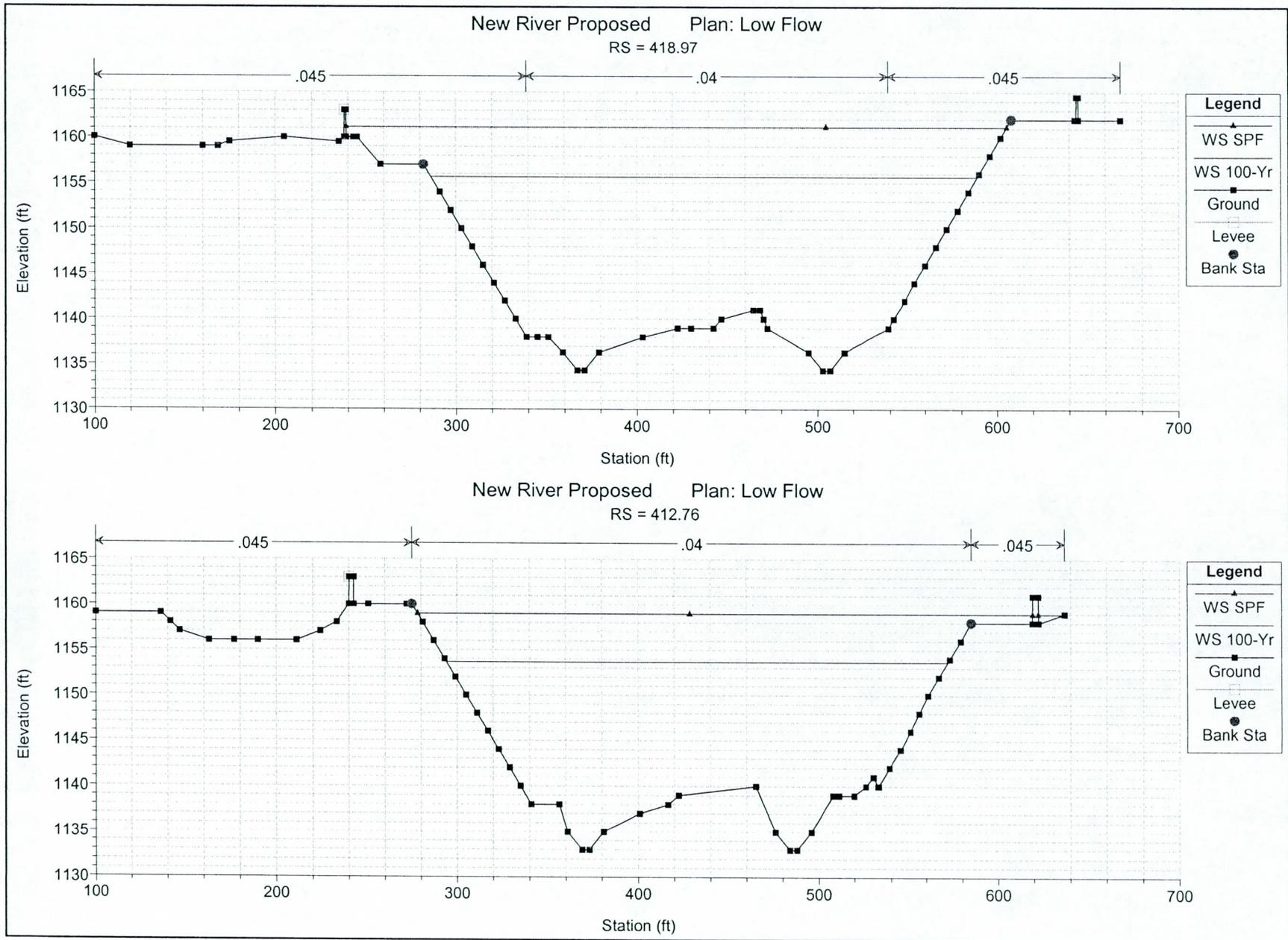
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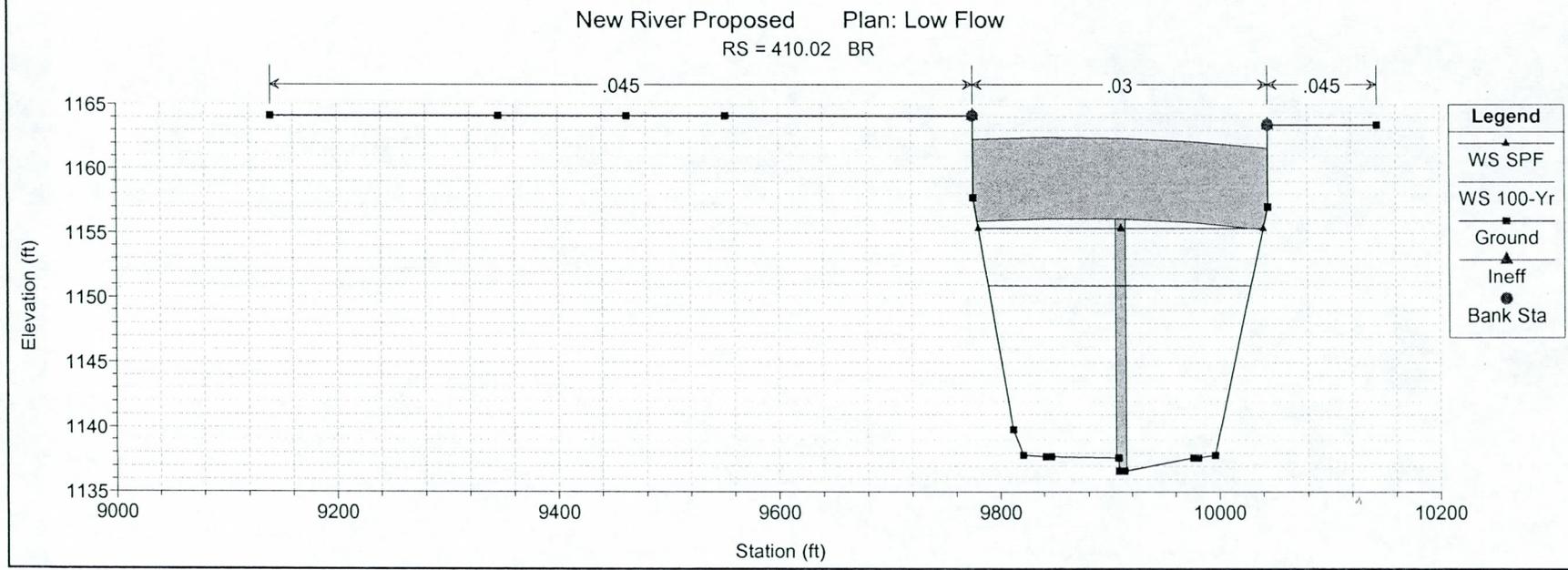
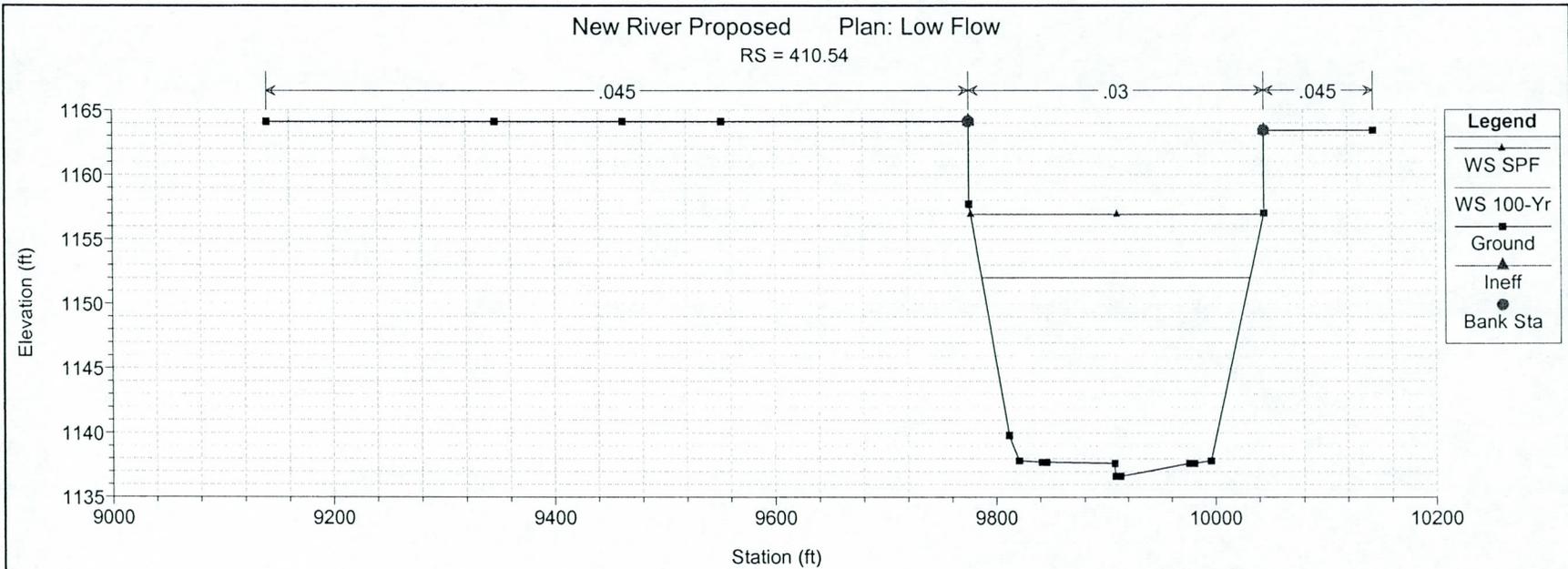
- ▲ WS SPF
- WS 100-Yr
- Ground
- Bank Sta

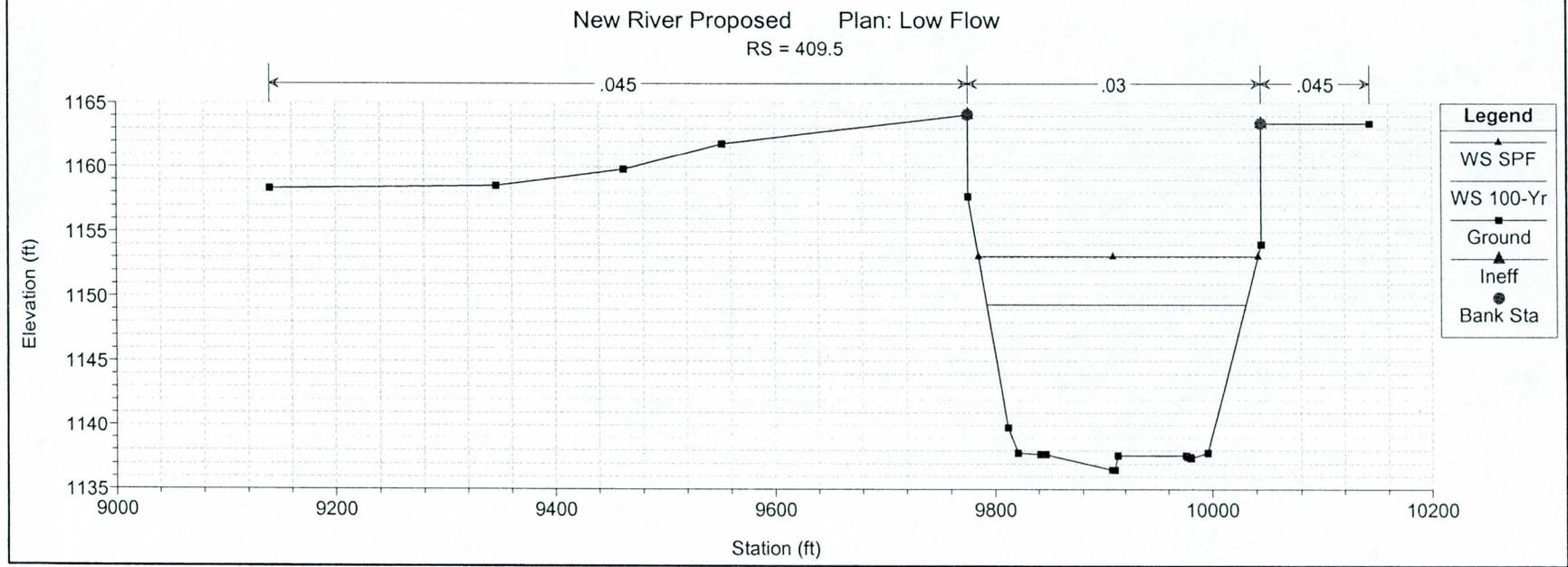
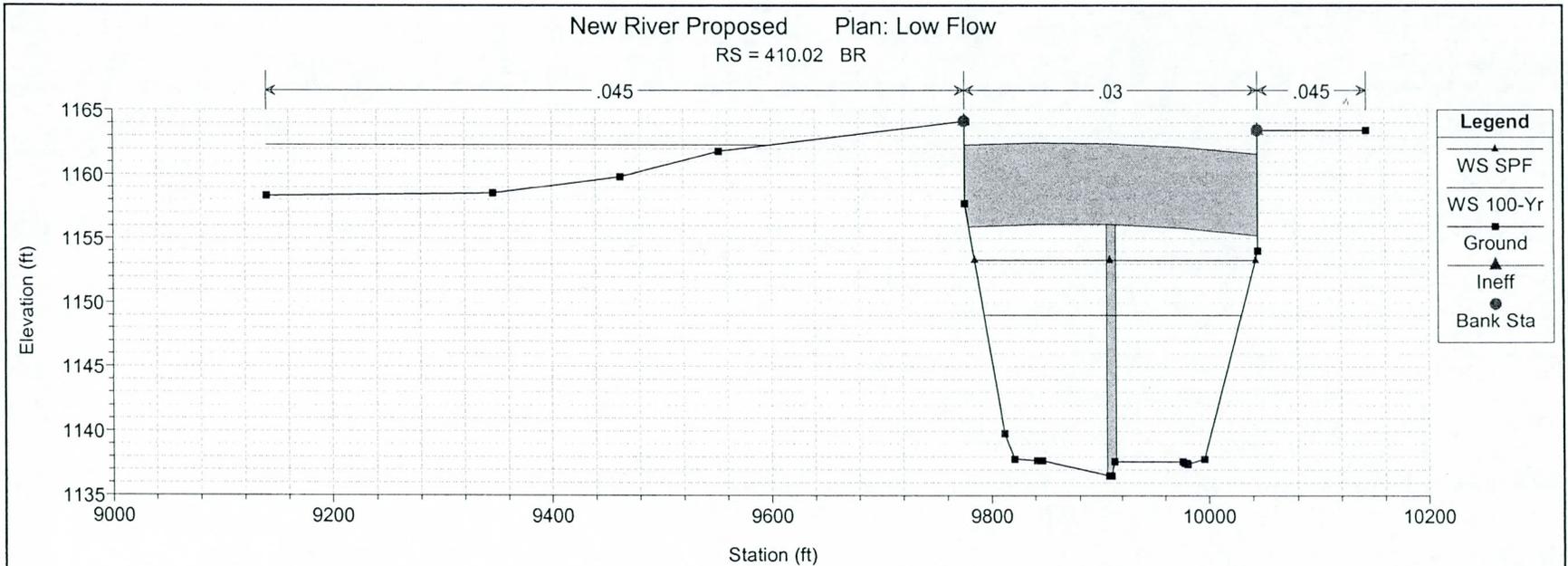




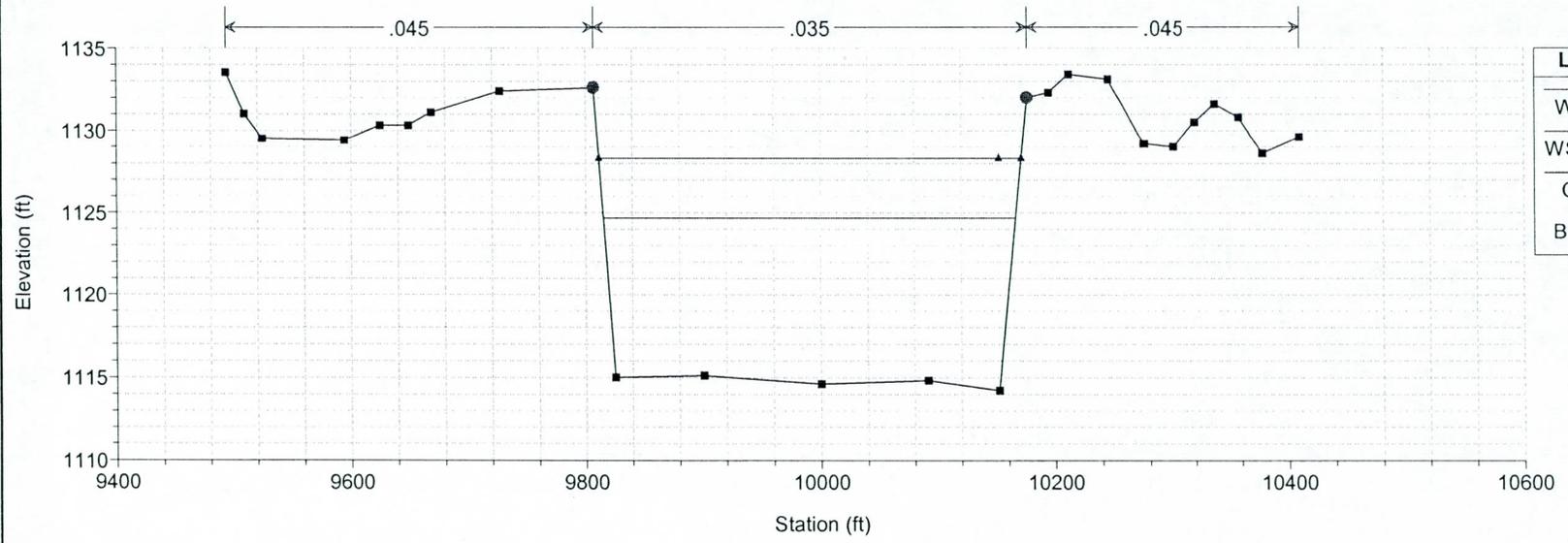






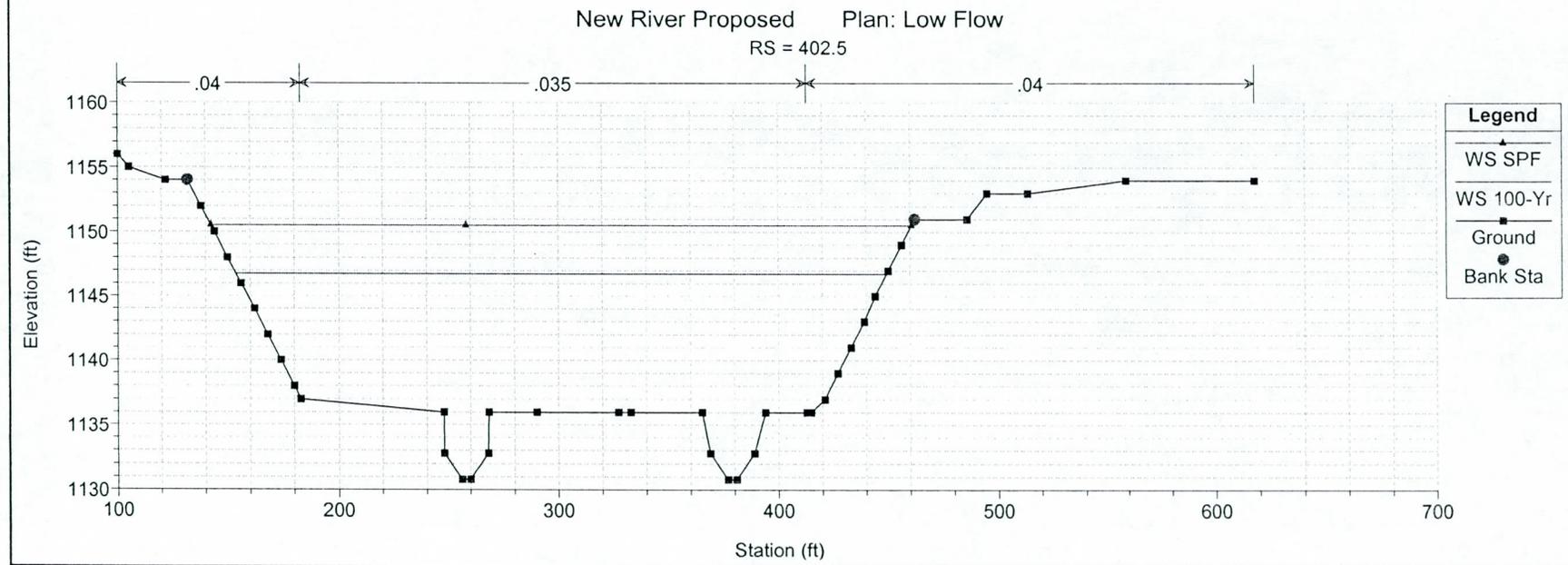
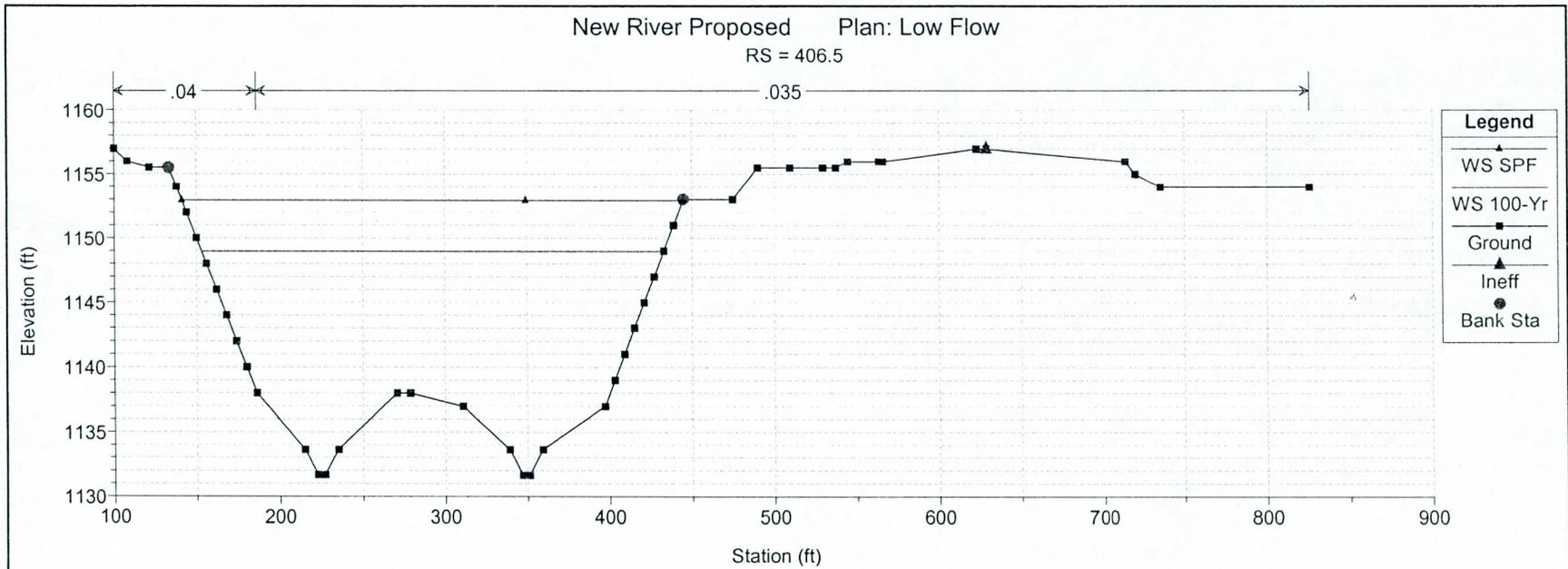


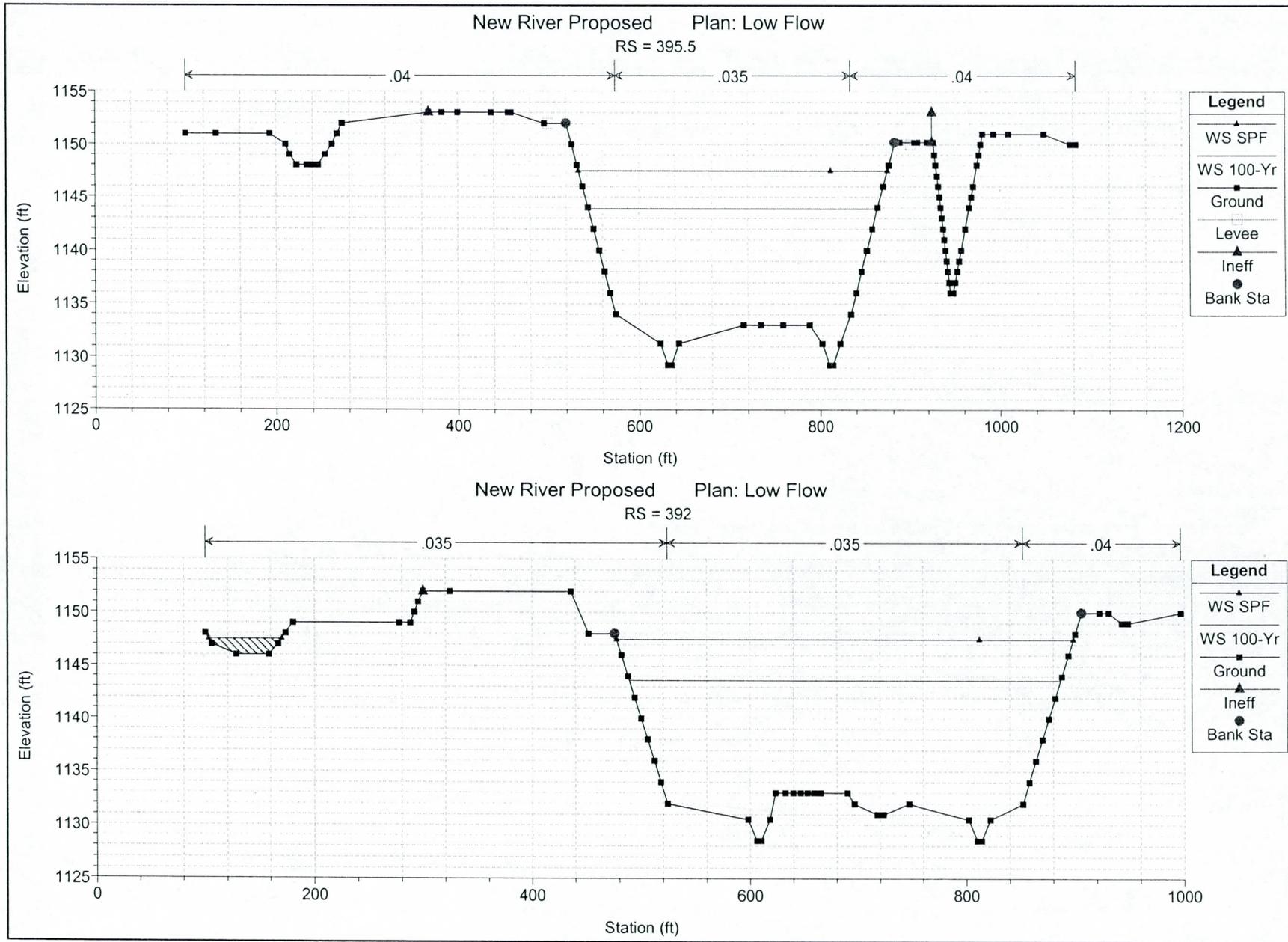
New River Proposed Plan: Low Flow
RS = 337

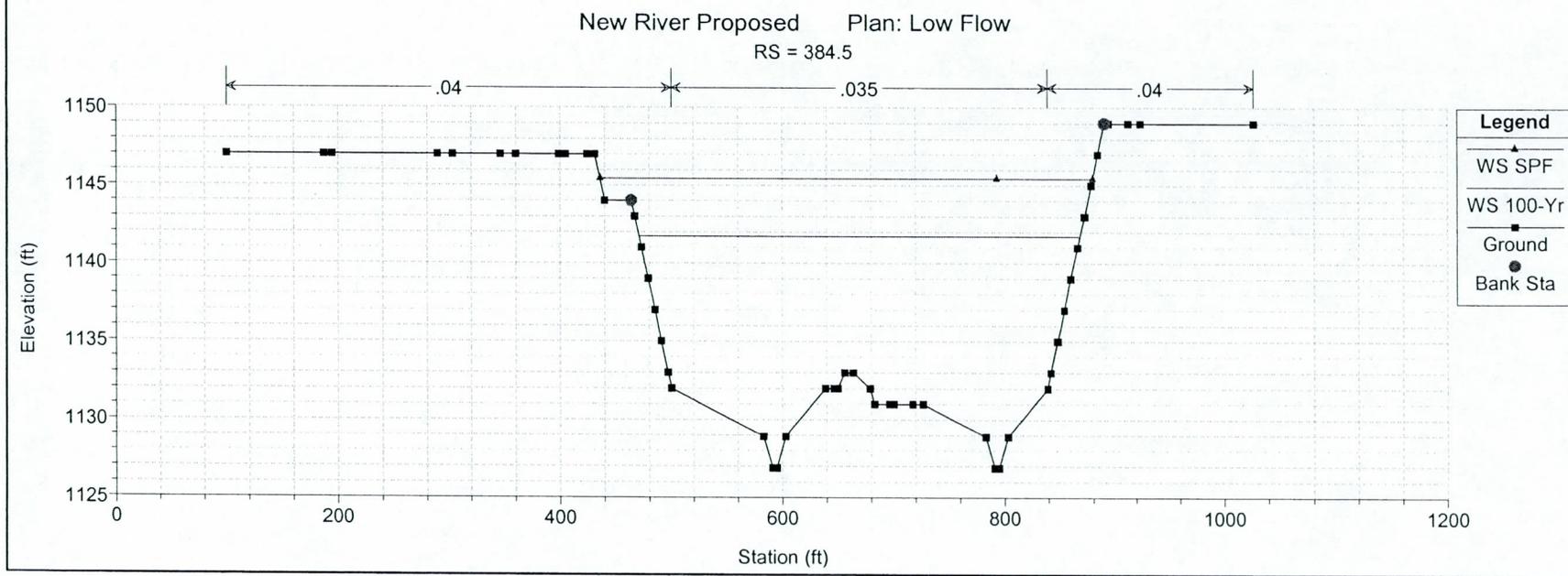
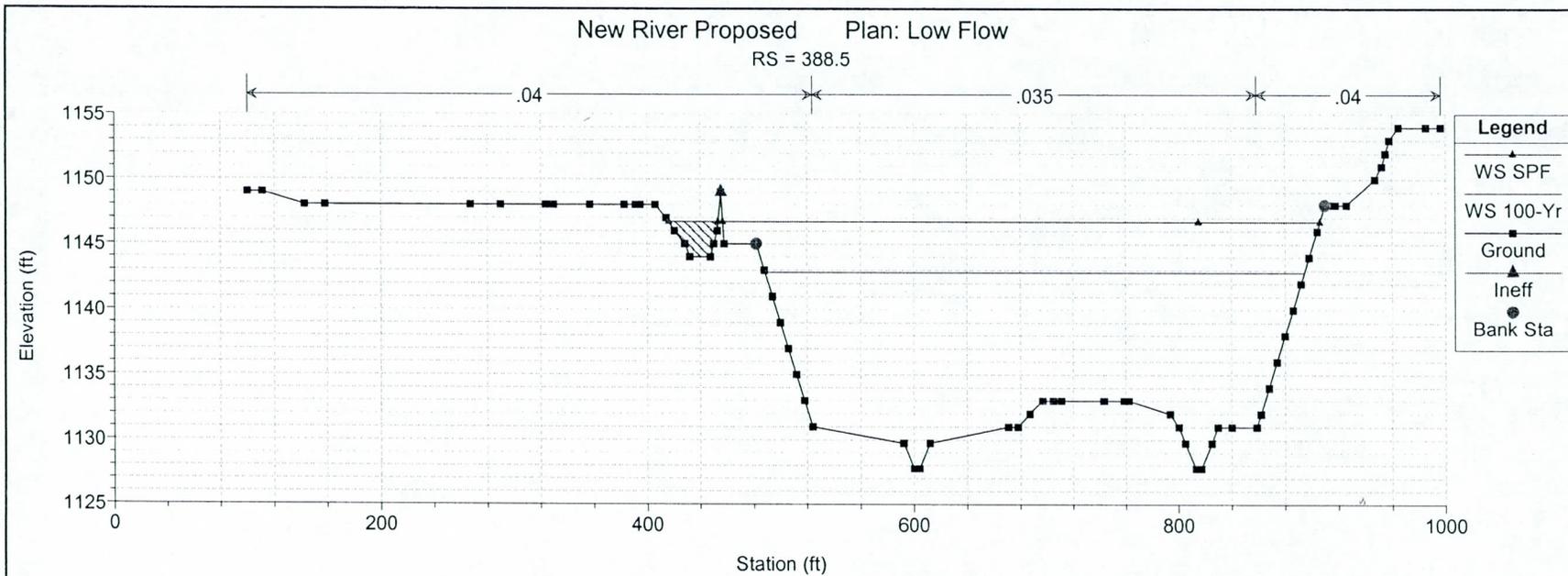


