



2025-26 Fresno COG One Voice Advocacy Trip

Regional Priorities Submittal Form

Submittal Deadline: Wed., Jan. 15, 2026

Keep your regional priority content to less than three pages long. Do not change the font (*Arial*). Contact Brenda Thomas at bthomas@fresnocog with questions.

One Voice Proposed Priority title:

Firebaugh Multi-Benefit Flood Management Project

Sponsoring agency/business:

City of Firebaugh

- 1. Request summary** – provide specific “ask”. Keep this brief. It should not include the project history or background:
The City of Firebaugh is requesting funding in the amount of \$26,411,000 for implementation of levee improvements and river bank restoration per the Firebaugh Multi-Benefit Flood Management Project. The City of Firebaugh is a Severely Disadvantaged Community (DAC) with a median household income of \$43,971 (as of 2017). Local funding sources alone are insufficient to implement a project of this scale; therefore, federal funding is critical to advance the protection of critical city infrastructure and the community at large.
- 2. About the Priority:** (Provide specific information about your proposed priority. Include information you want included in the trip materials.)

The Firebaugh Multi-Benefit Flood Management Project (Project) is a multi-benefit flood risk reduction project along the San Joaquin River. This project has been developed through coordination with multiple local, regional, State, and federal stakeholders with jurisdiction and responsibilities along the San Joaquin River. The Project will provide flood protection for the City for the projected 100-year storm event along with ecosystem restoration and recreational facilities in an integrated and cost-effective manner. The City commissioned a Flood Risk Reduction Feasibility Study (2022) which determined that even though the San Joaquin River is flanked by levees, they are too short in many areas in Firebaugh and sand-bagging is required even during

routine storm events with return periods less than 10 years. This leaves Firebaugh without protection against the 100-year rainfall event and some parts of the City are more vulnerable than others. The following locations and facilities have been identified as the most vulnerable:

- Firebaugh's wastewater treatment plant is located near the west bank of the San Joaquin River at the south end of Firebaugh. Flood flows in the river have threatened the treatment plant in recent years.
- The San Joaquin River makes a sharp turn to the northeast near the intersection of 9th and Q Streets in Firebaugh. The west bank at this turn is steep, unstable, and less than 50 feet from several residences. These residences are threatened due to bank erosion and the next major flood event is likely to flood these homes.
- One of Firebaugh's drinking water treatment plants (Well No. 11) is located south of 13th Street, near the City's rodeo grounds and park. Flood flows in the river have inundated the rodeo grounds and threatened the treatment plant in recent years.

Flooding at these locations poses risks not only to local residents and critical city infrastructure, but also to water quality downstream along the San Joaquin River. In order to reduce flood risk and protect the vulnerable parts of the City, the following Project improvements are needed:

- The construction of a setback levee to protect the Firebaugh Wastewater Treatment Plant and provide recreational and riparian habitat enhancements along this reach of the San Joaquin River. Estimated cost \$18,830,000.
- Stabilization of the eroding bank at a sharp bend in the San Joaquin River in Firebaugh. Estimated cost \$4,095,000.
- The construction of a setback levee to protect the Firebaugh Water Treatment Plant near the Rodeo Grounds including recreational and riparian habitat enhancements. Estimated cost \$3,486,000.

The Project scope would include 5,850 linear feet of replacement levees, 6,350 linear feet of recreational trails, 130 acres of riparian scrub and forest, and seasonal wetland; and 500 linear feet of sheet piles for erosion control.

3. Priority background – (Include the priority issues, history and an explanation of the regional significance if not provided in question 1)

The primary source of flooding in Firebaugh is the San Joaquin River; however, the North Fork of the Kings River is also a tributary stream that can also contribute to flood risk in the City. Flooding and flood risk have been documented in Firebaugh for decades. While the Flood Risk Reduction Feasibility Study prepared in 2022 outlined opportunities to protect vulnerable areas, flooding issues were previously documented in a Flood Insurance Study completed in 2016, which was based on a hydrologic and hydraulic analysis conducted in 2001. Documented flood events include:

- In 1983, the City experienced flooding due to seepage at the high school when freeboard was reduced to less than three feet.
- In 1997, the City was ordered to evacuate as river flows reached approximately 6,500 cubic feet per second (cfs) near the City (equivalent to a 100-year storm event).
- In 2006, river levels nearly overtopped levees as flows peaked at approximately 4,700 cfs.
- In 2011, 2018, and 2019, portions of the City were flooded, including Andrew Firebaugh Historical Park, which was inundated by up to five feet of water and sustained damage to water and sewer infrastructure.

A current FEMA flood map update study generated modeling data for flood insurance purposes that predicts flooding for the entire City resulting from the existing non-certified levees. These new flood zone maps are scheduled for release in 2026-2027. These new flood regulations would significantly affect the existing residents, commercial and industrial users, and prospective development for the City of Firebaugh with increasing flood insurance rates. These regulations are based on the 100-year storm event. The only way to mitigate this anticipated financial impact is to construct certified levees to handle the predicted flood event. The City has previously constructed the only certified levee in Fresno County and the benefits from this levee have been reflected in the proposed updated flood zone maps. The subdivision protected by this certified

levee has kept it out of the flood zone area. Any new levees built in the City of Firebaugh would meet the certification criteria for flood zone regulations.

The San Joaquin River near Firebaugh is highly degraded as a result of water diversions at Friant Dam, conversion of riparian habitat to farmland, and channelization of the river for flood control. Riparian ecosystems in the area have been drastically reduced in size, quality, and connectivity compared to historical conditions. The resulting loss of habitat has significantly diminished the river's function as a wildlife habitat corridor. Additionally, Firebaugh has very few trails and recreational facilities within the City limits, and those that do exist are frequently inundated during wet seasons, rendering them unusable during those periods.

This multi-benefit flood management project along the San Joaquin River would restore the river's function as a regional habitat corridor while reducing flood risk to small, disadvantaged communities and supporting public safety, ecosystem vitality, and expanded recreational use of the river. Although several trails and recreational facilities are identified in the City's General Plan, funding remains a major challenge. As a Severely Disadvantaged Community, the City's local funding from impact fees, property tax, and sales tax revenues is insufficient to implement the structural improvements needed to address the anticipated flood risks, targeted ecosystem restoration, and much needed recreational facilities.

4. If your priority is not transportation related, are there any transportation policy connections?

Although the primary purpose of the priority is flood management, the Project includes clear transportation policy connections through the construction of new multi-use trails and the connection of existing trail segments into a continuous riverfront trail network. These improvements support walking and bicycling as active transportation options within the City and are not solely recreational, but also provide critical access to schools, parks, and riverfront destinations. In addition, reducing flood risk along and adjacent to the San Joaquin River will improve the reliability and resilience of the local transportation system, including both roadways and non-motorized facilities.

The Project includes the implementation of new multi-use trails that support several active transportation goals and policies identified in the City of Firebaugh Bicycle Transportation Plan and the General Plan Circulation Element, which calls for development of a trail and bike path network throughout the City. The Circulation Element designates bicycle routes and pedestrian trails within the planning area and supports the use of state and federal funding to complete the pathway system.

This project would provide a continuous riverfront trail system that supports non-vehicular travel and provides safe, low-cost transportation options in a Severely Disadvantaged Community.

Additionally, flooding poses a significant risk to the local transportation system, as flood events have the potential to disrupt local roads, access routes, and trail usability. Flooding within the City can result in reduced reliability, the need for detours, and unusable paths during wet seasons. Flood risk reduction measures included in this Project will help minimize transportation disruptions and improve year-round mobility and access.

5. Attach high-resolution photos, graphics or other explanatory attachments for the One Voice trip materials. Do not copy and paste them here, attach them as separate electronic files. Then, describe the attachments and include them with your submittal.

Attachment 1: Project Photos

- Photos showing the San Joaquin River in the City of Firebaugh, both with and without recent levee and bank stabilization improvements.

Attachment 2: Preliminary Improvement Plans

- Preliminary conceptual plans illustrating the proposed flood management improvements, including the recommended levee alignment and associated project components

evaluated in the Flood Risk Reduction Study. These plans demonstrate project feasibility and overall scope.

Attachment 3: Draft FEMA Flood Zone Map Update

- Draft FEMA Flood Zone Map update based on recent flood modeling that identifies expanded flood hazard areas throughout the City of Firebaugh due to existing non-certified levees, demonstrating increased flood exposure and potential.

Attachment 4: Flood Risk Reduction Feasibility Study

- The Flood Risk Reduction Feasibility Study which provides the technical bases for the proposed project.

6. **Contact** – Include the contact information for the priority submittal **and** the contact information of the person that will be attending the One Voice trip to speak on behalf of the priority:

Project Contact:

Name, Title: Mario Gouveia, PE, City Engineer
Organization: Gouveia Engineering, Inc.
Email Address: mgouveia@gouveiaengineering.com
Phone Numbers, Cell/Office: (209) 854-3300
Address: 456 6th Street
City, CA Zip Code: Gustine, CA 95322

One Voice Participant:

Name, Title: Ben Gallegos, City Manager
Organization: City of Firebaugh
Email Address: bgallegos@firebaugh.org
Phone Numbers, Cell/Office: (559) 659-2043
Address: 1133 P Street
City, CA Zip Code: Firebaugh, CA 93622

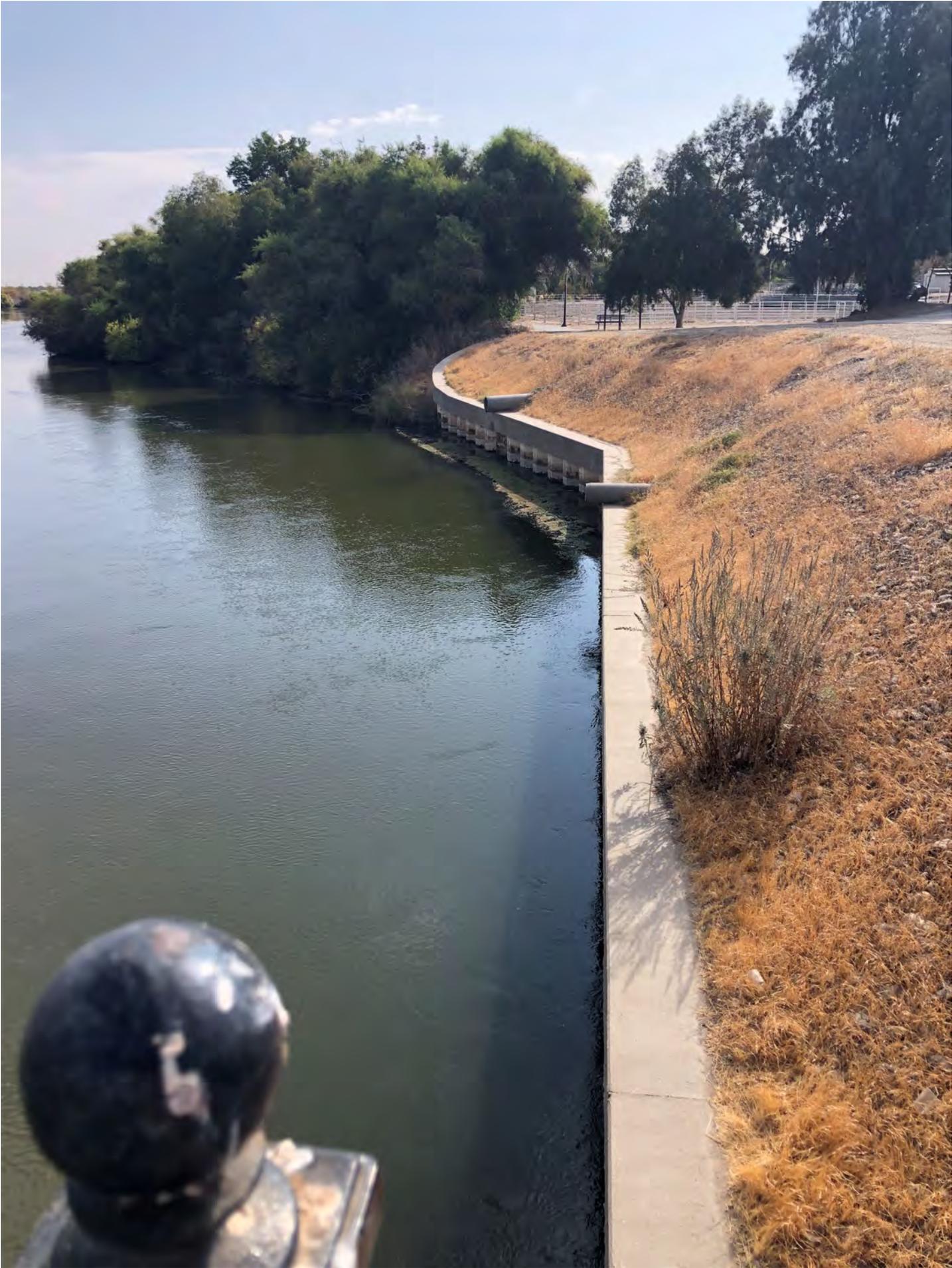
Firebaugh Multi-Benefit Flood Management Project

Attachment 1

Project Photos







Firebaugh Multi-Benefit Flood Management Project

Attachment 2

Preliminary Improvement Plans

BENCHMARK

VERTICAL AND HORIZONTAL DATUM:

VERTICAL AND HORIZONTAL DATUM INFORMATION WAS TAKEN FROM THE NGS DATA SHEET FOR PID GU0681.
 VERTICAL DATUM: NAVD88
 ELEVATION: 150.4'
 HORIZONTAL DATUM: NAD83-1992, CALIFORNIA SPCS, ZONE 4

DESCRIPTION: THE STATION MARK IS A C AND GS TRIANGULATION STATION DISK STAMPED FIREBAUGH 1943 SET IN THE TOP OF A 10-INCH SQUARE CONCRETE POST PROJECTING 0.3 FOOT ABOVE THE GROUND AND IS 142.0 FEET NORTHEAST OF THE NORTHEAST RAIL OF A RAILROAD TRACK, 41 FEET SOUTHWEST OF THE CENTERLINE OF THE HIGHWAY, 7.9 FEET NORTHWEST OF THE WEST CORNER OF HIGHWAY BRIDGE 42-34, 3.6 FEET SOUTHWEST OF A GUARD RAIL, 1.4 FEET NORTHEAST OF A METAL WITNESS POST, ABOUT LEVEL WITH THE HIGHWAY, AND ABOUT 2 FEET LOWER THAN THE RAILROAD TRACK.

PROJECT PLANS FOR CONSTRUCTION OF Firebaugh Multi-Benefit Flood Management Project CITY OF FIREBAUGH

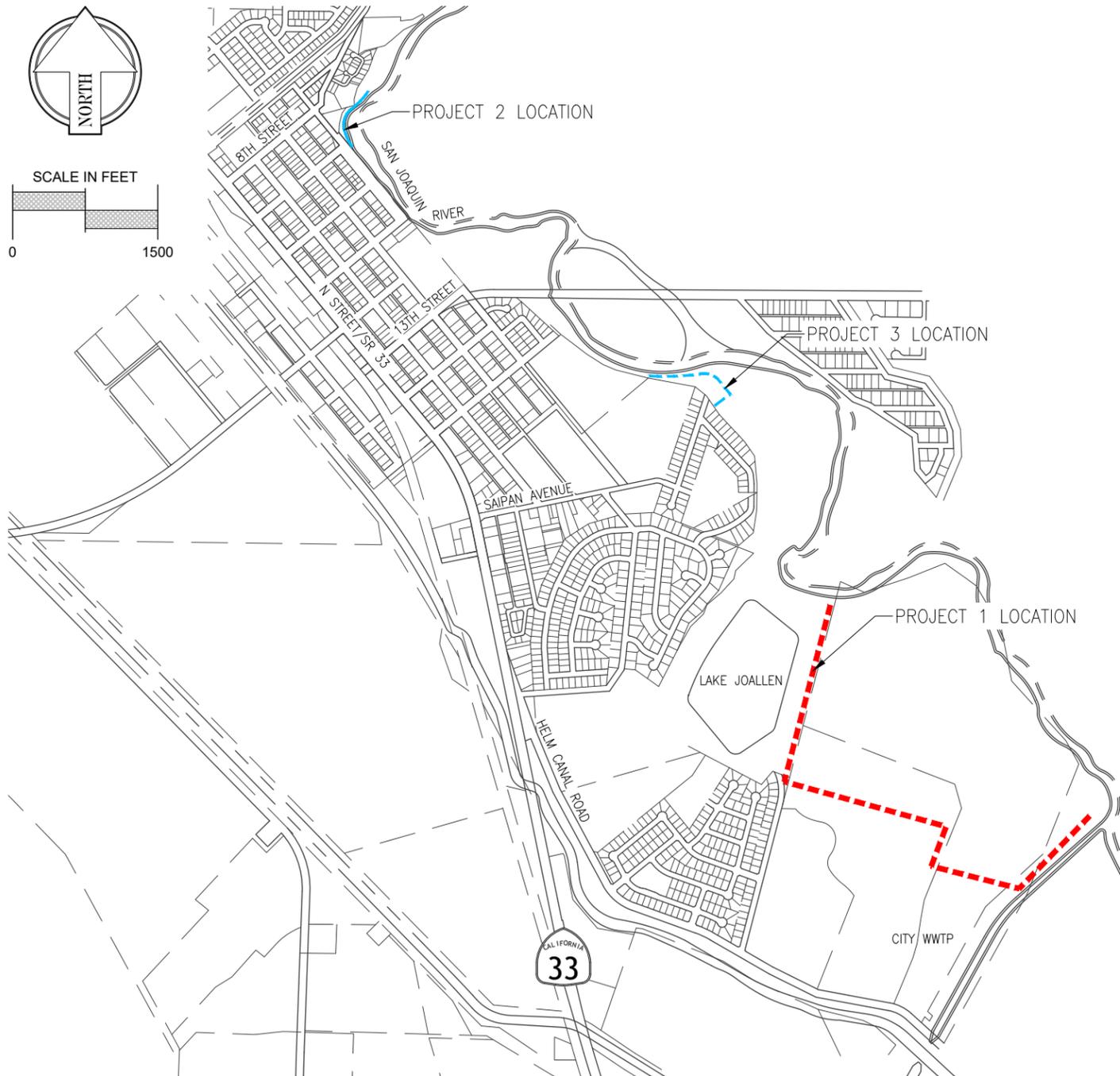
INDEX OF DRAWINGS

1	LOCATION MAP AND INDEX OF DRAWINGS
2	GENERAL NOTES AND LEGEND
3-19	PROJECT 1 PLAN AND PROFILE STATION: 55+00 - 104+00
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21	PROJECT 2 - SITE PLAN
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23-30	PROJECT 3 PLAN AND PROFILE STATION: 10+00 - 34+00
31	LEVEE PATH AND WALL CONSTRUCTION DETAILS
32	LEVEE WALL AND PATH SIGNAGE CONSTRUCTION DETAILS
33	PATH AMENITY CONSTRUCTION DETAILS

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER MANHOLE	⊙	
UNDERGROUND COMMUNICATIONS LINE	— COM —	
COMMUNICATIONS PEDESTAL	●	
UNDERGROUND ELECTRICAL LINE	— E —	
POWER POLE	⊙	
GAS LINE	— G —	
GAS VALVE	⊗	
FIRE HYDRANT	⊗	
WATER VALVE	⊗	
WATER METER	⊙	
STORM DRAIN MANHOLE	⊙	
DRAIN INLET	⊙	⊙
STREET SIGN	+	+
MONUMENT WELL	⊙	
CONTOUR ELEVATION	109.50	
WROUGHT IRON FENCE	— x —	
WOOD FENCE	— o —	
SAWCUT LINE	---	
AREA OF AC REMOVAL		▨
AREA OF CONCRETE REMOVAL		▩
CONCRETE		■
ASPHALT CONCRETE		■
AREA OF AC REPAIR		■
AREA OF AC PULVERIZATION		■

FOR CLARITY PURPOSES SYMBOLS SHOWN IN THE LEGEND MAY APPEAR SMALLER THAN SHOWN ON THE PLANS.



SIGNATURE BLOCK

REVIEWED AND APPROVED BY THE CITY OF FIREBAUGH ACTING PUBLIC WORKS DIRECTOR

BY: _____ DATE: _____
 BEN GALLEGOS
 CITY MANAGER/ACTING PUBLIC WORKS DIRECTOR

CITY CONTACT INFORMATION

BEN GALLEGOS	CITY MANAGER/ ACTING PW DIRECTOR	(559) 694-6166
CITY COUNCIL		
FREDDY VALDEZ	MAYOR	RITA LOZANO DEPUTY CITY CLERK
BRADY JENKINS	MAYOR PRO TEM	JAMES SANCHEZ CITY ATTORNEY
ELSA LOPEZ	COUNCIL MEMBER	MARIO GOUVEIA CITY ENGINEER
FELIPE PEREZ	COUNCIL MEMBER	
MARCIA SABLAN	COUNCIL MEMBER	



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Plan sheets in this plan set are full size when printed on 11x17 size sheets without an exaggeration. The bar scale should be used to check plan sheet scale.

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City of Firebaugh

**Firebaugh Multi-Benefit Flood Management Project
 LOCATION MAP AND INDEX OF DRAWINGS**

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-101
DRAWN BY DGR	DATE 04/20/22	SHEET 1
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

GENERAL NOTES

1. PROJECT WORK HOURS ARE:
MON – FRI 7AM – 5PM
2. THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CONSTRUCTION ENCROACHMENT PERMIT FROM CALTRANS PRIOR TO PERFORMING ANY WORK.
4. SURVEY MONUMENTS ARE NOT LOCATED AS PART OF THE USA CALL BEFORE YOU DIG PROCESS. THE PROJECT SURVEYOR SHALL LOCATE AND MARK THE MONUMENTS WITHIN THE PROJECT ENVELOPE FOR PRESERVATION.
5. PURSUANT TO SECTION 8771 OF THE CALIFORNIA BUSINESS AND PROFESSIONS CODE, THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND PRESERVATION OF ANY MONUMENTATION FOUND WITHIN OR ADJACENT TO THE PROJECT IMPROVEMENTS. IF PROJECT IMPROVEMENTS ENCROACH UPON AN AREA WHERE MONUMENTATION IS PRESENT, THE ENGINEER OF RECORD MUST BE CONTACTED AND THE MONUMENT MUST BE PROTECTED AND REMAIN UNDISTURBED BY CONSTRUCTION ACTIVITIES. IF AN EXISTING MONUMENT IS DISTURBED DURING CONSTRUCTION, THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL COSTS RELATED TO RESTORATION OF THE MONUMENT INCLUDING THE DOCUMENTATION, RECORDATION, AND RESETTING OF THE MONUMENT (IF REQUIRED) BY THE ENGINEER OF RECORD.
6. EXISTING UTILITY LOCATIONS ARE SHOWN BASED ON USA MARKINGS COLLECTED IN THE FIELD AND RECORD INFORMATION PROVIDED BY THE UTILITY OWNER. ACTUAL BUILT LOCATIONS AND UTILITY DEPTHS MAY VARY. THE ENGINEER DOES NOT GUARANTEE THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE PLANS TO BE EITHER TRUE OR EXACT. THE CONTRACTOR SHALL VERIFY ACTUAL DEPTH AND EXACT LOCATION OF EXISTING UTILITIES PRIOR TO EXCAVATION ACTIVITIES TO THE SATISFACTION OF THE UTILITY OWNER. ALL COSTS RELATED TO LOCATING AND PROTECTING EXISTING UTILITIES AS REQUIRED BY THE RESPONSIBLE UTILITY COMPANY AND/OR GOVERNING AGENCY ARE THE RESPONSIBILITY OF THE CONTRACTOR. THESE COSTS INCLUDE ALL LOCATING AND POT HOLE ACTIVITIES REQUIRED BY THE UTILITY OWNER. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHILE EXCAVATING IN AREAS NEAR NATURAL GAS, TV, PHONE, AND OTHER EXISTING UTILITIES AND IS RESPONSIBLE FOR ALL COSTS RELATED TO DAMAGED LINES OR DISRUPTION OF SERVICE CAUSED BY ANY ACTIVITIES AS THEY RELATE TO THIS PROJECT.
7. THE CONTRACTOR SHALL BE AWARE OF EXISTING OVERHEAD UTILITY LINES AND SHALL EXERCISE CAUTION WHILE WORKING NEAR SUCH LINES. OVERHEAD UTILITY LINES HAVE BEEN OMITTED FROM PLANS FOR CLARITY PURPOSES.
8. THE CONTRACTOR SHALL EXERCISE CARE TO MINIMIZE DAMAGE TO FACILITIES ADJACENT TO PROJECT IMPROVEMENTS SUCH AS EQUIPMENT, FENCING, CONCRETE FLATWORK, LANDSCAPING, LANDSCAPE IRRIGATION, ECT., DESIGNATED TO REMAIN. ANY FACILITIES DAMAGED BY THE CONTRACTOR SHALL BE RESTORED IN KIND AT NO COST TO THE CITY TO THEIR ORIGINAL PRE-CONSTRUCTION CONDITION OR BETTER. DISTURBED AND DAMAGED SURFACES SHALL BE RESTORED AFTER ALL CONSTRUCTION IS COMPLETE AND PRIOR TO CITY ACCEPTANCE.
9. IN INSTANCES WHERE RESTORATION OF THE PAVEMENT IMPACTS ADJACENT FACILITIES SUCH AS EXISTING UTILITY FRAMES AND COVERS, THOSE FACILITIES SHALL BE RAISED TO GRADE AS PART OF THE PROJECT IMPROVEMENTS EVEN IF NOT SHOWN OR ACCOUNTED FOR IN THE PROJECT PLANS AND SPECIFICATIONS.
10. UTILITY CONFLICTS ARE TO BE WORKED OUT IN THE FIELD WITH THE PROJECT ENGINEER AND CITY REPRESENTATIVE.
11. AT THE END OF EACH DAY OR AS DIRECTED BY THE OWNER, THE CONTRACTOR SHALL SWEEP ROADWAYS OF ALL DEBRIS AND EXCESS MATERIAL ATTRIBUTED TO THE CONTRACTOR'S OPERATIONS. UNLESS OTHERWISE APPROVED BY THE OWNER, MECHANICAL STREET SWEEPERS WITHOUT DEBRIS STORAGE COMPARTMENTS WILL NOT BE ALLOWED.
12. UNLESS OTHERWISE APPROVED BY THE OWNER, TARPS OR OTHER EFFECTIVE COVERS ARE REQUIRED ON ALL STOCKPILED MATERIAL AND ON ALL HAUL TRUCKS TO MINIMIZE DUST.
13. CONTRACTOR IS RESPONSIBLE FOR REMOVING EXISTING GRASS, TREES, PLANTS, ALL TREE STUMPS, ALL ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE DELETERIOUS MATERIALS AS REQUIRED FOR CONSTRUCTION.