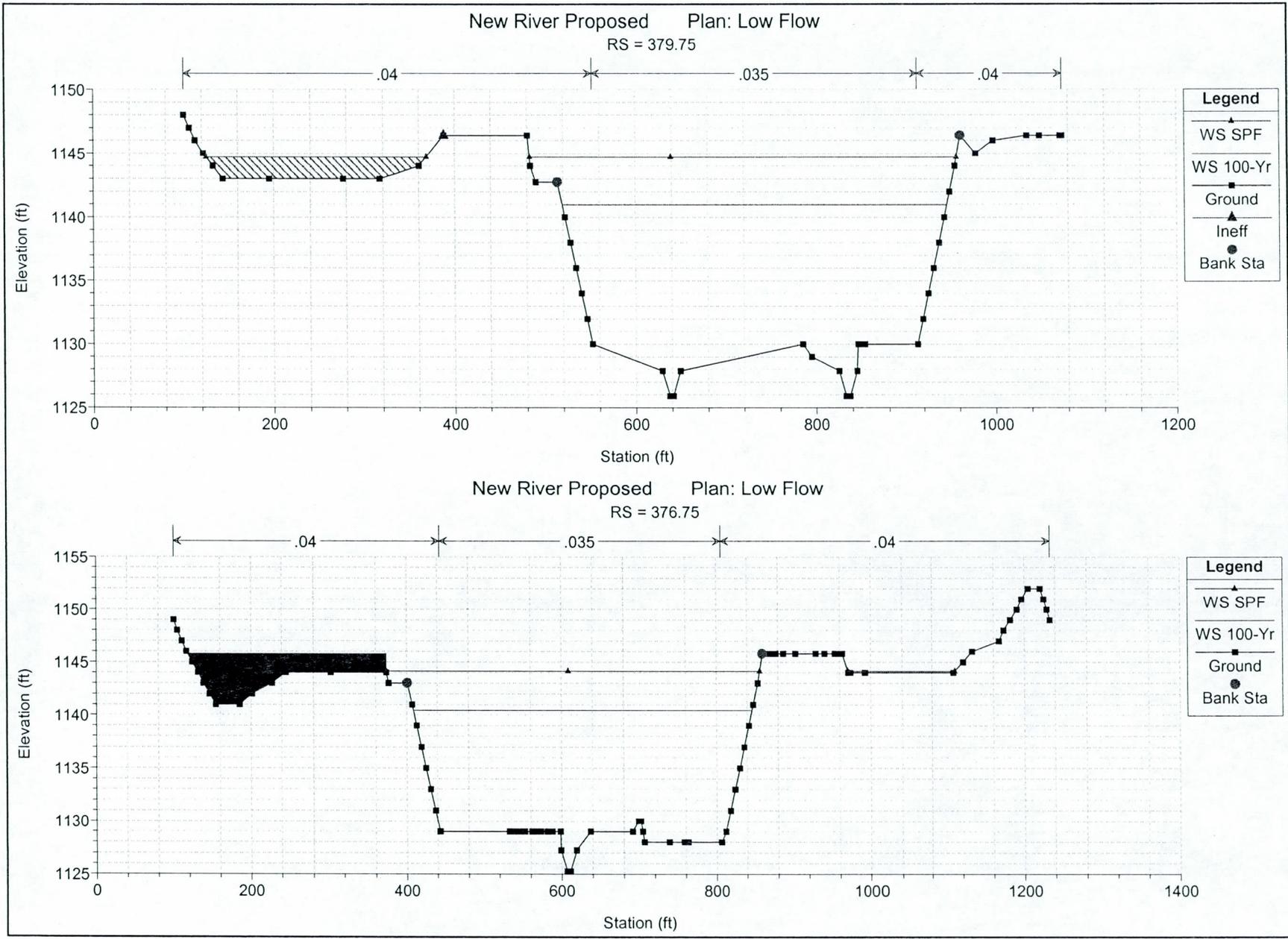
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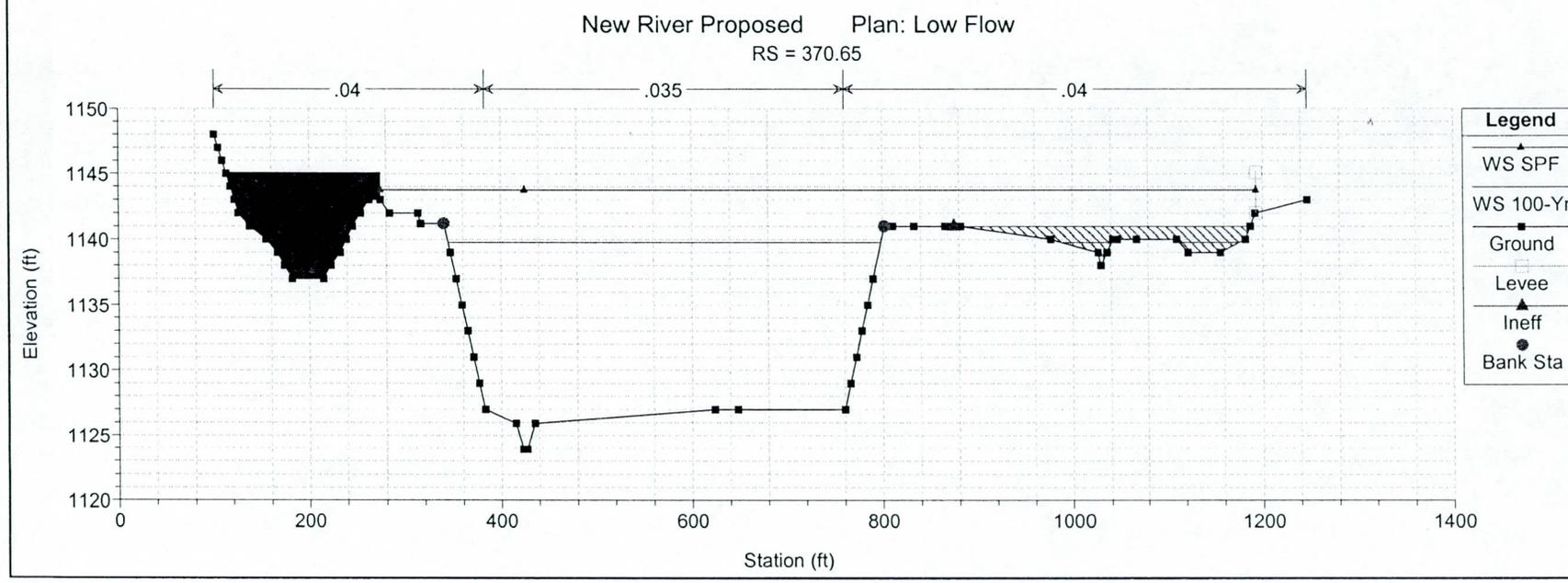
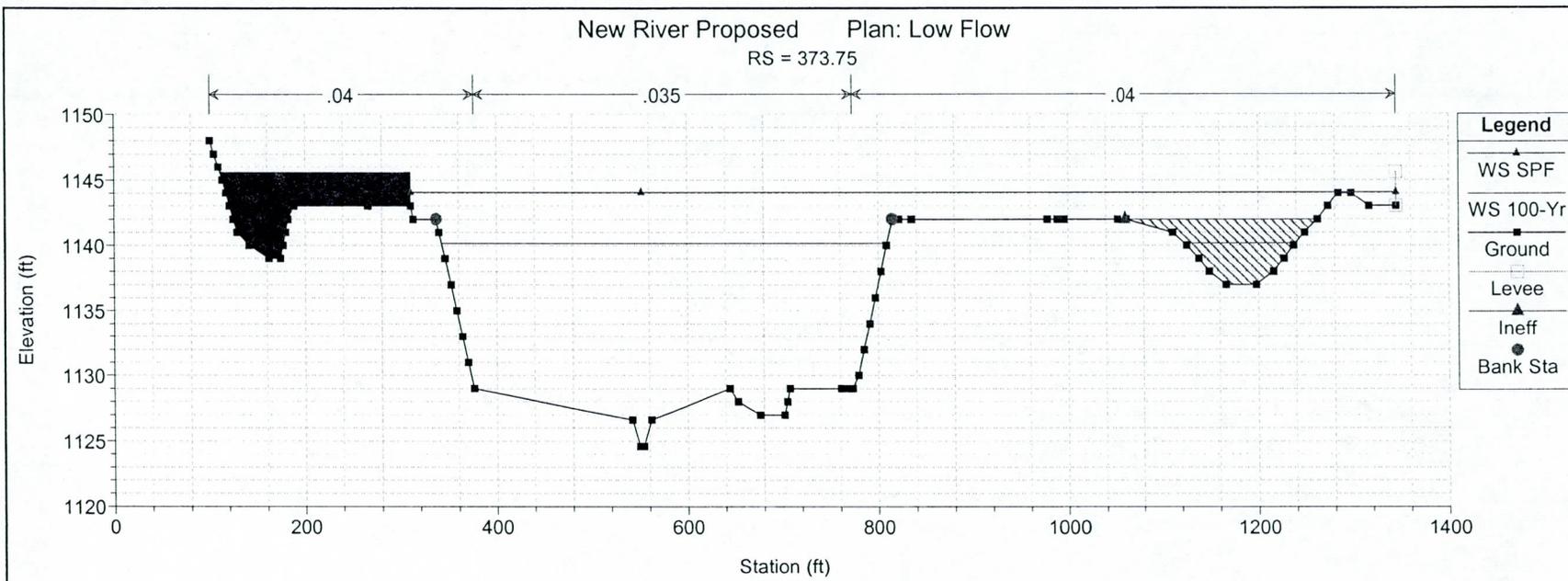
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- WS 100-Yr
- Ground
- Bank Sta

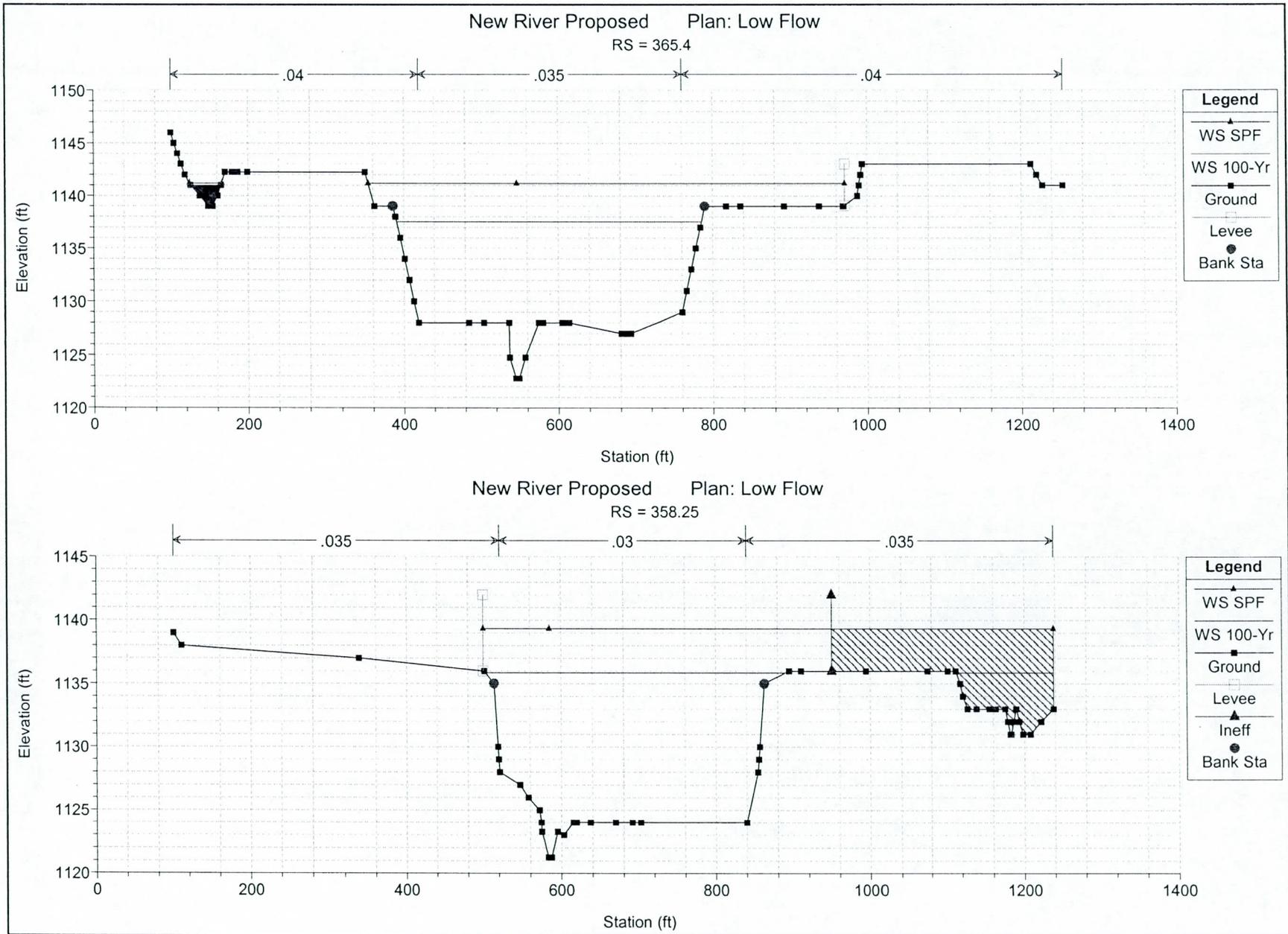


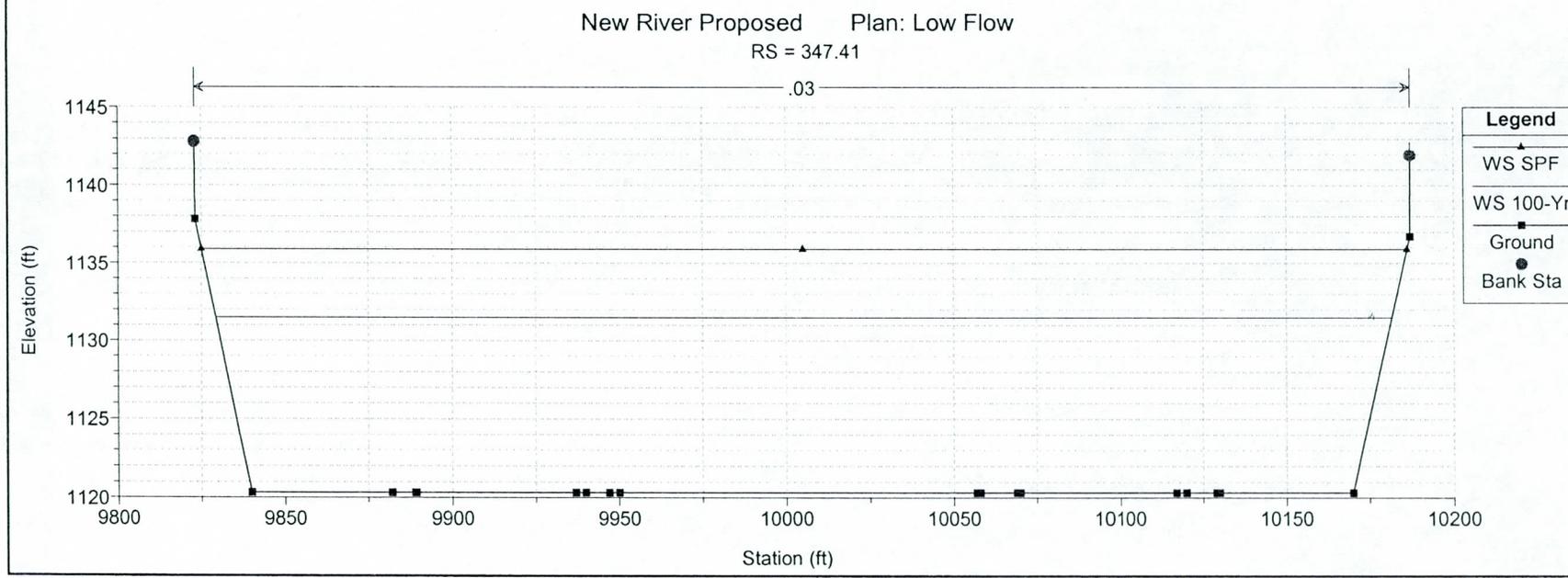
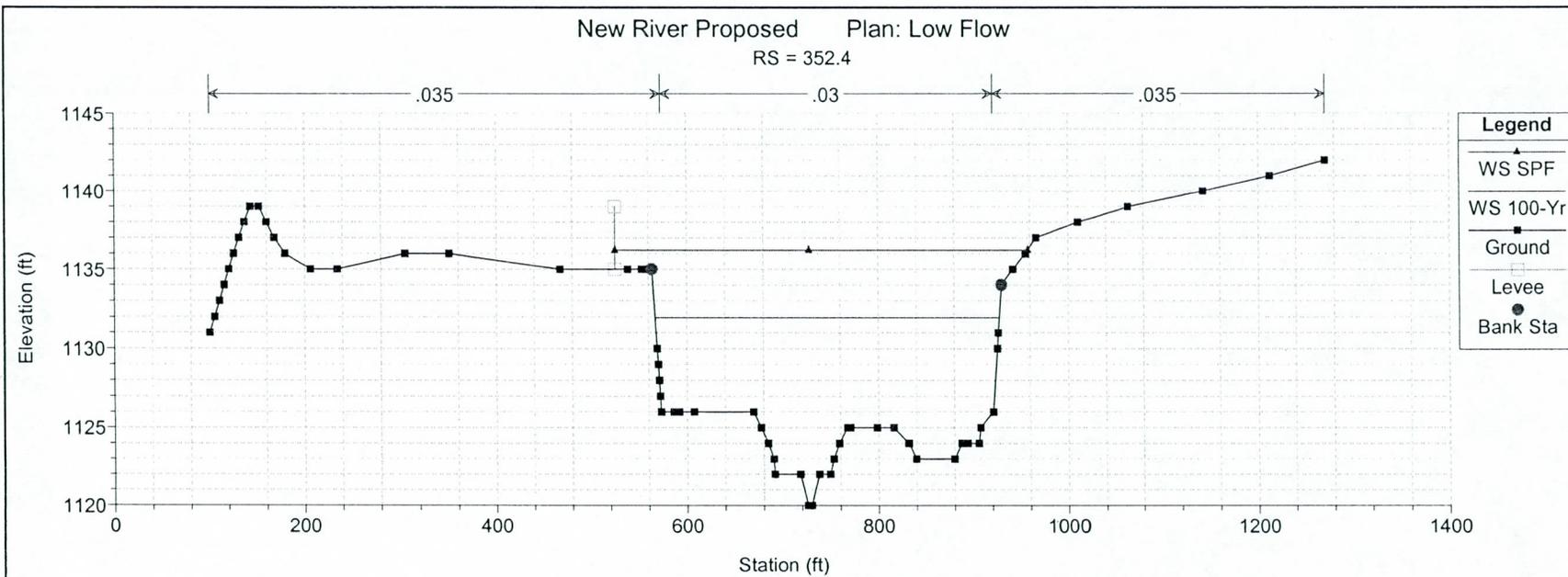


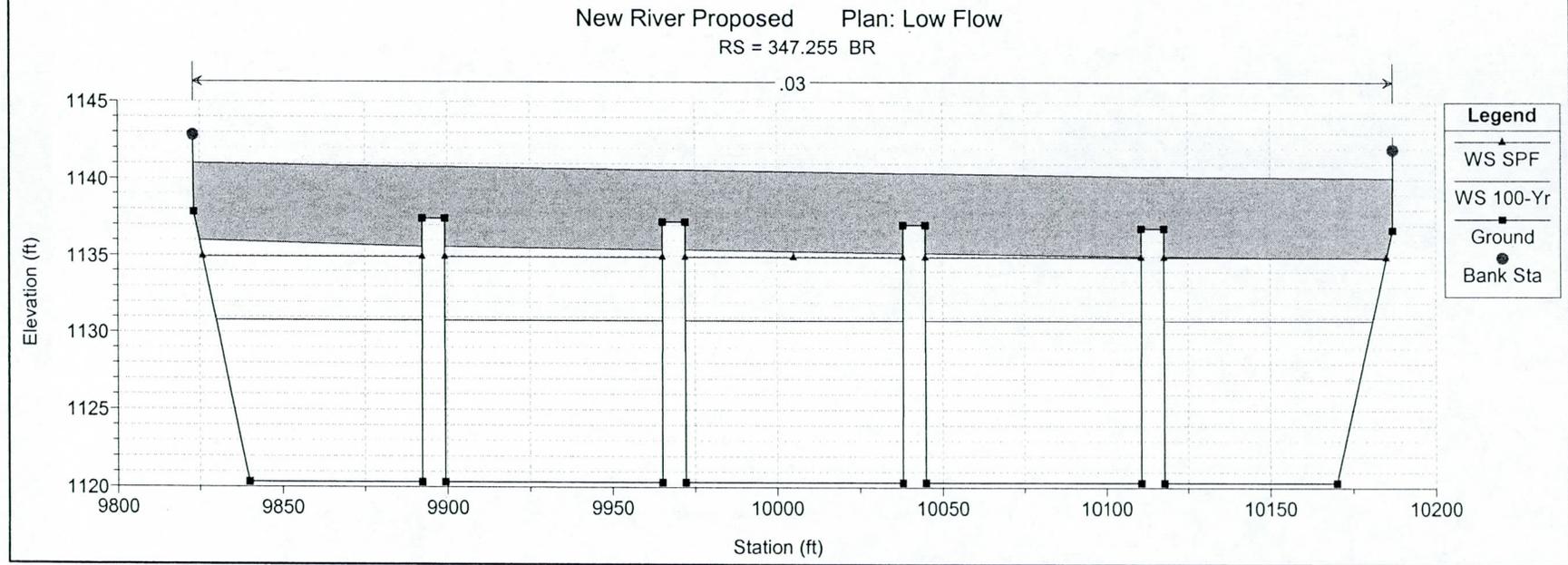
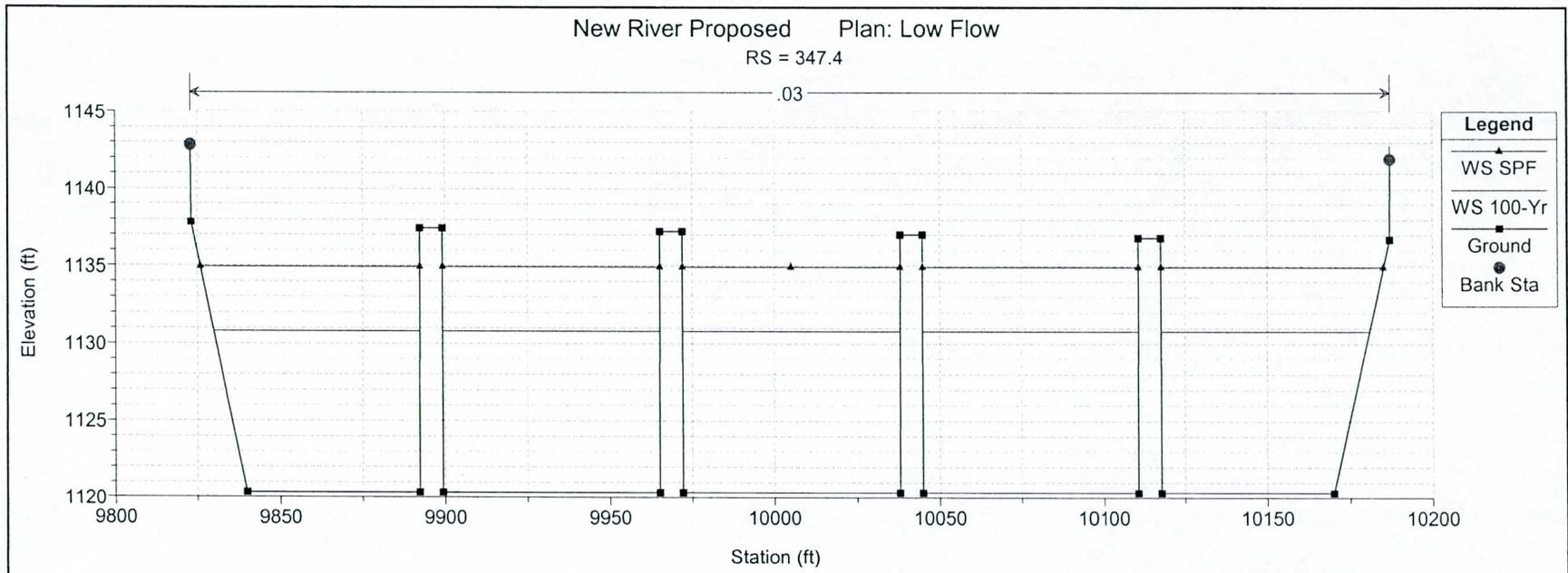


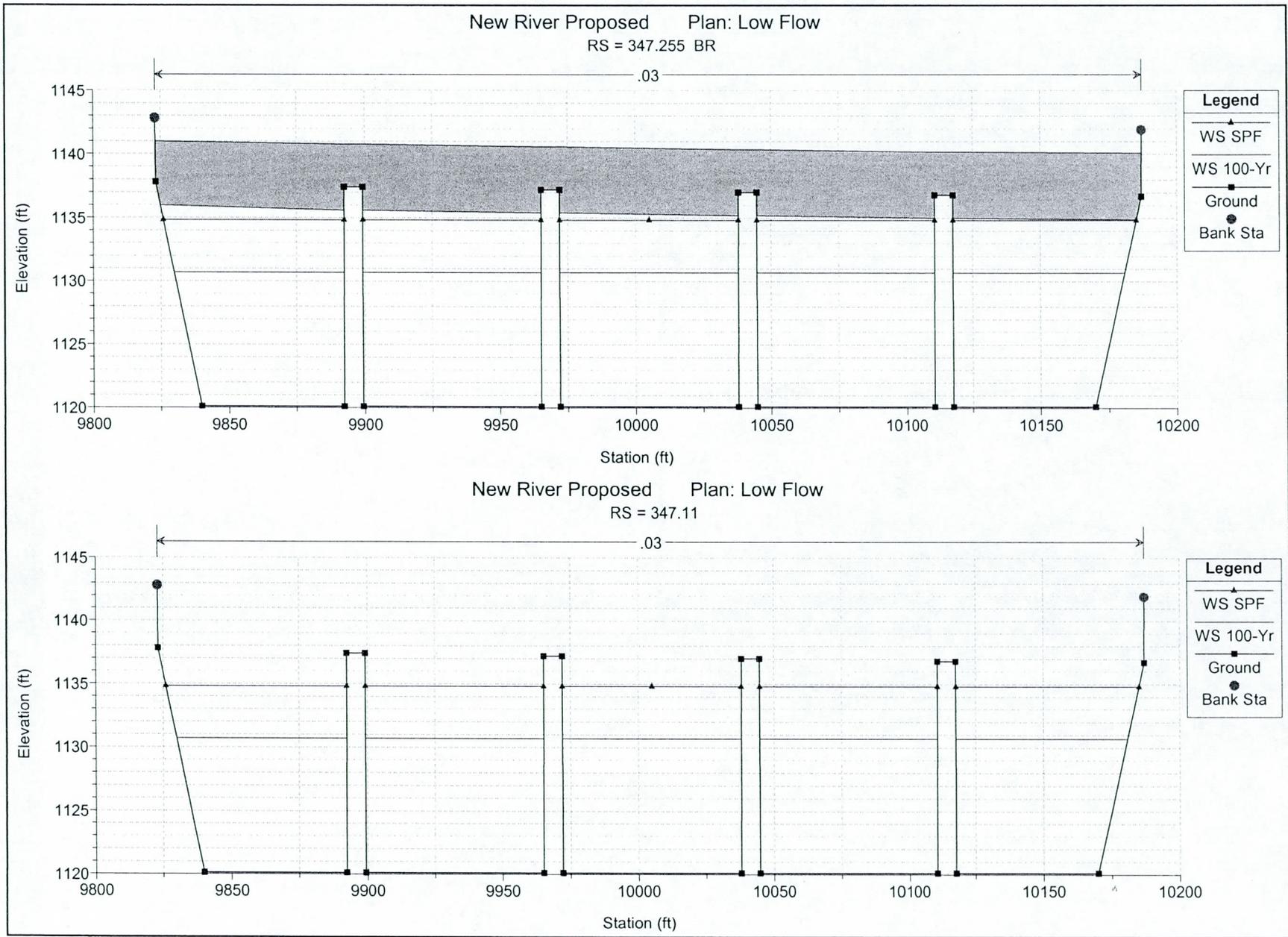


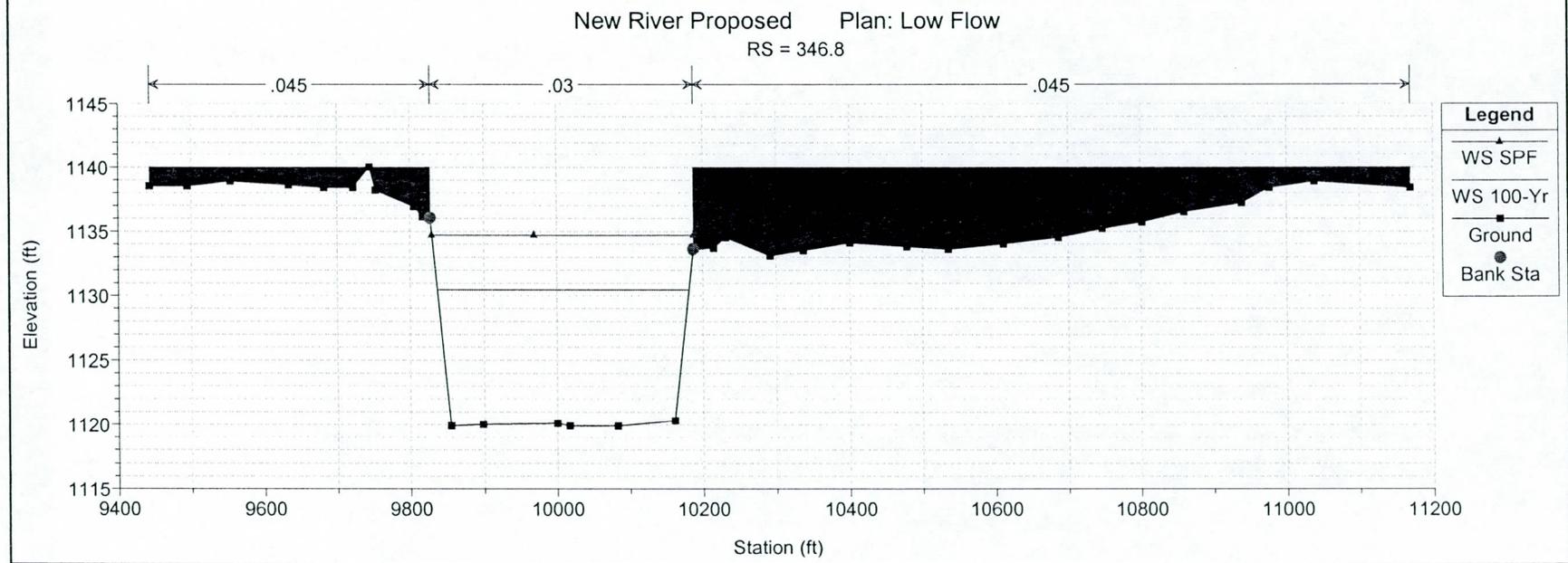
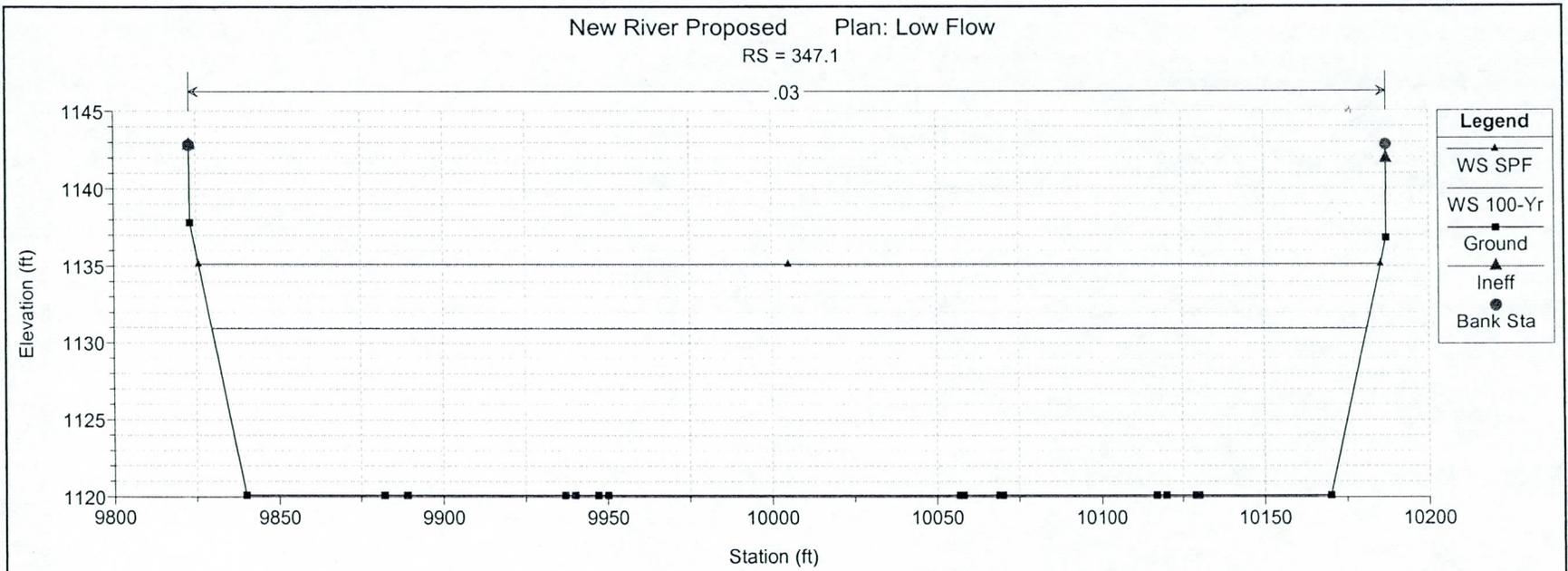