GENERAL NOTES (Continued)

14. IF EXISTING SPRINKLERS NEED TO BE REMOVED, RELOCATED, OR ARE DAMAGED AS A DIRECT OR INDIRECT RESULT OF CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CAP AND FLAG THE SPRINKLER LINE BEHIND THE PROPOSED IMPROVEMENTS, AND SHALL RESTORE THE SYSTEM TO ITS PRE-CONSTRUCTION CONDITION AS SOON AS POSSIBLE IN ORDER TO MINIMIZE DOWN TIME AND DAMAGE TO LANDSCAPING AND AT NO ADDITIONAL COST TO THE CITY. IF THE CONTRACTOR DOES NOT REPAIR THE SYSTEM IN A TIMELY MANNER, THE OWNER MAY HAVE THE SYSTEM REPAIRED, AND THE COST WILL BE BACK CHARGED TO THE CONTRACTOR.
15. EXCESS AC GRINDINGS TO BE STOCKPILED AT THE WASTE WATER TREATMENT PLANT LOCATED AT 8000 HELM CANAL ROAD AND SHALL BECOME PROPERTY OF THE OWNER.

TRAFFIC MANAGEMENT NOTES

1. THE CONTRACTOR SHALL COORDINATE TRAFFIC CONTROL EFFORTS WITH THE PUBLIC WORKS DEPARTMENT, AND THE ENGINEER OF RECORD DURING THE CONSTRUCTION OF THE PROJECT.
2. THE CONTRACTOR IS REQUIRED TO MAINTAIN EMERGENCY VEHICLE ACCESS THROUGH THE PROJECT AREA AT ALL TIMES.
3. THE CONTRACTOR SHALL MAINTAIN PROPERTY ACCESS AT ALL TIMES. CONSTRUCTION ACTIVITIES SHALL BE COORDINATED IN SUCH A MANNER TO ALLOW BUSINESSES ADJACENT TO THE PROJECT TO HAVE AT LEAST ONE POINT OF ACCESS DURING CONSTRUCTION.
4. ALL SIGNS AND TRAFFIC CONTROL DEVICES BEING USED SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE MUTCD.
5. THE CONTRACTOR SHALL HAVE ALL SIGNS, DELINEATORS, BARRICADES, ETC., PROPERLY PLACED PRIOR TO COMMENCING CONSTRUCTION AND SHALL BE SOLELY RESPONSIBLE FOR MAINTAINING THE TRAFFIC CONTROL DEVICES BEING IMPLEMENTED THROUGHOUT THE CONSTRUCTION OF THE PROJECT.
6. REFLECTIVE TABS ARE NOT ACCEPTABLE TO BE USED AS TEMPORARY DELINEATION DEVICES.
7. THE CONTRACTOR SHALL DIRECT PEDESTRIANS TO USE ALTERNATE ROUTES WHILE CONSTRUCTION IS TAKING PLACE WITHIN PEDESTRIAN ROUTE.
8. THE CONTRACTOR SHALL NOTIFY ALL OWNERS WITHIN THE AFFECTED AREA AT LEAST 2 FULL BUSINESS DAYS PRIOR TO ANY ROAD CLOSURE.
9. IN AREAS WHERE PARKING WILL BE RESTRICTED DURING CONSTRUCTION, TEMPORARY NO PARKING SIGNS WITH DATES OF RESTRICTION SHALL BE PUT INTO PLACE AT LEAST 3 FULL BUSINESS DAYS PRIOR TO THE IMPLEMENTATION OF RESTRICTED PARKING.



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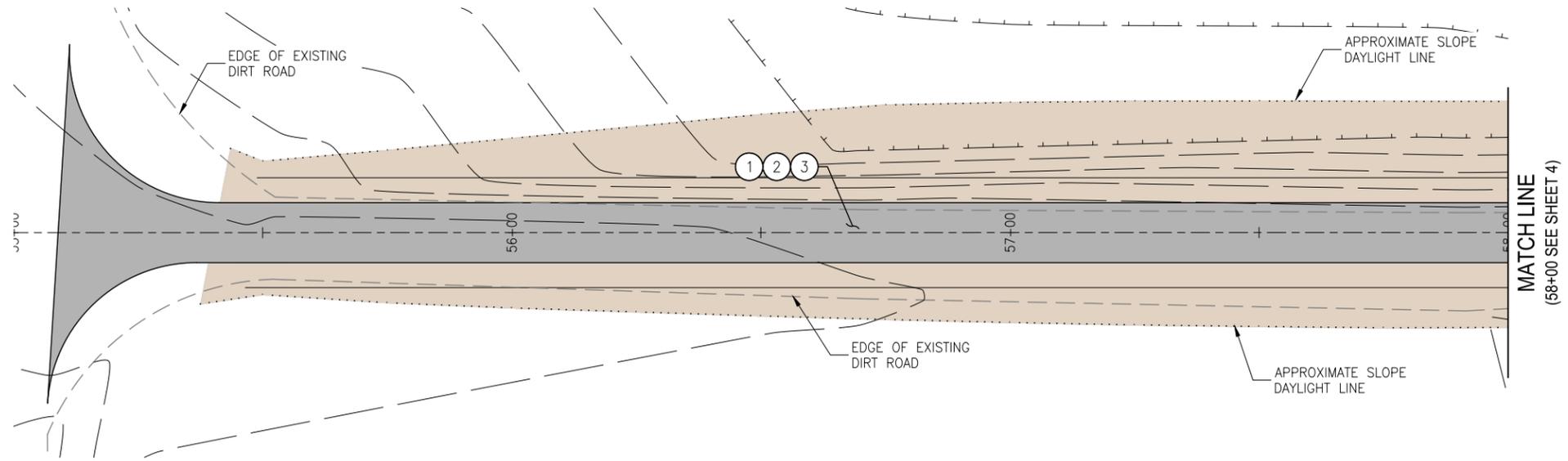
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City of Firebaugh

Firebaugh Multi-Benefit Flood Management Project
GENERAL NOTES AND LEGEND

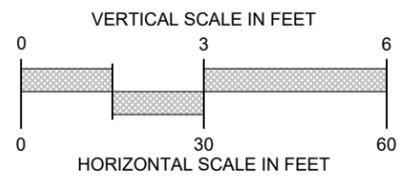
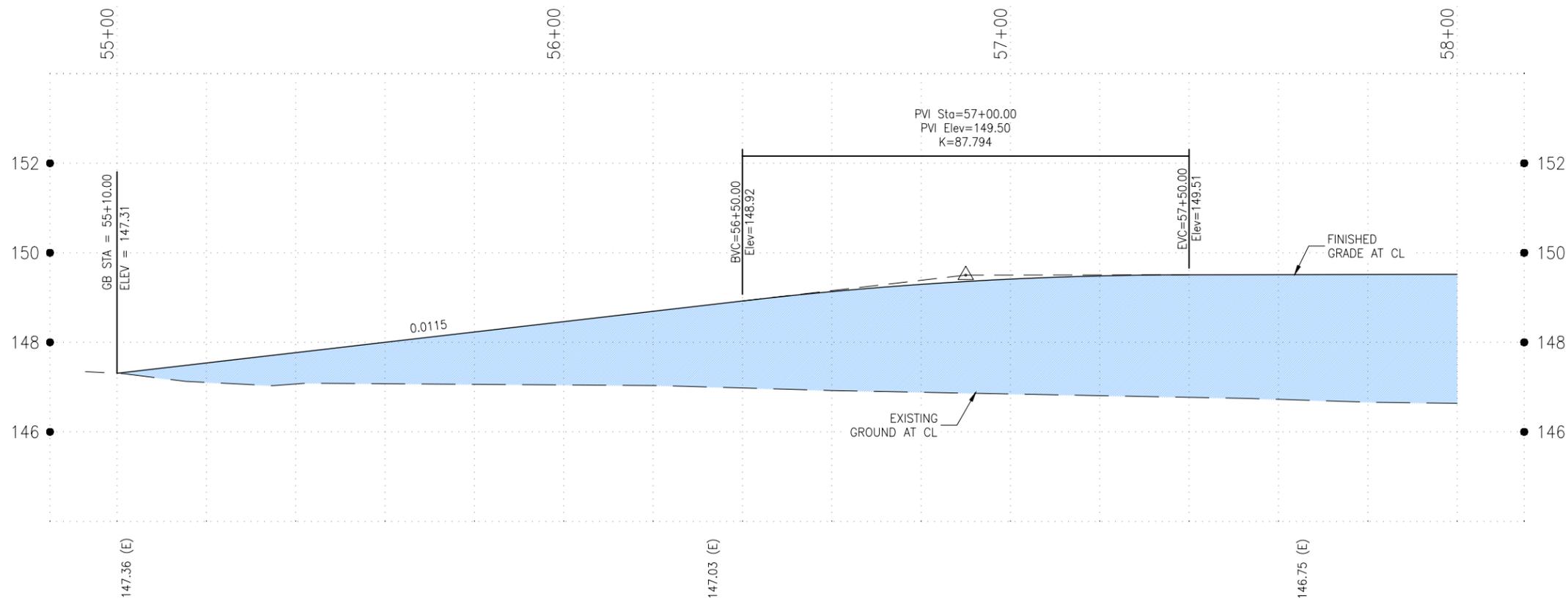
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-102
DRAWN BY DGR	DATE 04/20/22	SHEET 2
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH. PROVIDE A SMOOTH TRANSITION BETWEEN THE PROPOSED AC TRAIL AND THE EXISTING DIRT ROAD.	① 31
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF


Project 1
 STATION 55+00 - 58+00



May 10, 2022 - 12:07pm
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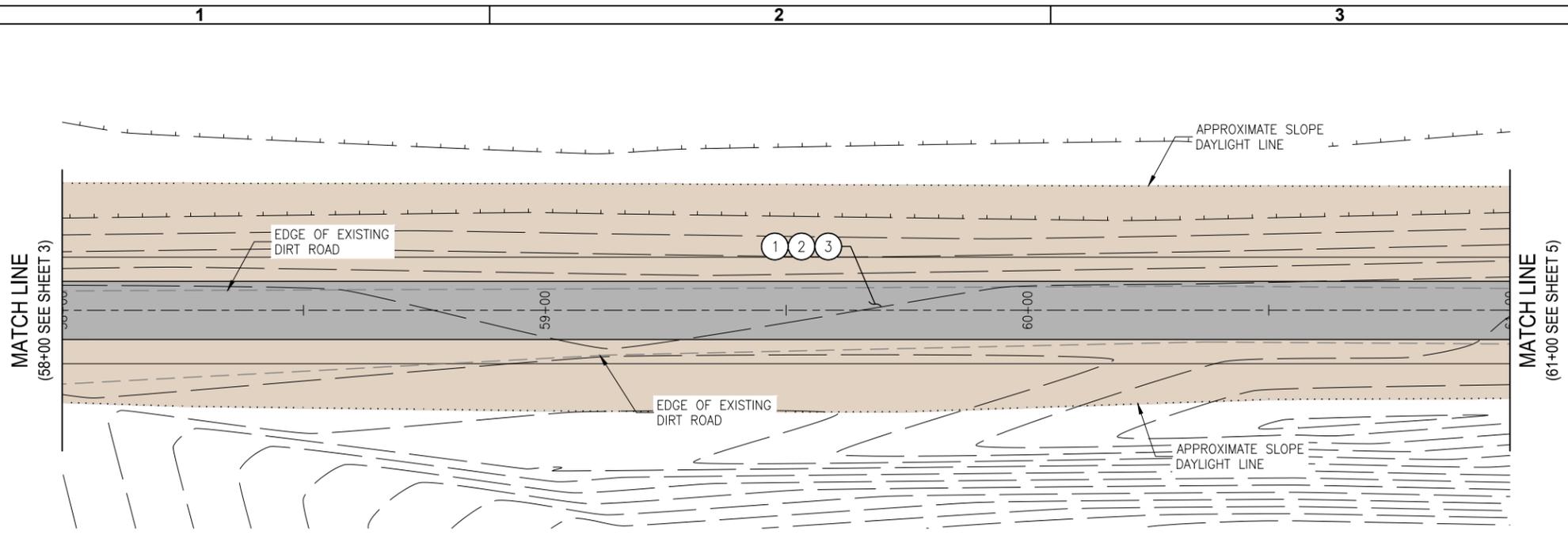
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 55+00 to 58+00

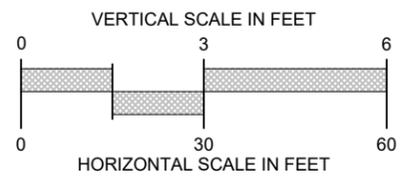
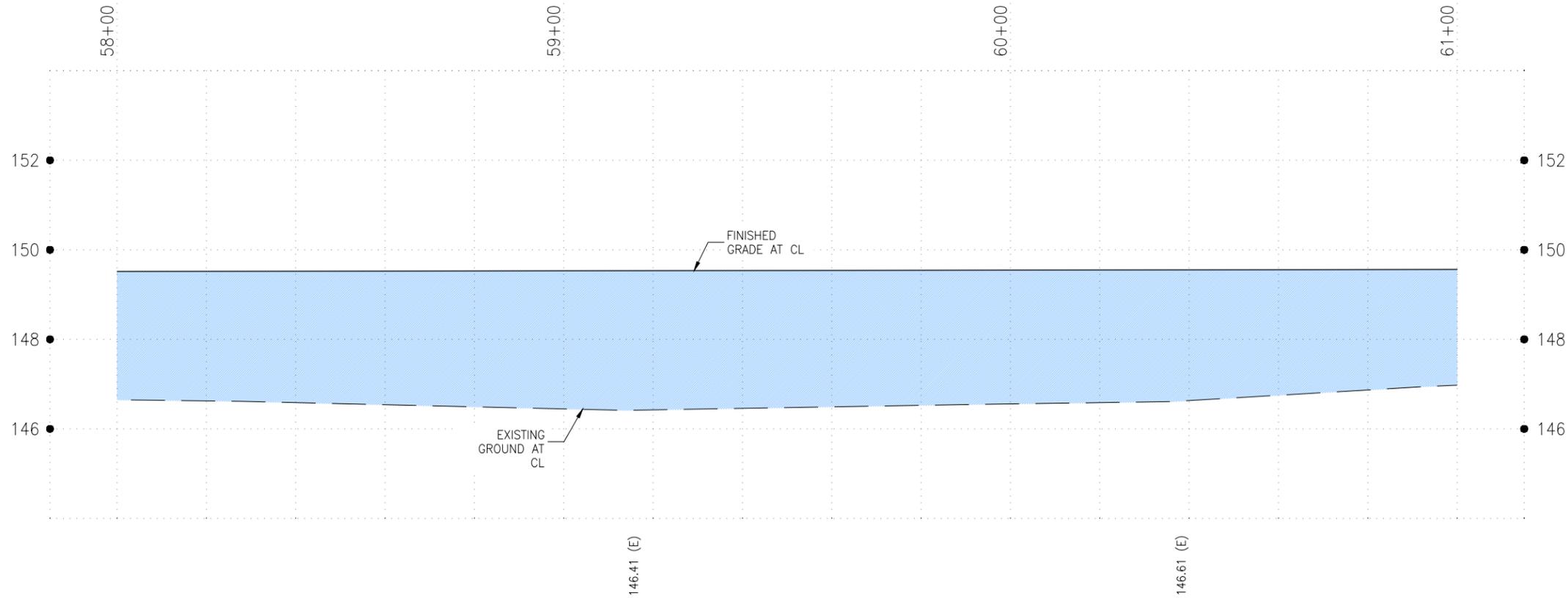
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DRAWN BY DGR	DATE 04/20/22	SHEET 3
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 58+00 - 61+00



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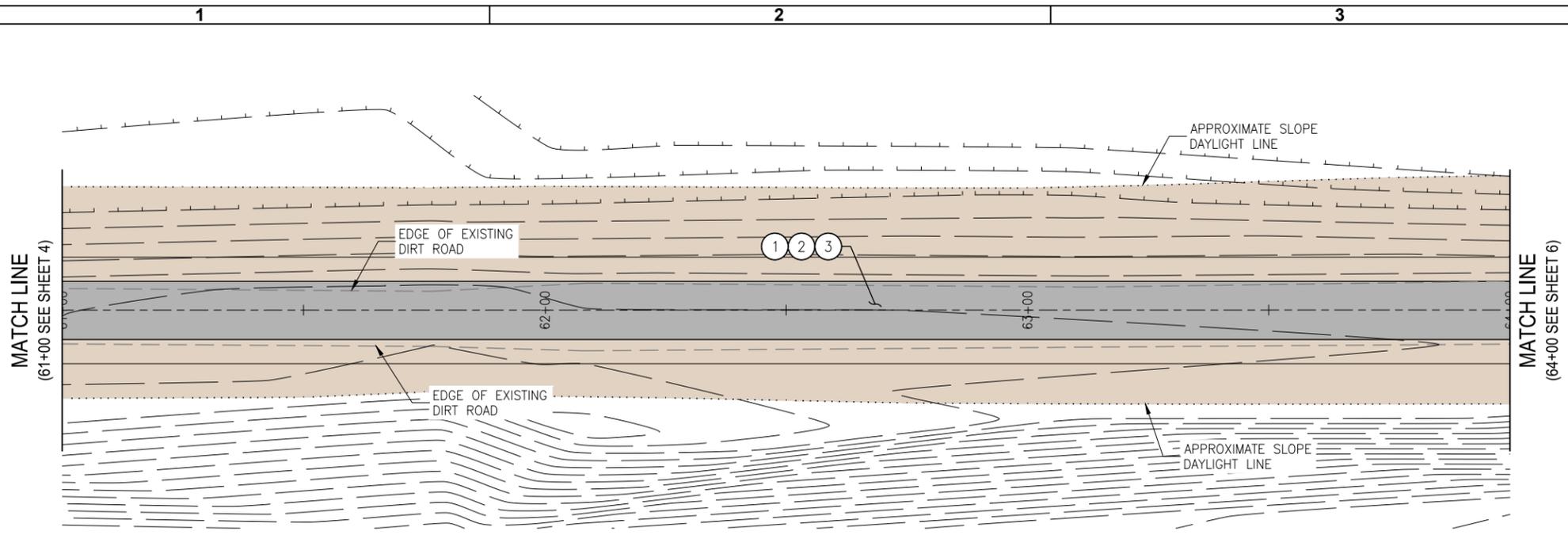
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 58+00 to 61+00

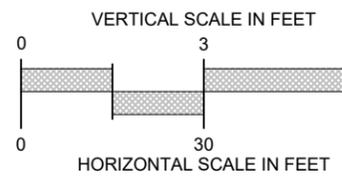
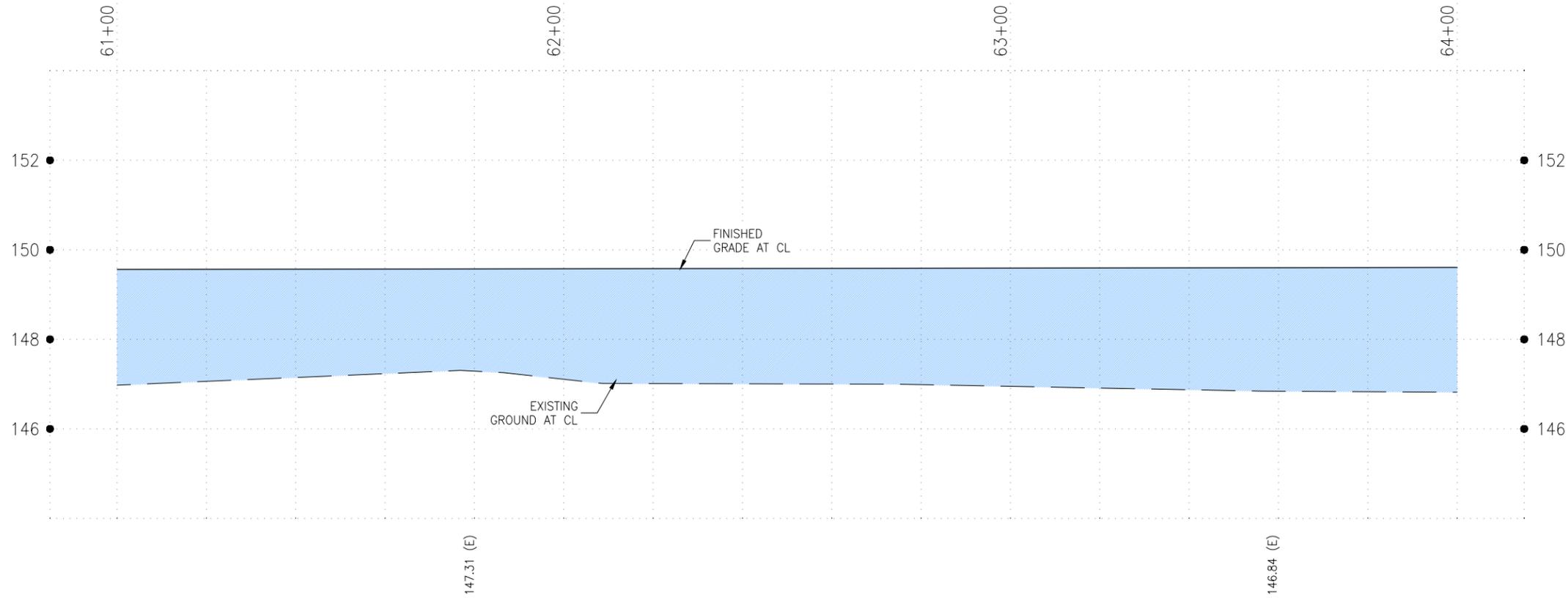
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-104
DRAWN BY DGR	DATE 04/20/22	SHEET 4
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	1 31
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 61+00 - 64+00



May 10, 2022 - 12:08pm
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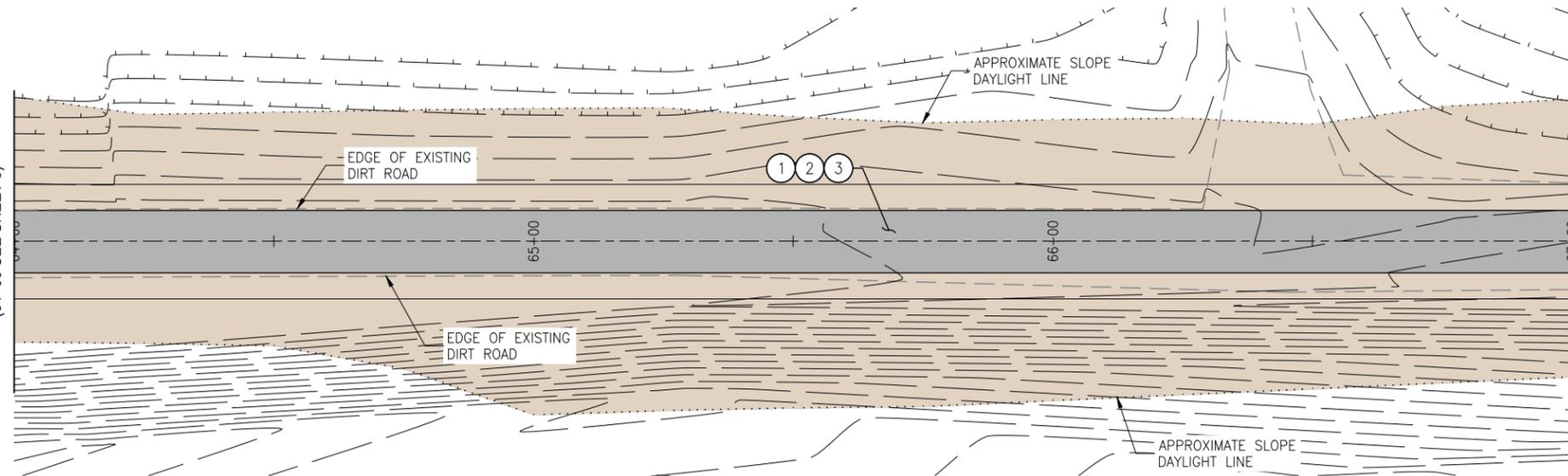
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456 Sixth Street • Gustine, California 95322
Telephone (209) 854-3300

City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 61+00 to 64+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-105
DRAWN BY DGR	DATE 04/20/22	SHEET 5
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

MATCH LINE
(64+00 SEE SHEET 5)

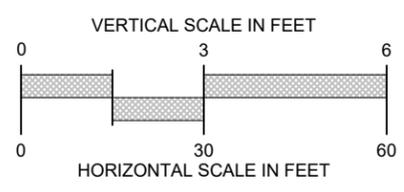
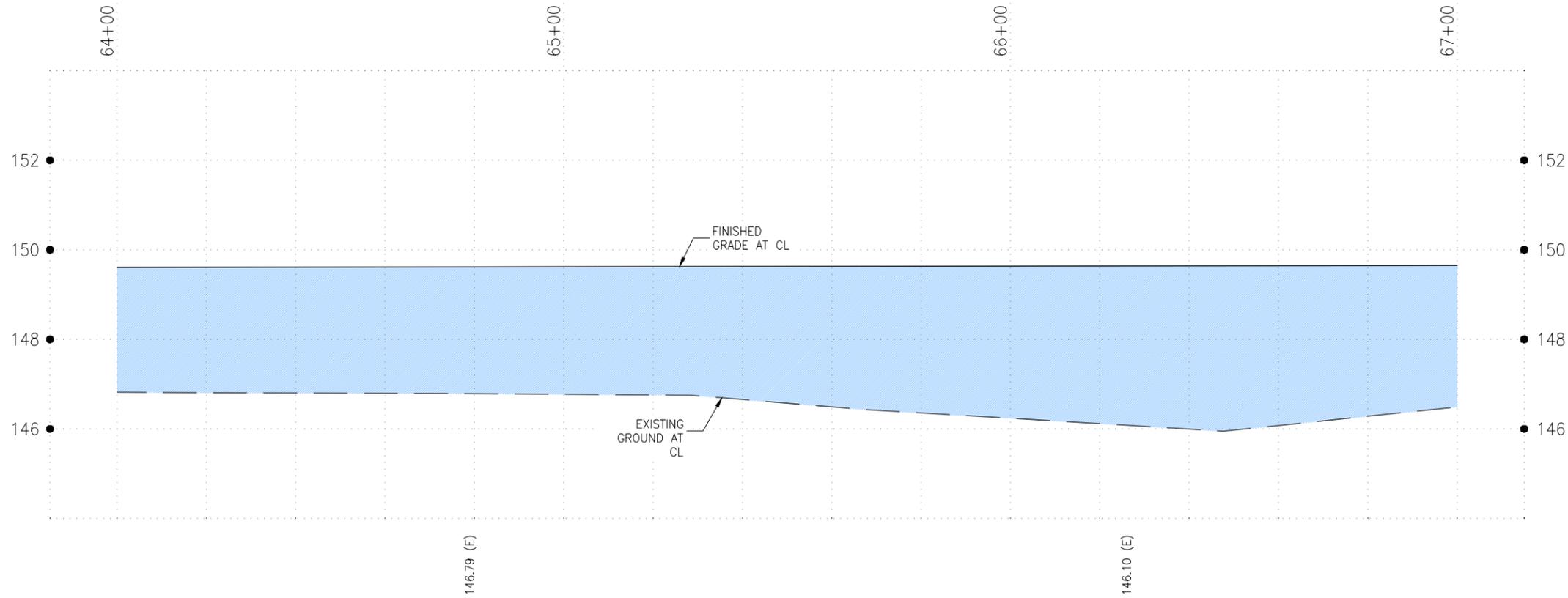
MATCH LINE
(67+00 SEE SHEET 7)



Project 1
STATION 64+00 - 67+00

CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	1 31
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 12:08pm
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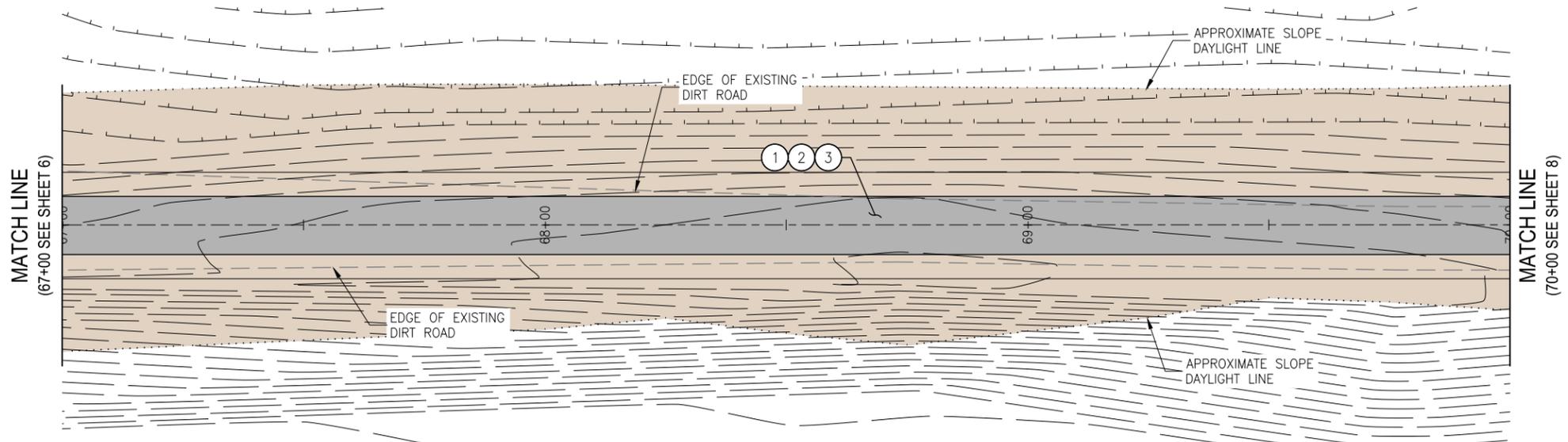
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 64+00 to 67+00

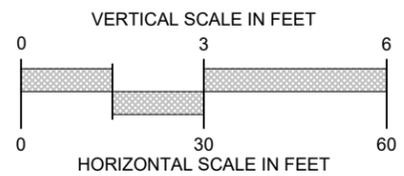
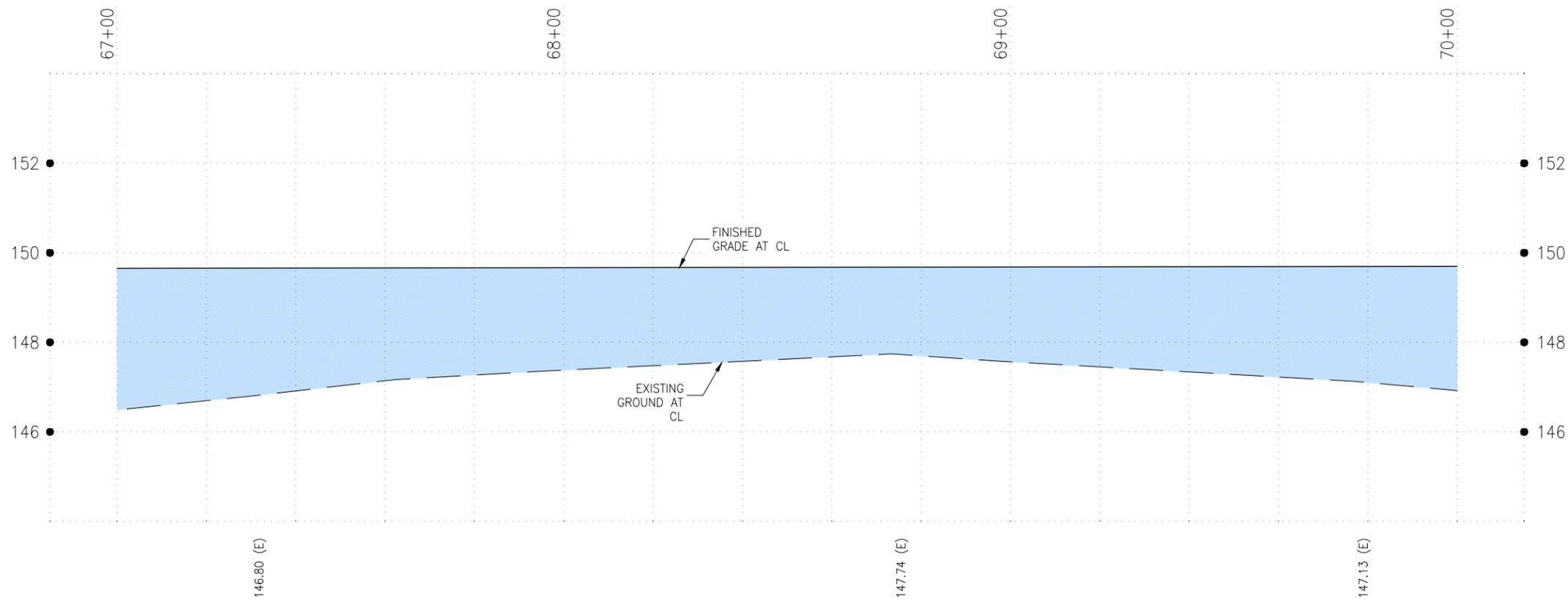
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DRAWN BY DGR	DATE 04/20/22	SHEET 6
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 67+00 - 70+00



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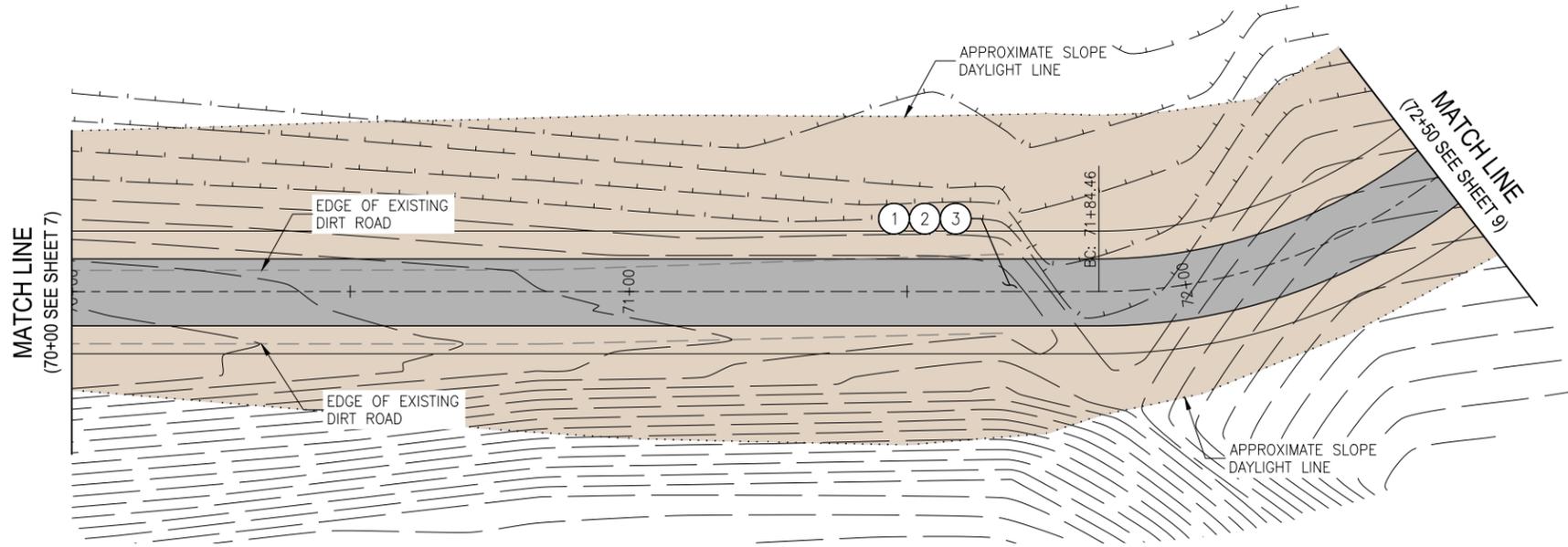
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Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 67+00 to 70+00

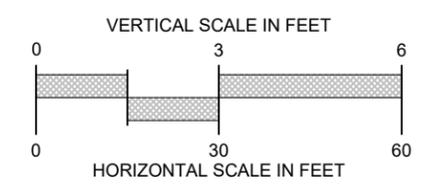
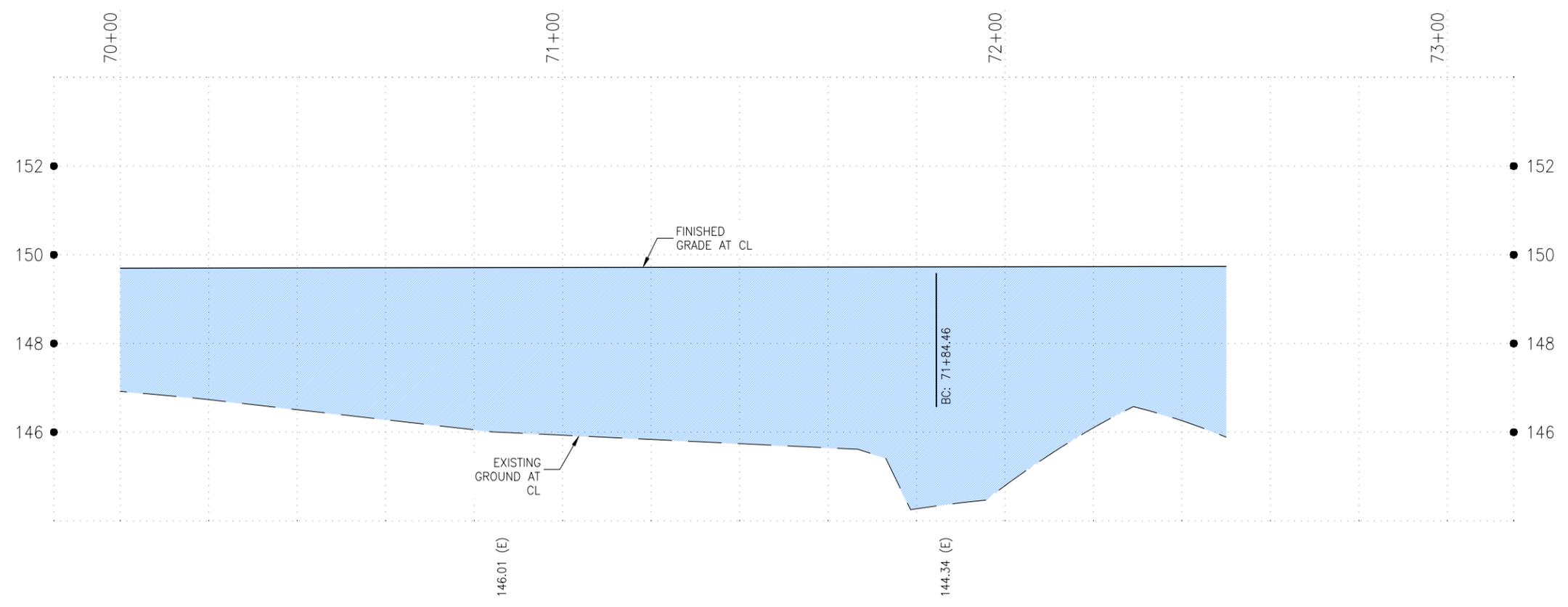
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DRAWN BY DGR	DATE 04/20/22	SHEET 7
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 1
STATION 70+00 - 72+50

CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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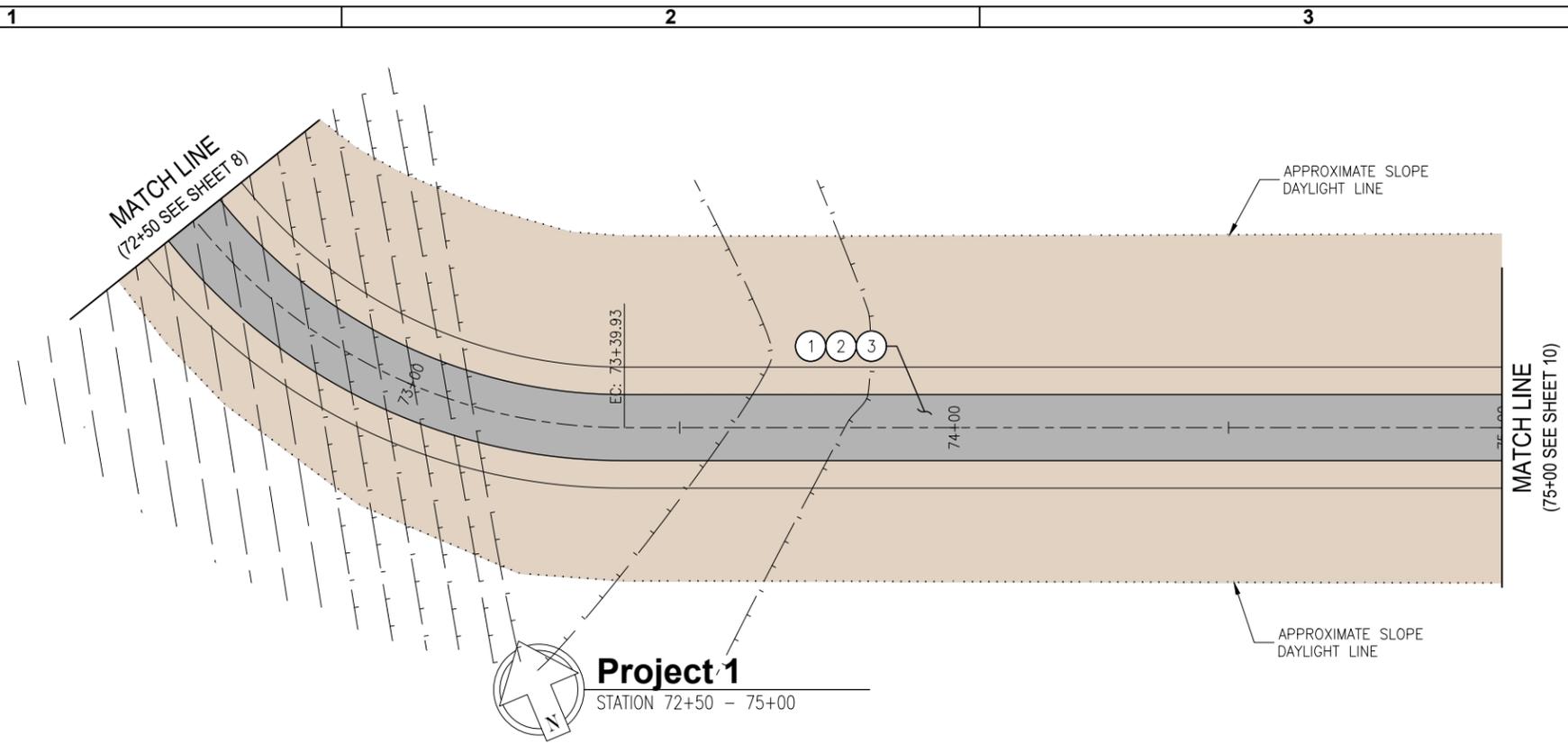
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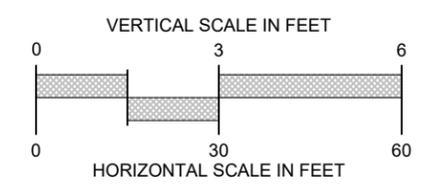
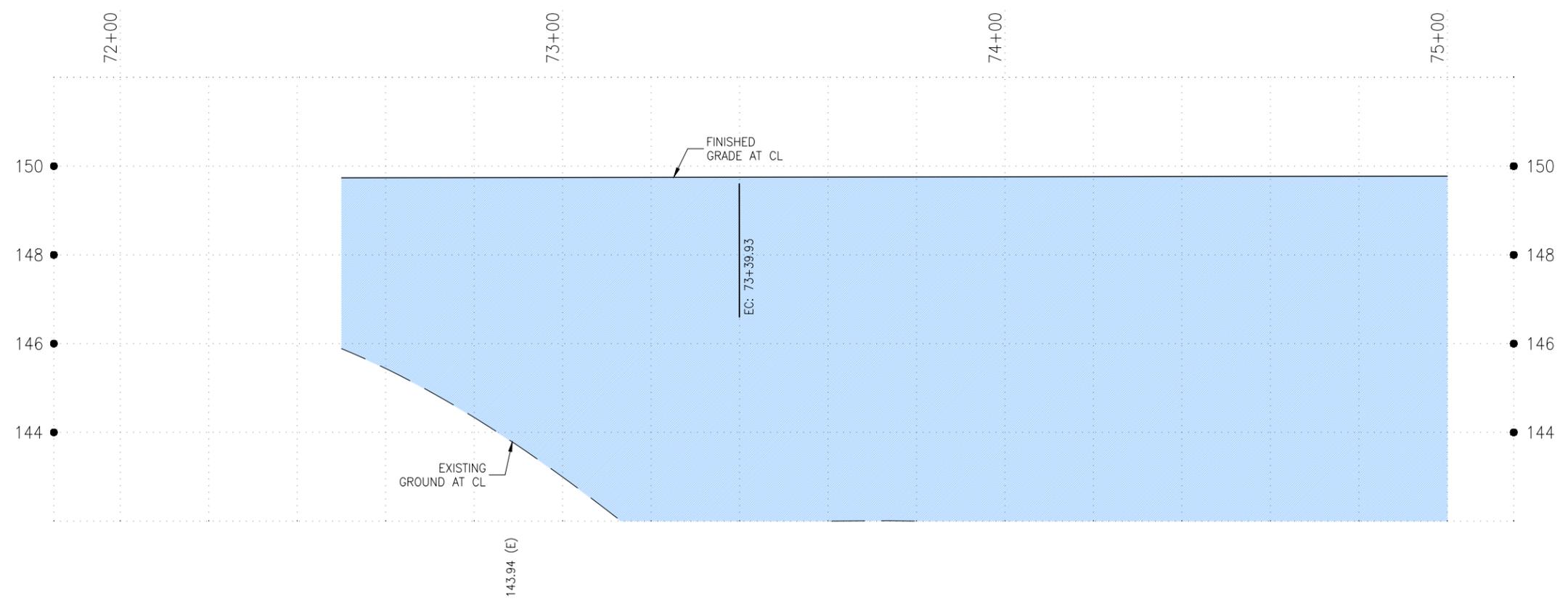
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 70+00 to 72+50

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-108
DRAWN BY DGR	DATE 04/20/22	SHEET 8
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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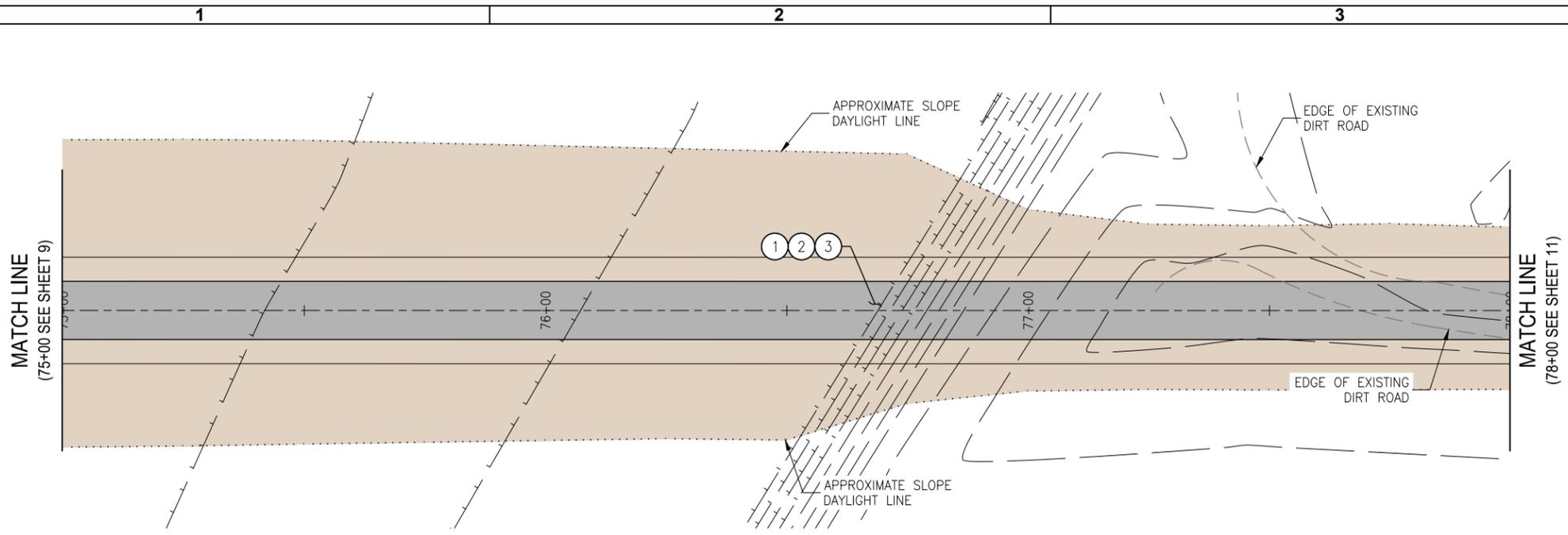
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 72+50 to 75+00