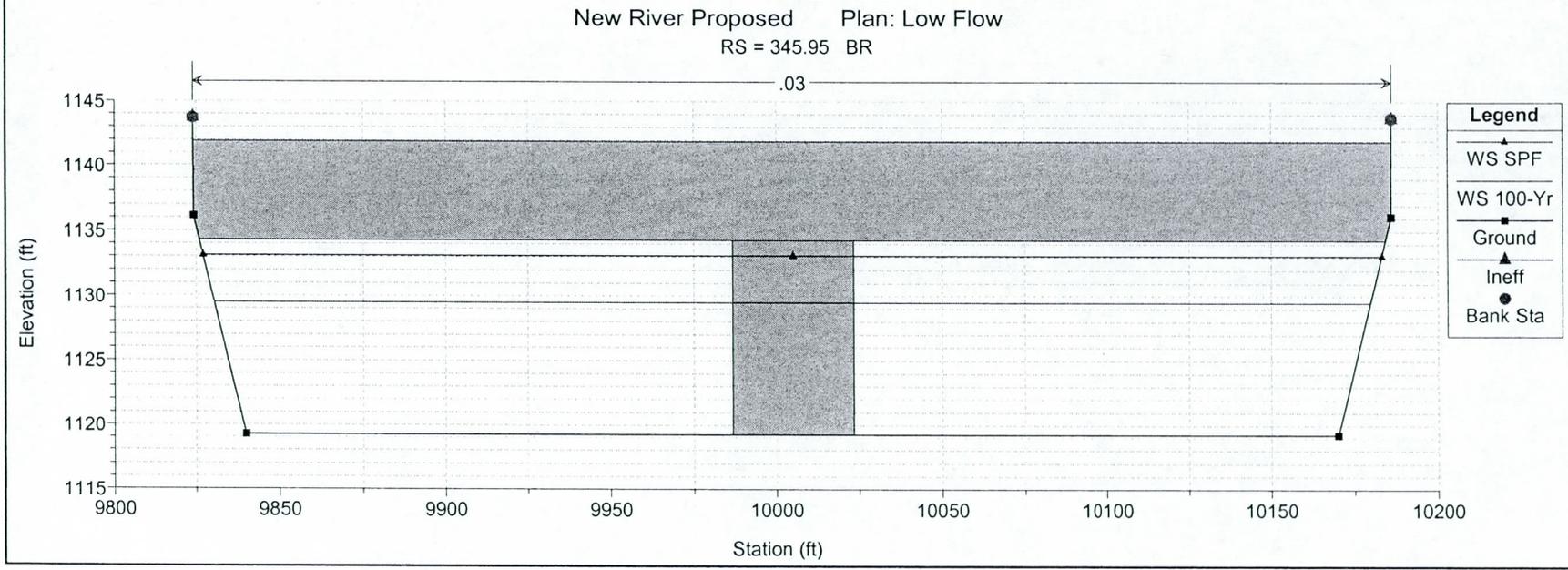
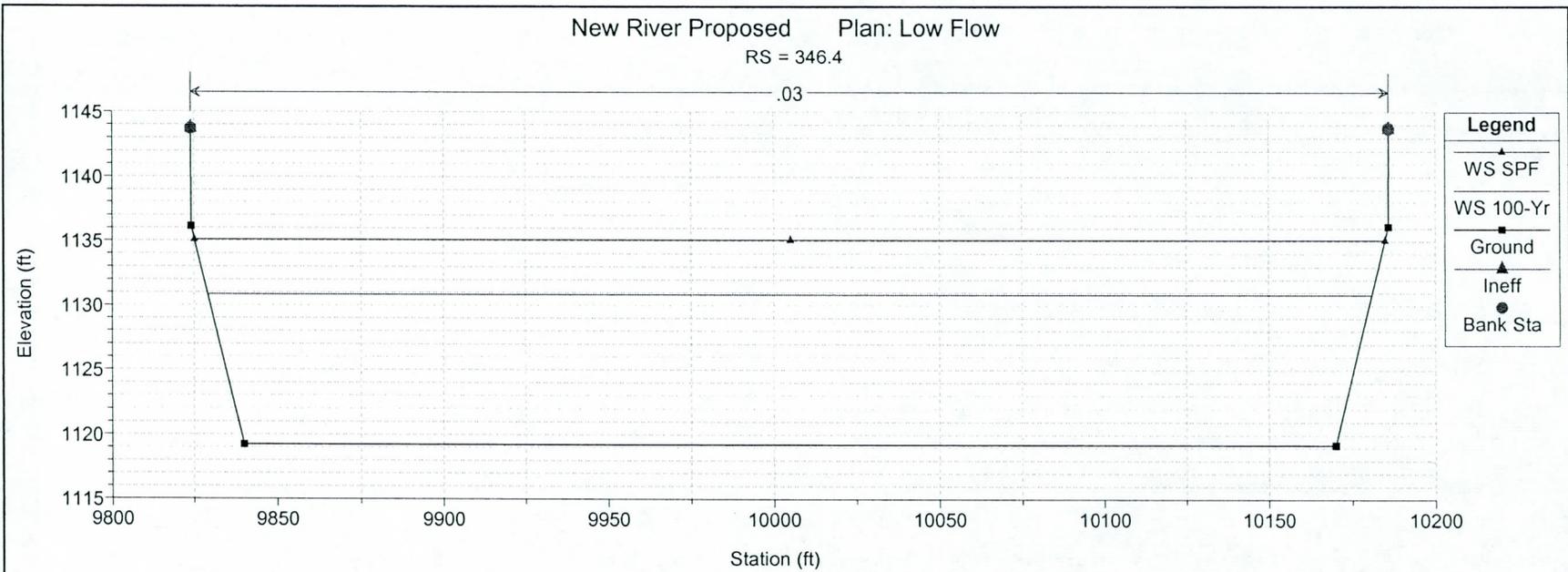


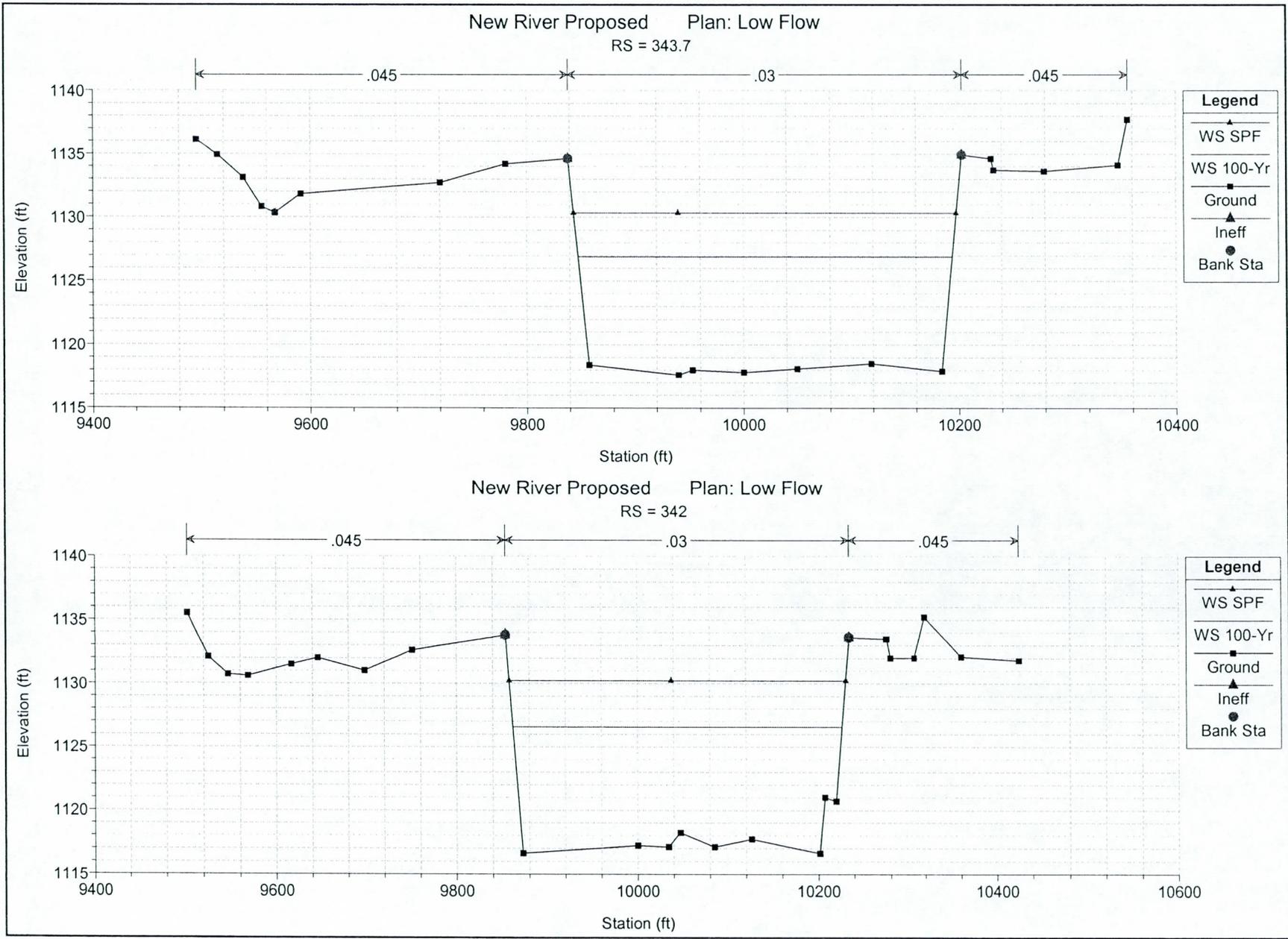














New River Channel Grand Avenue to Skunk Creek

**HEC-RAS ANALYSIS
EXISTING CONDITION**



HEC-RAS Plan Existing River New River Reach Grand Ave - Drop

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpth (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	479.90	100-Yr	19000.00	1193.12	1208.88	15.76		1209.01	0.000151	3.26	8545.01	1331.40	0.16
Grand Ave - Drop	479.90	SPF	38000.00	1193.12	1211.40	18.28		1211.65	0.000260	4.83	11889.93	1331.40	0.22
Grand Ave - Drop	479.85	100-Yr	19000.00	1191.82	1208.56	16.74	1200.07	1208.93	0.000347	4.98	4649.51	835.00	0.25
Grand Ave - Drop	479.85	SPF	38000.00	1191.82	1210.63	18.81	1203.62	1211.48	0.000716	7.90	6372.31	835.00	0.36
Grand Ave - Drop	479.84		Brdge										
Grand Ave - Drop	479.83	100-Yr	19000.00	1191.02	1201.24	10.22	1199.68	1202.91	0.003398	10.36	1833.74	266.51	0.70
Grand Ave - Drop	479.83	SPF	38000.00	1191.02	1207.18	16.16	1203.03	1208.19	0.001165	8.83	6341.51	1175.50	0.45
Grand Ave - Drop	479.79	100-Yr	19000.00	1190.82	1198.46	7.64	1198.46	1201.67	0.007359	14.39	1320.14	205.40	1.00
Grand Ave - Drop	479.79	SPF	38000.00	1190.82	1202.28	11.46	1202.28	1207.27	0.006535	17.92	2120.50	212.86	1.00
Grand Ave - Drop	479.78	100-Yr	19000.00	1187.92	1197.00	9.08	1197.00	1200.29	0.007261	14.56	1304.63	199.87	1.00
Grand Ave - Drop	479.78	SPF	38000.00	1187.92	1200.88	12.96	1200.88	1205.99	0.006469	17.96	2116.16	213.13	1.00
Grand Ave - Drop	479.74	100-Yr	19000.00	1185.32	1194.55	9.23	1194.55	1197.94	0.007181	14.77	1286.38	190.44	1.00
Grand Ave - Drop	479.74	SPF	38000.00	1185.32	1198.60	13.28	1198.60	1203.70	0.006454	18.13	2095.71	209.33	1.01
Grand Ave - Drop	479.64	100-Yr	19000.00	1180.22	1189.20	8.98	1189.20	1191.57	0.008072	12.34	1539.40	330.28	1.01
Grand Ave - Drop	479.64	SPF	38000.00	1180.22	1191.99	11.77	1191.99	1195.66	0.006951	15.37	2471.74	339.49	1.00
Grand Ave - Drop	479.55	100-Yr	19000.00	1179.72	1188.44	8.72		1189.20	0.001442	7.02	2707.91	372.51	0.46
Grand Ave - Drop	479.55	SPF	38000.00	1179.72	1191.74	12.02		1193.17	0.001706	9.60	3957.95	384.34	0.53
Grand Ave - Drop	479.45	100-Yr	19000.00	1178.32	1185.43	7.11	1185.43	1187.62	0.008192	11.89	1597.66	366.86	1.00
Grand Ave - Drop	479.45	SPF	38000.00	1178.32	1188.02	9.70	1188.02	1191.44	0.007078	14.84	2561.33	377.13	1.00
Grand Ave - Drop	479.36	100-Yr	19000.00	1175.12	1182.76	7.64		1183.50	0.001922	6.91	2748.03	481.46	0.51
Grand Ave - Drop	479.36	SPF	38000.00	1175.12	1186.83	11.71		1187.83	0.001306	8.02	4740.25	495.84	0.46
Grand Ave - Drop	479.28	100-Yr	19000.00	1172.62	1182.48	9.86		1182.88	0.000664	5.07	3751.19	471.89	0.32
Grand Ave - Drop	479.28	SPF	38000.00	1172.62	1186.60	13.98		1187.29	0.000679	6.63	5732.83	487.36	0.34
Grand Ave - Drop	479.17	100-Yr	19000.00	1170.12	1179.24	9.12	1179.24	1181.86	0.007689	12.99	1462.82	281.82	1.00
Grand Ave - Drop	479.17	SPF	38000.00	1170.12	1182.62	12.50	1182.62	1186.21	0.006879	15.20	2499.61	349.59	1.00
Grand Ave - Drop	479.07	100-Yr	19000.00	1167.22	1175.79	8.57		1176.30	0.001036	5.73	3318.54	485.19	0.39
Grand Ave - Drop	479.07	SPF	38000.00	1167.22	1180.85	13.63		1181.51	0.000681	6.50	5849.77	514.49	0.34
Grand Ave - Drop	478.98	100-Yr	19000.00	1165.72	1175.34	9.62		1175.83	0.000769	5.63	3374.65	403.73	0.34
Grand Ave - Drop	478.98	SPF	38000.00	1165.72	1180.41	14.69		1181.15	0.000671	6.90	5510.66	436.92	0.34
Grand Ave - Drop	475.8	100-Yr	19000.00	1163.92	1171.85	7.93	1171.63	1174.74	0.006470	13.64	1393.34	218.25	0.95
Grand Ave - Drop	475.8	SPF	38000.00	1163.92	1175.41	11.49	1175.41	1180.00	0.006387	17.19	2210.14	241.31	1.00
Grand Ave - Drop	471.3	100-Yr	19000.00	1161.12	1169.84	8.72	1169.33	1171.70	0.005719	10.92	1740.35	348.24	0.86
Grand Ave - Drop	471.3	SPF	38000.00	1161.12	1174.19	13.07		1176.22	0.002852	11.43	3347.52	390.71	0.67
Grand Ave - Drop	466.6	100-Yr	19000.00	1159.82	1168.76	8.94		1169.89	0.002233	8.50	2234.15	319.35	0.57
Grand Ave - Drop	466.6	SPF	38000.00	1159.82	1173.52	13.70		1175.06	0.001688	9.95	3818.49	348.00	0.53
Grand Ave - Drop	462.6	100-Yr	19000.00	1158.32	1168.80	10.48		1169.23	0.000673	5.29	3592.56	425.13	0.32
Grand Ave - Drop	462.6	SPF	38000.00	1158.32	1173.75	15.43		1174.42	0.000597	6.61	5764.73	457.75	0.32
Grand Ave - Drop	458.5	100-Yr	41000.00	1153.92	1168.57	14.65		1169.02	0.000441	5.41	7580.94	635.30	0.28
Grand Ave - Drop	458.5	SPF	68000.00	1153.92	1173.61	19.69		1174.17	0.000511	5.98	11375.19	916.94	0.30
Grand Ave - Drop	455.63	100-Yr	41000.00	1153.82	1167.62	13.80		1168.76	0.001080	8.60	4769.22	387.19	0.43
Grand Ave - Drop	455.63	SPF	68000.00	1153.82	1172.21	18.39		1173.85	0.001032	10.31	6742.12	480.58	0.44
Grand Ave - Drop	453.23	100-Yr	41000.00	1154.00	1165.91	11.91		1168.26	0.002650	12.30	3332.65	308.23	0.66
Grand Ave - Drop	453.23	SPF	68000.00	1154.00	1169.91	15.91		1173.30	0.002627	14.78	4624.27	363.48	0.69
Grand Ave - Drop	452.73	100-Yr	41000.00	1154.00	1165.51	11.51		1168.09	0.003062	12.90	3177.94	303.96	0.70
Grand Ave - Drop	452.73	SPF	68000.00	1154.00	1169.41	15.41	1166.67	1173.13	0.003054	15.47	4397.67	331.67	0.73
Grand Ave - Drop	452.65	100-Yr	41000.00	1155.00	1163.68	8.68	1163.68	1167.89	0.006701	16.47	2488.68	297.82	1.00
Grand Ave - Drop	452.65	SPF	68000.00	1155.00	1167.11	12.11	1167.11	1172.89	0.006003	19.30	3526.20	307.69	1.00
Grand Ave - Drop	452.5	100-Yr	41000.00	1153.00	1161.78	8.78	1161.78	1166.06	0.006694	16.60	2469.41	291.24	1.00
Grand Ave - Drop	452.5	SPF	68000.00	1153.00	1165.28	12.28	1165.28	1171.13	0.006020	19.42	3501.98	299.15	1.00
Grand Ave - Drop	452.23	100-Yr	41000.00	1144.00	1161.92	17.92		1163.17	0.000868	8.97	4572.69	286.99	0.40
Grand Ave - Drop	452.23	SPF	68000.00	1144.00	1166.48	22.48		1168.54	0.001079	11.52	5904.34	296.76	0.46
Grand Ave - Drop	451.23	100-Yr	41000.00	1144.00	1161.84	17.84		1163.08	0.000841	8.92	4597.72	283.86	0.39
Grand Ave - Drop	451.23	SPF	68000.00	1144.00	1166.38	22.38		1168.44	0.001062	11.51	5906.34	293.46	0.45
Grand Ave - Drop	451.05	100-Yr	41000.00	1144.00	1161.89	17.89		1163.04	0.000769	8.59	4771.43	293.28	0.38
Grand Ave - Drop	451.05	SPF	68000.00	1144.00	1166.47	22.47		1168.37	0.000958	11.07	6150.80	314.51	0.43
Grand Ave - Drop	450.23	100-Yr	41000.00	1143.00	1161.86	18.86		1162.96	0.000811	8.40	4878.91	330.75	0.39
Grand Ave - Drop	450.23	SPF	68000.00	1143.00	1166.52	23.52		1168.23	0.000921	10.50	6497.71	363.87	0.43
Grand Ave - Drop	449.05	100-Yr	41000.00	1143.00	1161.01	18.01		1162.78	0.001568	10.69	3837.11	298.24	0.52
Grand Ave - Drop	449.05	SPF	68000.00	1143.00	1165.39	22.39		1168.02	0.001742	13.01	5237.16	341.28	0.57
Grand Ave - Drop	446.87	100-Yr	41000.00	1142.00	1160.56	18.56		1162.40	0.001688	10.89	3765.33	300.88	0.54

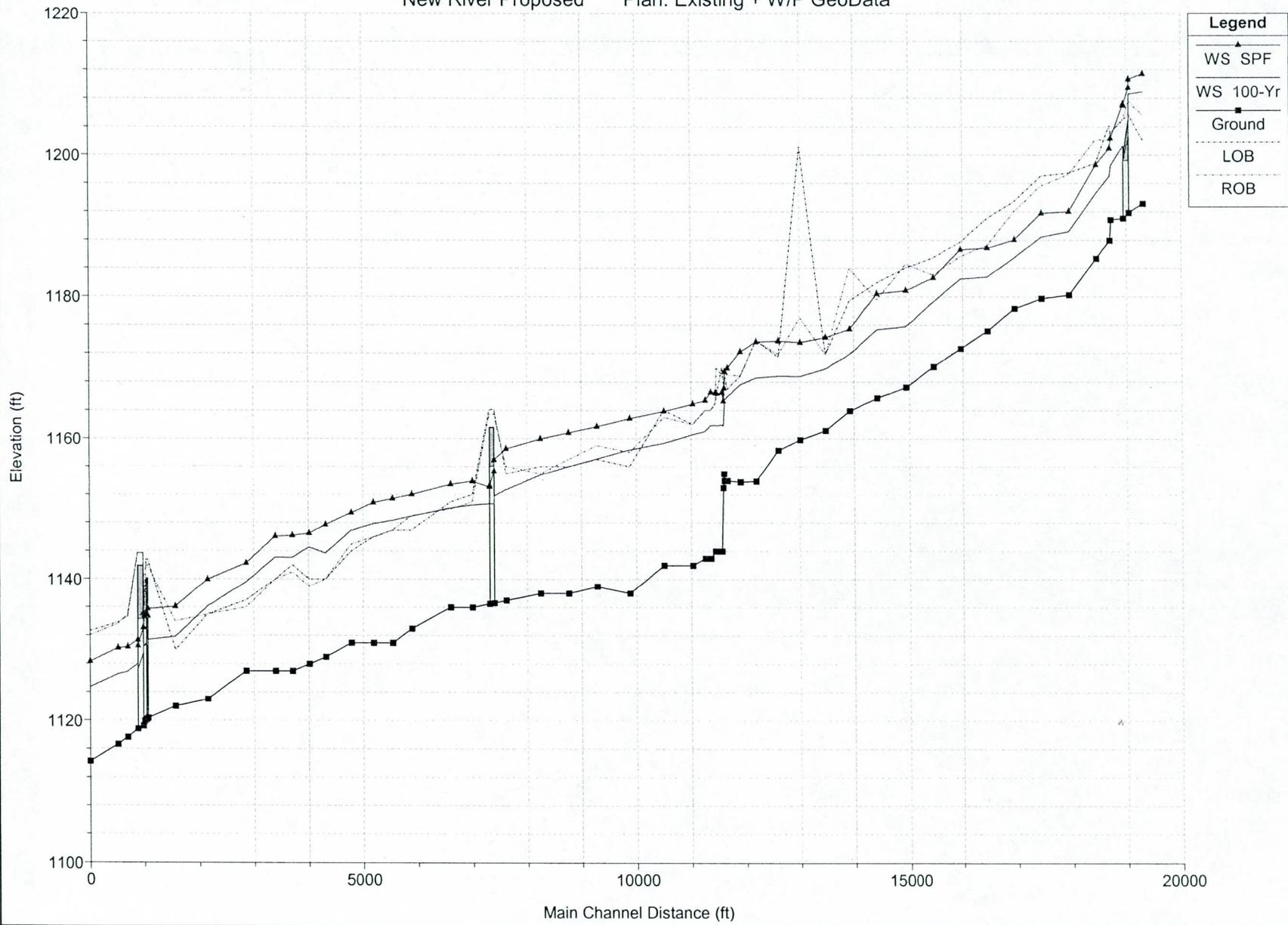
HEC-RAS Plan Existing River New River Reach Grand Ave - Drop (Continued)

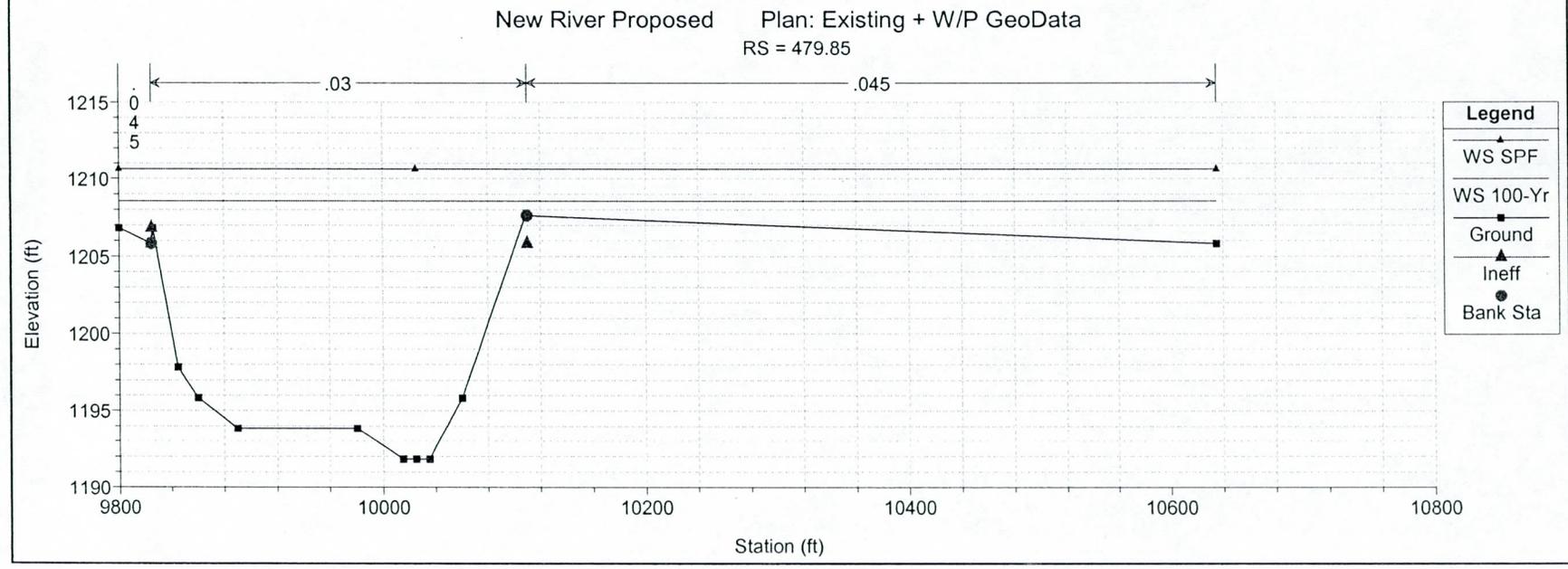
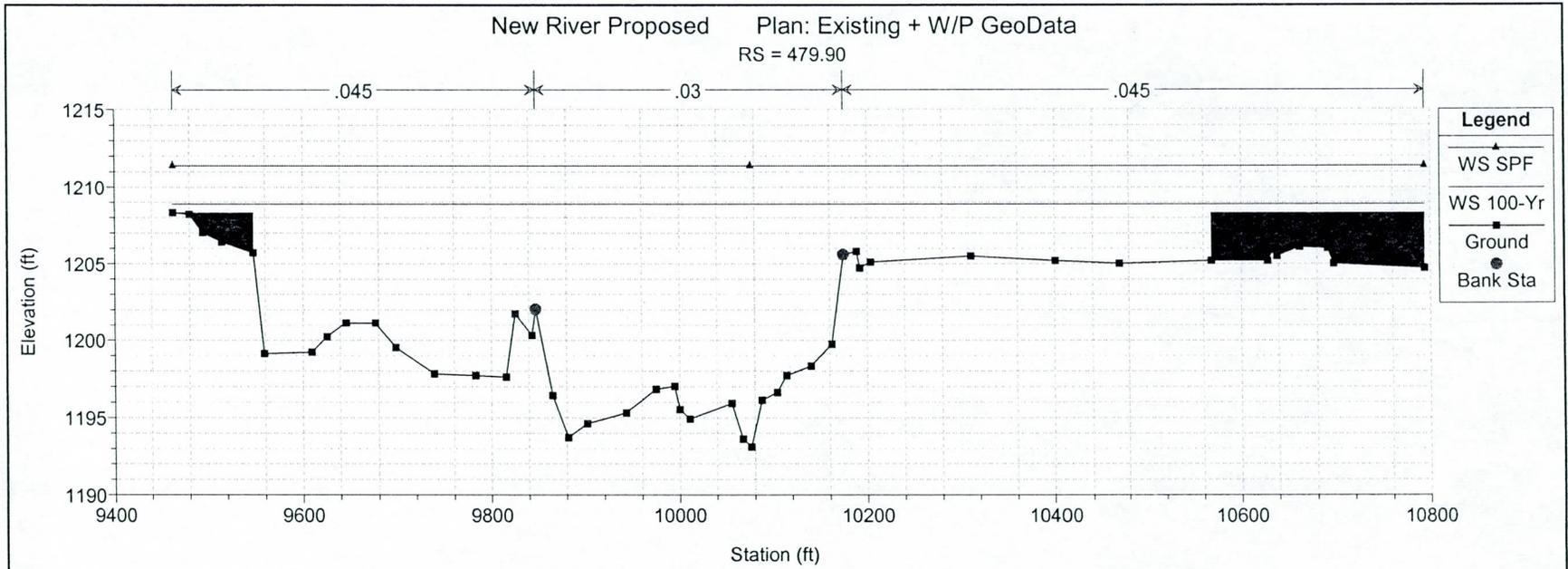
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpth (ft)	Crit W.S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	448.87	SPF	68000.00	1142.00	1164.86	22.86		1167.60	0.001781	13.29	5150.09	341.82	0.58
Grand Ave - Drop	441.6	100-Yr	41000.00	1142.00	1159.33	17.33		1161.39	0.002098	11.51	3583.69	329.79	0.60
Grand Ave - Drop	441.6	SPF	68000.00	1142.00	1163.86	21.86		1166.59	0.002062	13.34	5253.14	404.54	0.62
Grand Ave - Drop	435.37	100-Yr	41000.00	1138.00	1158.37	20.37		1160.15	0.001672	10.71	3837.04	319.76	0.54
Grand Ave - Drop	435.37	SPF	68000.00	1138.00	1162.81	24.81		1165.42	0.001642	13.02	5354.68	377.46	0.56
Grand Ave - Drop	429.37	100-Yr	41000.00	1139.00	1157.11	18.11		1159.05	0.001955	11.19	3664.48	314.13	0.58
Grand Ave - Drop	429.37	SPF	68000.00	1139.00	1161.69	22.69		1164.38	0.001808	13.20	5237.97	376.20	0.58
Grand Ave - Drop	424.17	100-Yr	41000.00	1138.00	1156.01	18.01		1157.99	0.002093	11.30	3628.34	322.13	0.59
Grand Ave - Drop	424.17	SPF	68000.00	1138.00	1160.81	22.81		1163.43	0.001762	13.03	5382.76	485.02	0.58
Grand Ave - Drop	418.97	100-Yr	41000.00	1138.00	1154.82	16.82		1156.87	0.002201	11.49	3569.54	321.35	0.61
Grand Ave - Drop	418.97	SPF	68000.00	1138.00	1159.95	21.95		1162.51	0.001704	12.88	5450.15	487.44	0.57
Grand Ave - Drop	412.76	100-Yr	41000.00	1137.00	1152.78	15.78		1155.30	0.002676	12.74	3218.28	286.62	0.67
Grand Ave - Drop	412.76	SPF	68000.00	1137.00	1158.53	21.53		1161.35	0.001907	13.54	5224.22	447.09	0.60
Grand Ave - Drop	410.54	100-Yr	41000.00	1136.62	1151.80	15.18	1148.74	1154.67	0.002719	13.60	3014.83	243.41	0.68
Grand Ave - Drop	410.54	SPF	68000.00	1136.62	1156.92	20.30	1152.95	1160.77	0.002563	15.73	4322.69	266.78	0.69
Grand Ave - Drop	410.02		Bridge										
Grand Ave - Drop	409.5	100-Yr	41000.00	1136.52	1150.74	14.22	1148.67	1154.06	0.003469	14.62	2803.74	244.72	0.76
Grand Ave - Drop	409.5	SPF	68000.00	1136.52	1153.13	16.61	1152.81	1159.33	0.005356	19.99	3402.37	256.74	0.97
Grand Ave - Drop	406.5	100-Yr	41000.00	1136.00	1150.59	14.59		1152.77	0.002642	11.85	3460.41	342.17	0.66
Grand Ave - Drop	406.5	SPF	68000.00	1136.00	1153.93	17.93		1157.28	0.002822	14.70	4687.47	402.13	0.71
Grand Ave - Drop	402.5	100-Yr	41000.00	1136.00	1150.15	14.15		1151.76	0.001692	10.18	4029.36	358.90	0.53
Grand Ave - Drop	402.5	SPF	68000.00	1136.00	1153.51	17.51		1156.12	0.001951	12.97	5279.84	403.22	0.60
Grand Ave - Drop	395.5	100-Yr	41000.00	1133.00	1148.98	15.98		1150.57	0.001648	10.29	4213.85	426.42	0.53
Grand Ave - Drop	395.5	SPF	68000.00	1133.00	1152.07	19.07		1154.71	0.002029	13.35	5952.98	753.17	0.61
Grand Ave - Drop	392	100-Yr	41000.00	1131.00	1148.36	17.36		1149.99	0.001624	10.30	4105.72	430.38	0.53
Grand Ave - Drop	392	SPF	68000.00	1131.00	1151.44	20.44		1153.99	0.001918	13.06	5965.55	753.52	0.60
Grand Ave - Drop	388.5	100-Yr	41000.00	1131.00	1147.88	16.88		1149.44	0.001427	10.04	4195.93	393.76	0.50
Grand Ave - Drop	388.5	SPF	68000.00	1131.00	1150.90	19.90		1153.31	0.001736	12.79	6348.43	778.46	0.57
Grand Ave - Drop	384.5	100-Yr	41000.00	1131.00	1146.95	15.95		1148.78	0.001694	10.88	3808.95	338.96	0.54
Grand Ave - Drop	384.5	SPF	68000.00	1131.00	1149.44	18.44		1152.45	0.002283	14.27	5813.29	917.56	0.65
Grand Ave - Drop	379.75	100-Yr	41000.00	1129.00	1143.71	14.71	1142.60	1147.39	0.004294	15.49	2863.47	542.28	0.84
Grand Ave - Drop	379.75	SPF	68000.00	1129.00	1147.74	18.74	1147.74	1151.18	0.002985	16.04	6073.01	971.85	0.74
Grand Ave - Drop	376.75	100-Yr	41000.00	1128.00	1144.57	16.57		1146.01	0.001499	9.81	4873.43	939.33	0.51
Grand Ave - Drop	376.75	SPF	68000.00	1128.00	1146.55	18.55		1148.90	0.002118	12.94	6857.93	1038.57	0.62
Grand Ave - Drop	373.75	100-Yr	41000.00	1127.00	1143.08	16.08	1141.33	1145.30	0.003157	12.55	4362.99	1183.45	0.71
Grand Ave - Drop	373.75	SPF	68000.00	1127.00	1146.23	19.23		1148.12	0.002200	12.64	8213.45	1236.98	0.62
Grand Ave - Drop	370.65	100-Yr	41000.00	1127.00	1143.13	16.13		1144.29	0.001625	9.20	5891.54	1125.90	0.51
Grand Ave - Drop	370.65	SPF	68000.00	1127.00	1146.10	19.10		1147.39	0.001409	10.20	9262.54	1138.57	0.50
Grand Ave - Drop	365.4	100-Yr	41000.00	1127.00	1139.56	12.56	1139.56	1142.73	0.004491	14.61	3279.82	735.48	0.84
Grand Ave - Drop	365.4	SPF	68000.00	1127.00	1142.26	15.25	1142.26	1145.94	0.004148	16.62	5564.46	910.72	0.84
Grand Ave - Drop	358.25	100-Yr	41000.00	1123.00	1136.10	13.10	1134.47	1138.38	0.003199	12.27	3744.29	752.99	0.71
Grand Ave - Drop	358.25	SPF	68000.00	1123.00	1139.95	16.95	1138.33	1141.90	0.001994	12.20	7717.95	1137.84	0.59
Grand Ave - Drop	352.4	100-Yr	41000.00	1122.00	1131.84	9.84	1131.84	1135.56	0.006910	15.48	2652.69	364.87	1.00
Grand Ave - Drop	352.4	SPF	68000.00	1122.00	1136.08	14.08	1134.80	1140.06	0.004126	16.10	4552.09	804.05	0.83
Grand Ave - Drop	347.41	100-Yr	41000.00	1120.32	1131.38	11.06		1133.22	0.002108	10.87	3773.28	352.15	0.58
Grand Ave - Drop	347.41	SPF	68000.00	1120.32	1135.74	15.42		1138.27	0.001923	12.77	5325.44	360.87	0.59
Grand Ave - Drop	347.4	100-Yr	41000.00	1120.32	1130.64	10.31	1128.52	1133.15	0.004265	12.72	3224.14	323.15	0.71
Grand Ave - Drop	347.4	SPF	68000.00	1120.32	1134.73	14.41	1131.79	1138.17	0.004222	14.90	4563.66	331.53	0.71
Grand Ave - Drop	347.255		Bridge										
Grand Ave - Drop	347.11	100-Yr	41000.00	1120.12	1130.55	10.43		1133.00	0.004129	12.58	3258.98	323.13	0.70
Grand Ave - Drop	347.11	SPF	68000.00	1120.12	1134.64	14.52		1138.04	0.004127	14.79	4598.15	331.42	0.70
Grand Ave - Drop	347.1	100-Yr	41000.00	1120.12	1130.91	10.79	1127.90	1132.84	0.002292	11.15	3675.73	351.29	0.61
Grand Ave - Drop	347.1	SPF	68000.00	1120.12	1135.14	15.02	1130.98	1137.82	0.002101	13.13	5178.00	359.63	0.61
Grand Ave - Drop	346.8	100-Yr	41000.00	1119.92	1130.46	10.54		1132.73	0.002885	12.09	3389.94	344.47	0.68
Grand Ave - Drop	346.8	SPF	68000.00	1119.92	1134.70	14.78		1137.71	0.002500	13.92	4883.52	358.04	0.66
Grand Ave - Drop	346.4	100-Yr	41000.00	1119.22	1130.83	11.61	1127.00	1132.49	0.001803	10.36	3957.10	351.91	0.54
Grand Ave - Drop	346.4	SPF	68000.00	1119.22	1135.08	15.86	1130.08	1137.48	0.001758	12.43	5470.28	359.93	0.56
Grand Ave - Drop	345.95		Bridge										
Grand Ave - Drop	345.5	100-Yr	41000.00	1118.82	1128.02	9.20	1126.60	1130.71	0.003906	13.17	3114.10	346.96	0.77