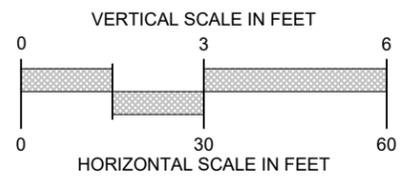
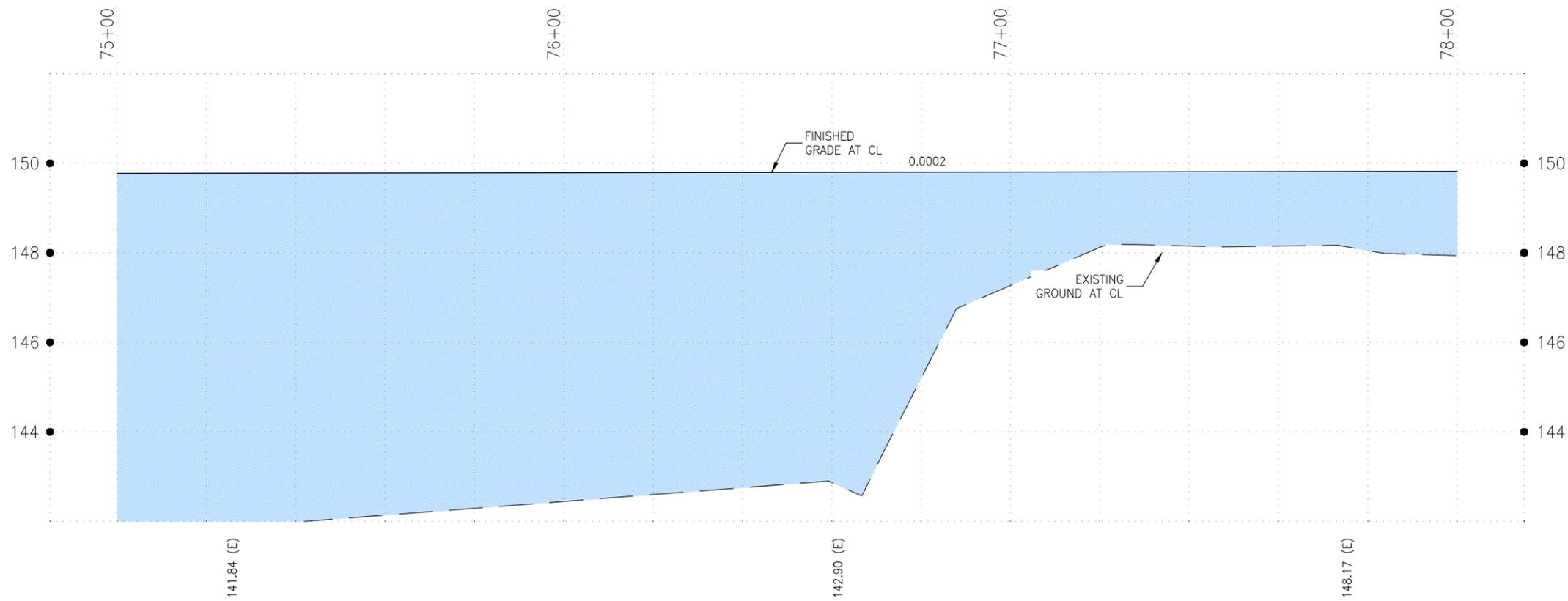
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CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 75+00 - 78+00



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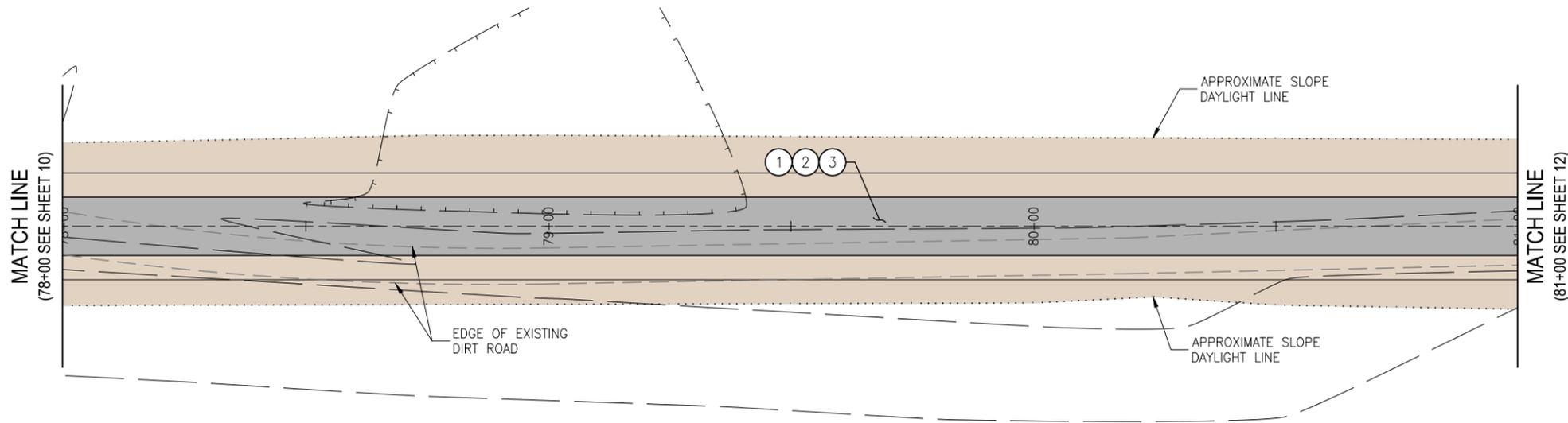
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 75+00 to 78+00

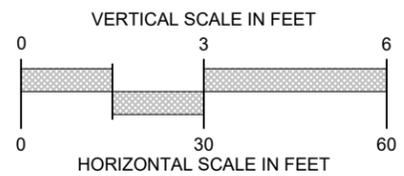
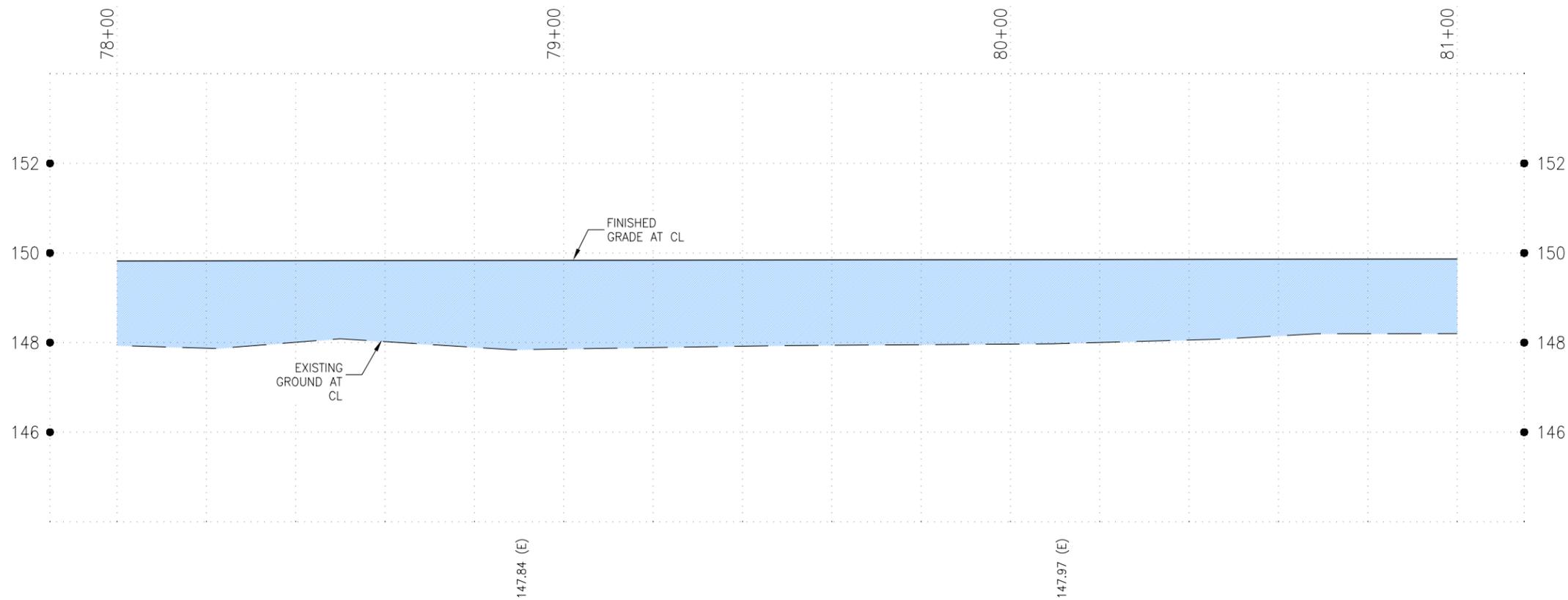
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DRAWN BY DGR	DATE 04/20/22	SHEET 10
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF


Project 1
 STATION 78+00 - 81+00



May 10, 2022 - 1:31 pm
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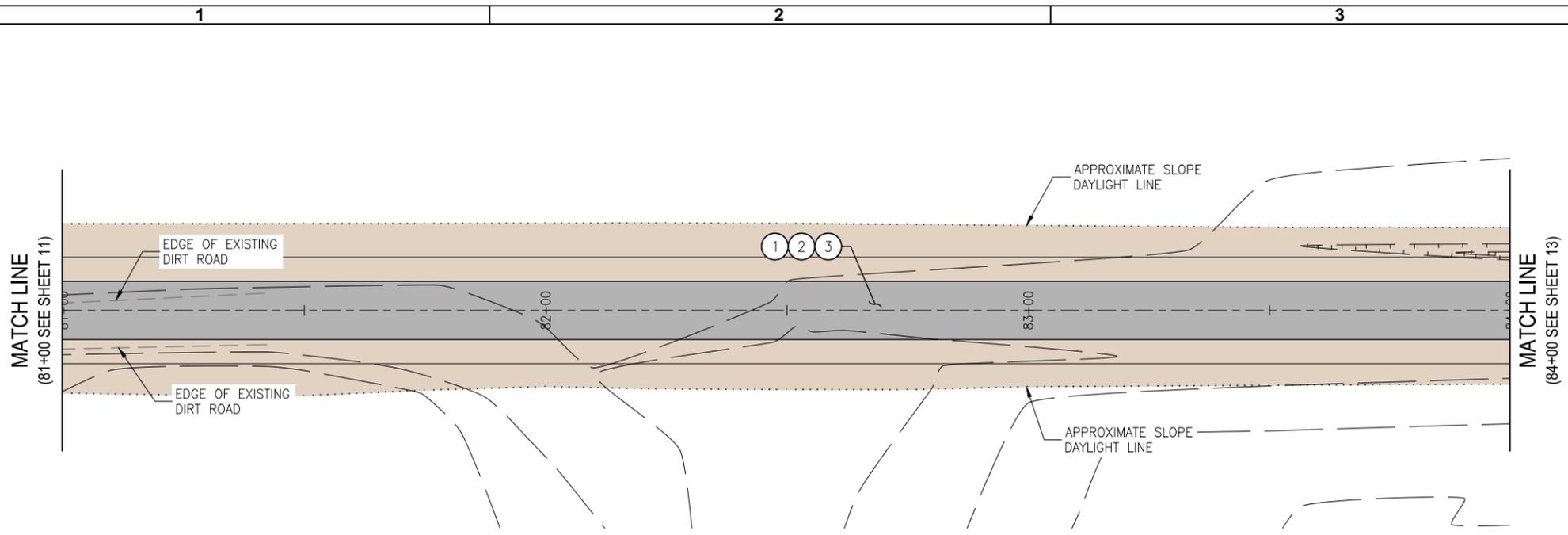
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Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 78+00 to 81+00

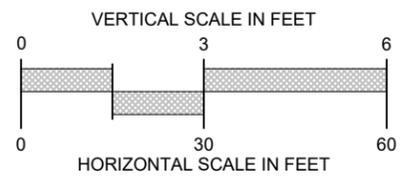
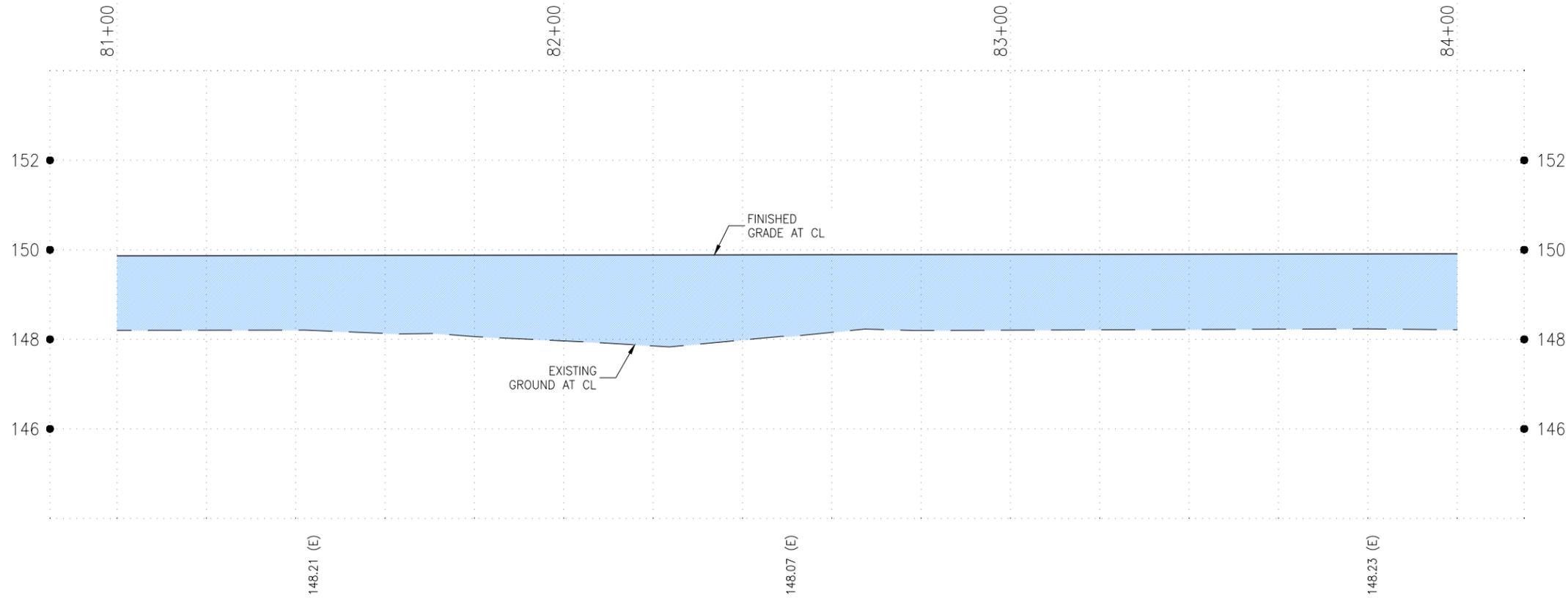
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DRAWN BY DGR	DATE 04/20/22	SHEET 11
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 81+00 - 84+00



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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 81+00 to 84+00

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DRAWN BY DGR	DATE 04/20/22	SHEET 12
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

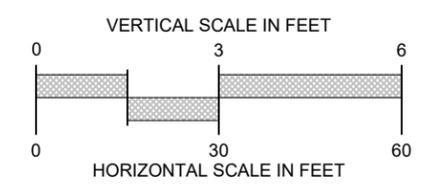
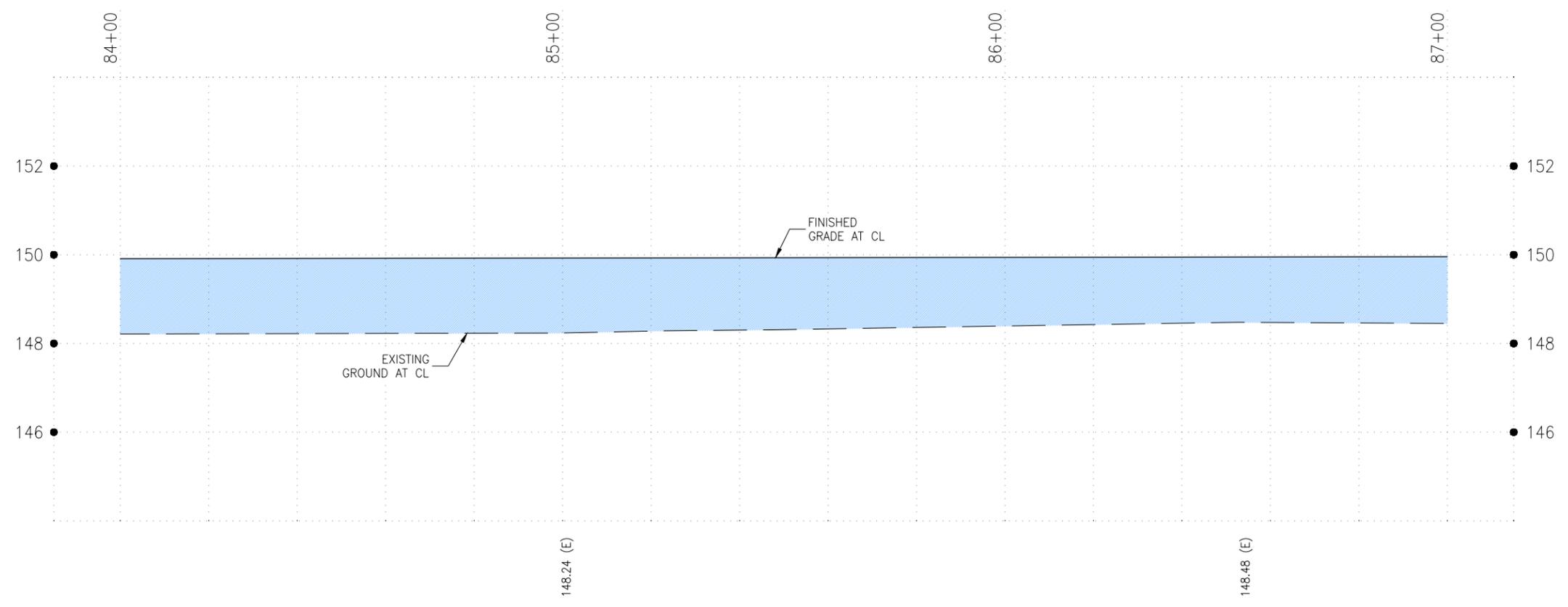
MATCH LINE
(84+00 SEE SHEET 12)

MATCH LINE
(87+00 SEE SHEET 14)

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 84+00 - 87+00



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Not for Construction

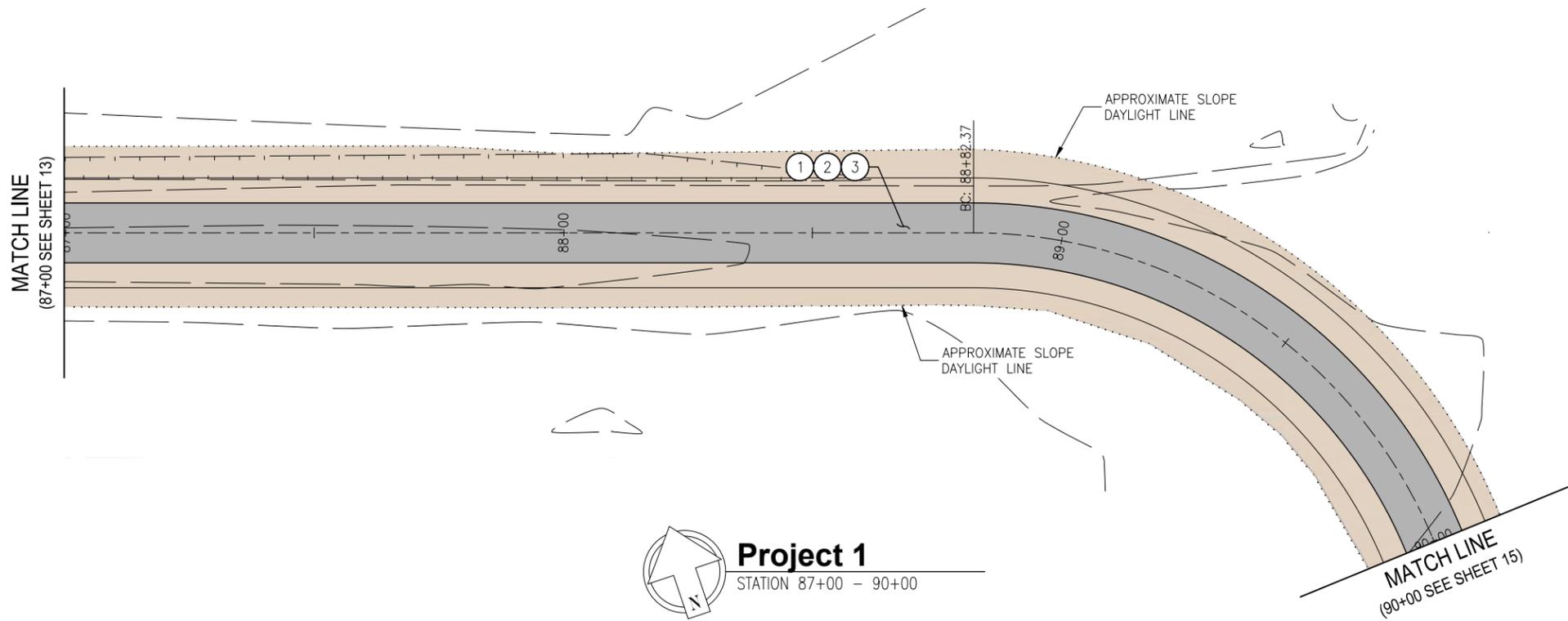
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 84+00 to 87+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-113
DRAWN BY DGR	DATE 04/20/22	SHEET 13
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

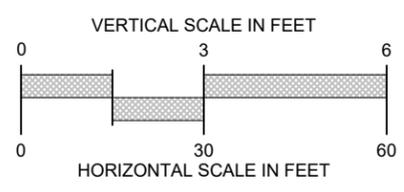
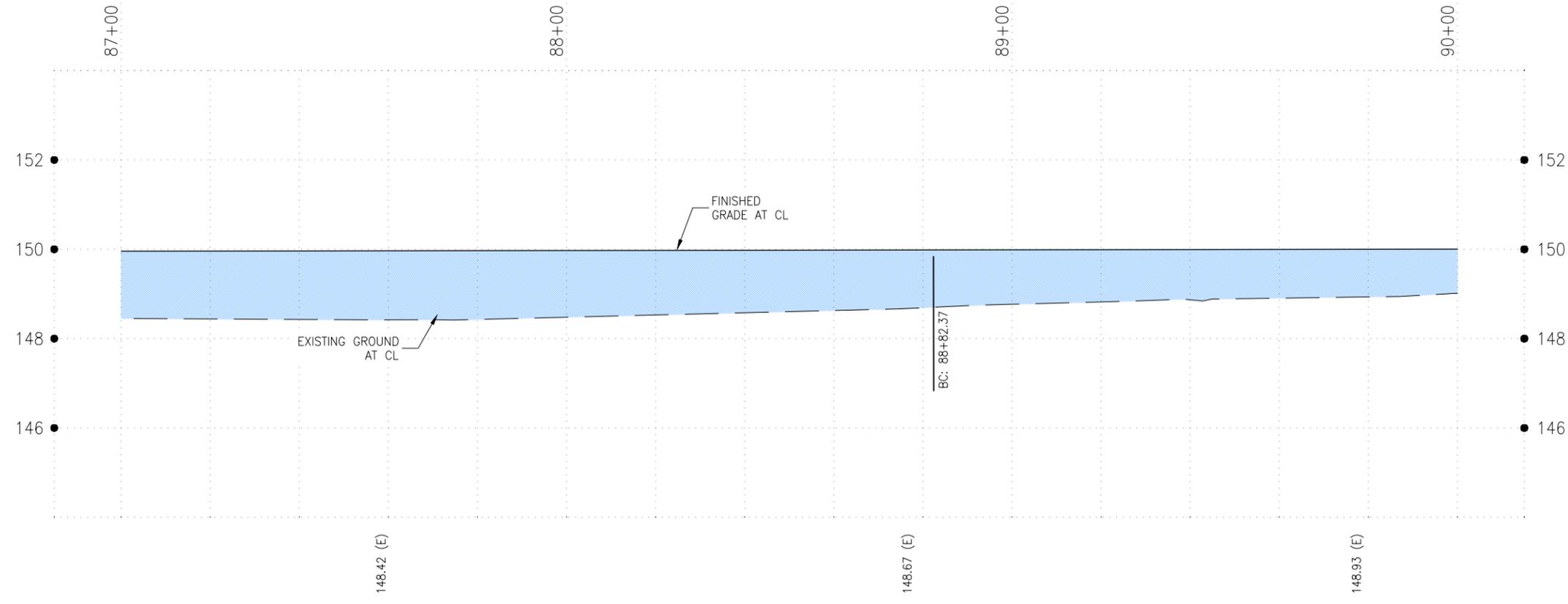
MATCH LINE
(87+00 SEE SHEET 13)



Project 1
STATION 87+00 - 90+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



Know what's below.
Call before you dig.