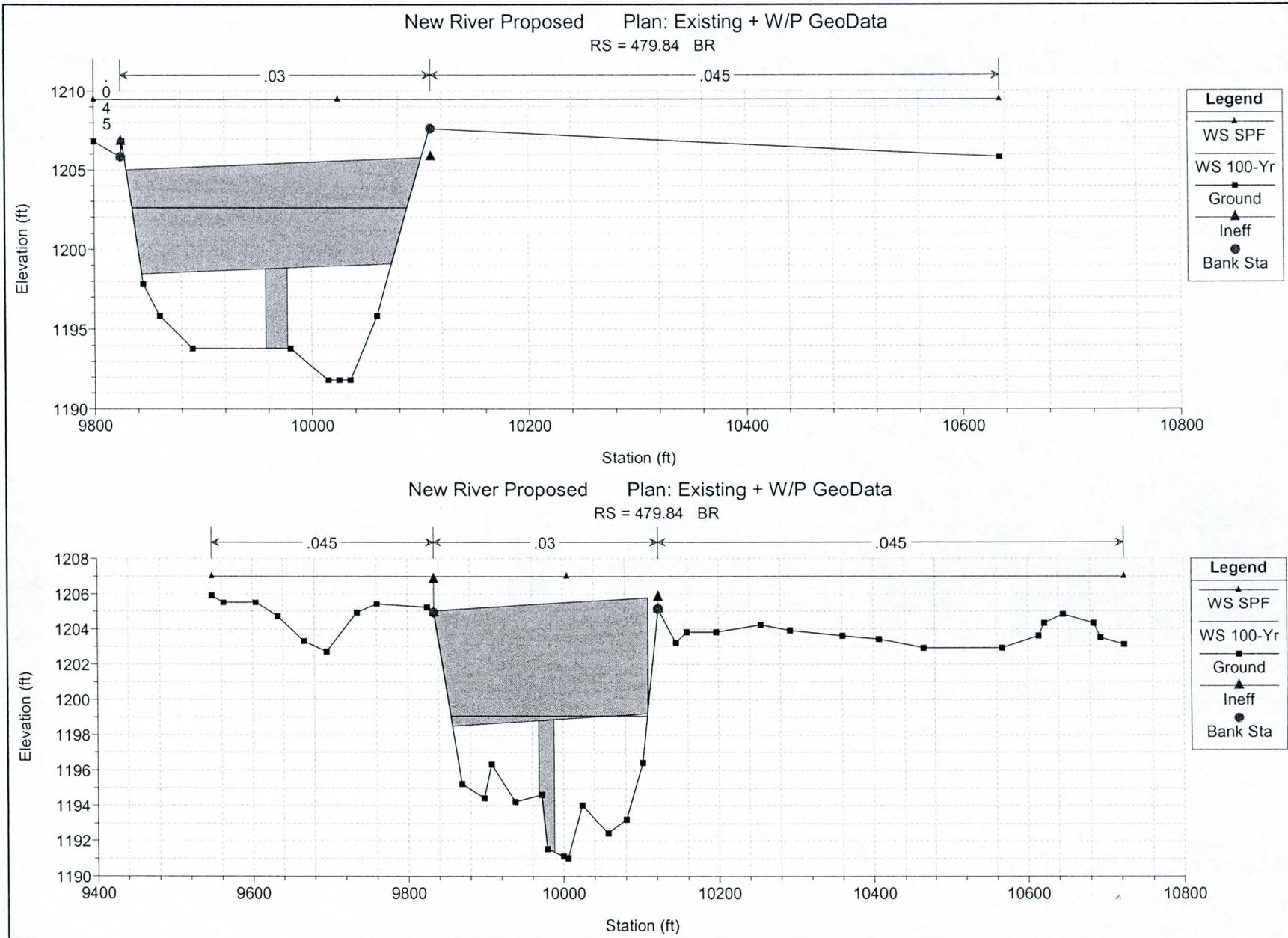
HEC-RAS Plan Existing River New River Reach Grand Ave - Drop (Continued)

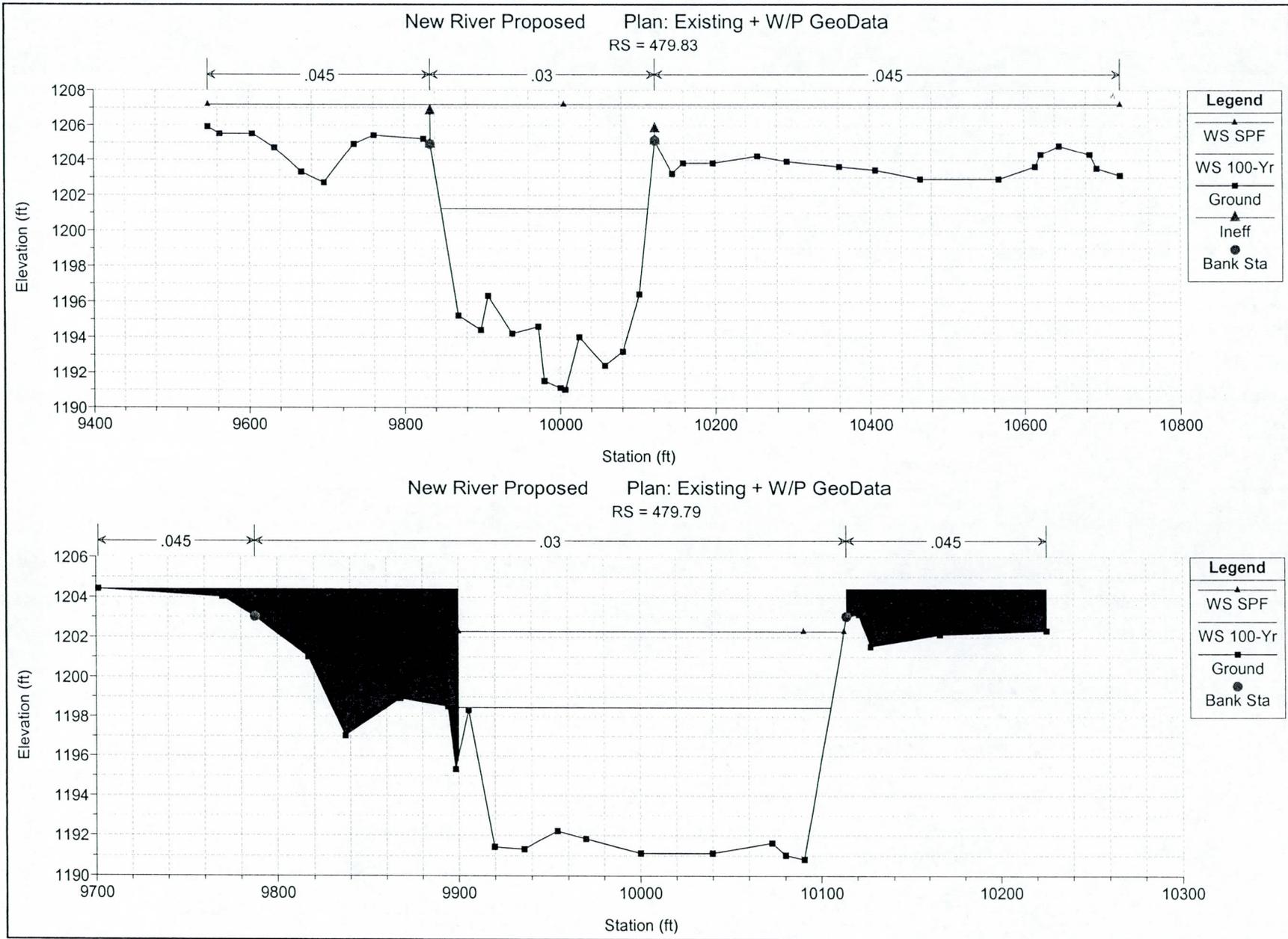
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Chl Dpth (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Grand Ave - Drop	345.5	SPF	68000.00	1118.82	1131.35	12.53	1129.67	1135.27	0.003854	15.89	4278.59	353.10	0.80
Grand Ave - Drop	343.7	100-Yr	41000.00	1117.62	1126.91	9.29	1125.90	1129.88	0.004573	13.84	2962.68	346.20	0.83
Grand Ave - Drop	343.7	SPF	68000.00	1117.62	1130.35	12.73	1129.03	1134.48	0.004192	16.31	4168.18	355.33	0.84
Grand Ave - Drop	342	100-Yr	41000.00	1116.62	1126.56	9.94	1124.87	1129.00	0.003533	12.54	3269.42	364.32	0.74
Grand Ave - Drop	342	SPF	68000.00	1116.62	1130.24	13.62	1127.90	1133.60	0.003179	14.70	4625.72	372.59	0.74
Grand Ave - Drop	337	100-Yr	41000.00	1114.22	1124.69	10.47	1122.57	1127.00	0.004201	12.21	3356.82	351.61	0.70
Grand Ave - Drop	337	SPF	69000.00	1114.22	1128.30	14.08	1125.77	1131.73	0.004204	14.86	4643.77	360.23	0.73

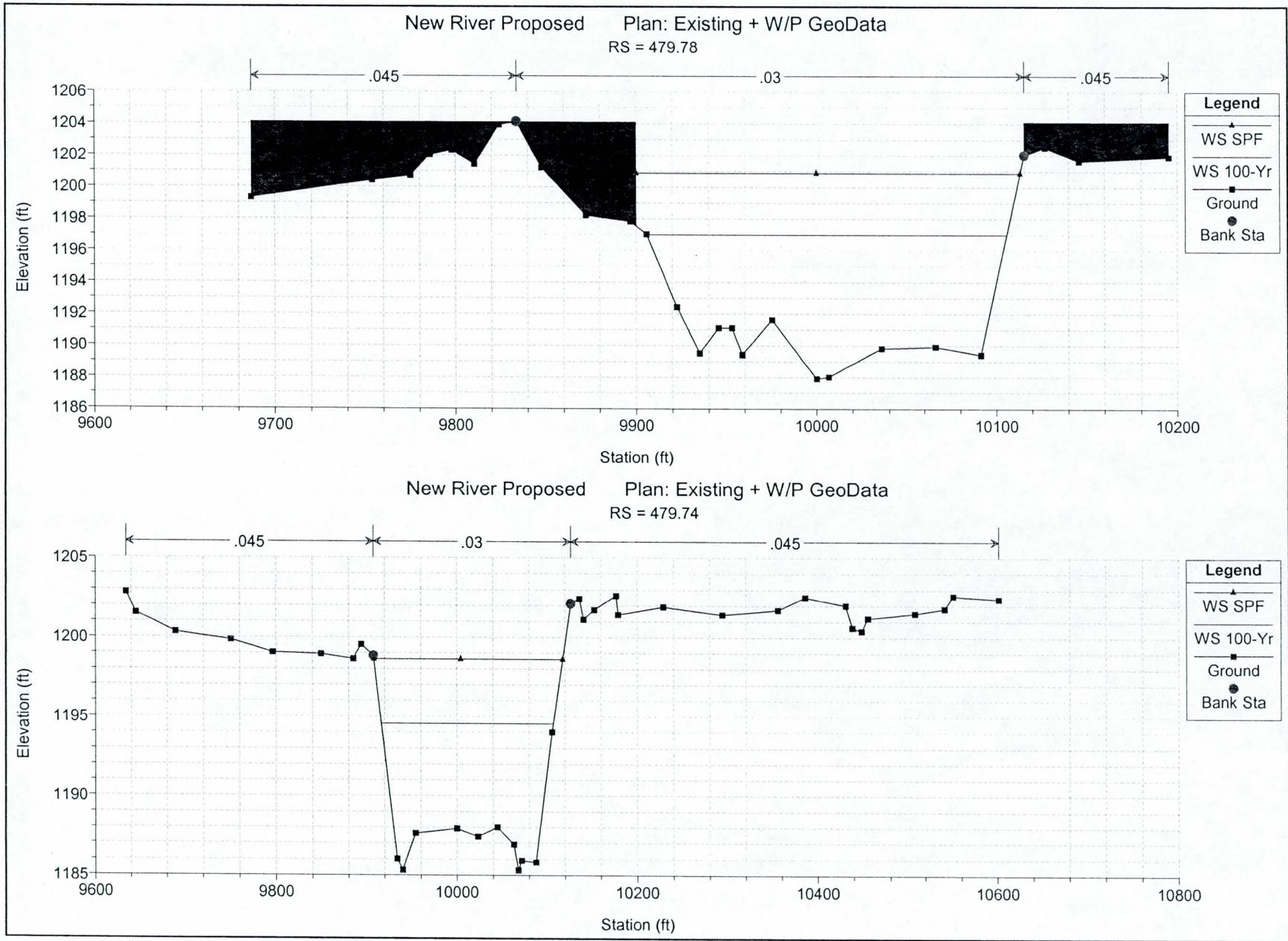
New River Proposed Plan: Existing + W/P GeoData

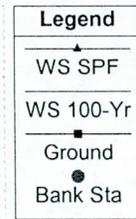
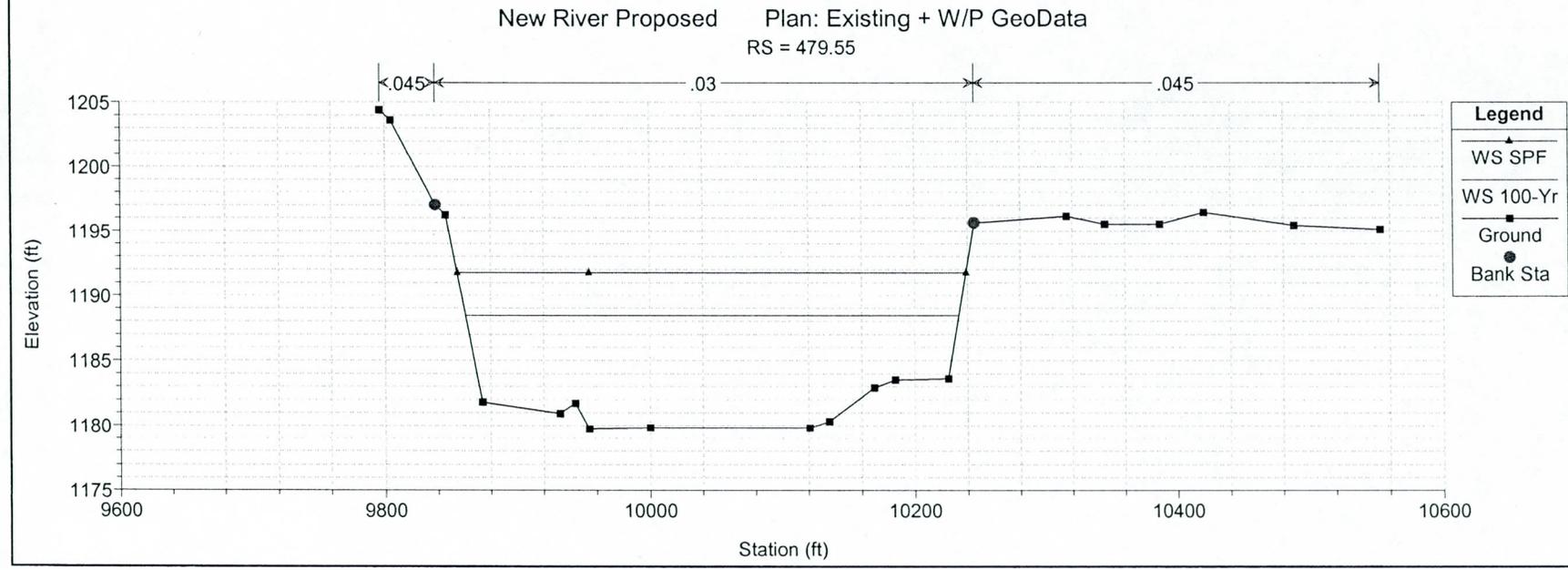
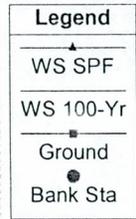
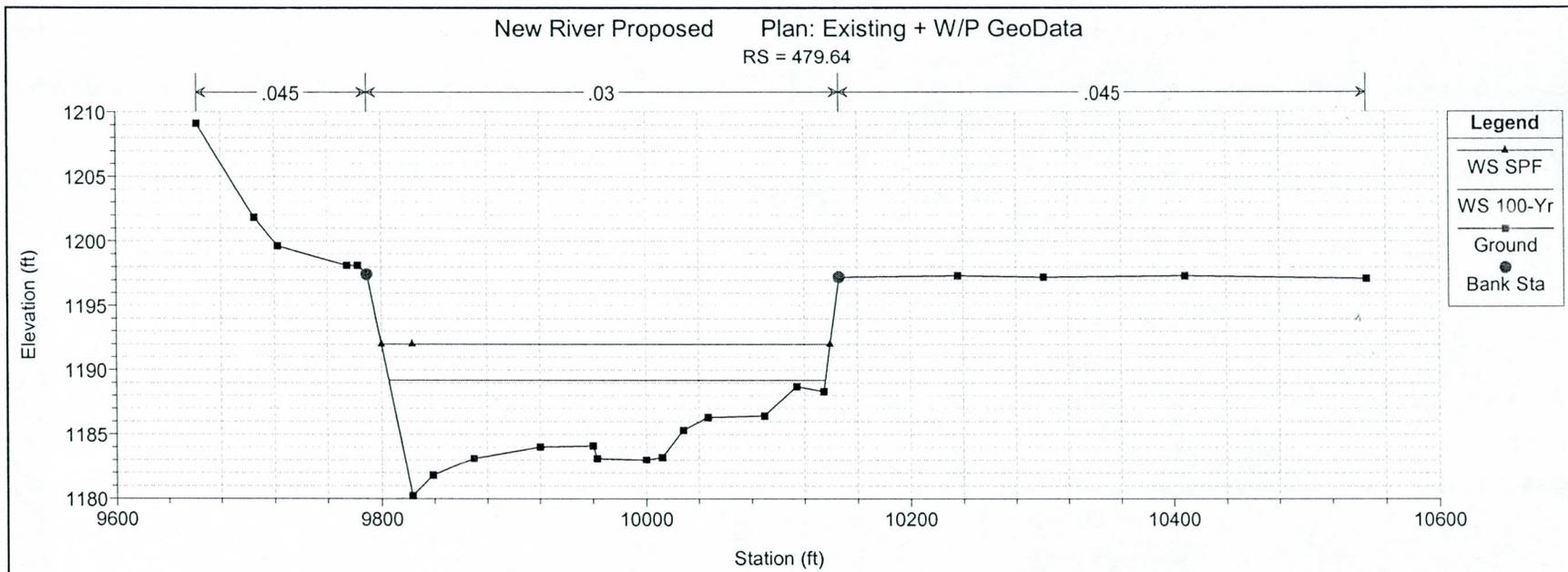


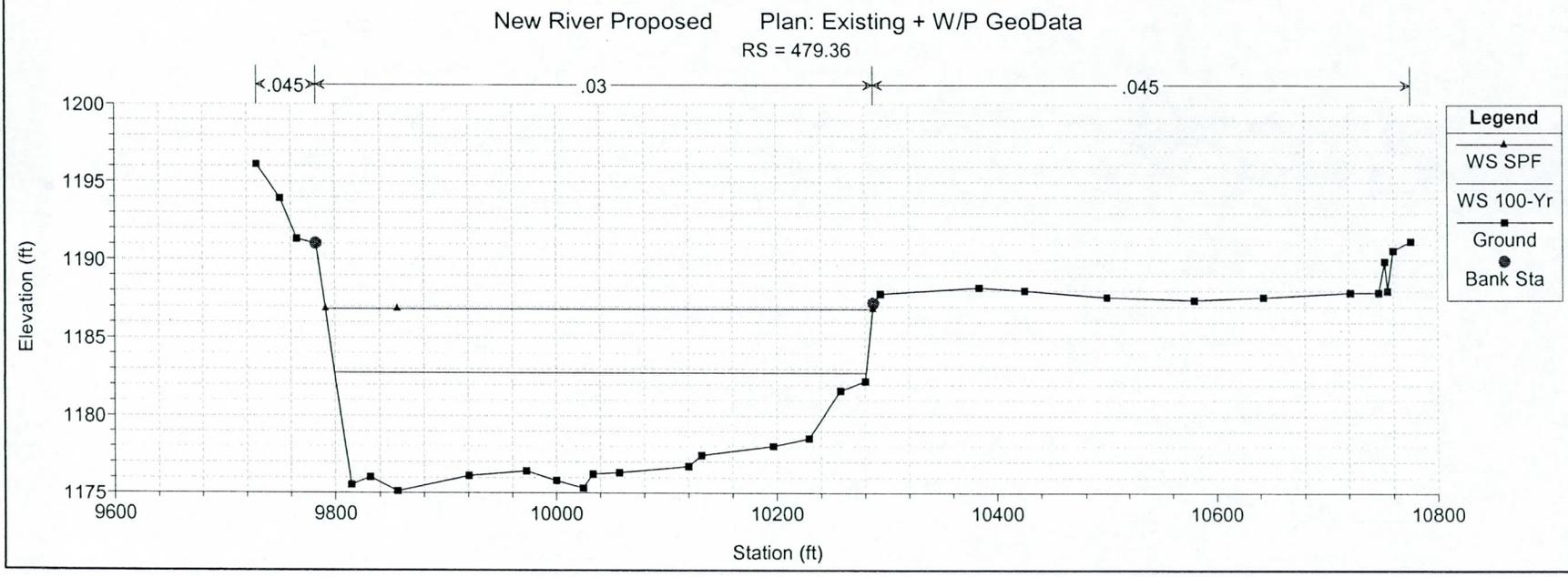
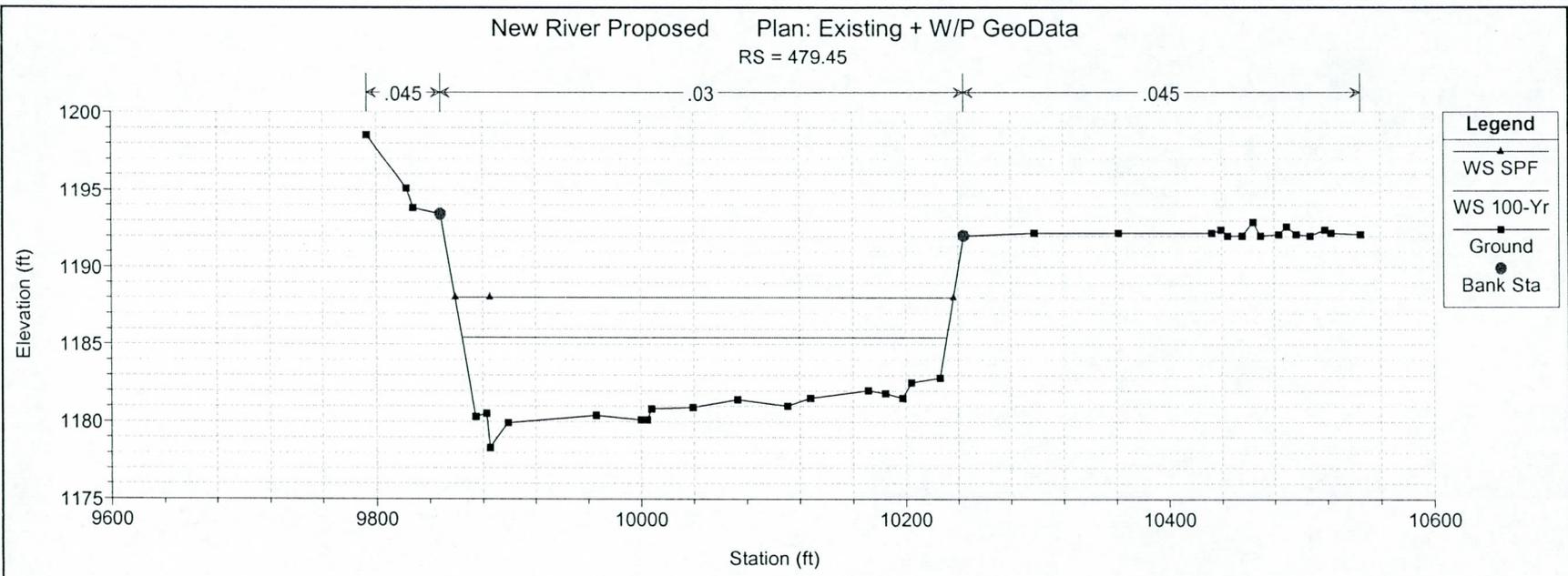