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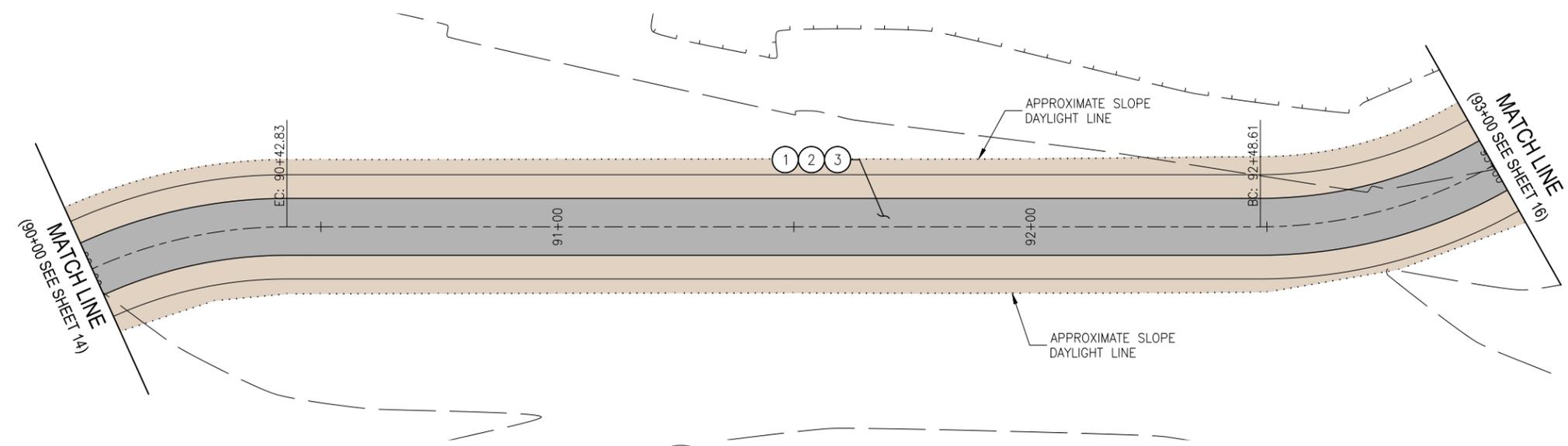
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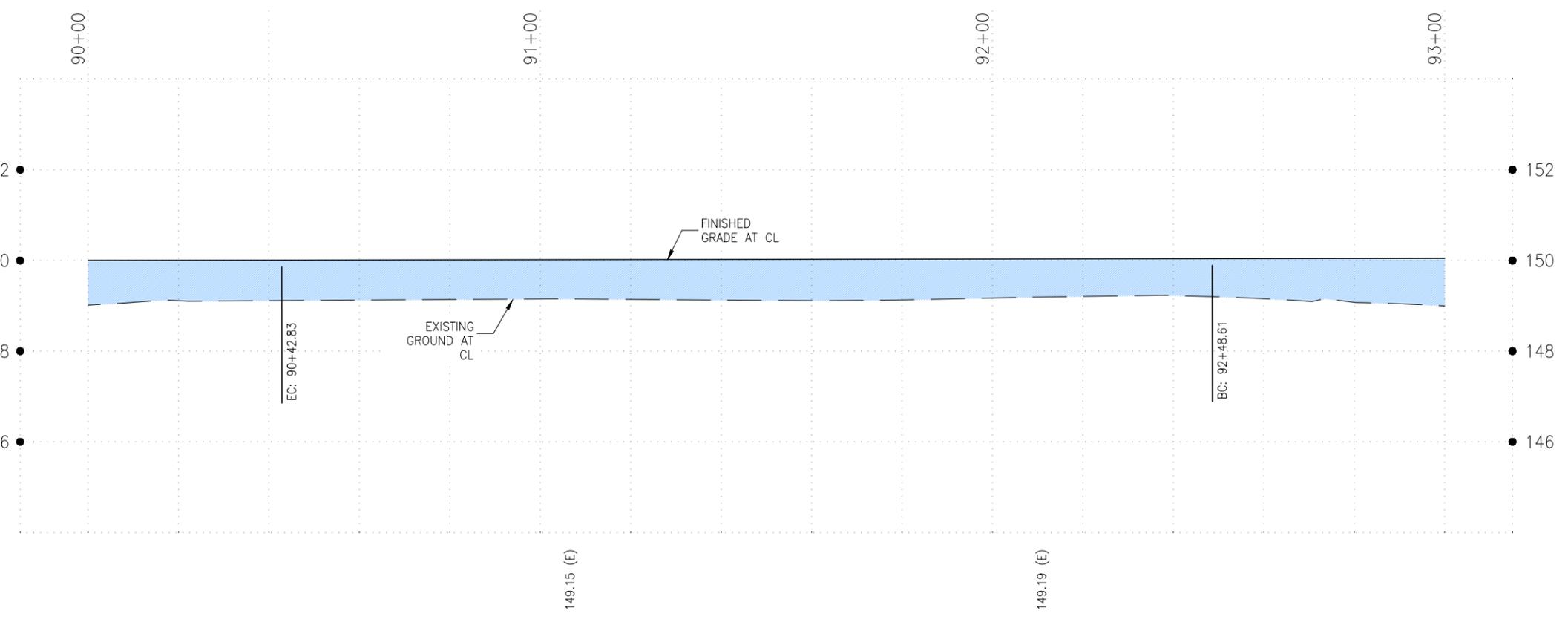
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 87+00 to 90+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-114
DRAWN BY DGR	DATE 04/20/22	SHEET 14
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

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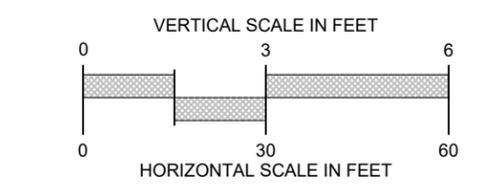


Project 1
STATION 90+00 - 93+00



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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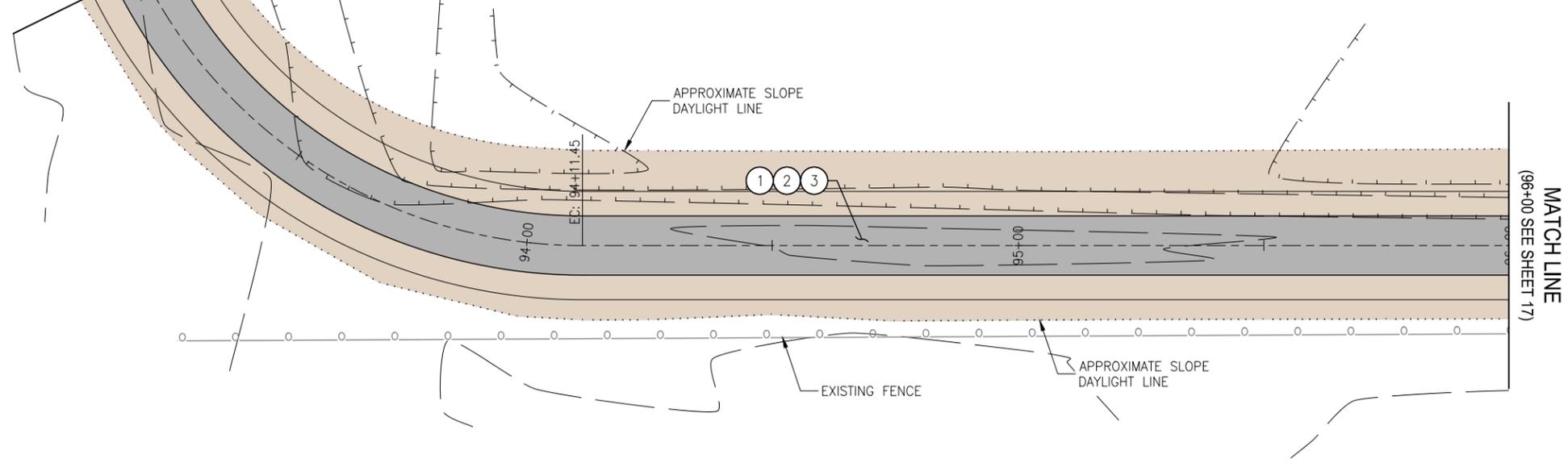
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 Telephone (209) 854-3300

City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 90+00 to 93+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-115
DRAWN BY DGR	DATE 04/20/22	SHEET 15
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

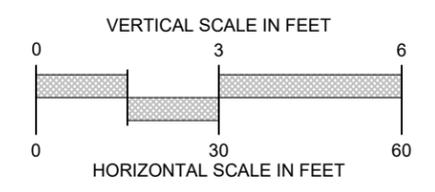
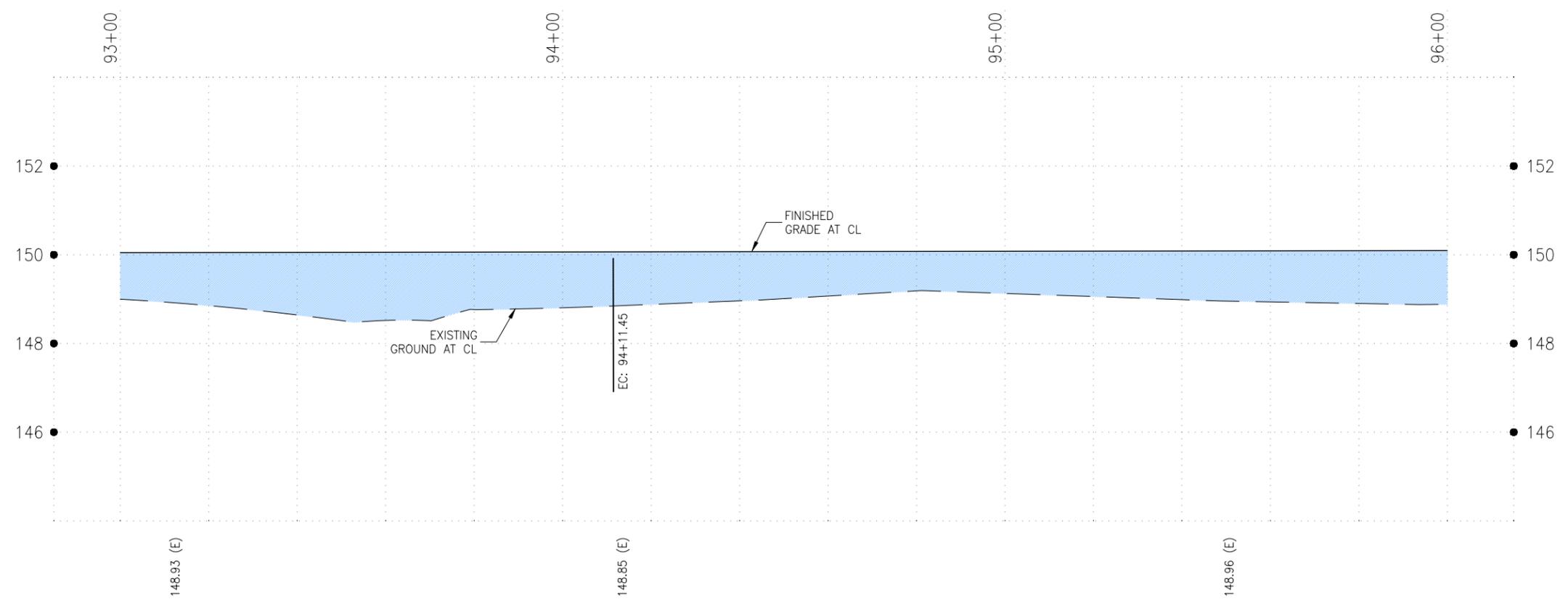
MATCH LINE
(93+00 SEE SHEET 15)

Project 1
STATION 93+00 - 96+00



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	1 31
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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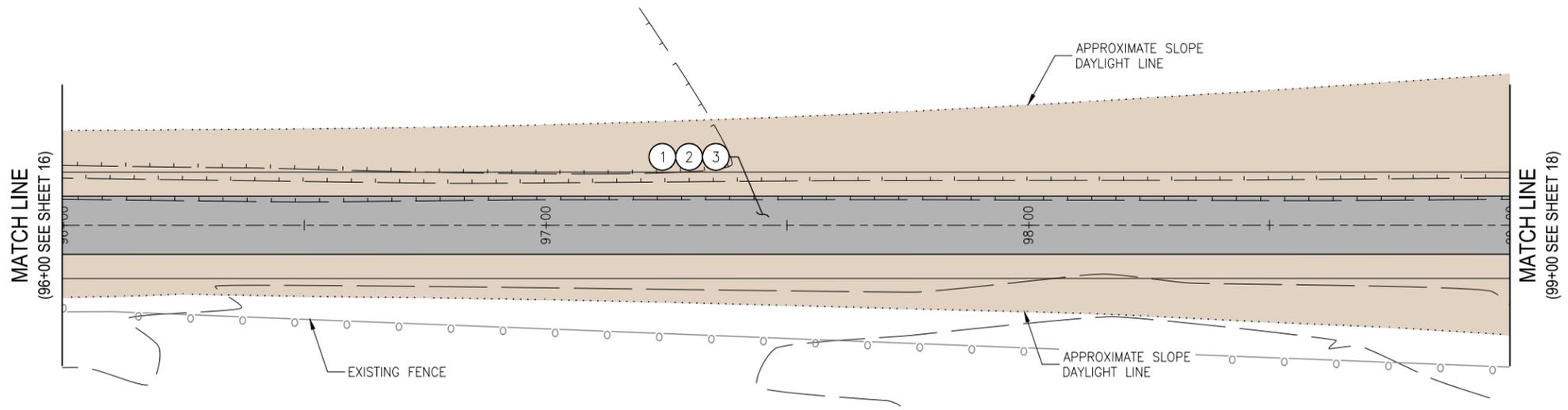
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 93+00 to 96+00

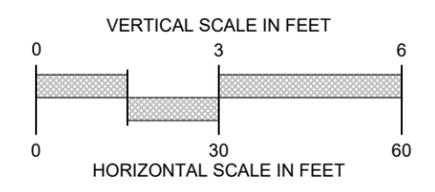
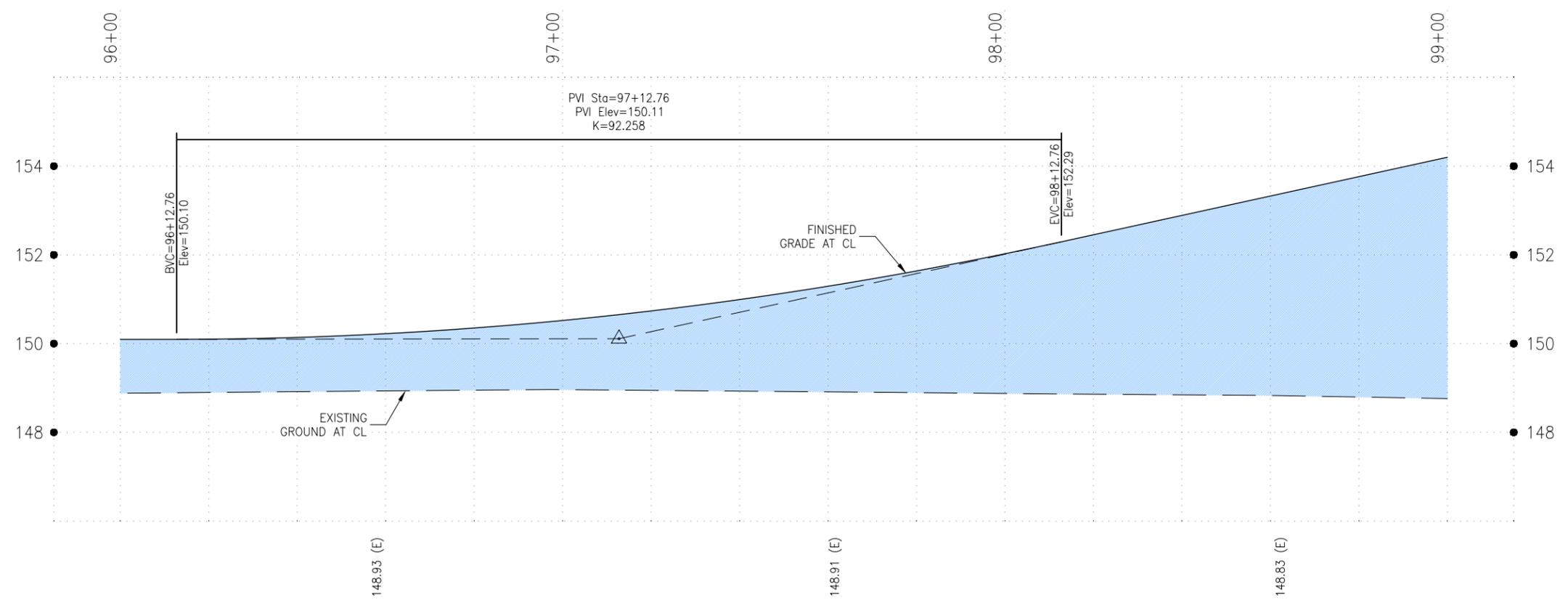
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-116
DRAWN BY DGR	DATE 04/20/22	SHEET 16
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF


Project 1
 STATION 96+00 - 99+00



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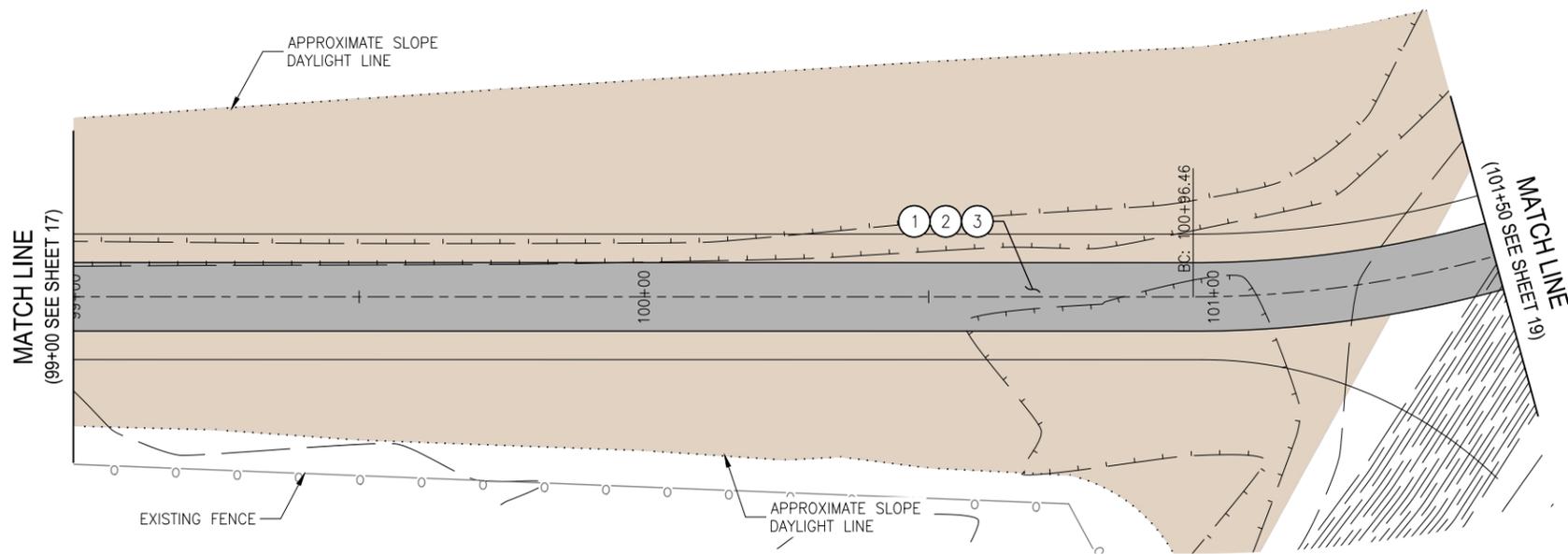
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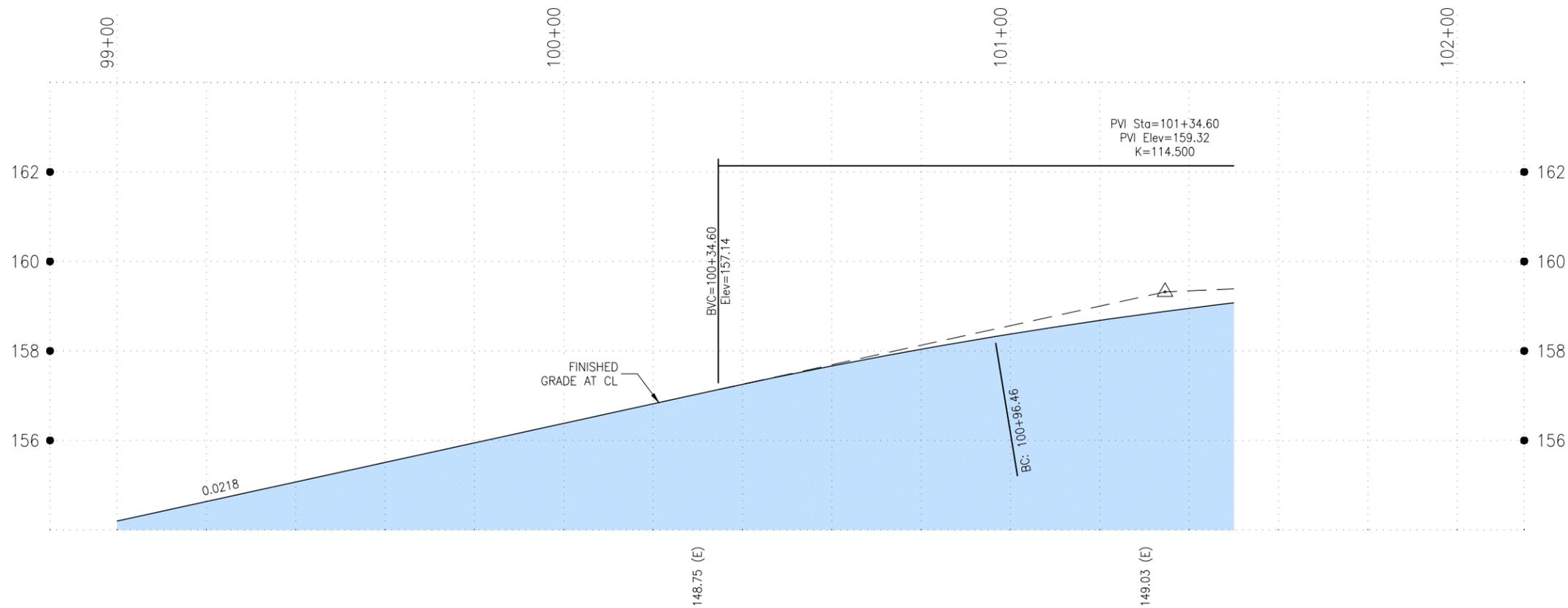

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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 95+00 to 98+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-117
DRAWN BY DGR	DATE 04/20/22	SHEET 17
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

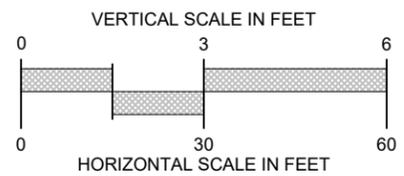


Project 1
STATION 99+00 - 101+50



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	1 31
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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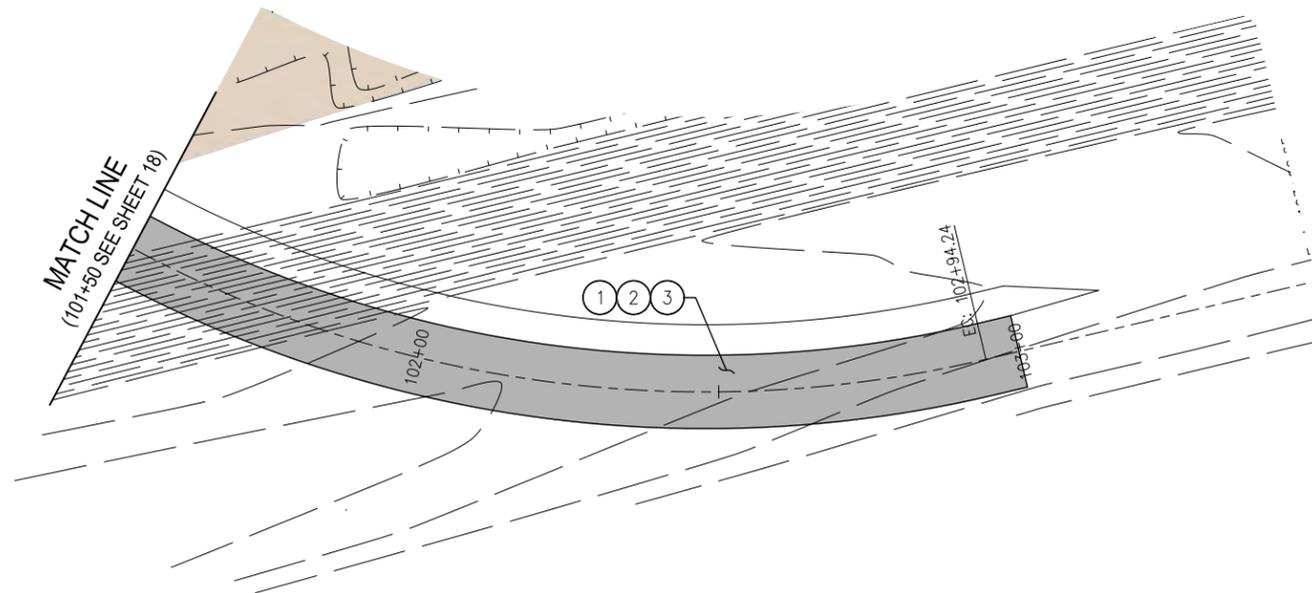
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 99+00 to 101+50