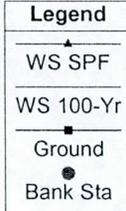
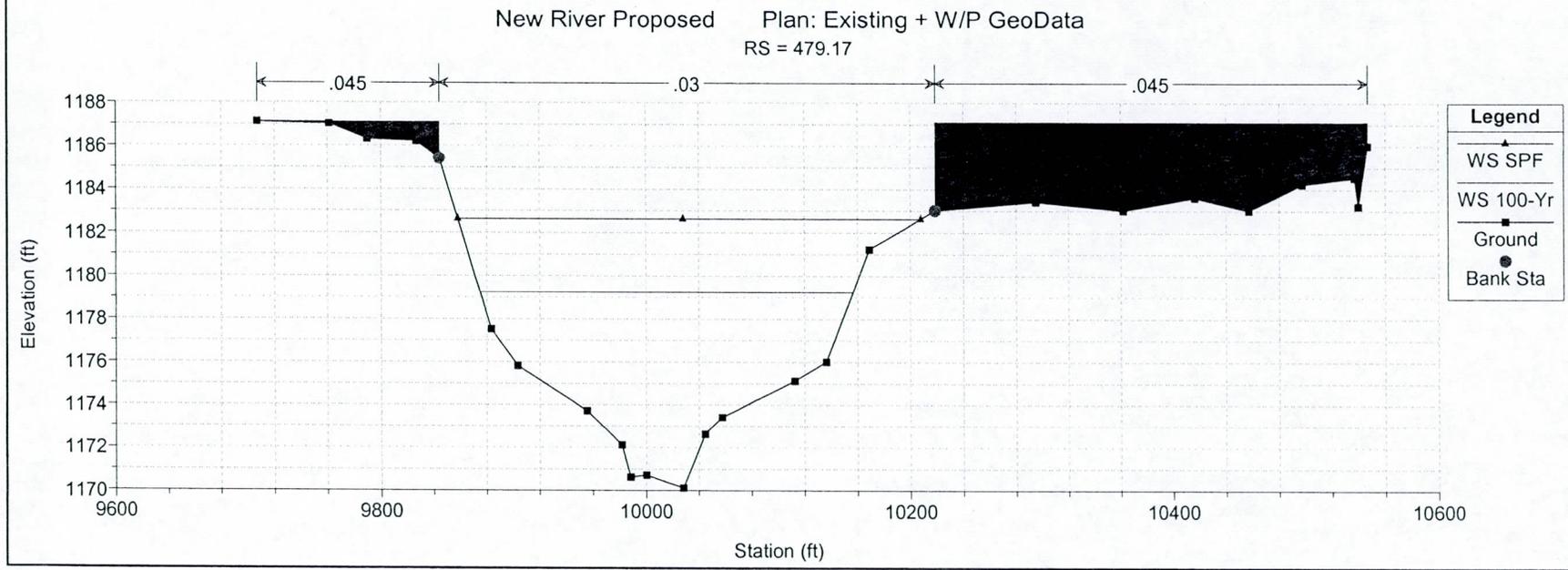
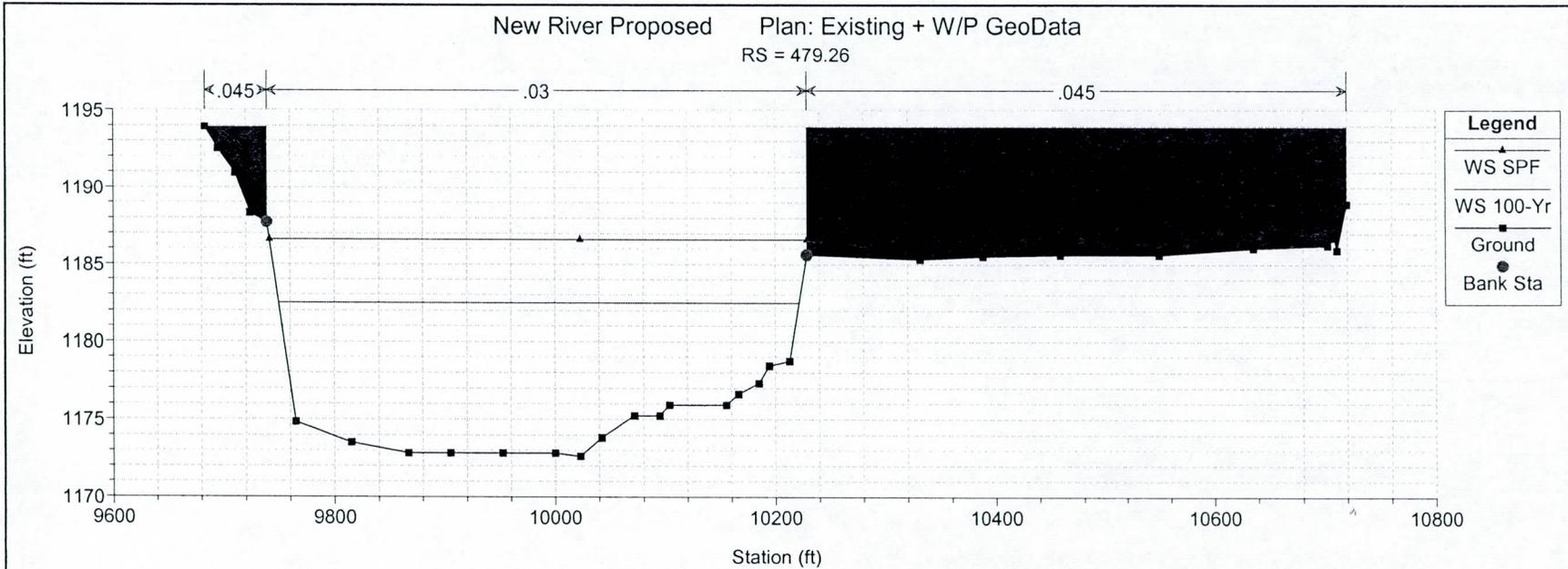


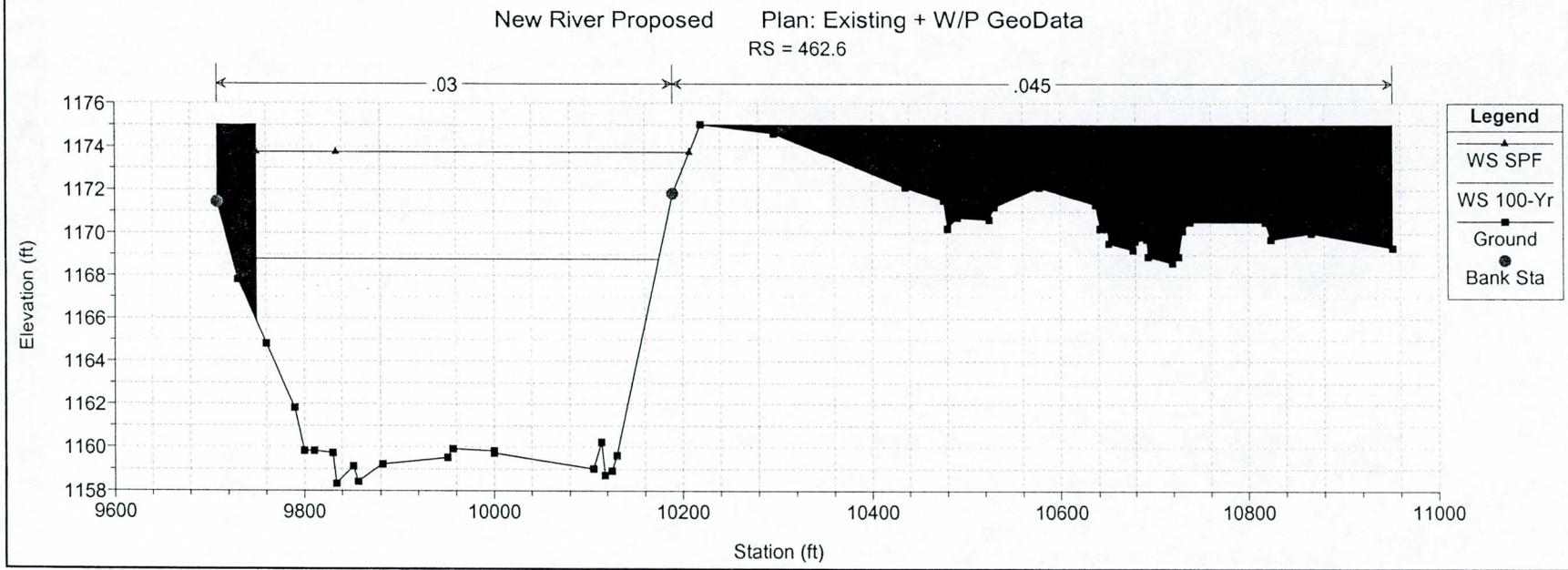
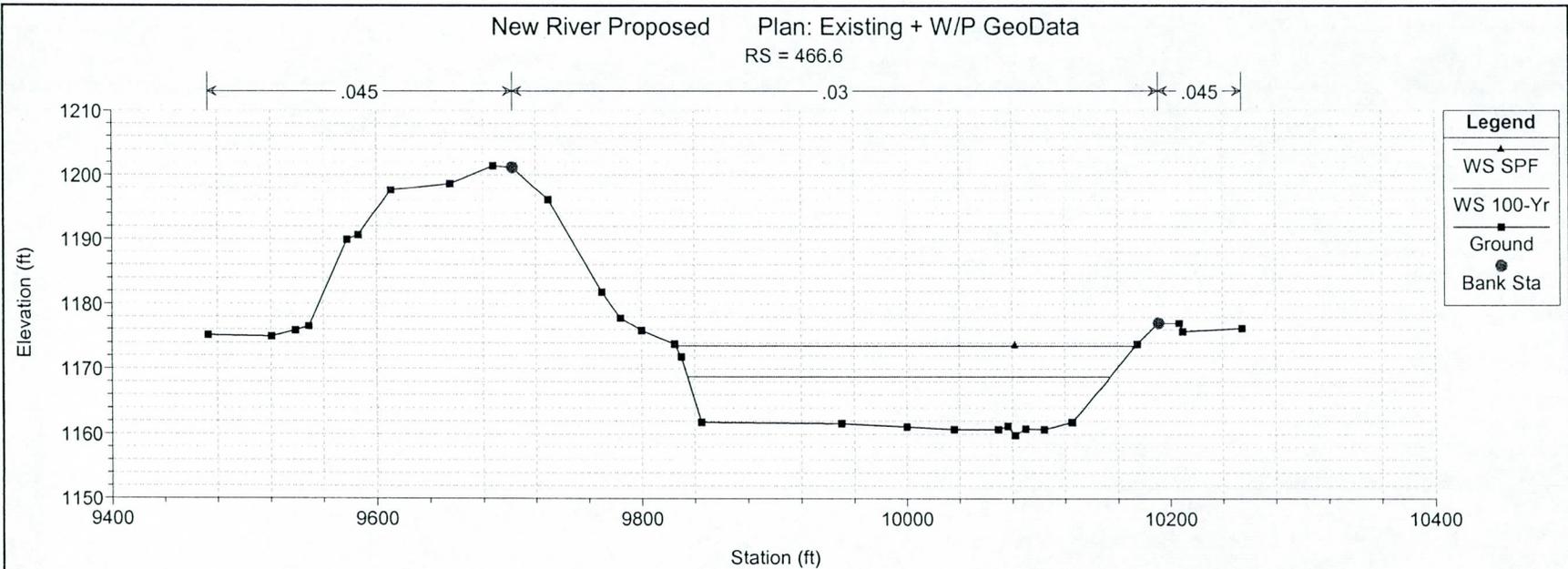


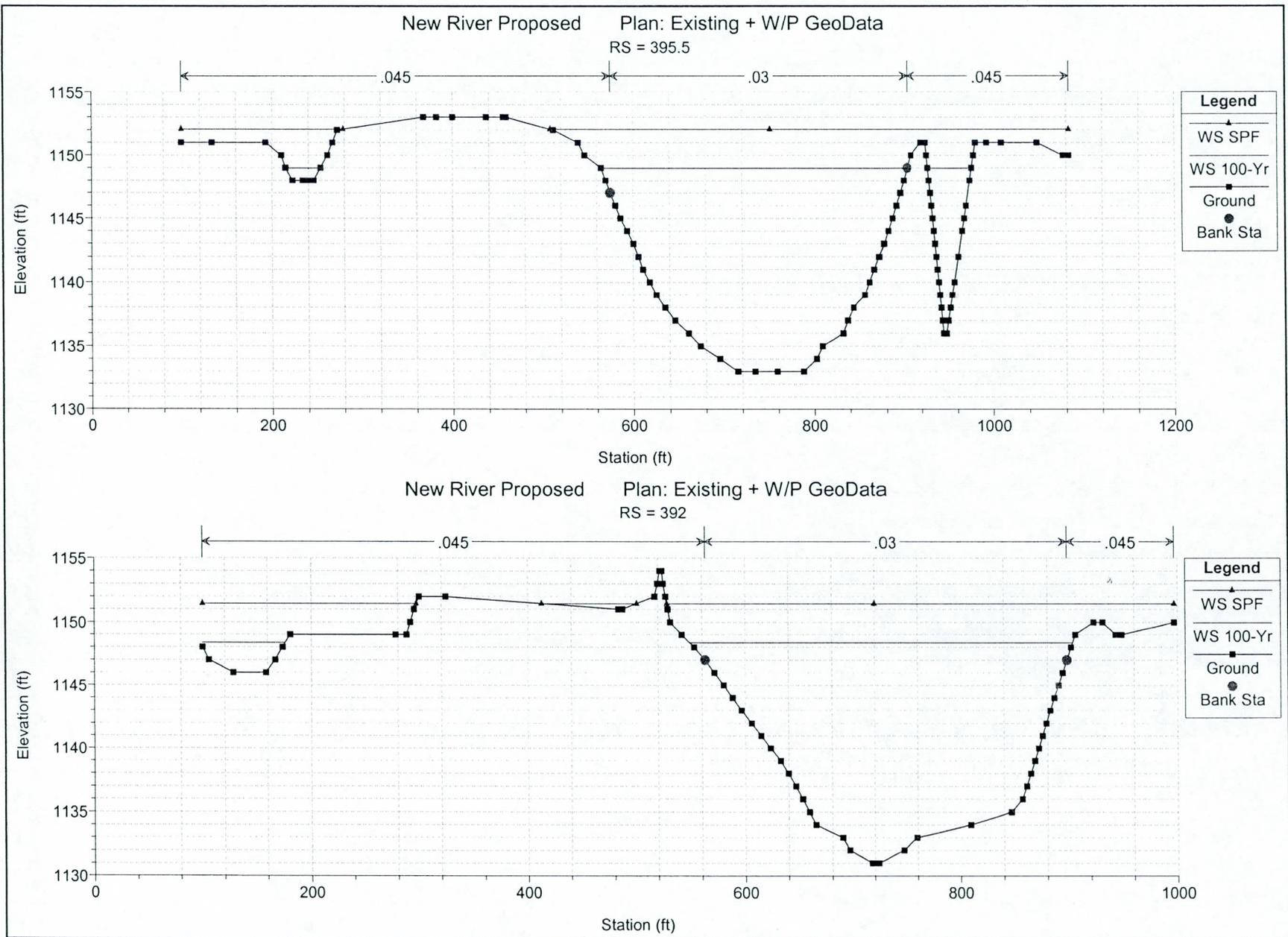


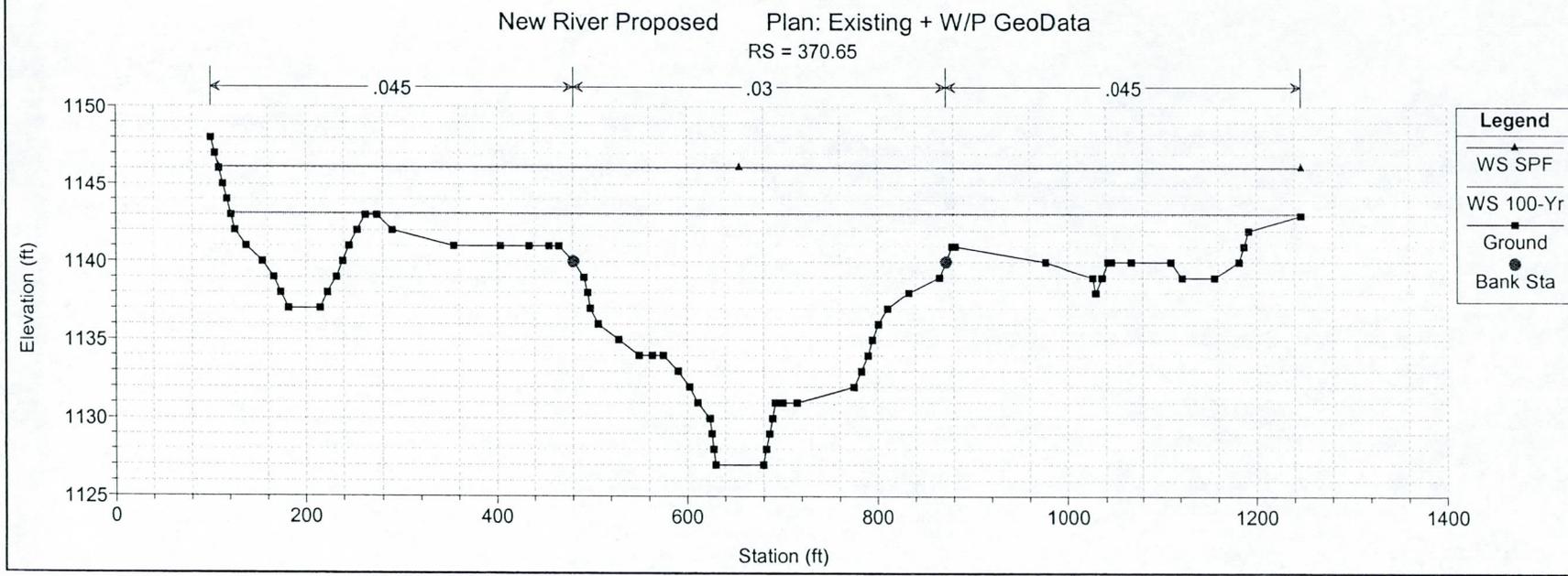
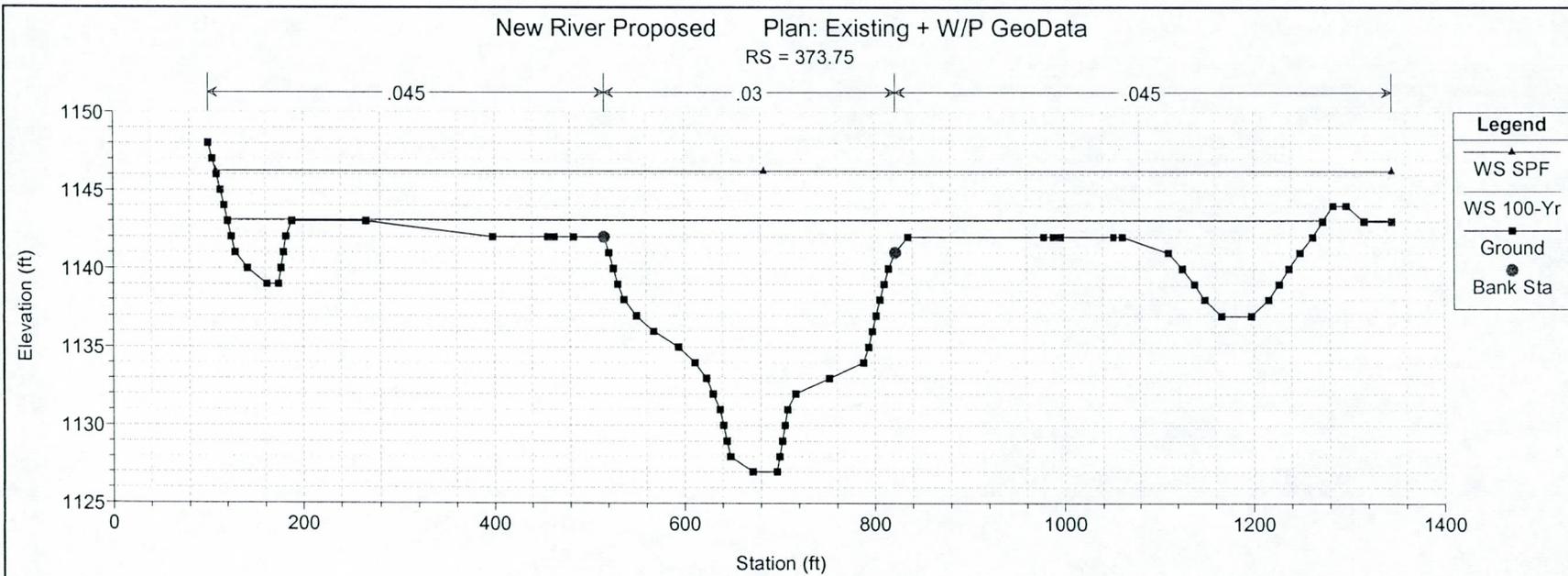


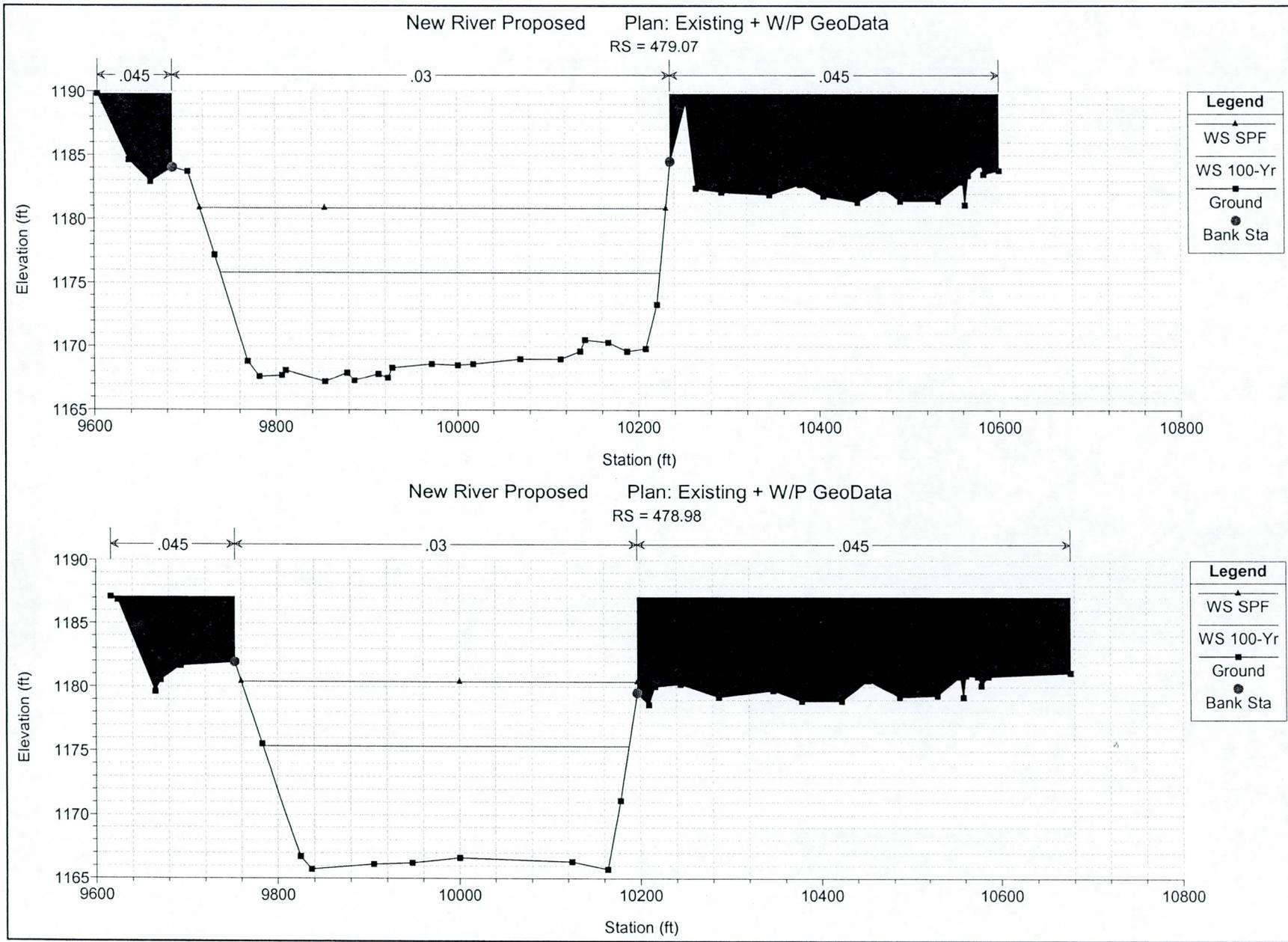


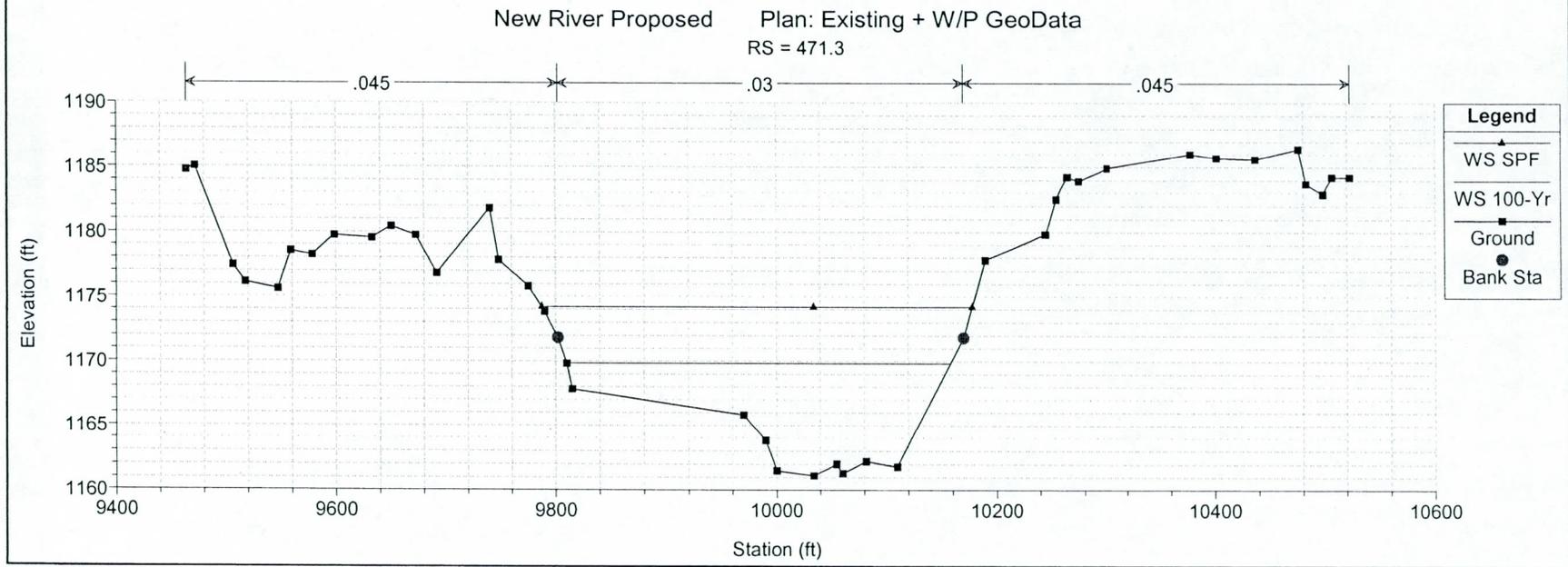
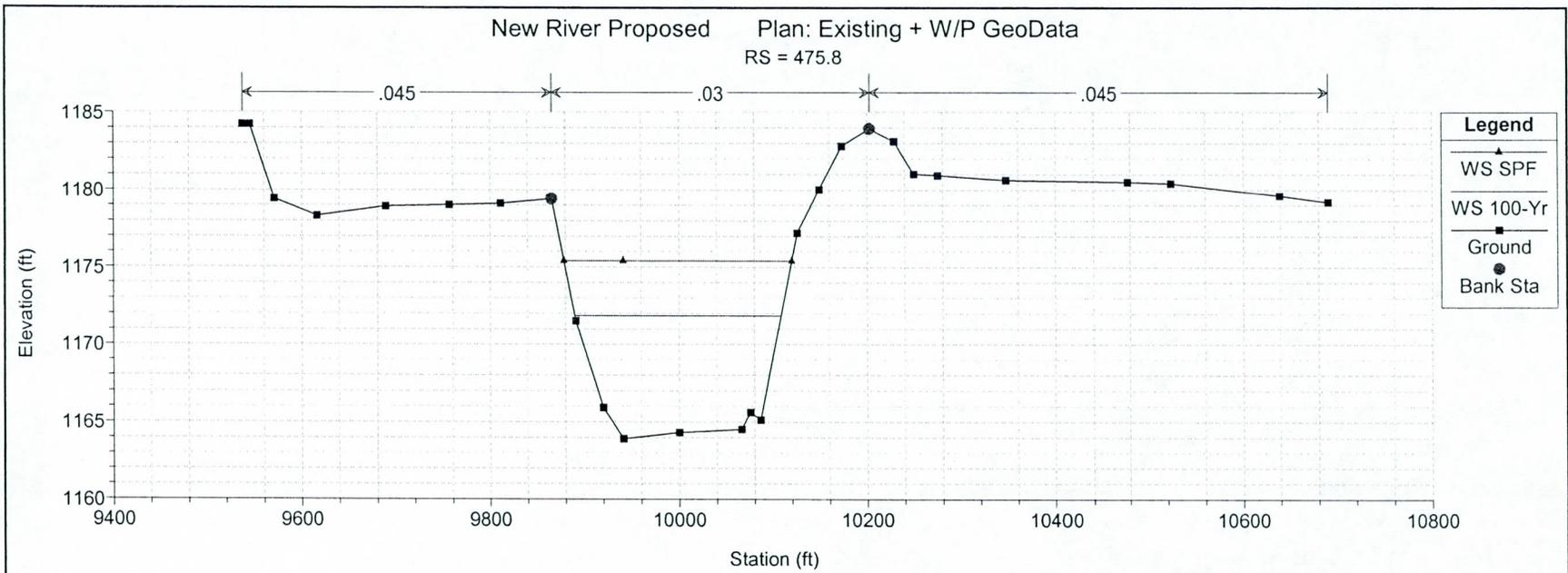


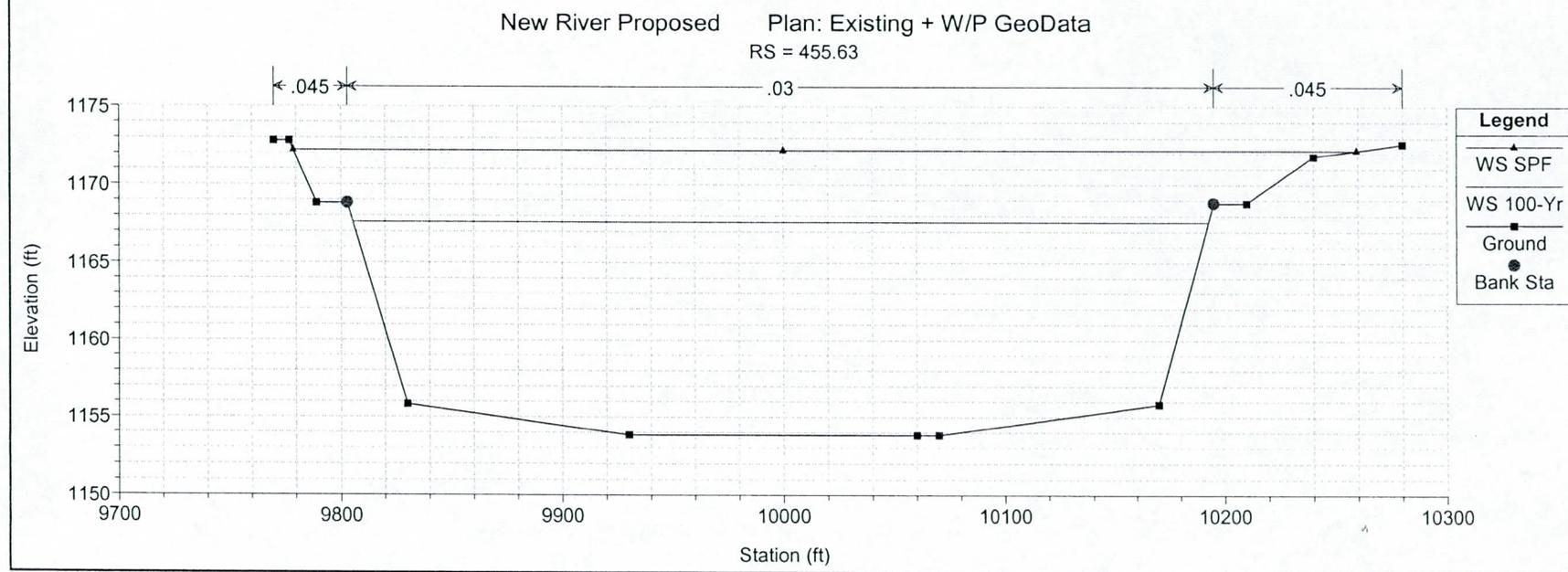
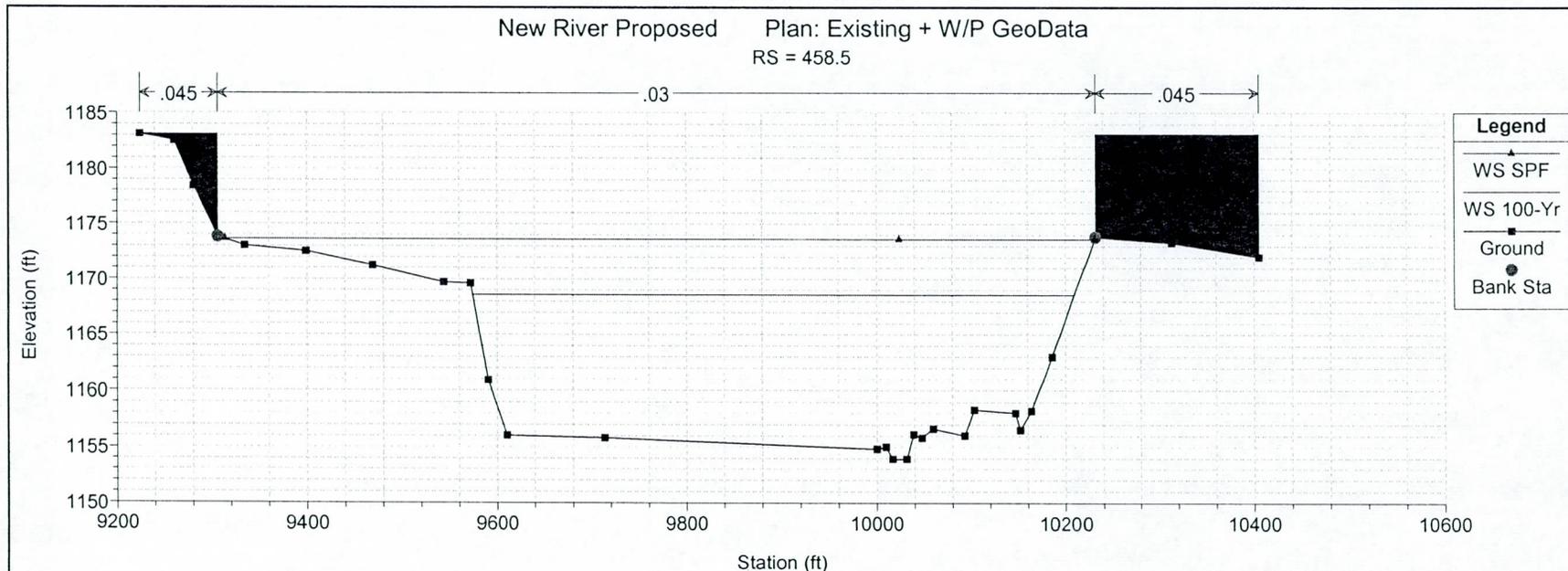