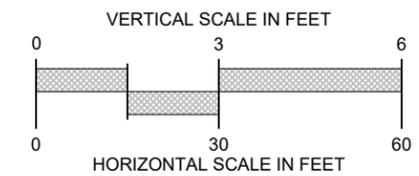
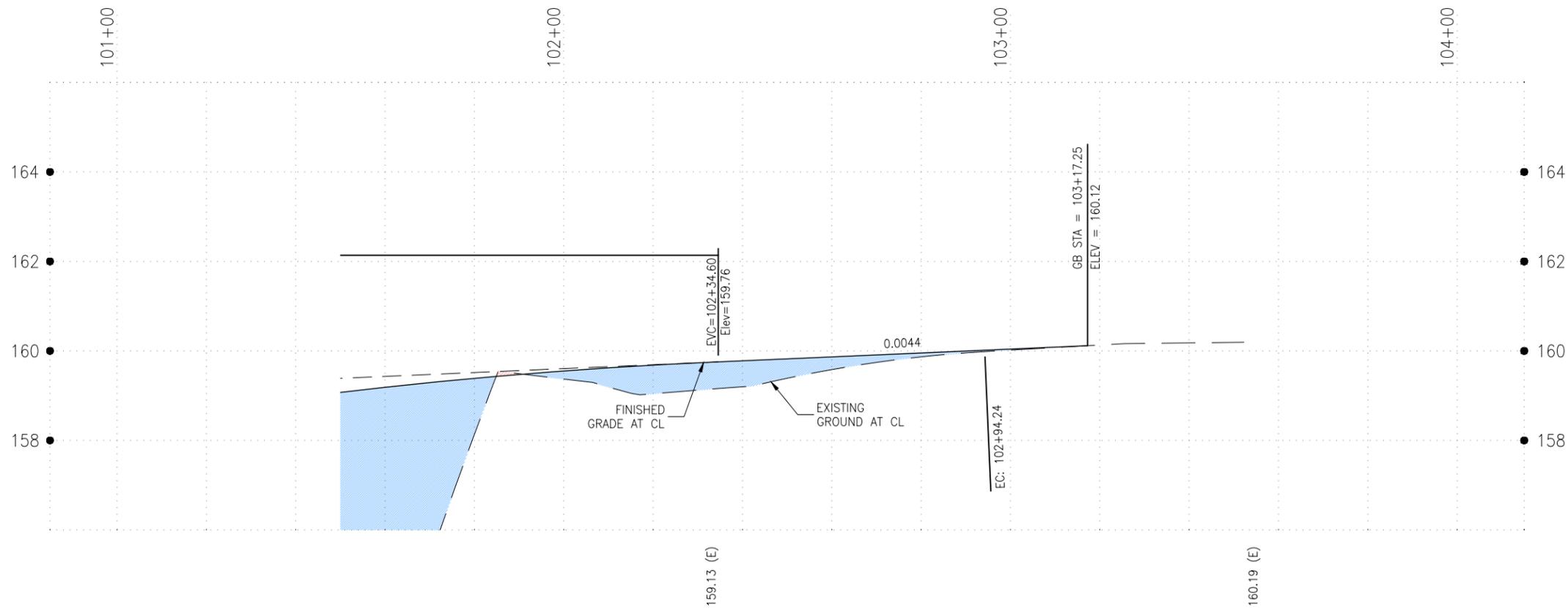
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-118
DRAWN BY DGR	DATE 04/20/22	SHEET 18
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 101+50 - 103+50



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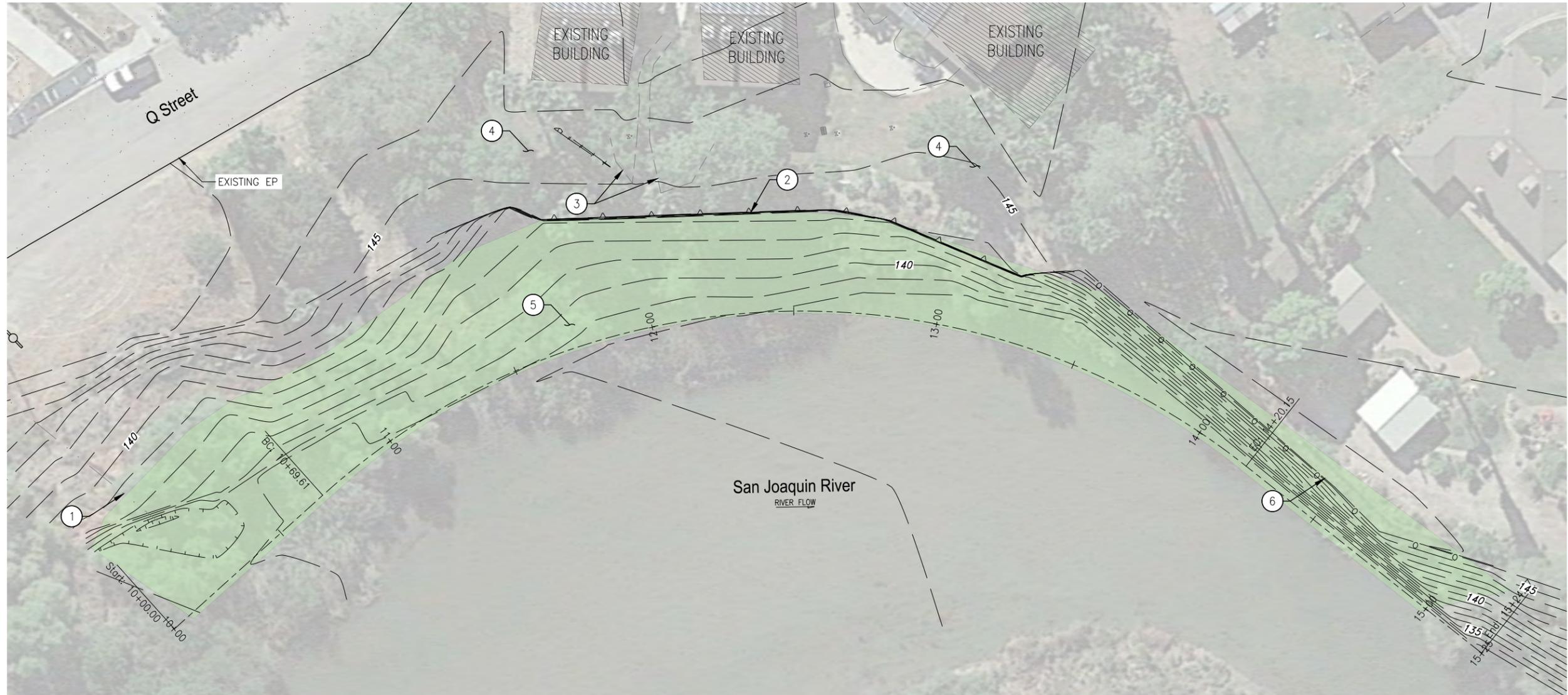
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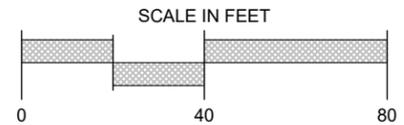
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 101+50 to 103+50

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-119
DRAWN BY DGR	DATE 04/20/22	SHEET 19
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 2
STATION 10+00 - 15+50



CONSTRUCTION NOTES	DETAIL/SYMBOL
① EXISTING STORM DRAIN PIPE TO REMAIN IN PLACE AND BE PROTECTED.	
② EXISTING RETAINING WALL TO REMAIN IN PLACE AND BE PROTECTED.	
③ EXISTING CONCRETE IMPROVEMENTS TO REMAIN IN PLACE AND BE PROTECTED.	
④ EXISTING PUTTING GREEN IMPROVEMENTS TO REMAIN IN PLACE AND BE PROTECTED.	
⑤ REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	■
⑥ EXISTING FENCE TO BE REMOVED AS NECESSARY TO ACCOMMODATE CONSTRUCTION ACTIVITIES.	



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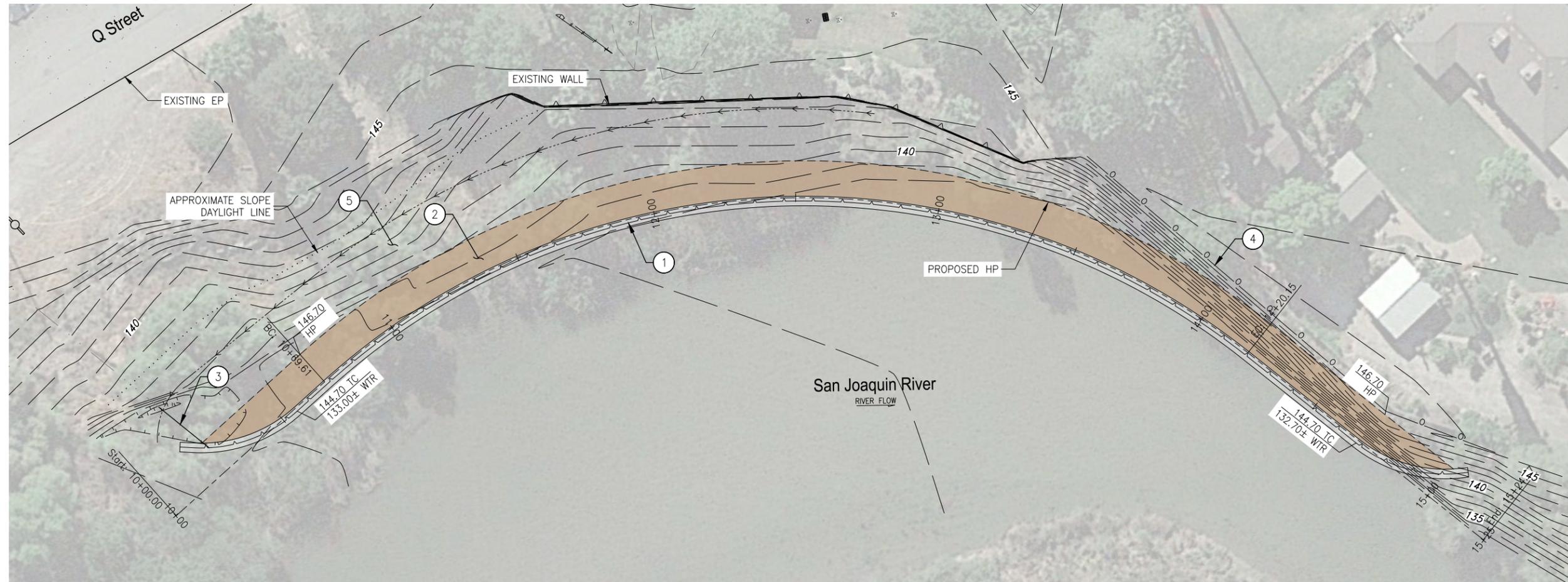
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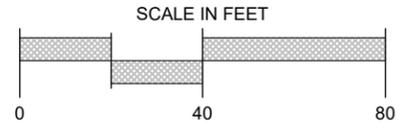
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 2 - Demolition Plan

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-120
DRAWN BY DGR	DATE 04/20/22	SHEET 20
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 2
STATION 10+00 - 15+50



CONSTRUCTION NOTES	DETAIL/SYMBOL
① CONSTRUCT SHEET PILE RETAINING WALL WITH CONCRETE CAP.	
② FURNISH AND PLACE RENO MATTRESS	
③ EXTEND EXISTING 12" STORM DRAIN PIPE.	
④ CONSTRUCT 6'-0" HIGH CHAIN LINK FENCE TO REPLACE REMOVED SEGMENTS.	
⑤ GRADE TO MATCH EXISTING SWALE TO DRAIN.	

ESTIMATED QUANTITIES	
SHEET PILING	498 LF
RENO MATTRESS	5,762 SF
CHAIN LINK FENCE	178 LF
12" SDR-35 PIPE	35 LF



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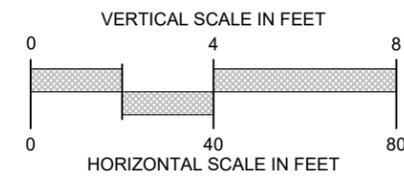
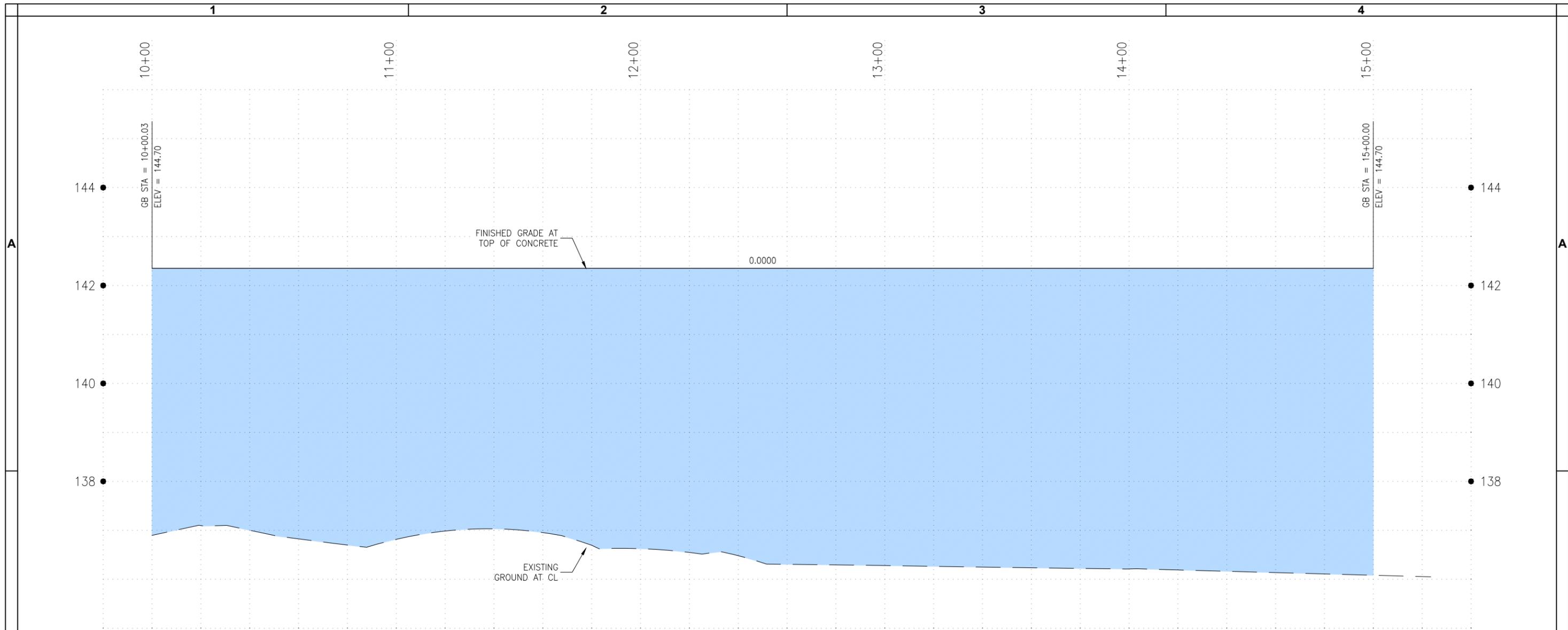
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 2 - Site Plan

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-121
DRAWN BY DGR	DATE 04/20/22	SHEET 21
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

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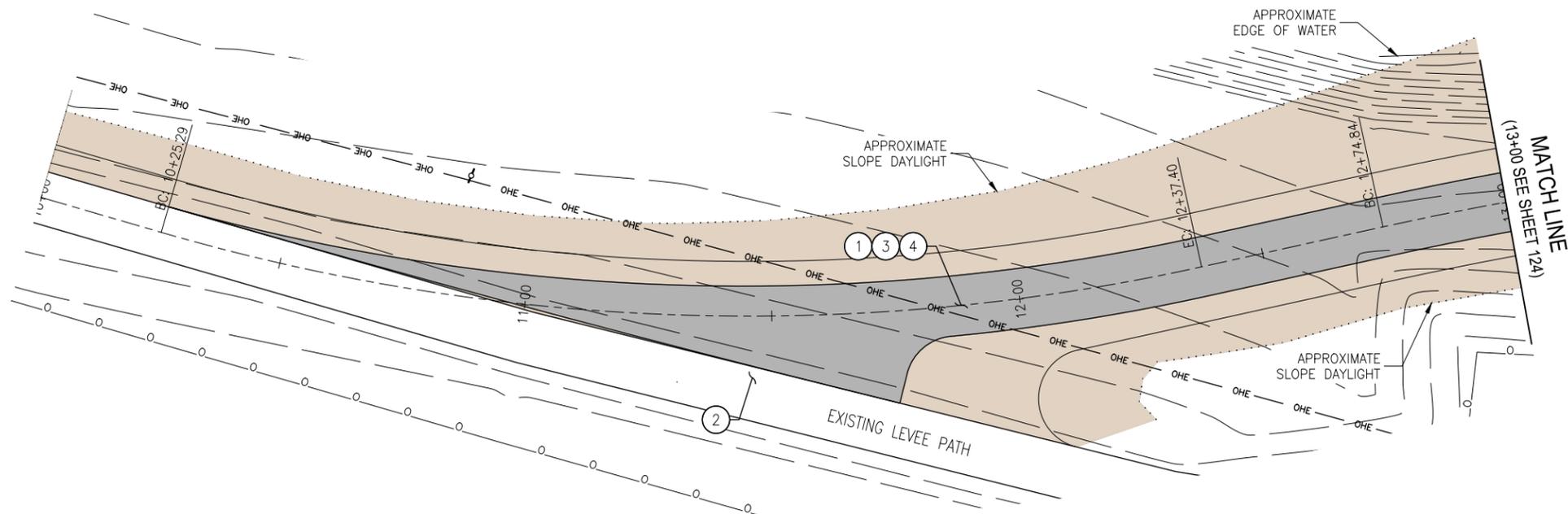
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
PROJECT 2 - Profile

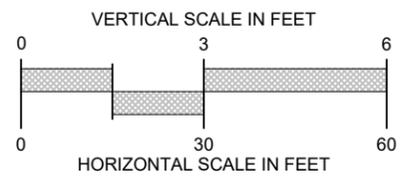
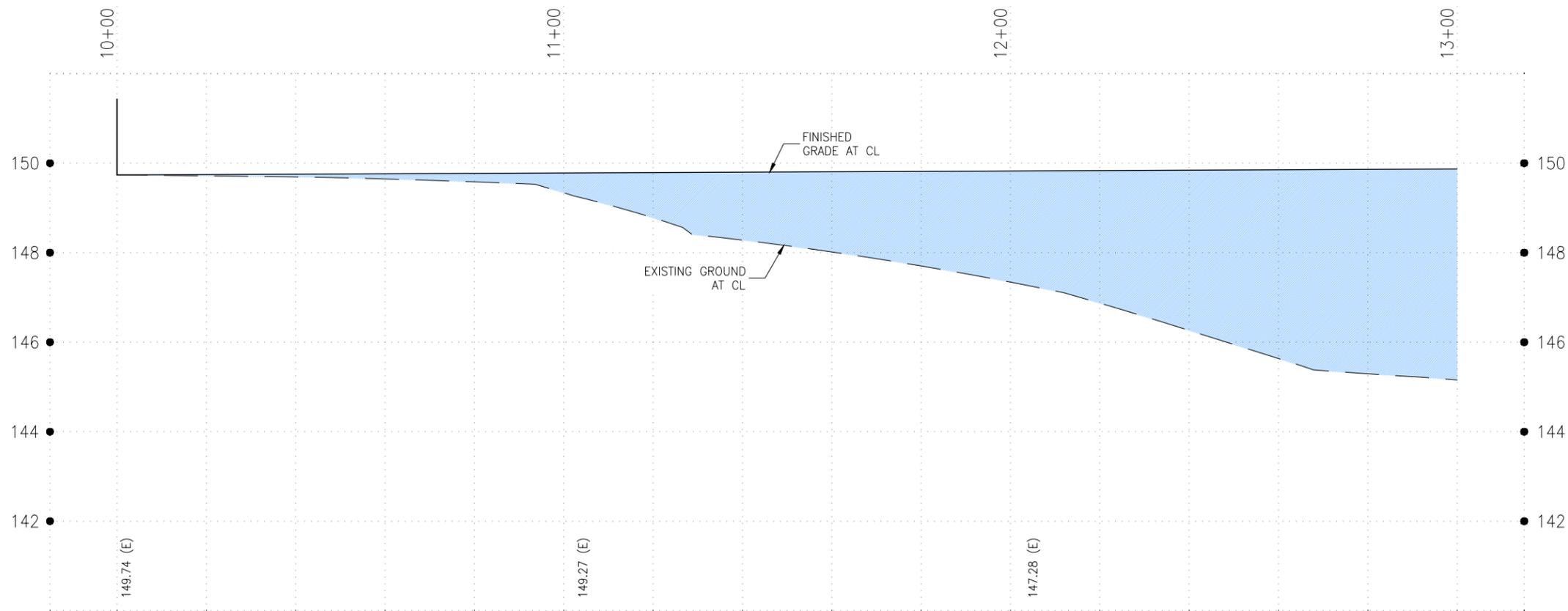
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DRAWN BY DGR	DATE 04/20/22	SHEET 22
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	REMOVE EXISTING AC PATH AS REQUIRED TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
3	CONSTRUCT 12' WIDE SHARED USE AC PATH. PROVIDE A SMOOTH TRANSITION BETWEEN THE PROPOSED AC TRAIL AND THE EXISTING AC TRAIL.	
4	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 3
 STATION 10+00 - 13+00



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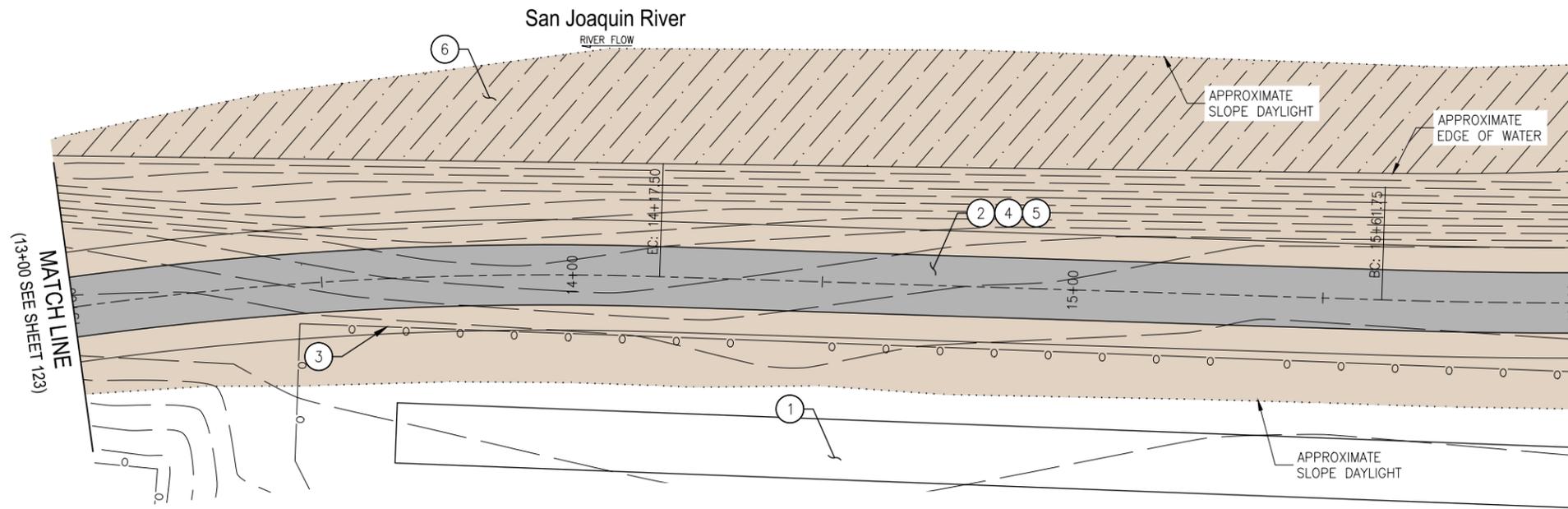
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 10+00 to 13+00

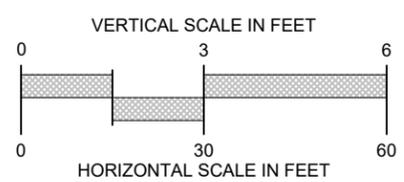
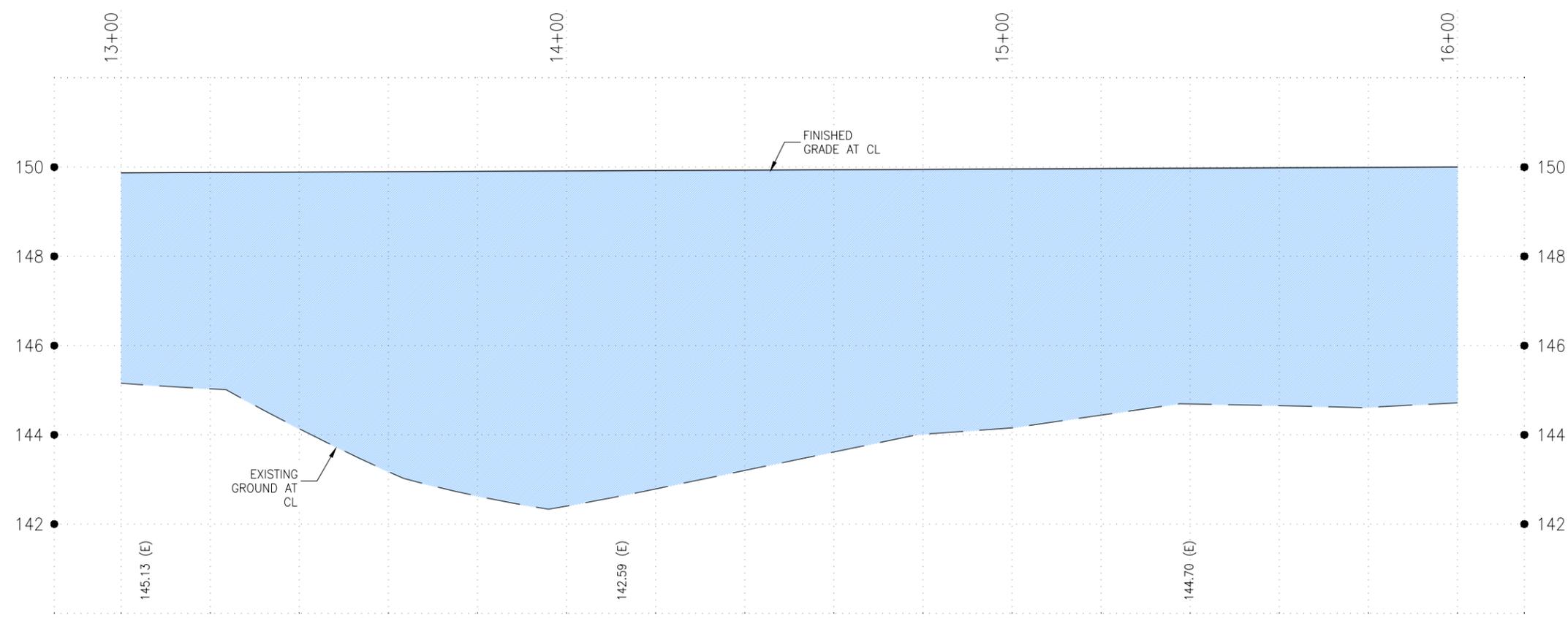
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DRAWN BY DGR	DATE 04/20/22	SHEET 23
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3




Project 3
 STATION 13+00 - 16+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	EXISTING SOLAR FACILITIES TO REMAIN IN PLACE AND BE PROTECTED. EXACT LOCATIONS OF FACILITIES AND SUPPORTING COMPONENTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.	
②	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
③	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
④	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
⑤	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	
⑥	AREA WHERE LEVEE FILL ENCROACHES ON THE EXISTING RIVER WATER LINE.	

ESTIMATED QUANTITIES		
AC PAVEMENT	xx	TN
CLASS II AB	xxx	TN
4" SINGLE DASHED STRIPING	300	LF



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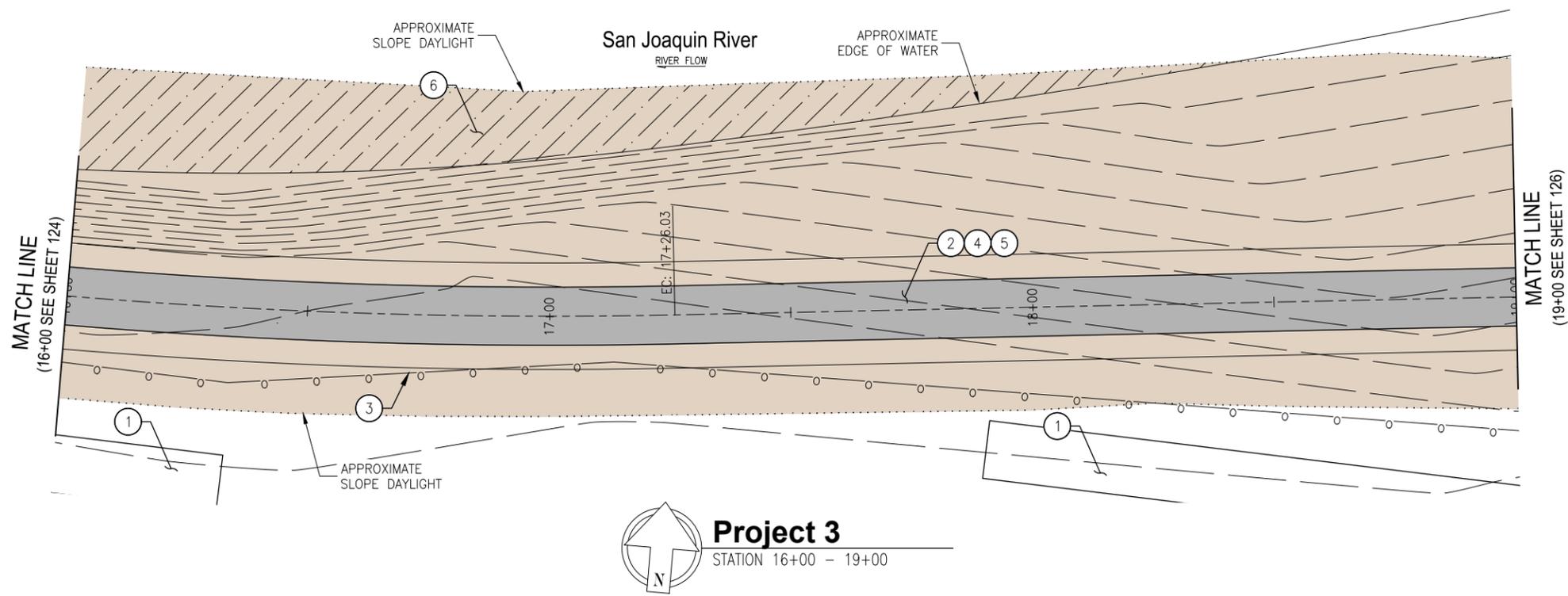
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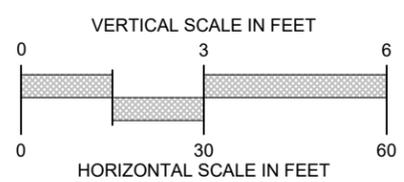
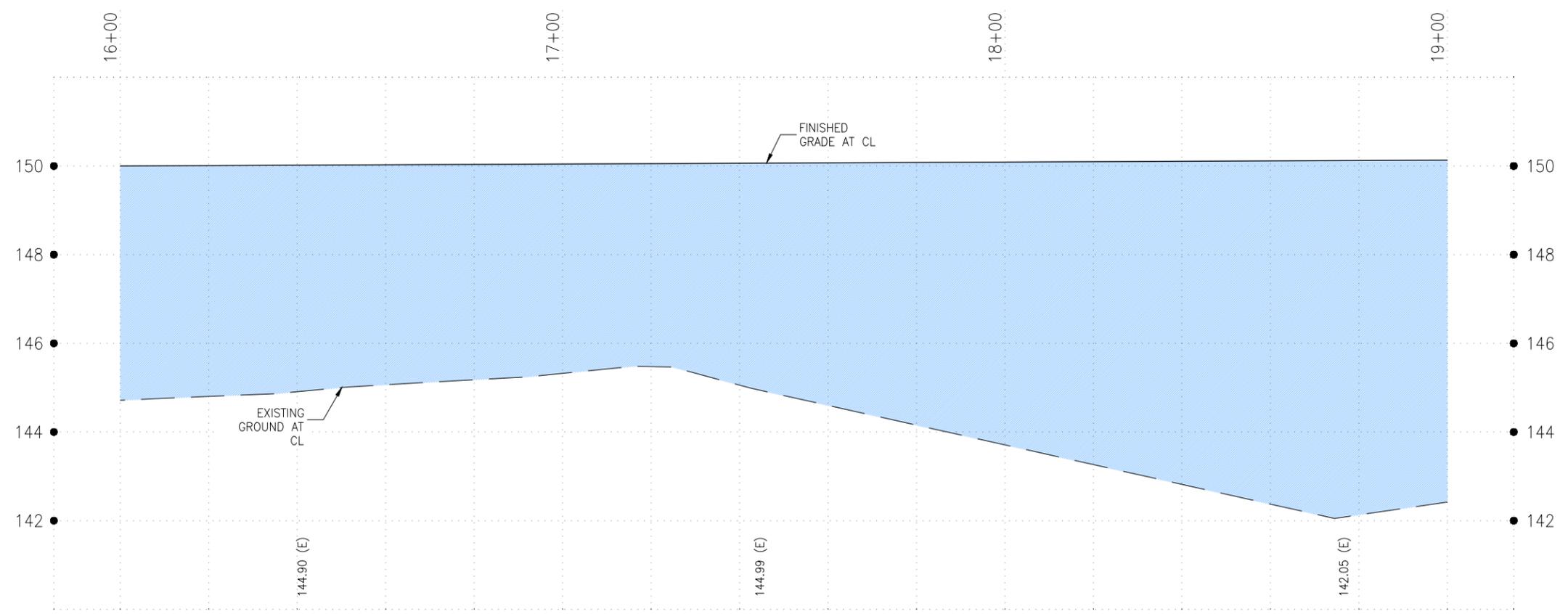
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 13+00 to 16+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-124
DRAWN BY DGR	DATE 04/20/22	SHEET 24
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	EXISTING SOLAR FACILITIES TO REMAIN IN PLACE AND BE PROTECTED. EXACT LOCATIONS OF FACILITIES AND SUPPORTING COMPONENTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.	
②	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
③	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
④	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
⑤	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	
⑥	AREA WHERE LEVEE FILL ENCROACHES ON THE EXISTING RIVER WATER LINE.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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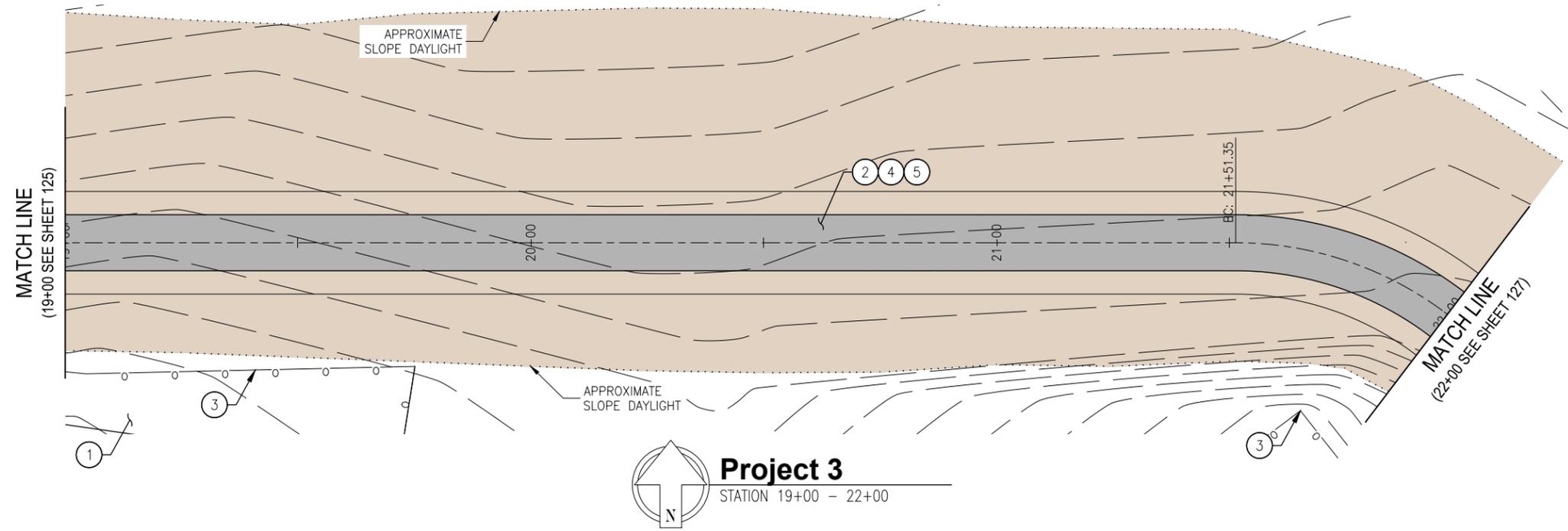
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 456 Sixth Street • Gustine, California 95322
 Telephone (209) 854-3300

City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 16+00 to 19+00

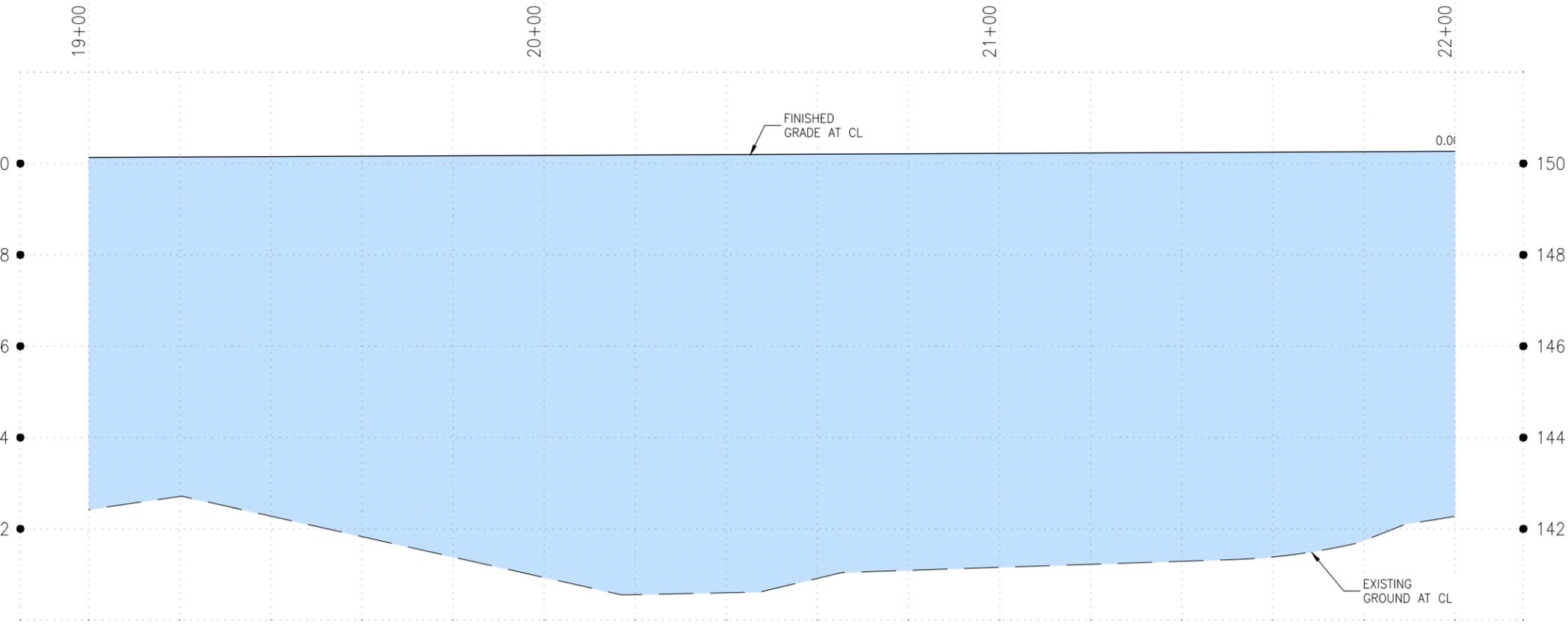
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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

MATCH LINE
(19+00 SEE SHEET 125)

MATCH LINE
(22+00 SEE SHEET 127)

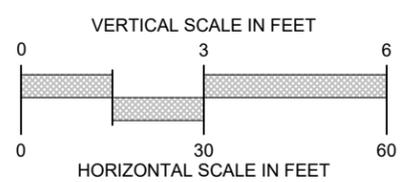


Project 3
STATION 19+00 - 22+00



CONSTRUCTION NOTES		REFERENCE DETAIL
①	EXISTING SOLAR FACILITIES TO REMAIN IN PLACE AND BE PROTECTED. EXACT LOCATIONS OF FACILITIES AND SUPPORTING COMPONENTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.	
②	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
③	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
④	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
⑤	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:16pm
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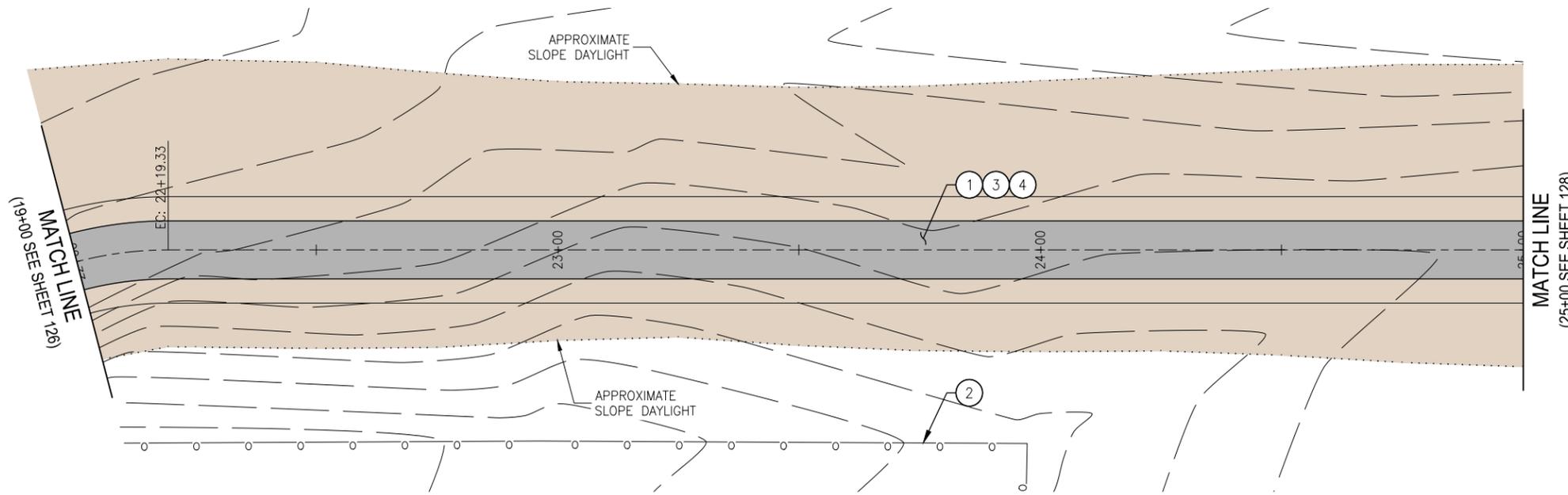
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Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 19+00 to 22+00

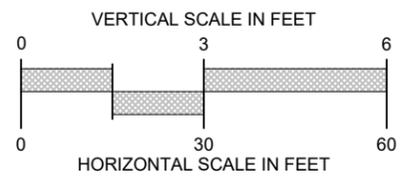
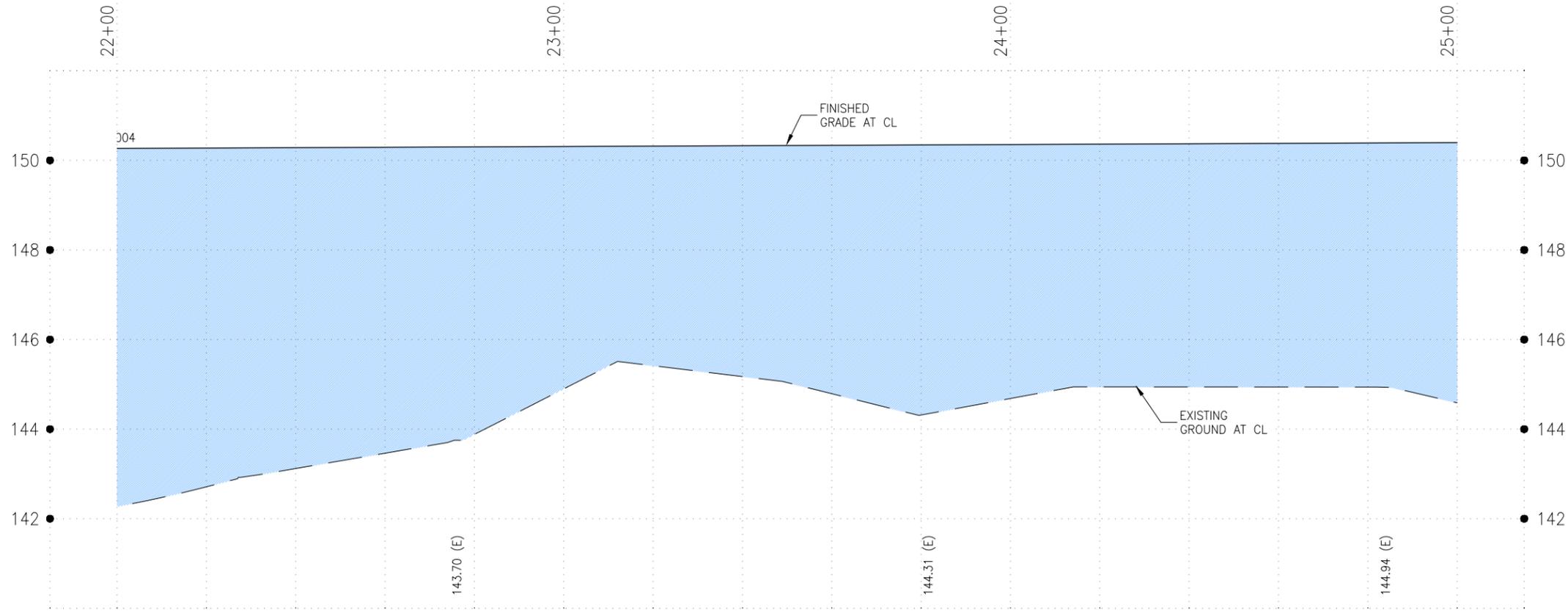
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CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 3
STATION 22+00 - 25+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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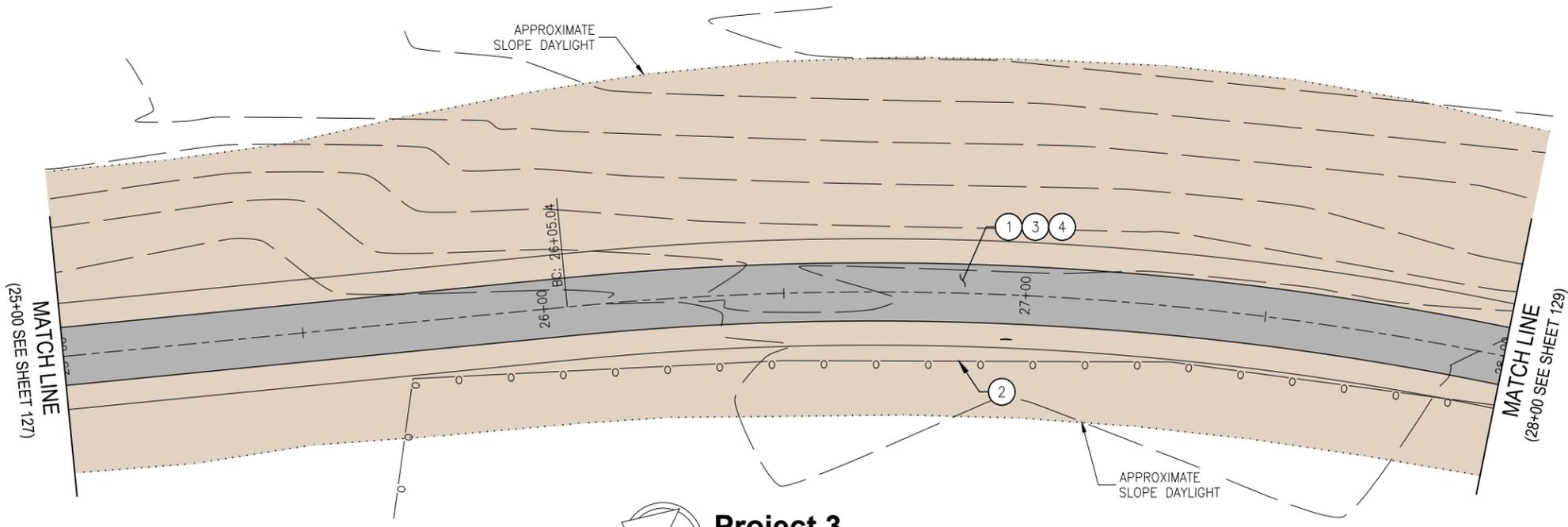
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 22+00 to 25+00