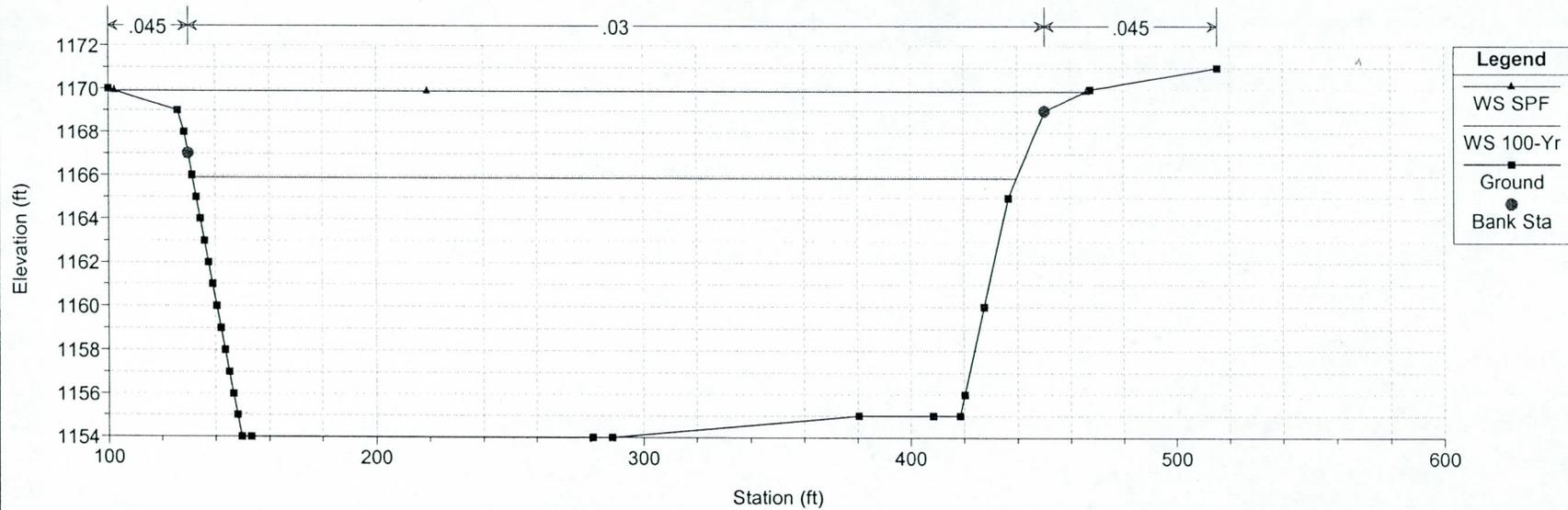




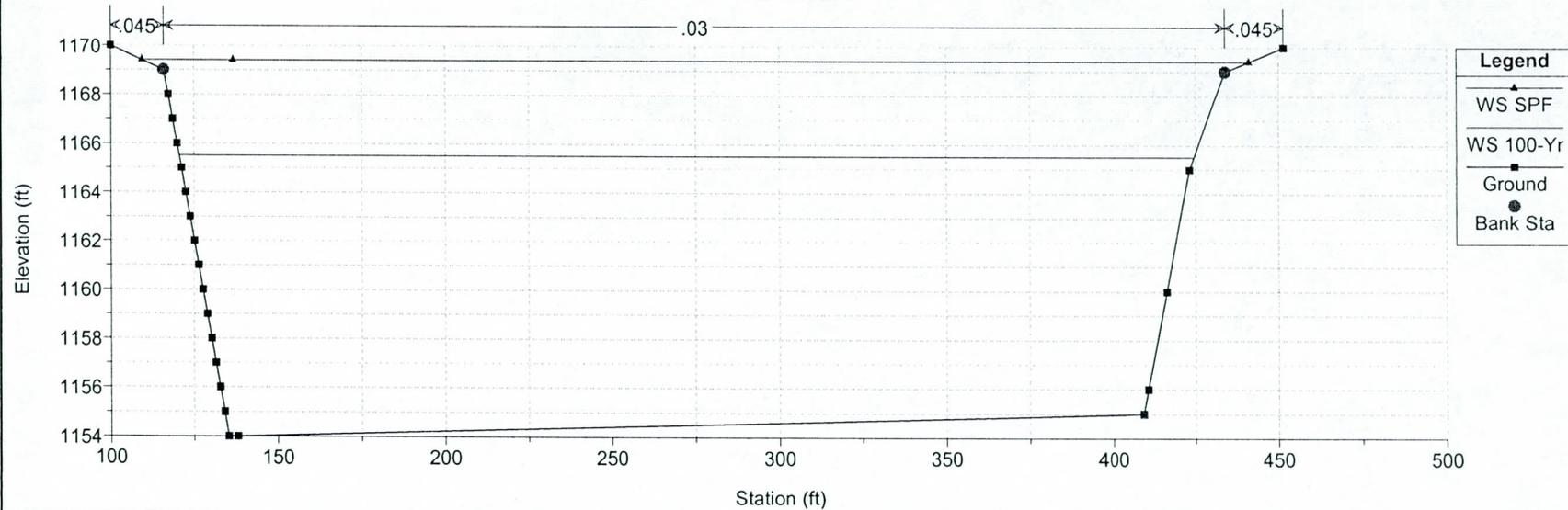


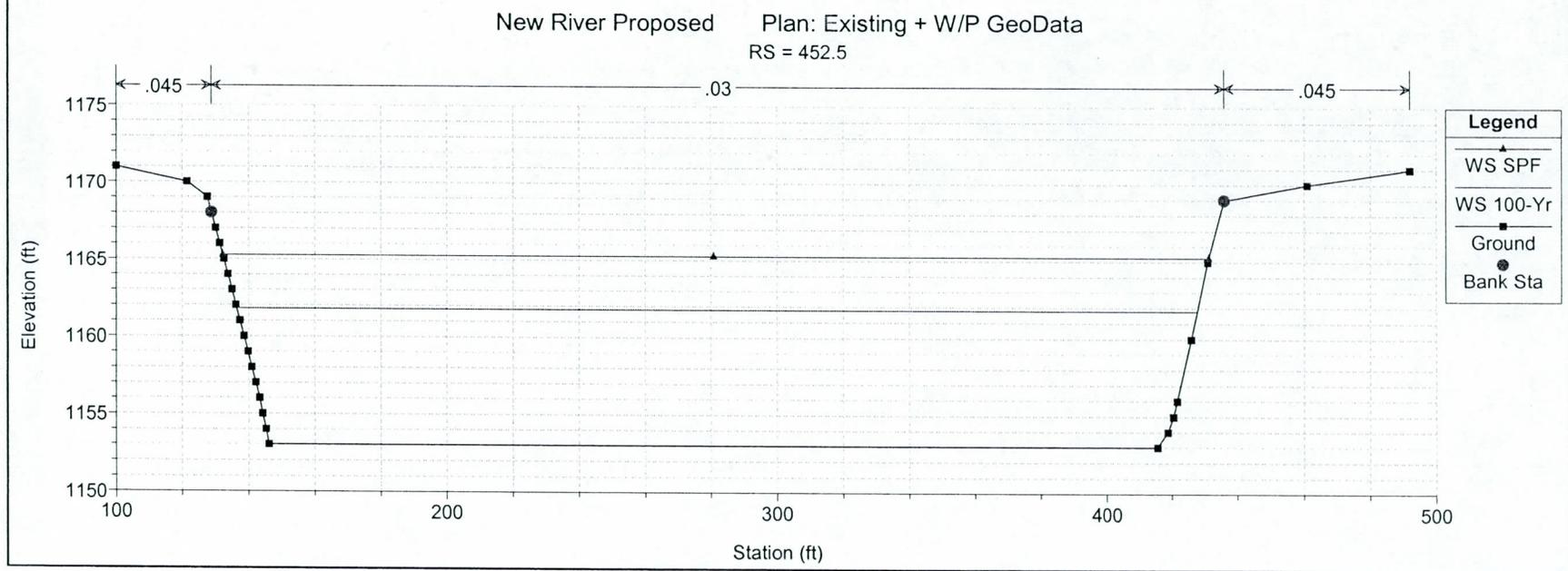
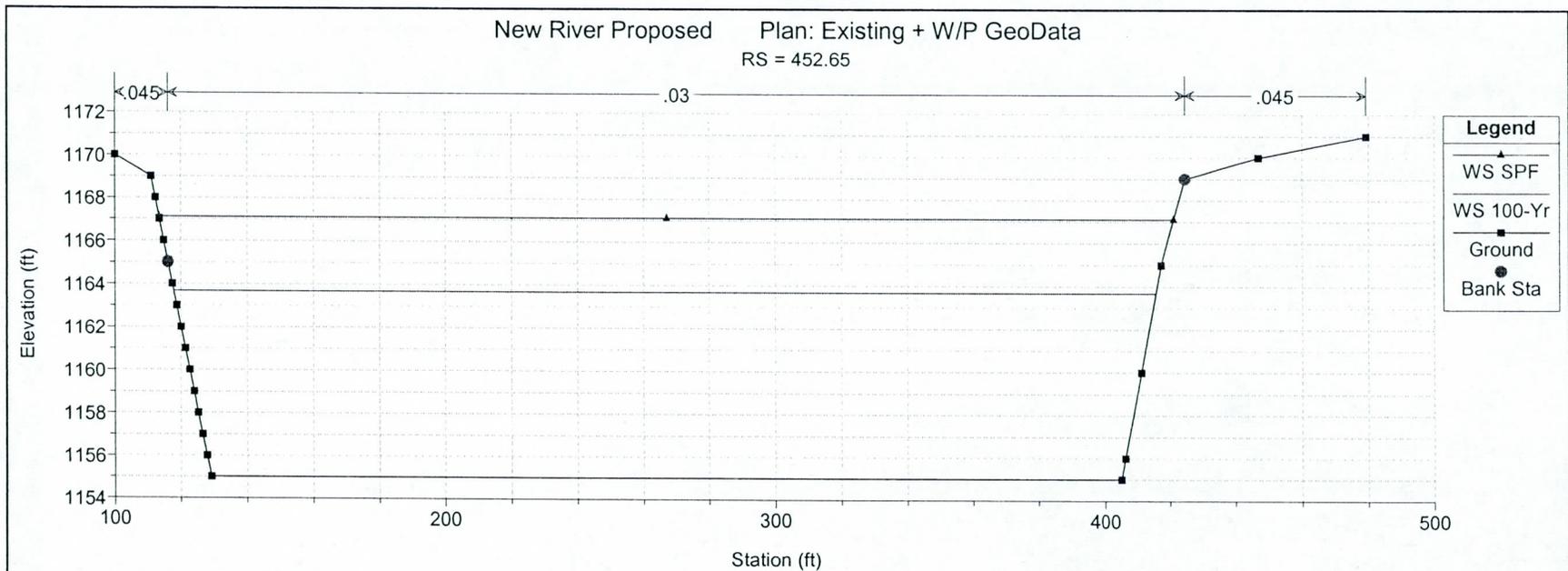


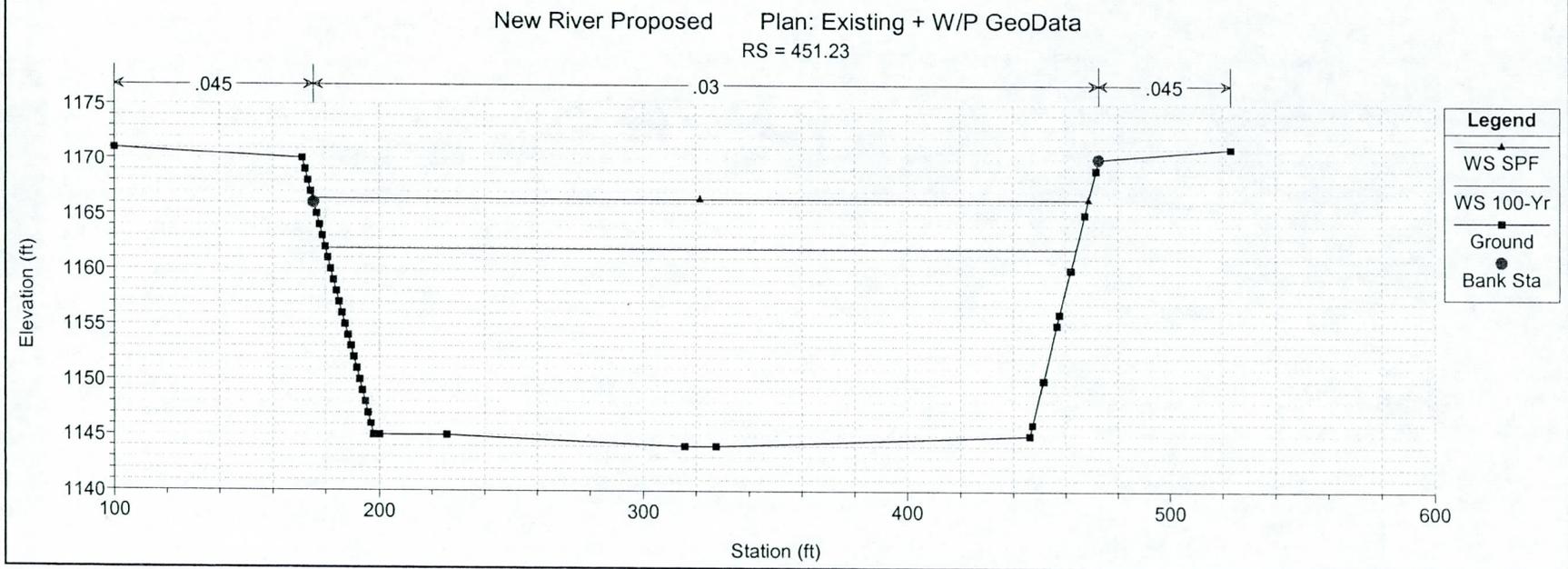
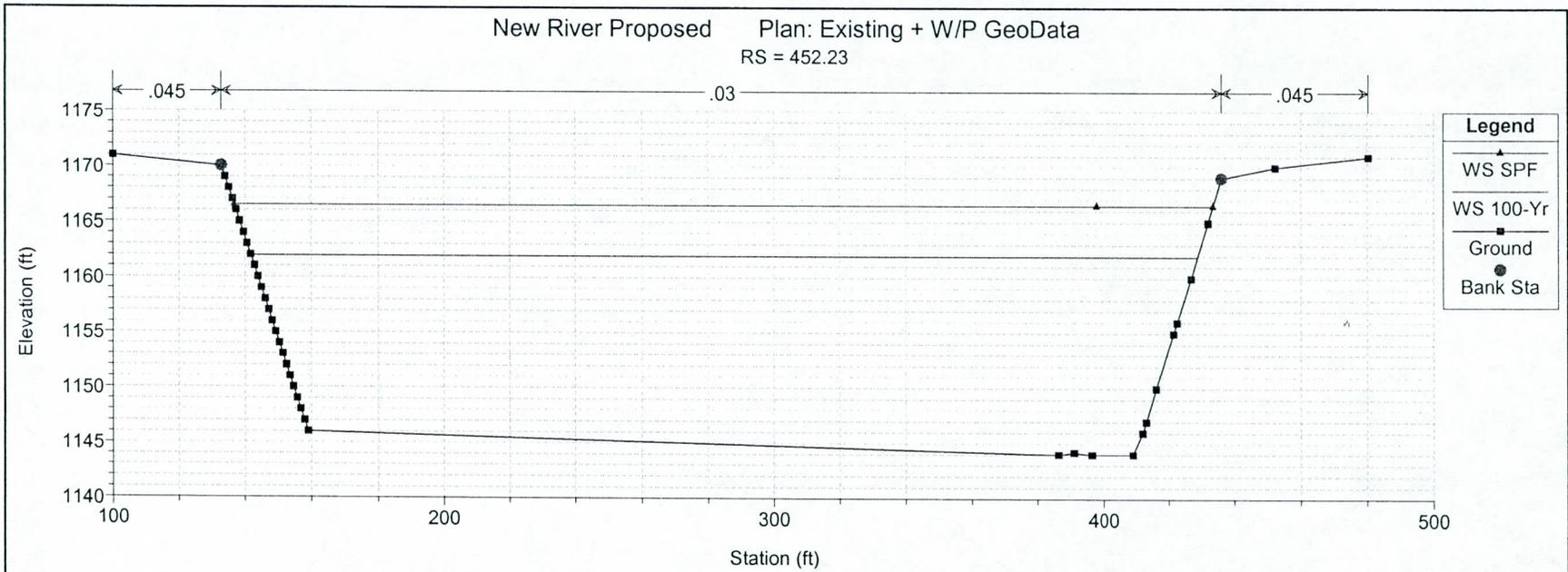
New River Proposed Plan: Existing + W/P GeoData
RS = 453.23



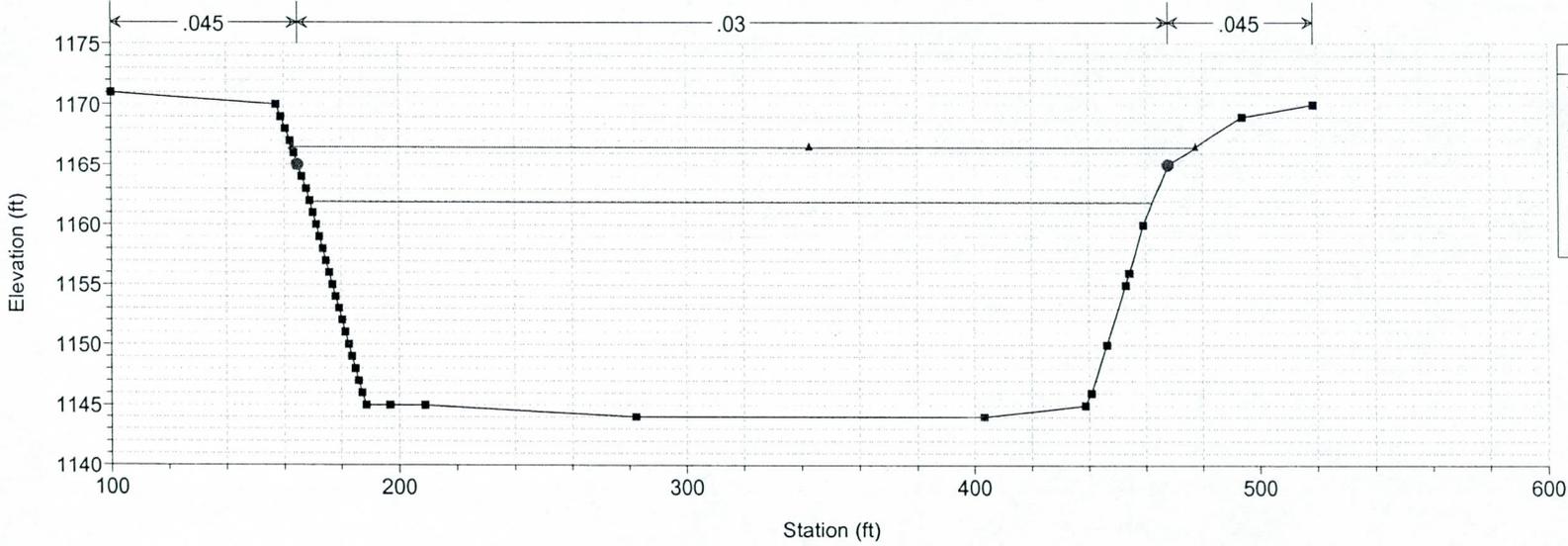
New River Proposed Plan: Existing + W/P GeoData
RS = 452.73







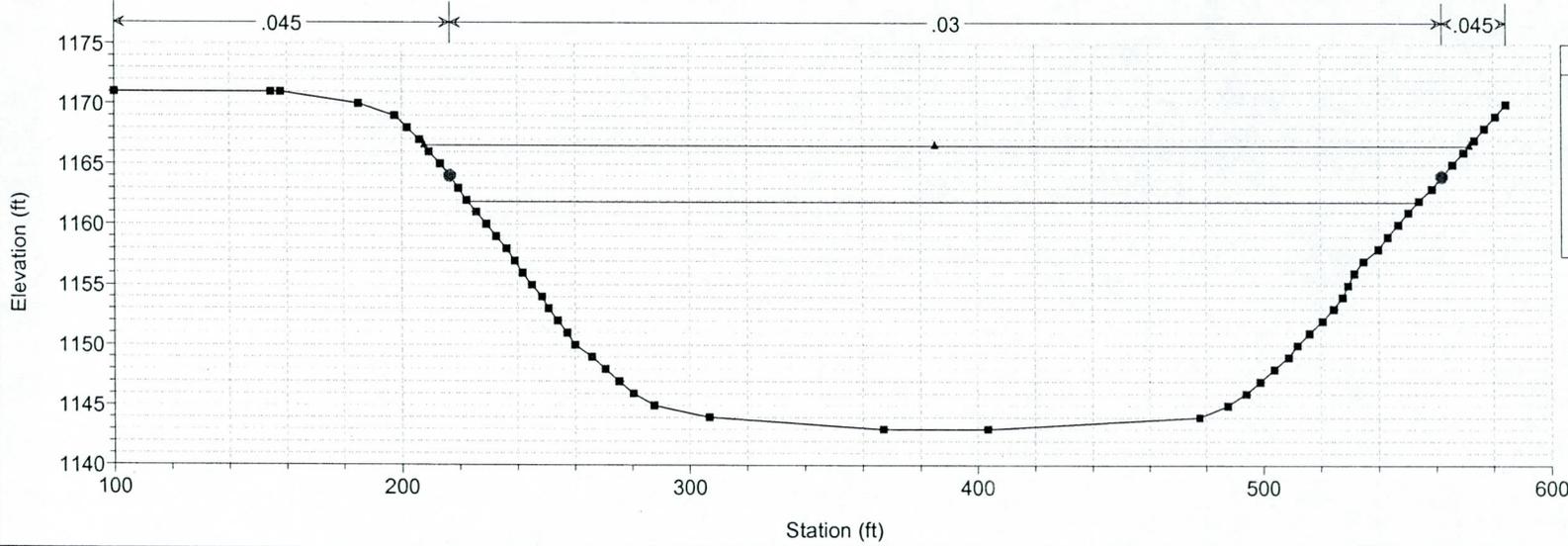
New River Proposed Plan: Existing + W/P GeoData
RS = 451.05



Legend

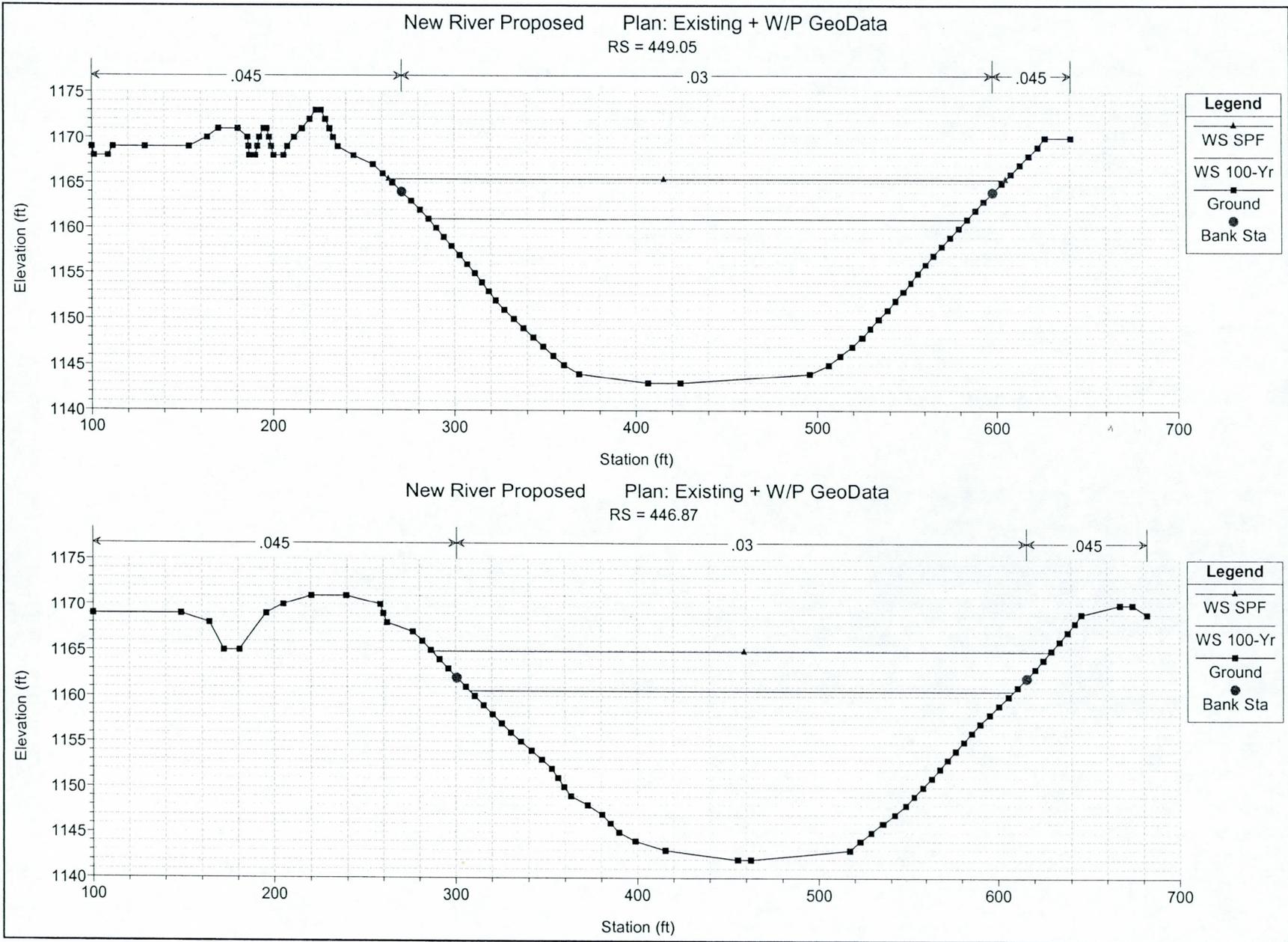
- ▲ WS SPF
- WS 100-Yr
- Ground
- Bank Sta

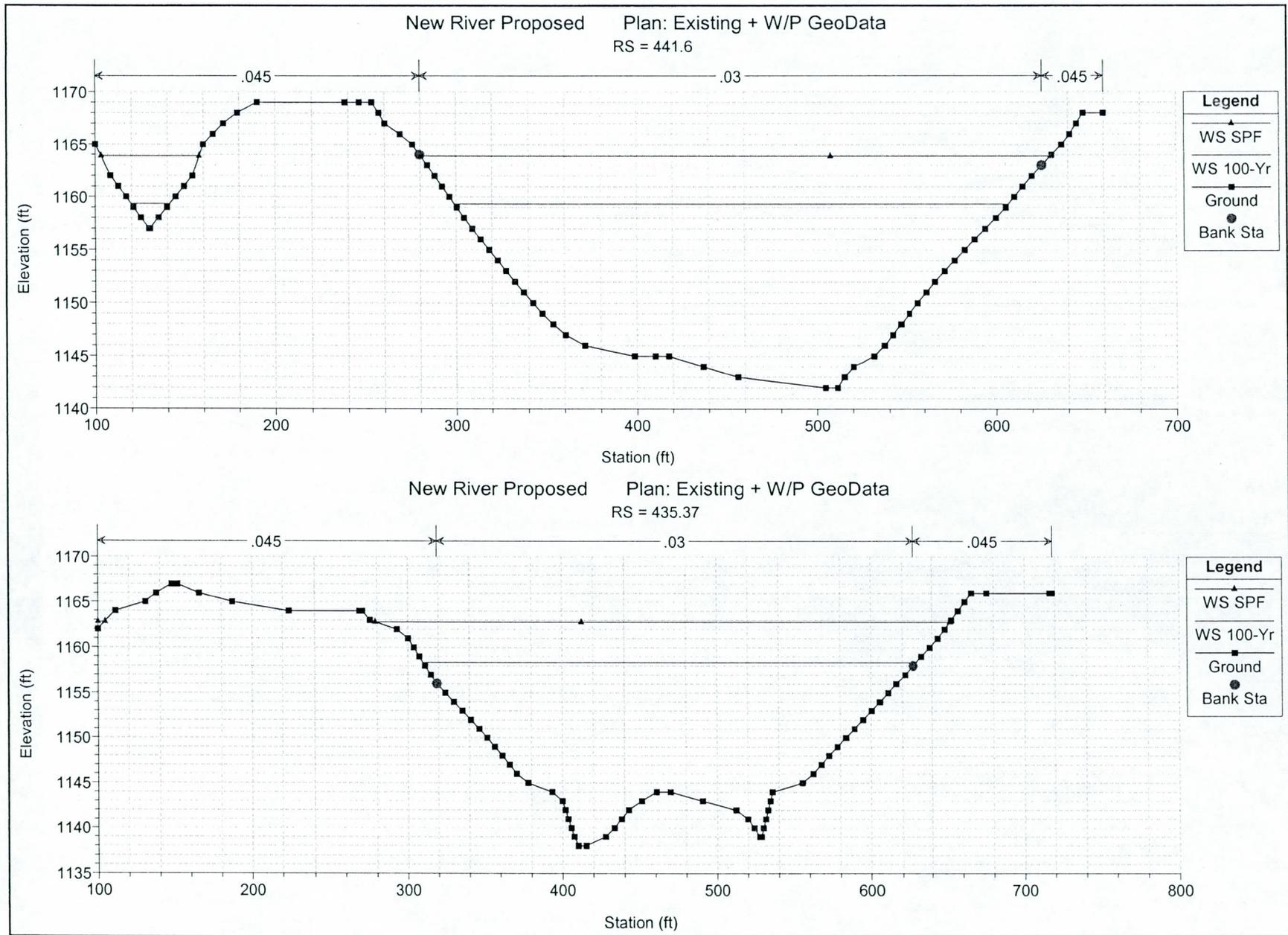
New River Proposed Plan: Existing + W/P GeoData
RS = 450.23

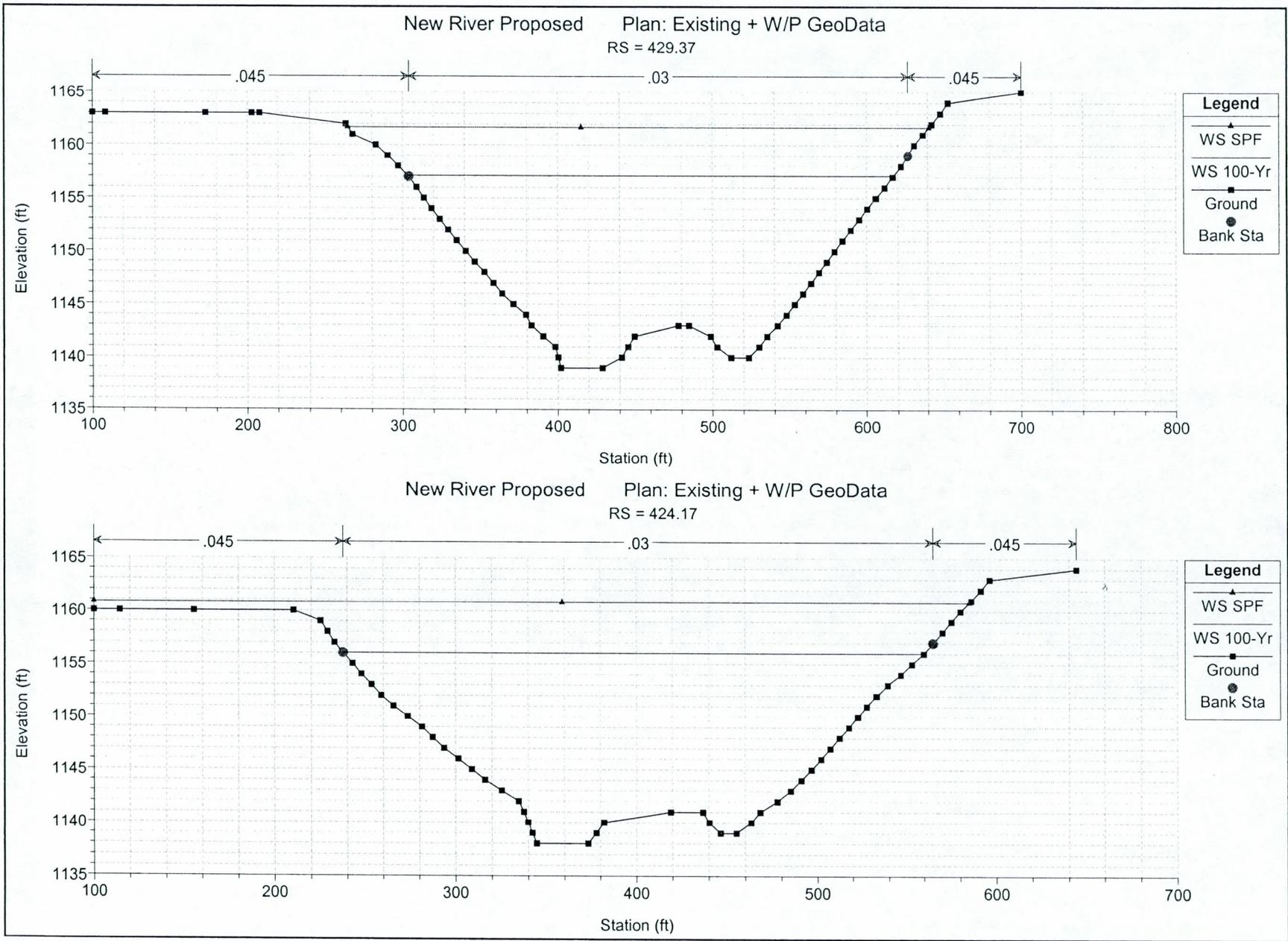


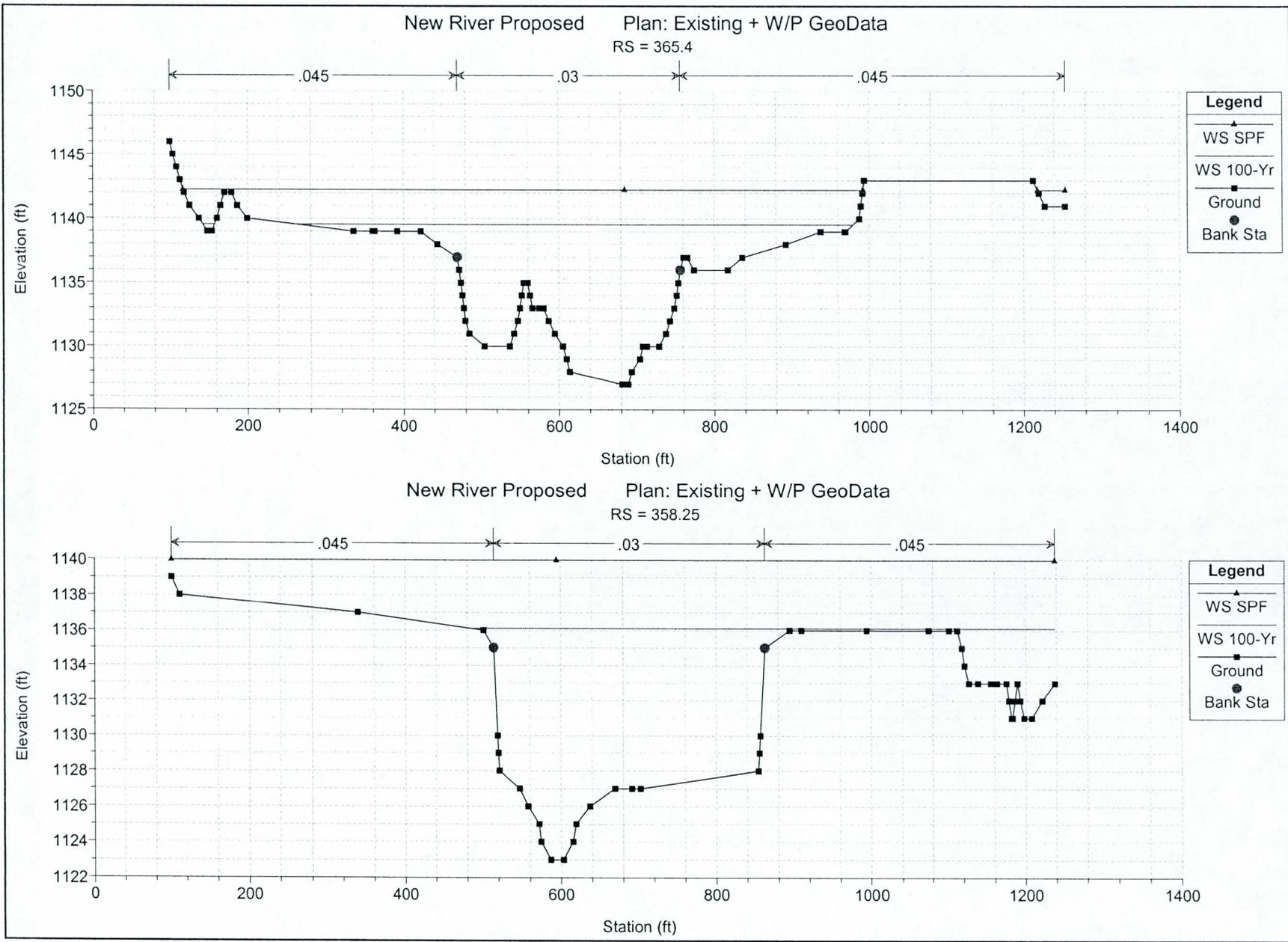
Legend

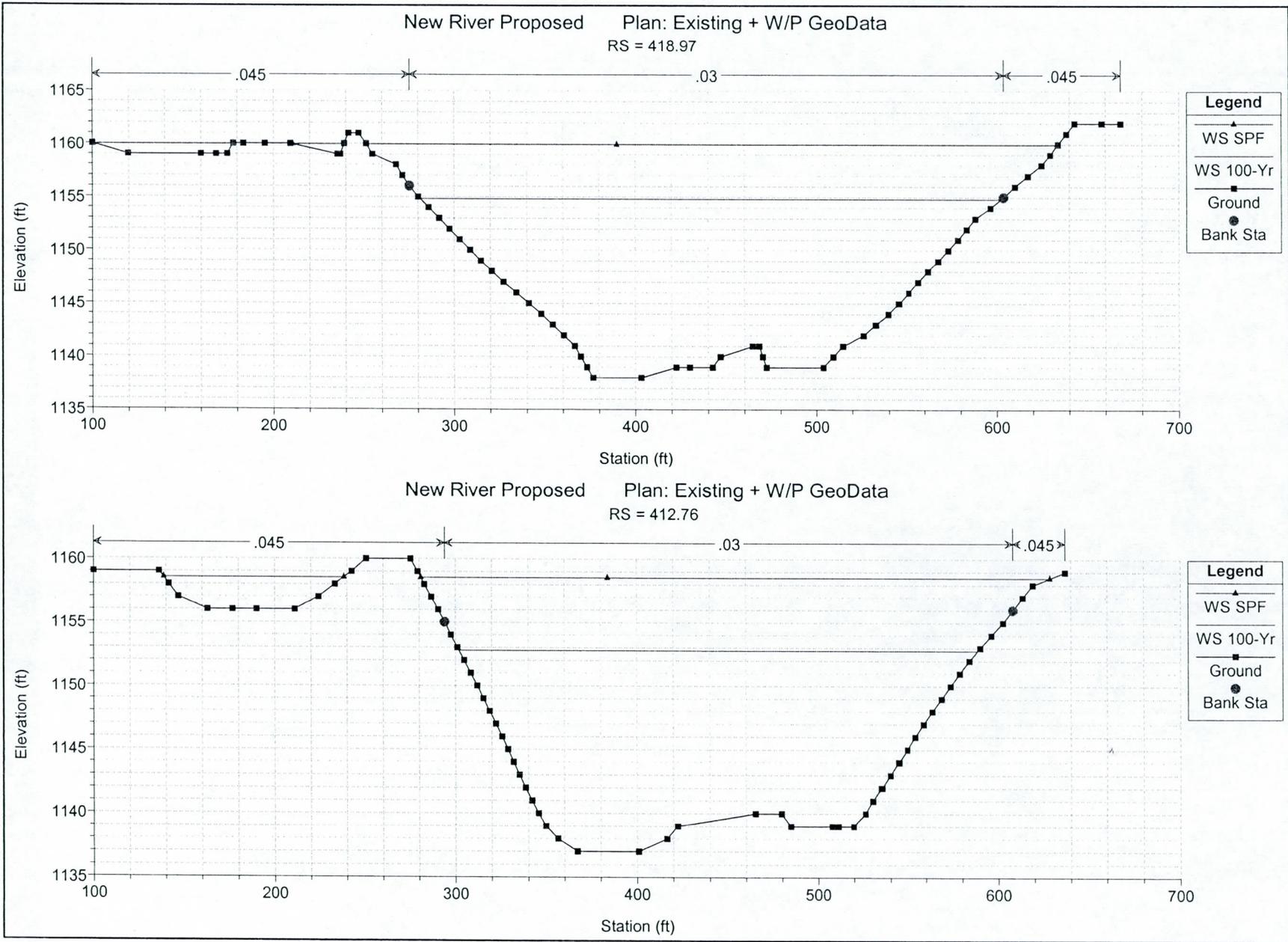
- ▲ WS SPF
- WS 100-Yr
- Ground
- Bank Sta

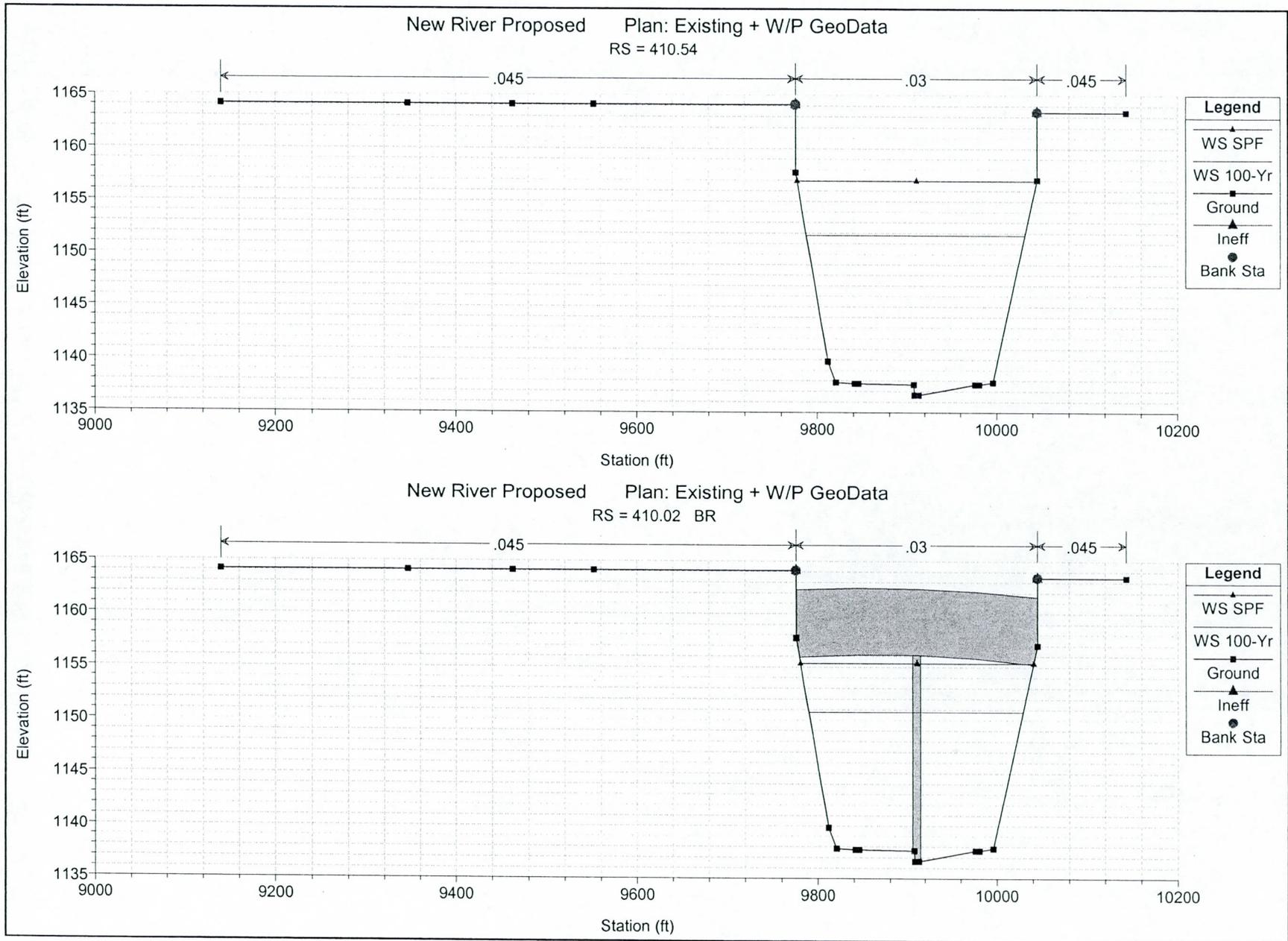


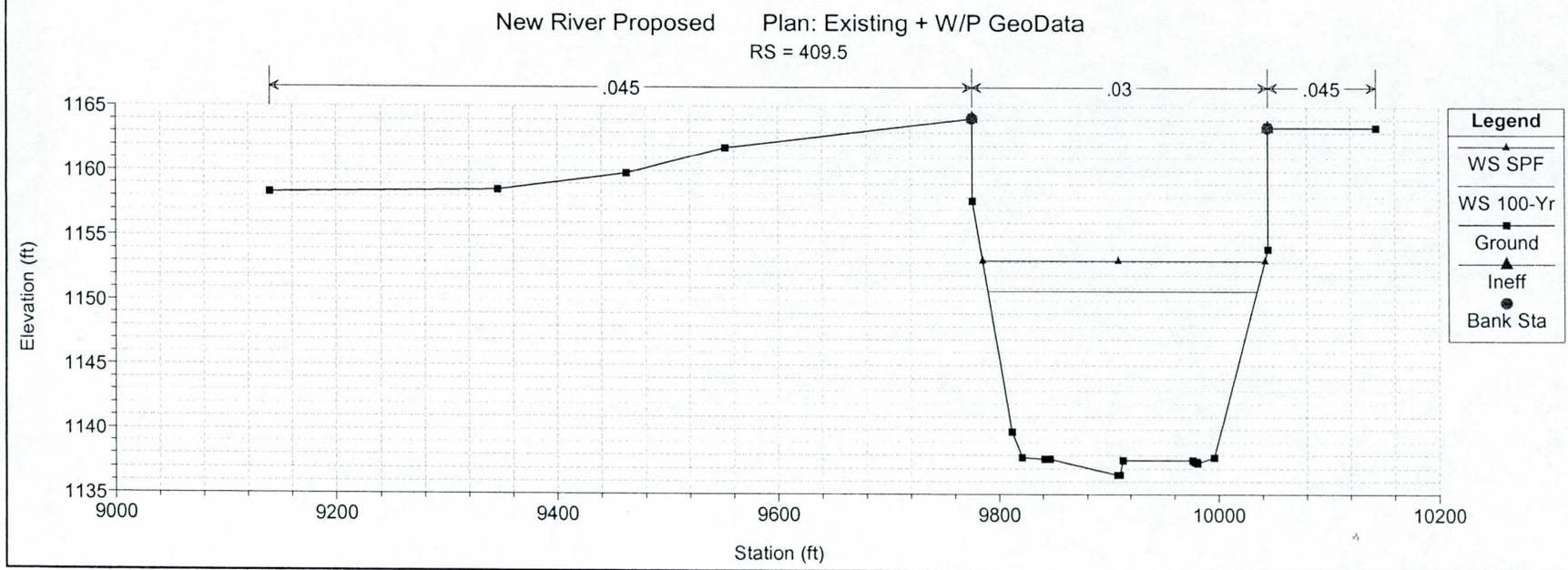
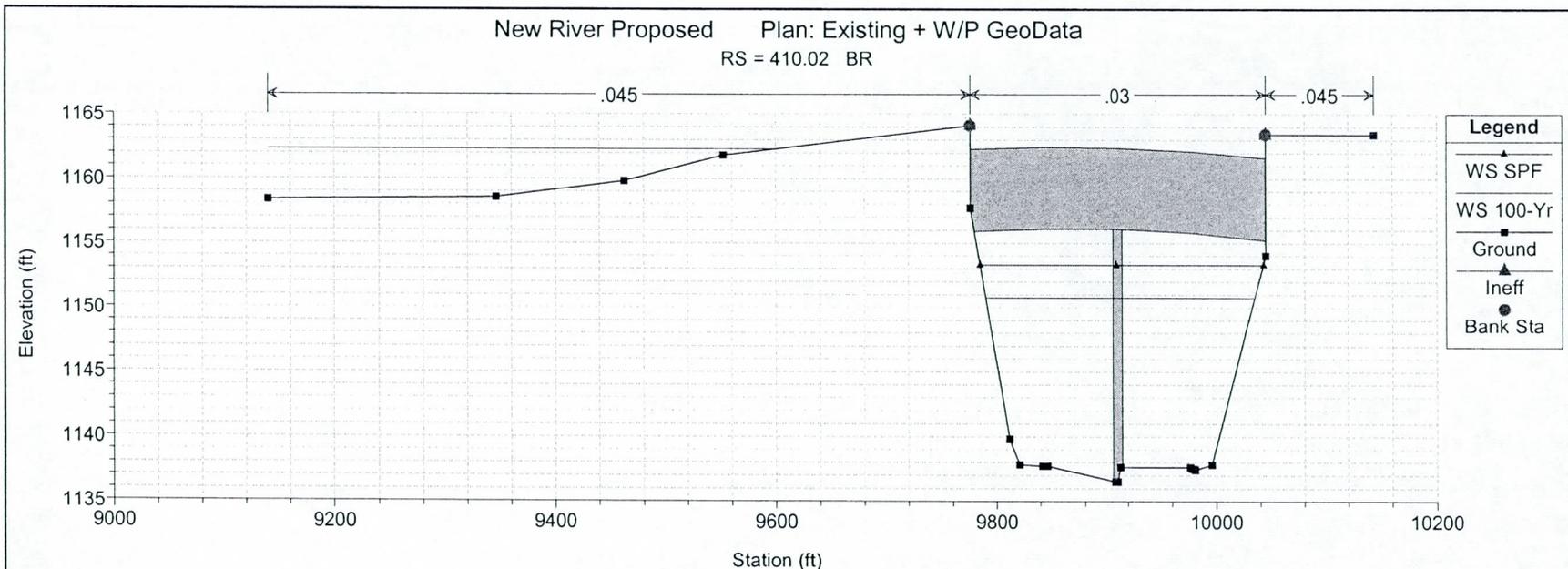


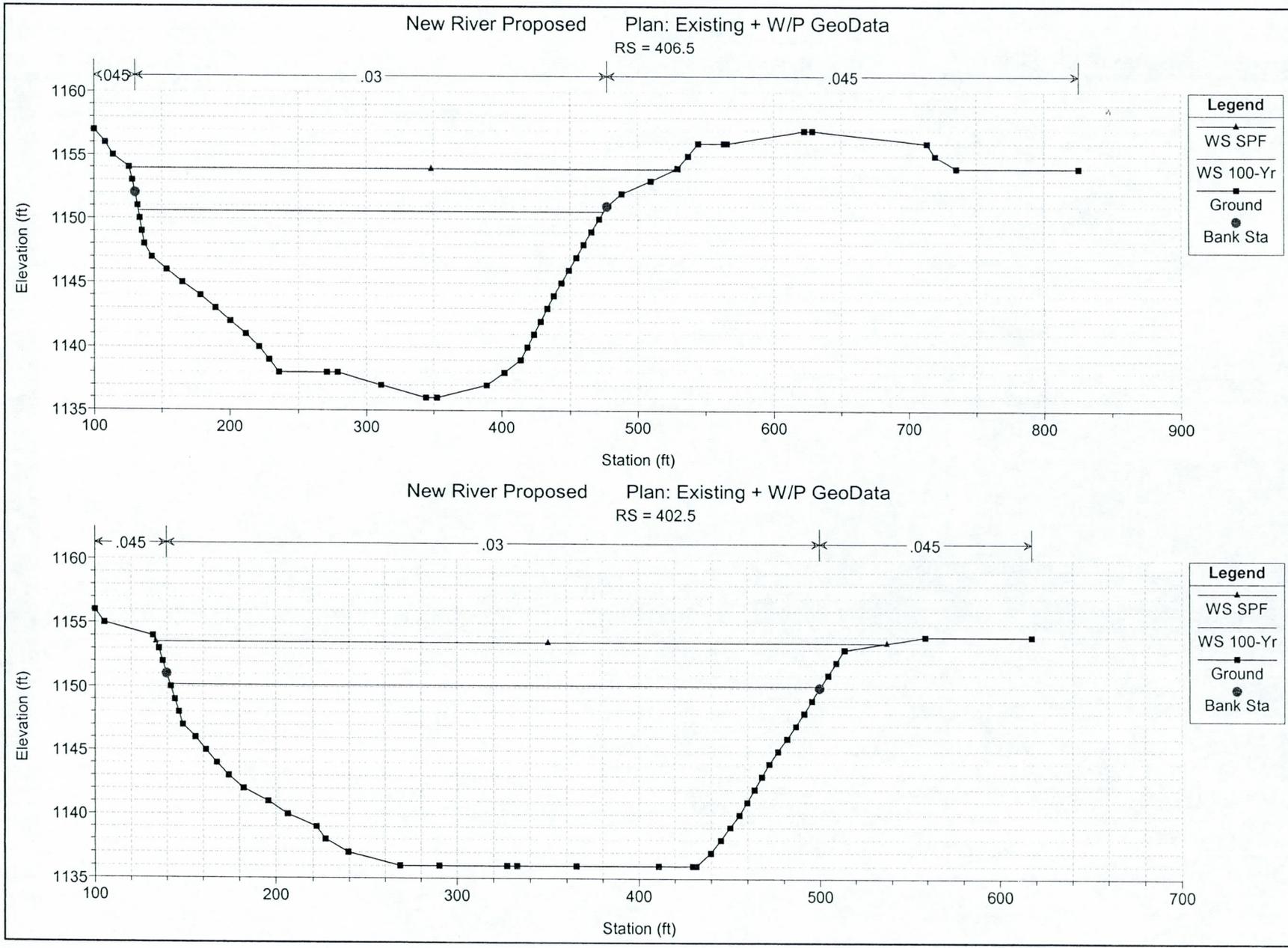


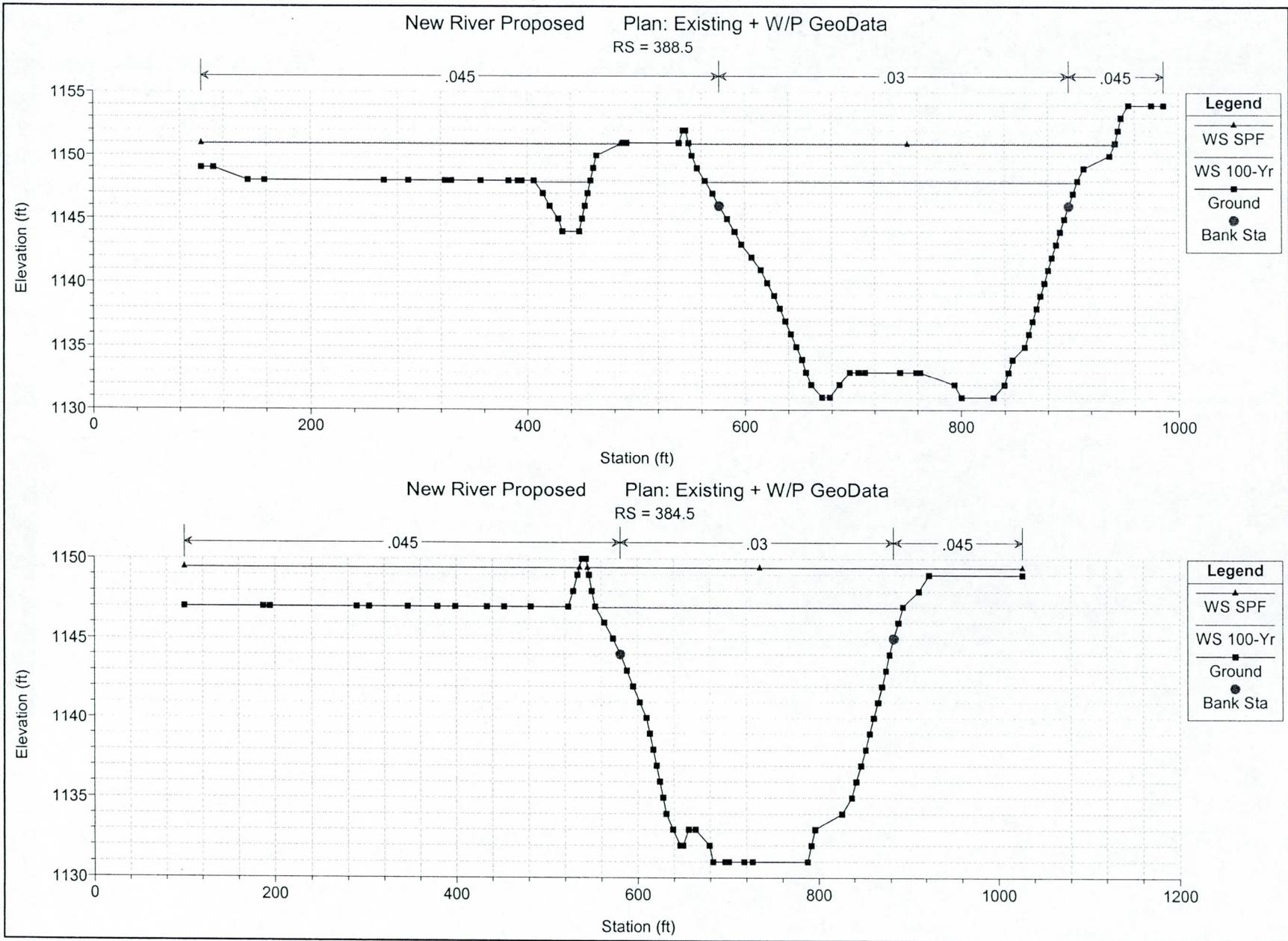


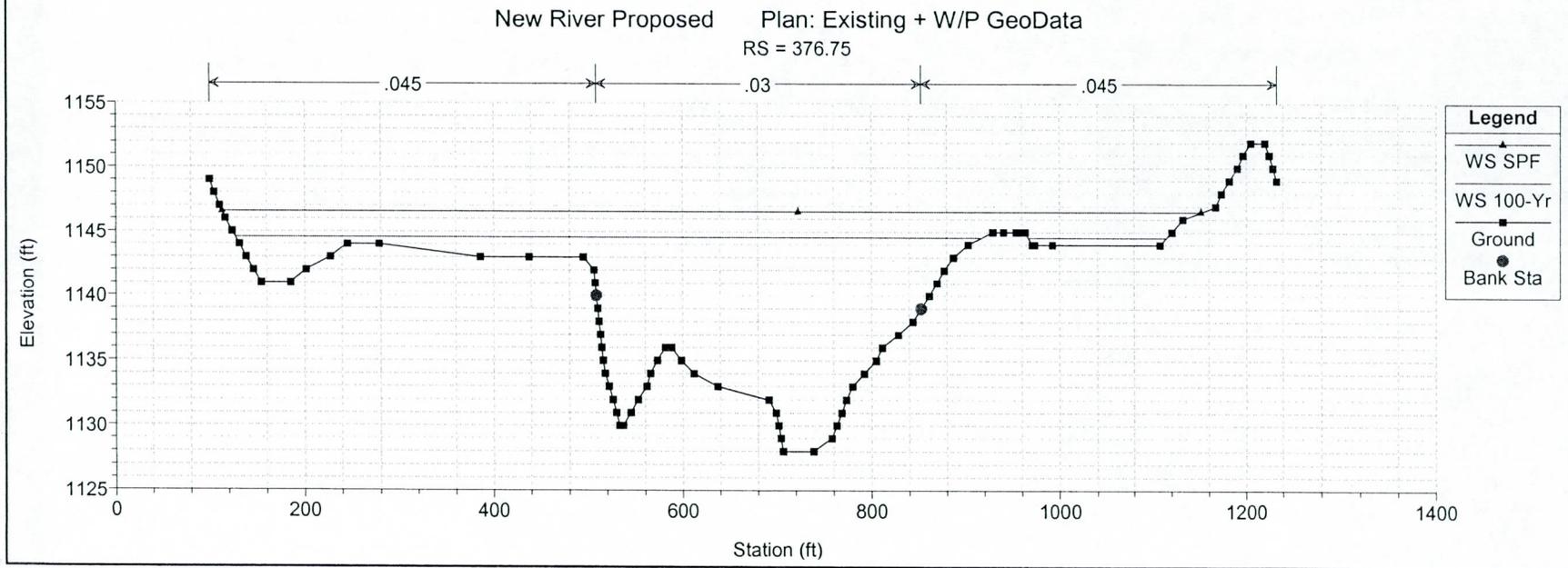
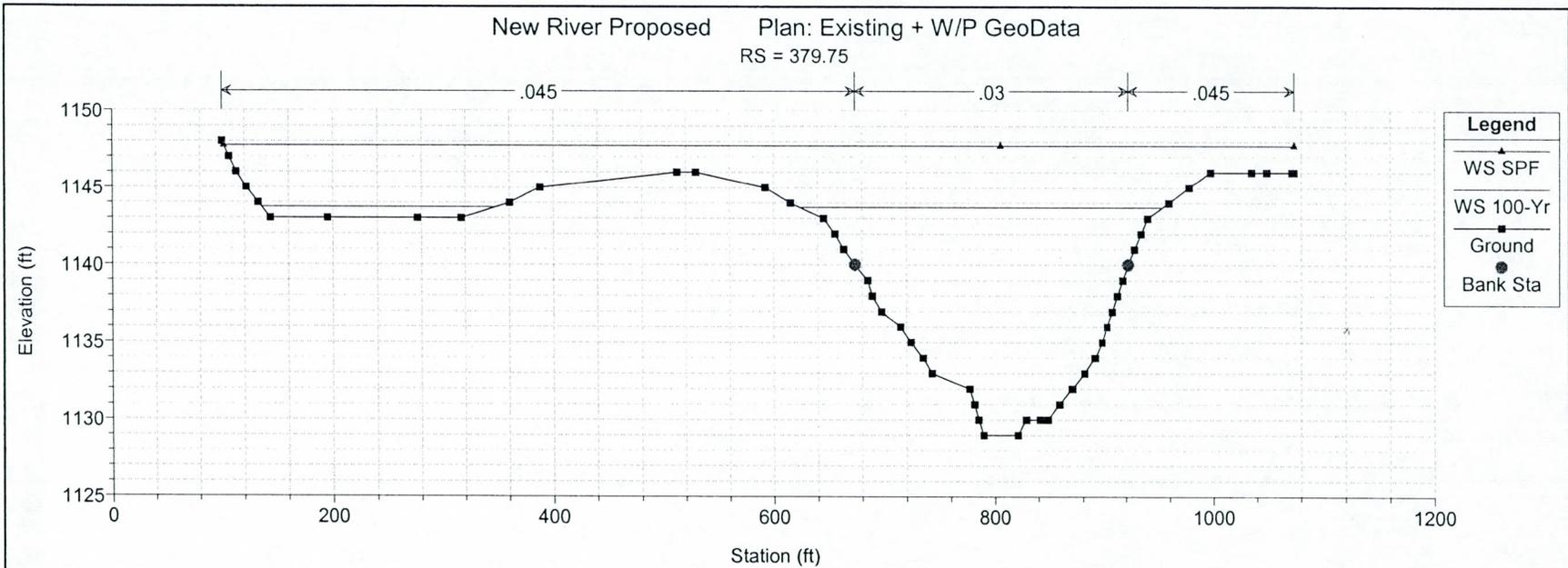


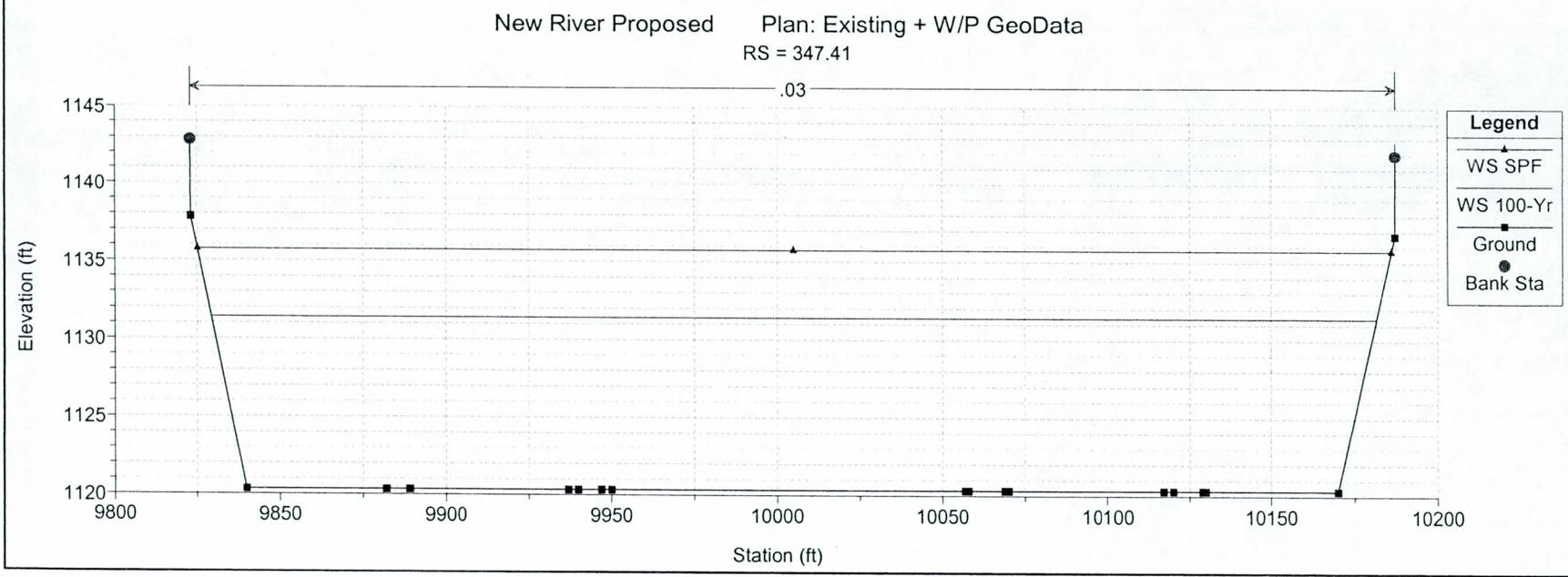
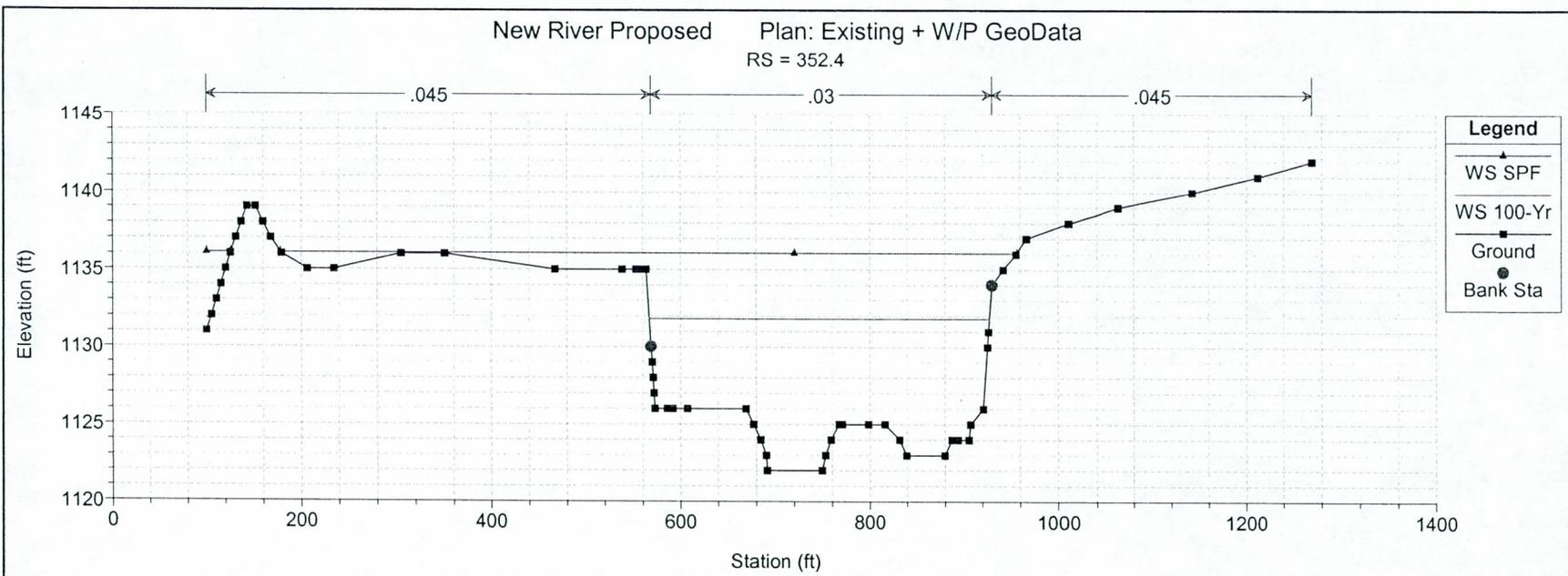


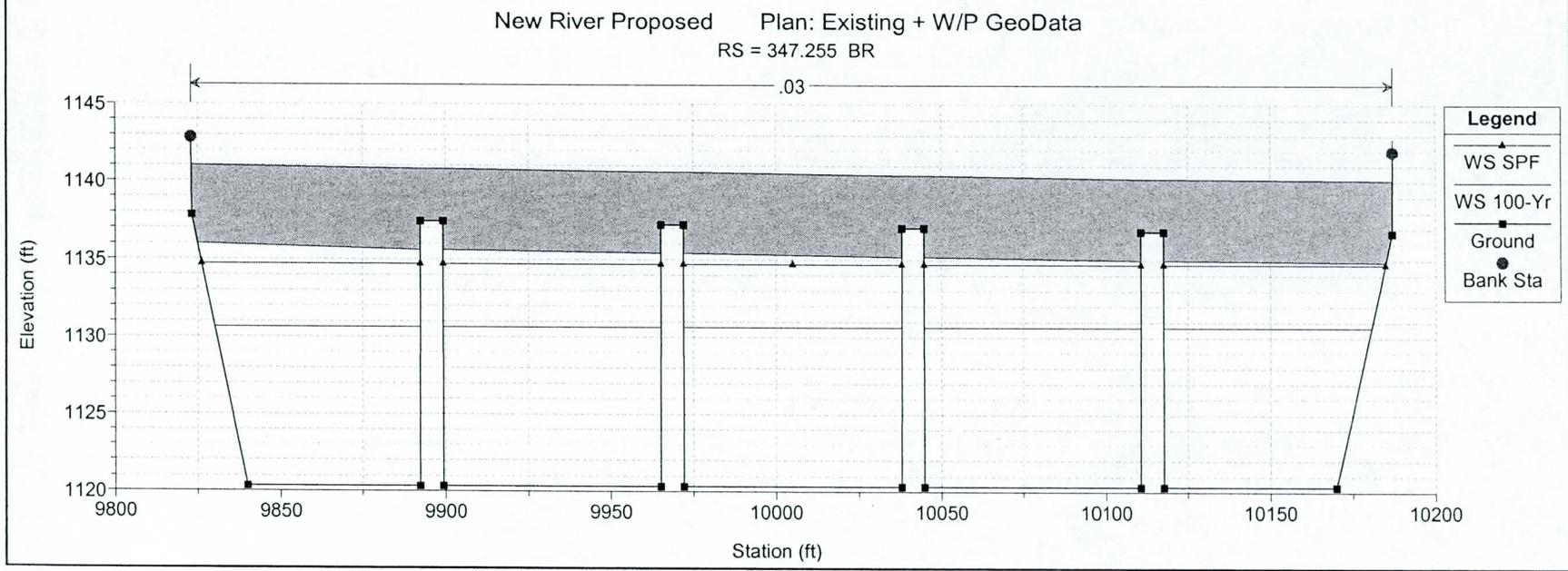
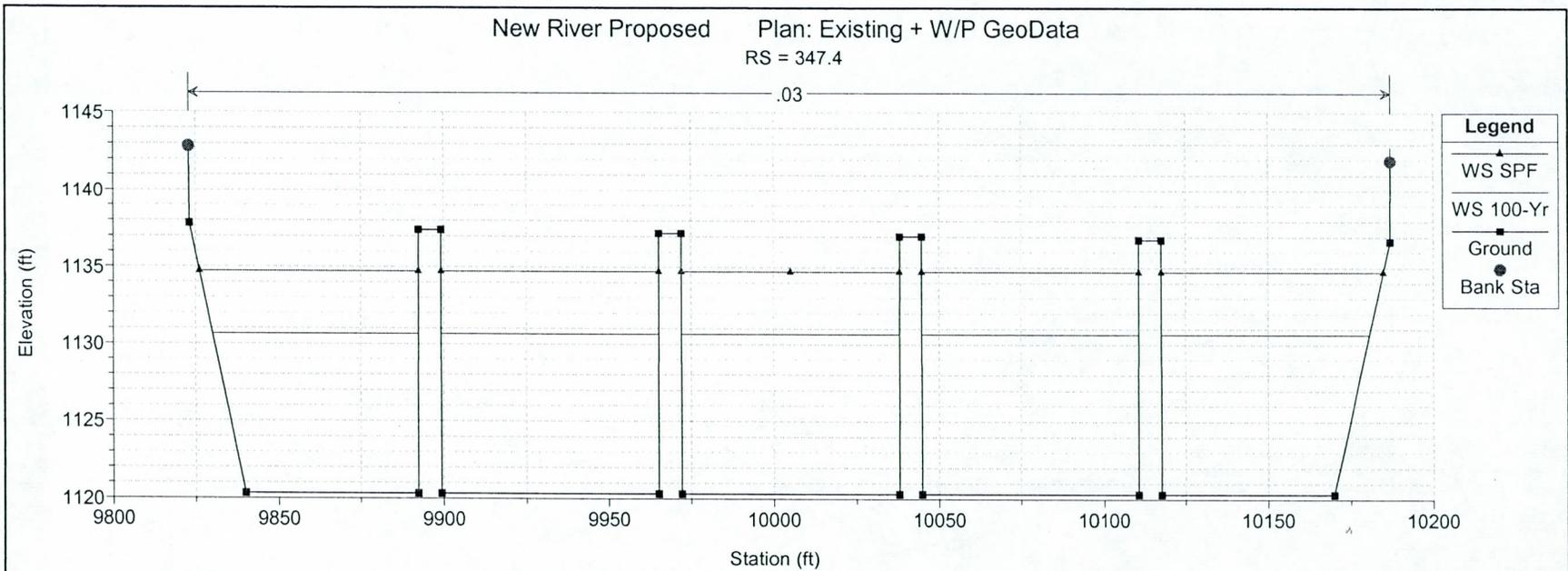


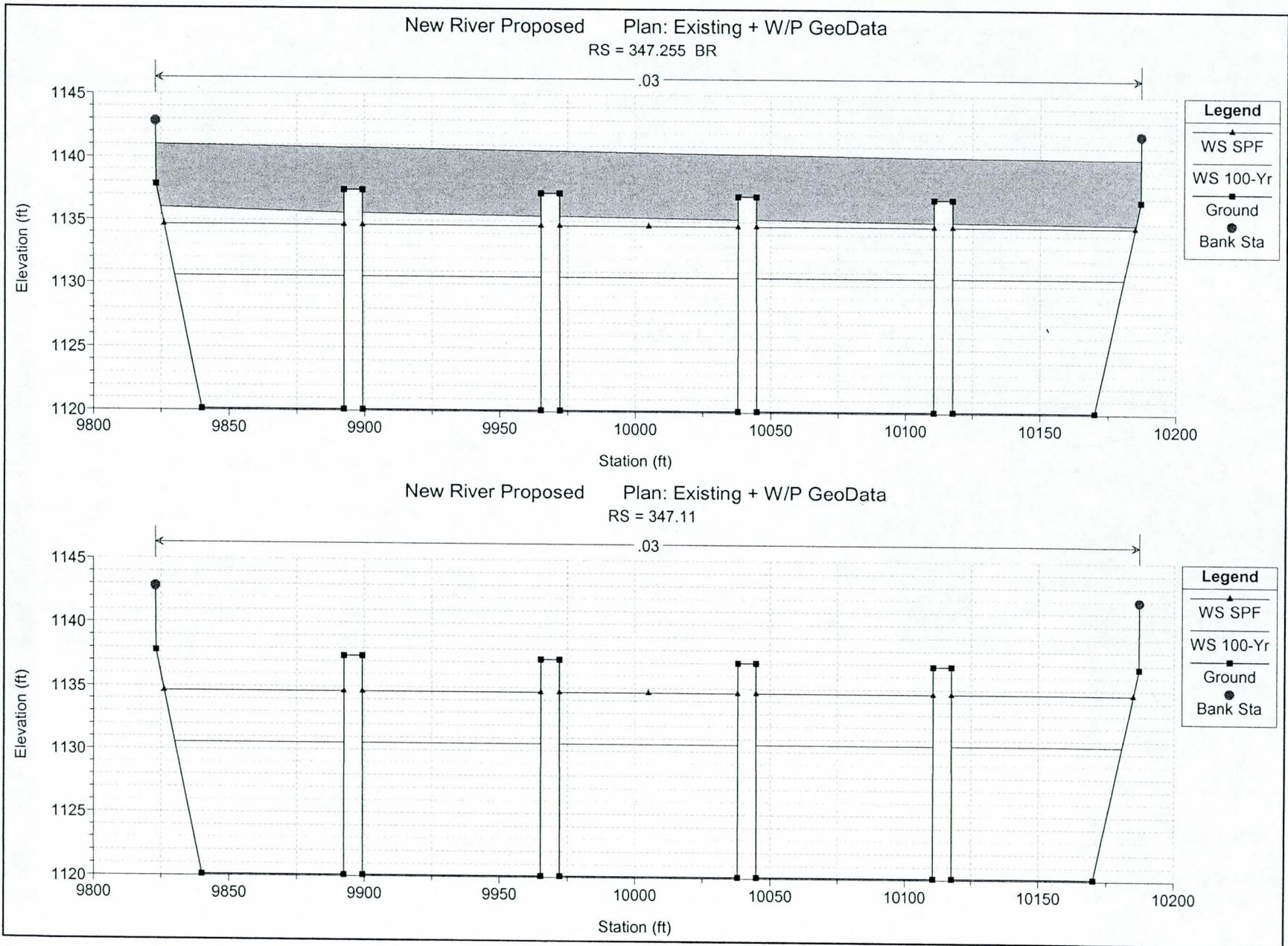


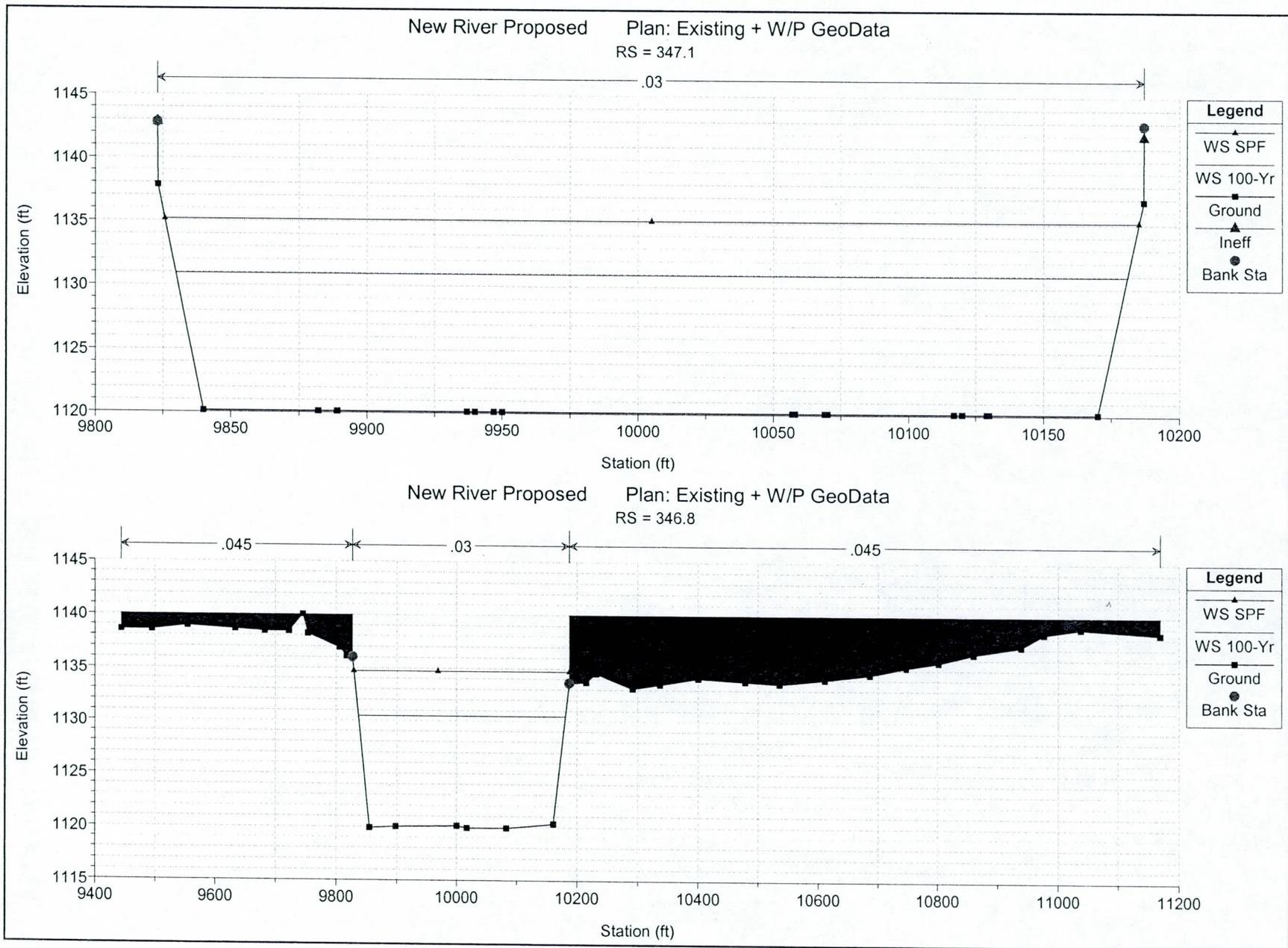


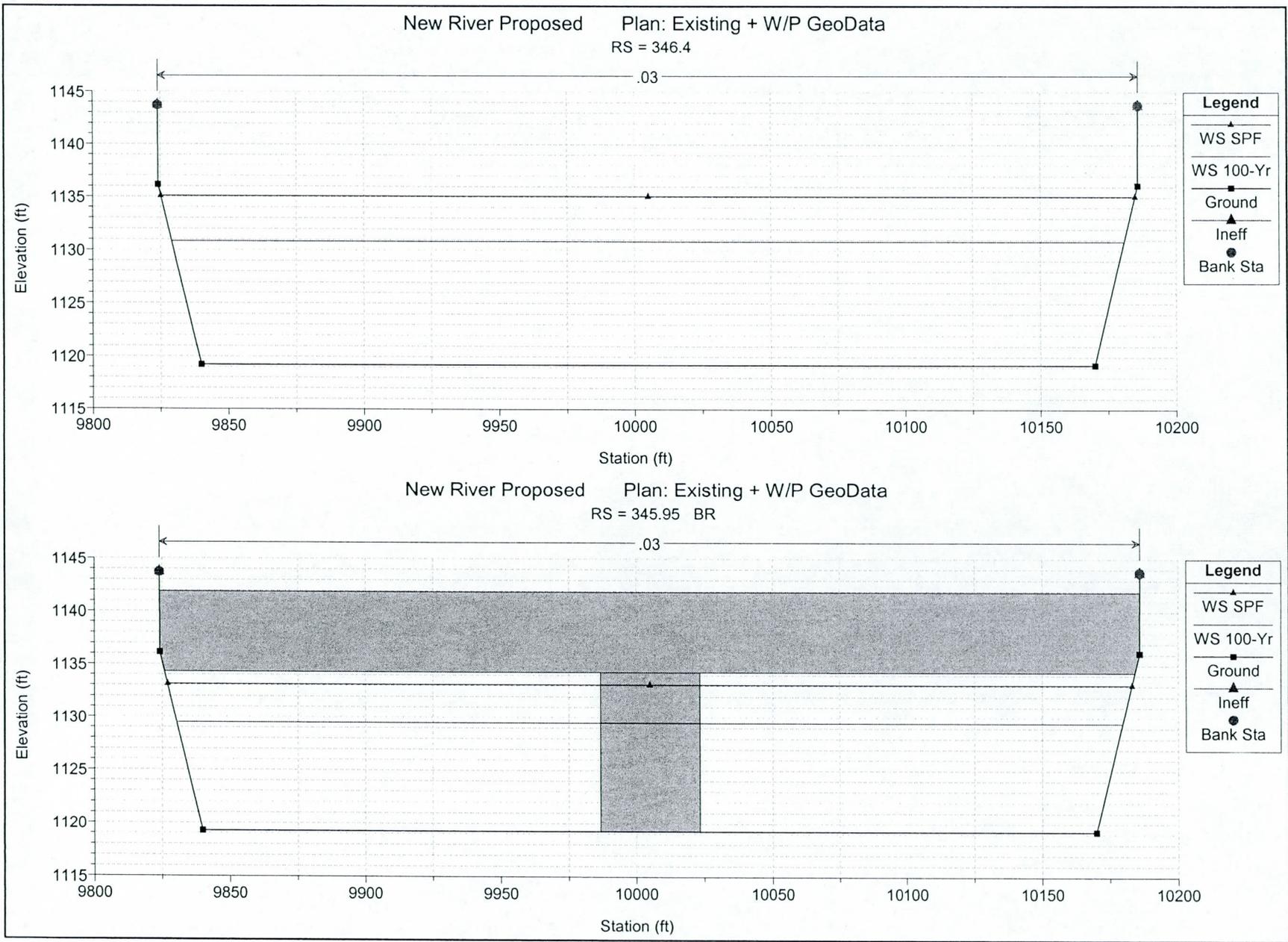


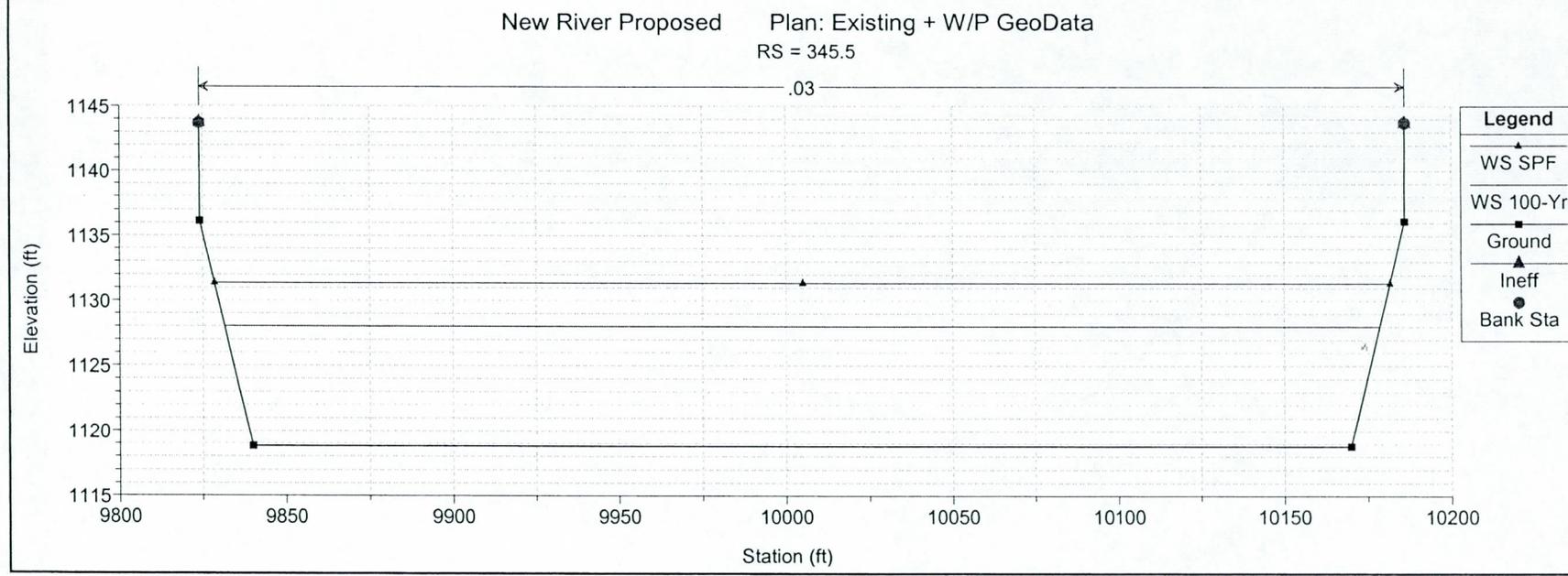
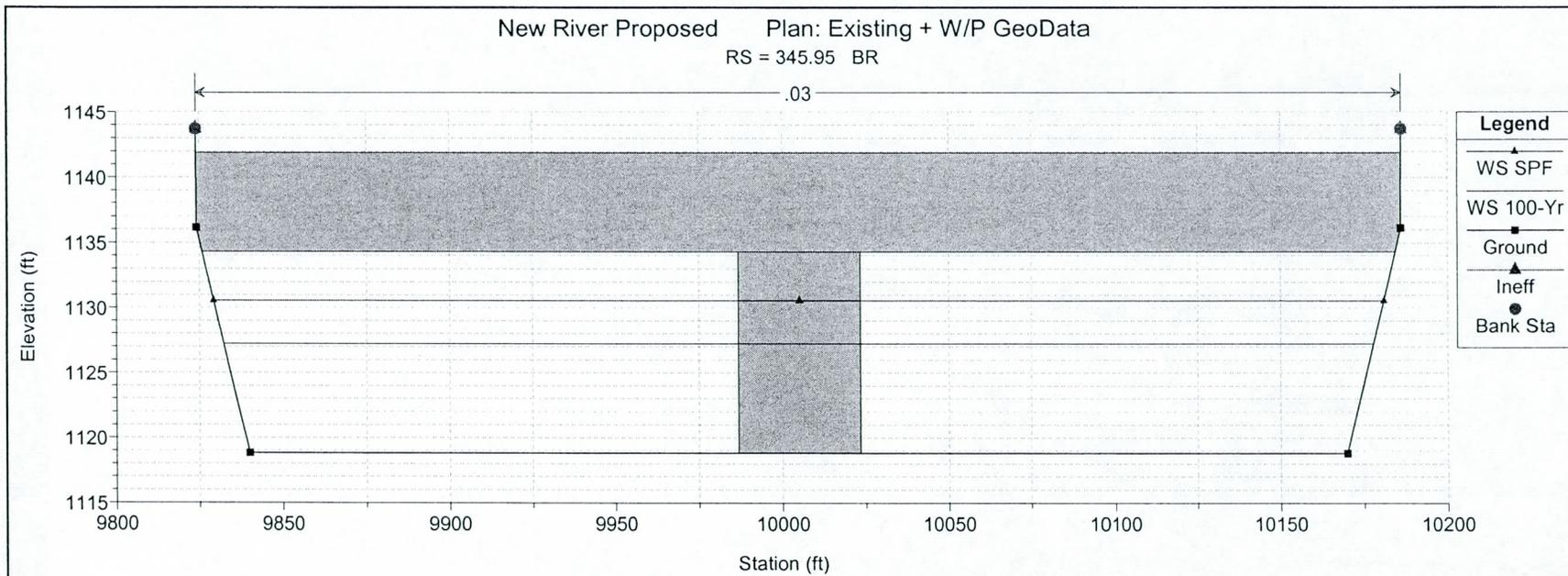


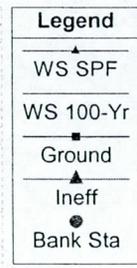
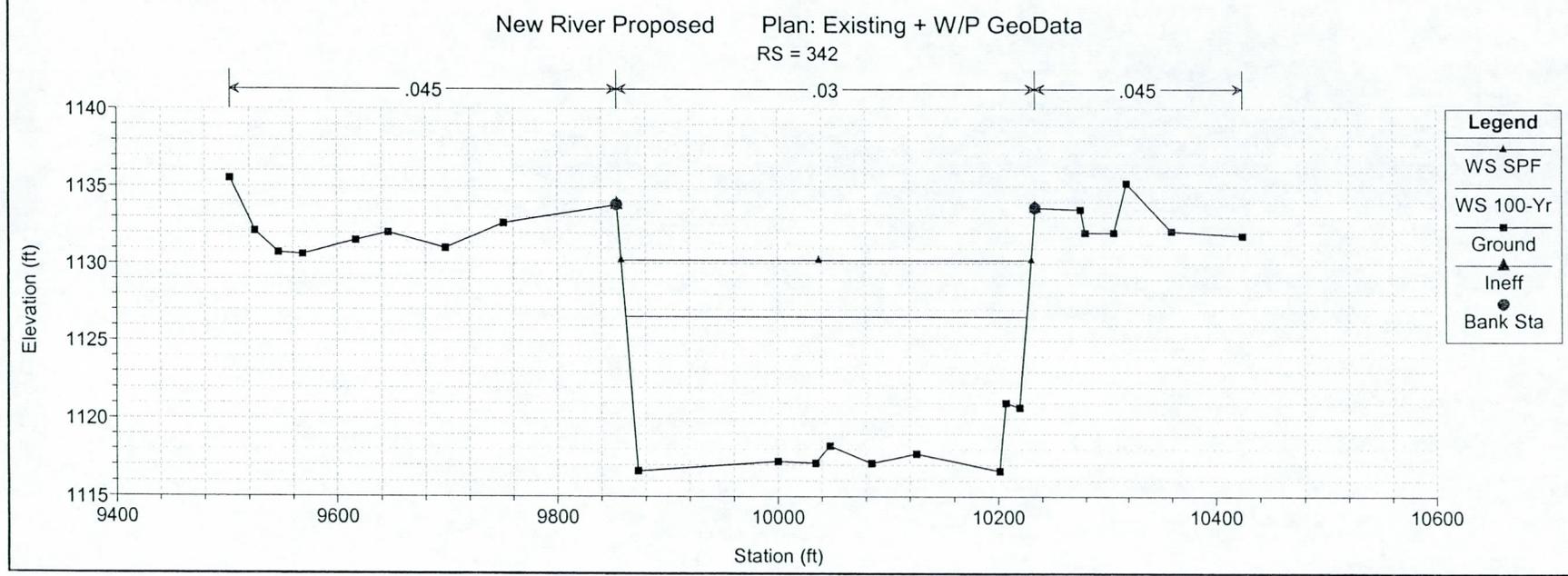
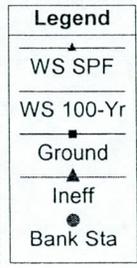
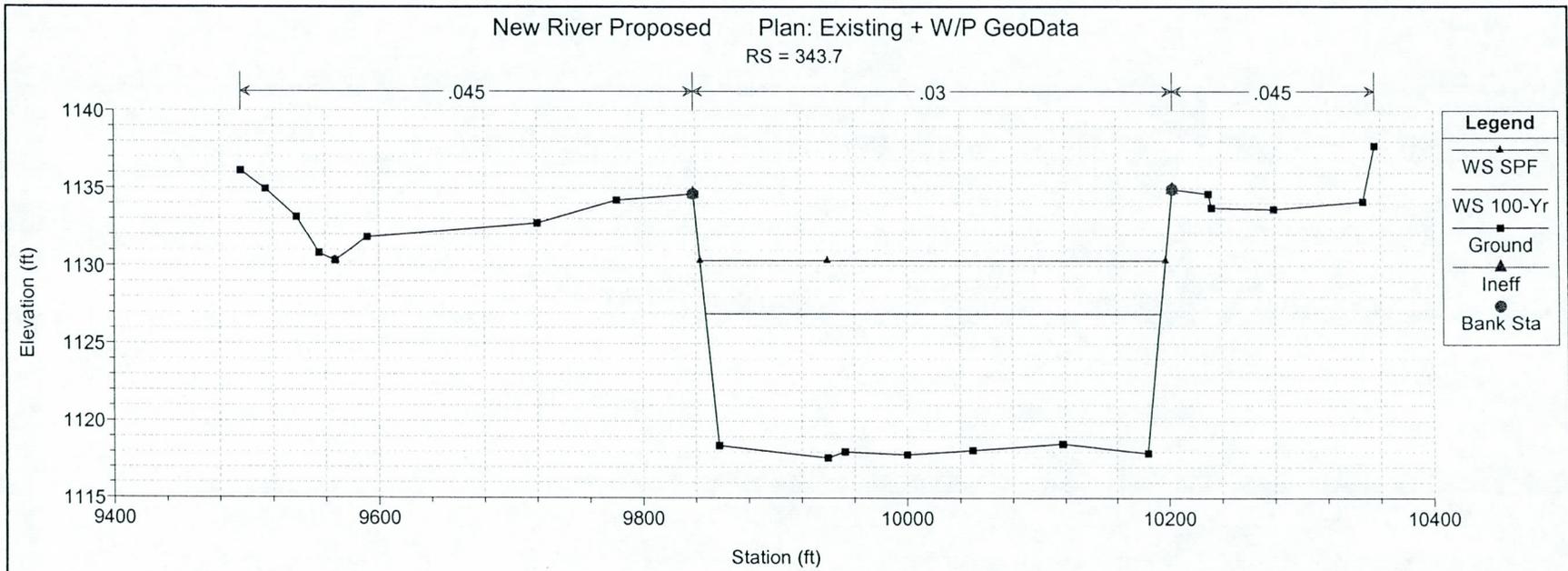












New River Proposed Plan: Existing + W/P GeoData
RS = 337