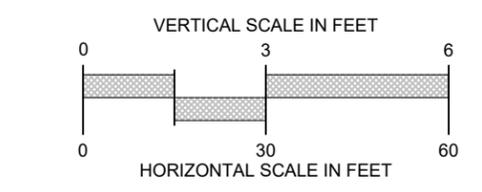
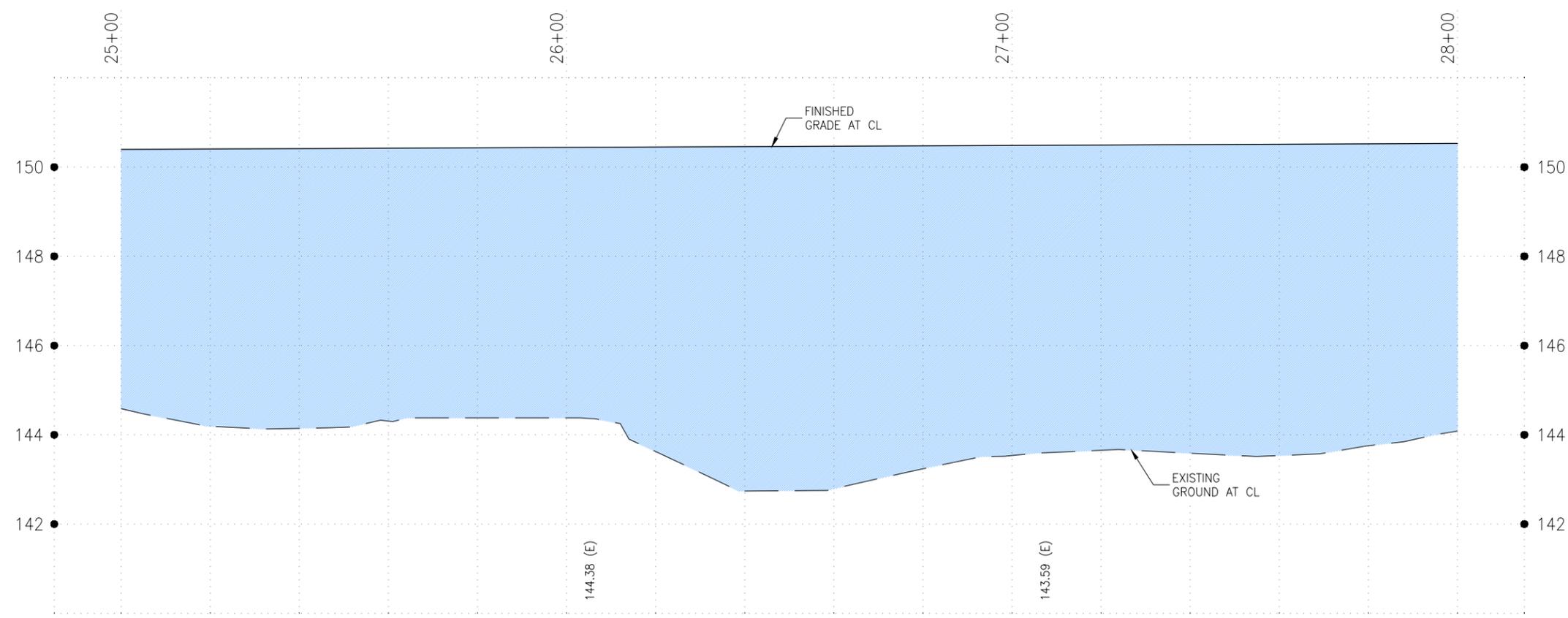
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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 3
STATION 25+00 - 28+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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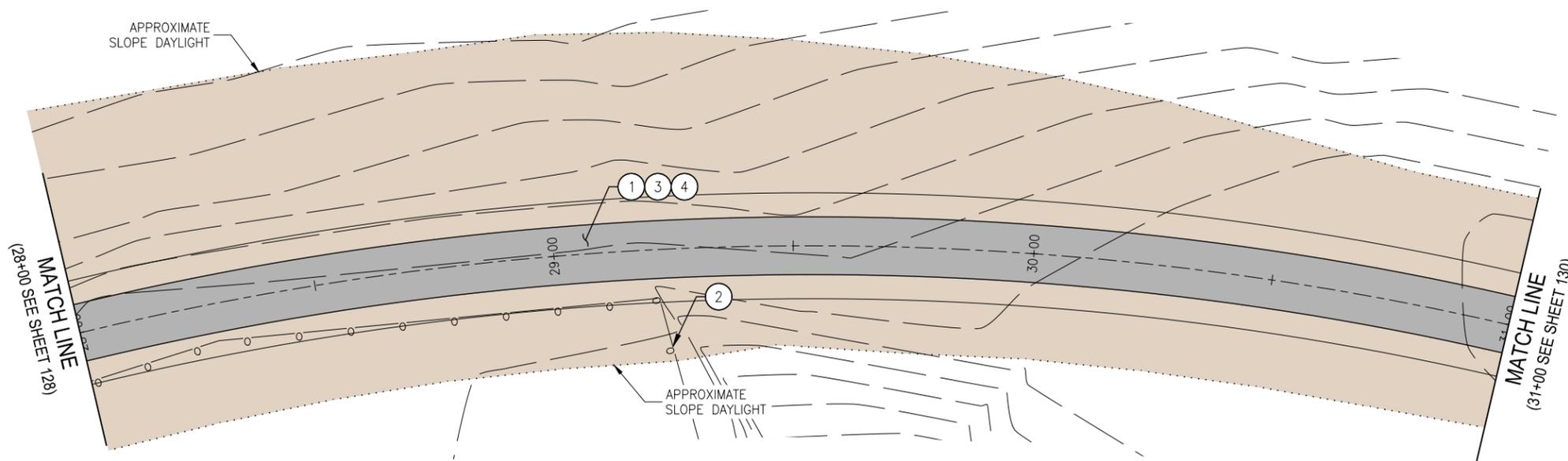
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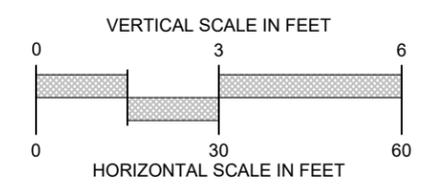
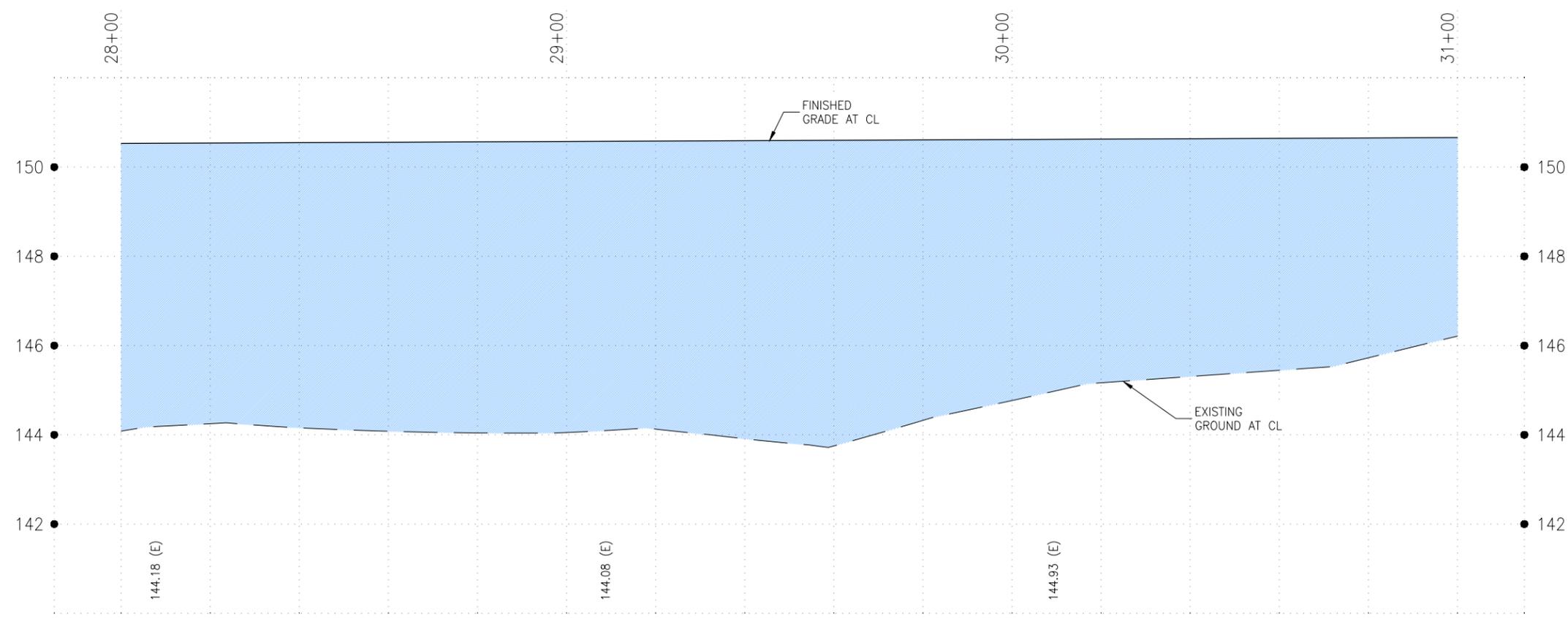
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CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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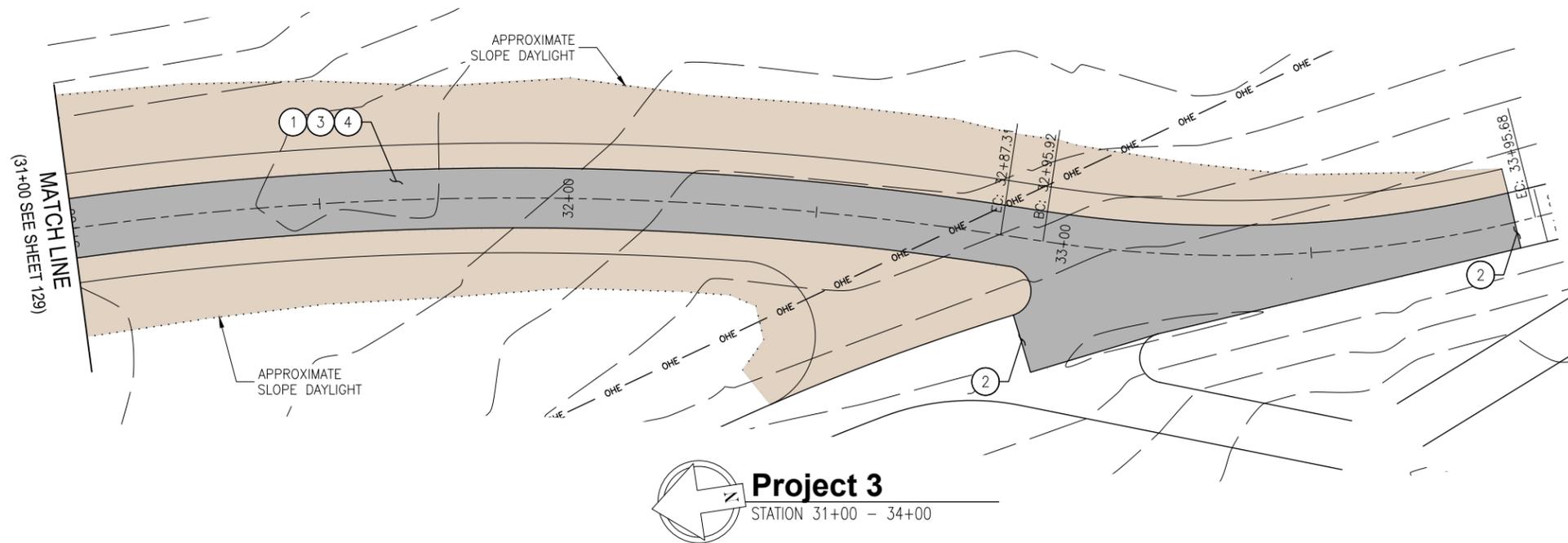
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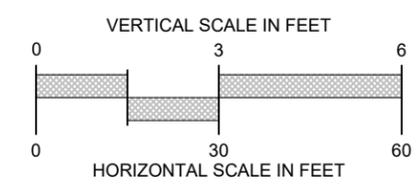
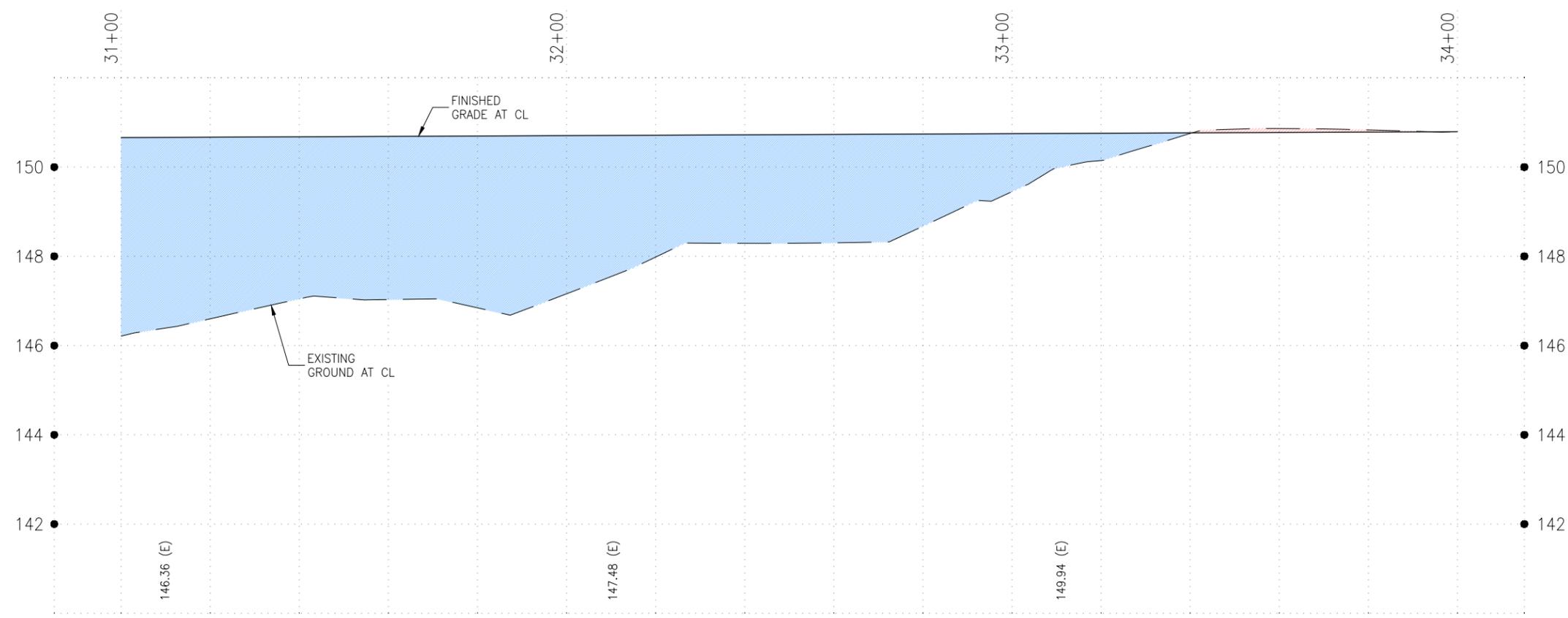
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Project 3 - Plan and Profile
Stations 28+00 to 31+00

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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	REMOVE EXISTING AC PATH AS REQUIRED TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
3	CONSTRUCT 12' WIDE SHARED USE AC PATH. PROVIDE A SMOOTH TRANSITION BETWEEN THE PROPOSED AC TRAIL AND THE EXISTING AC TRAIL.	(1/31)
4	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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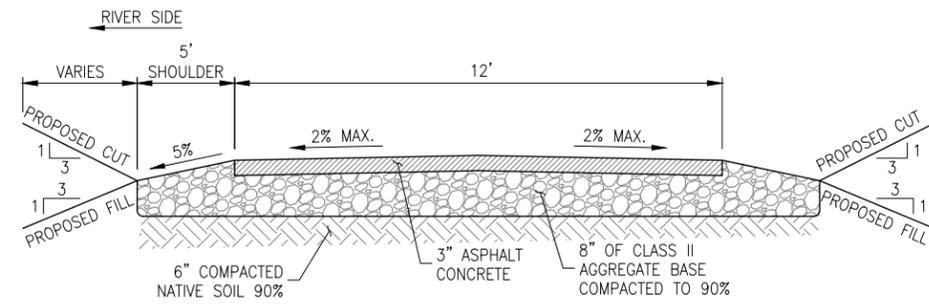
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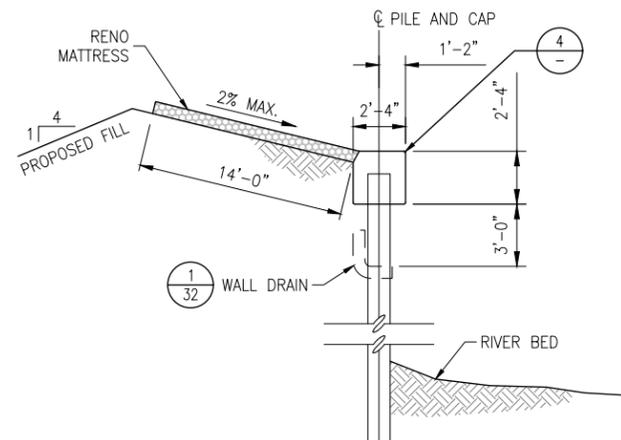
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Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 31+00 to 34+00

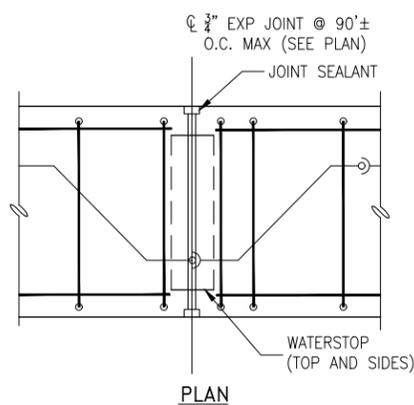
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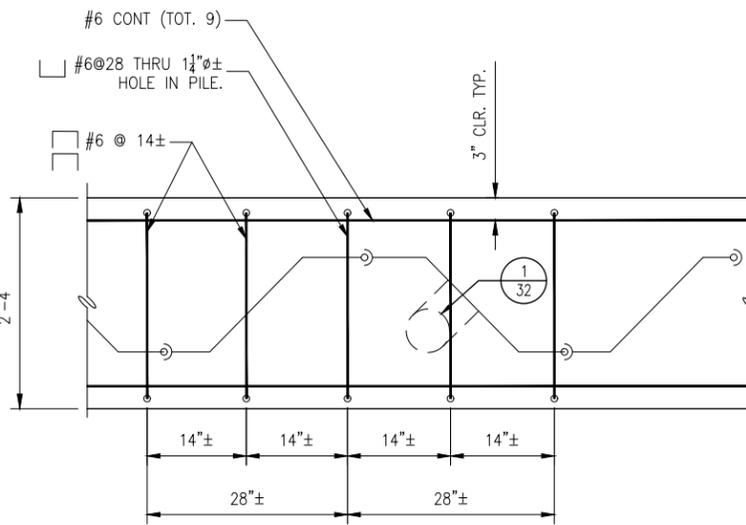
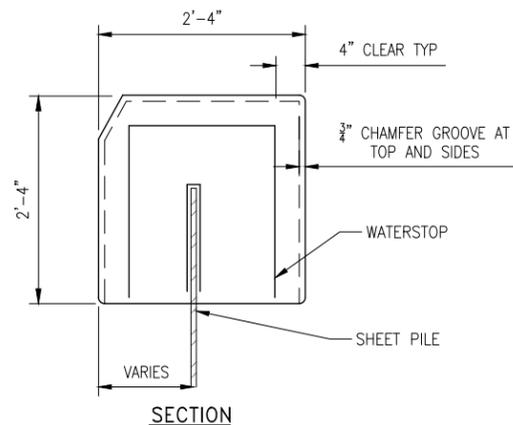
1 AC PATH TYPICAL CROSS SECTION
NOT TO SCALE



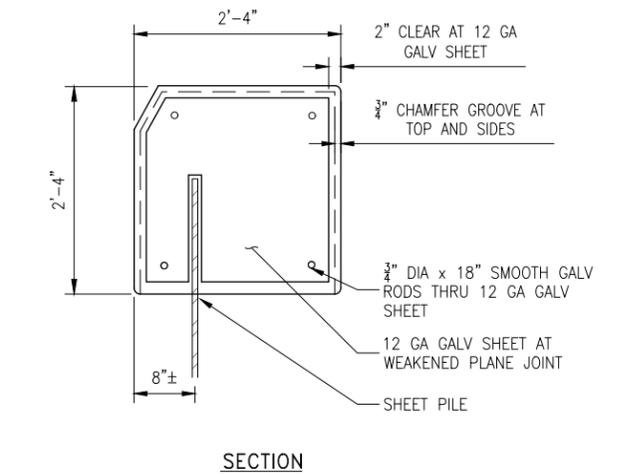
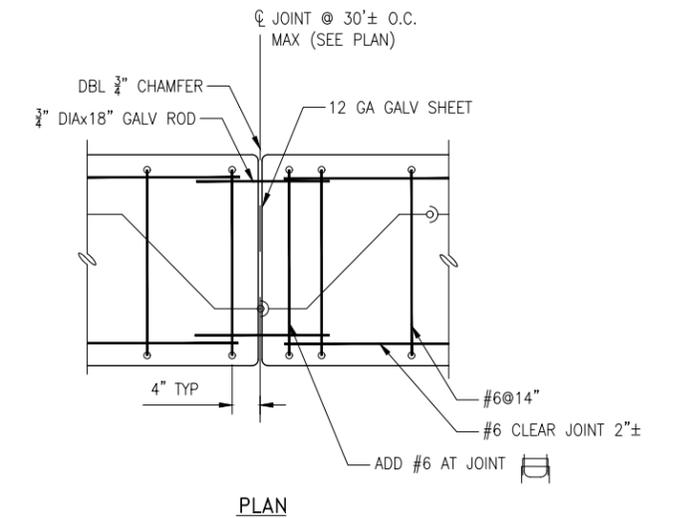
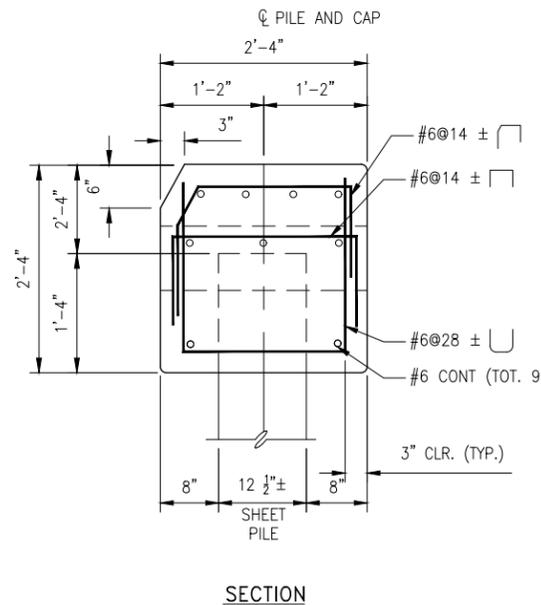
2 WALL SECTION
NOT TO SCALE



3 EXPANSION JOINT
NOT TO SCALE



4 CONCRETE CAP
NOT TO SCALE



5 WEAKEND JOINT
NOT TO SCALE



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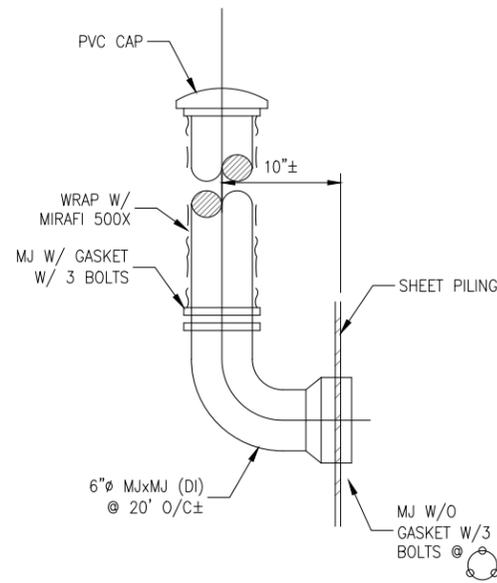
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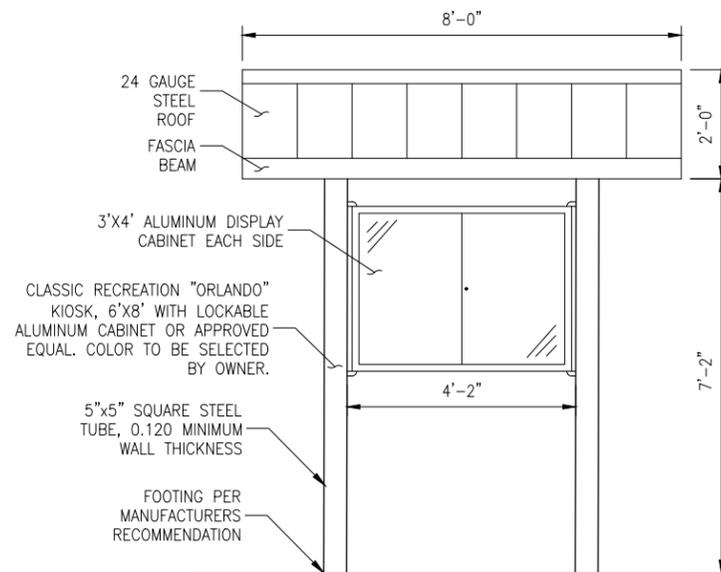
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
LEVEE PATH AND WALL CONSTRUCTION DETAILS

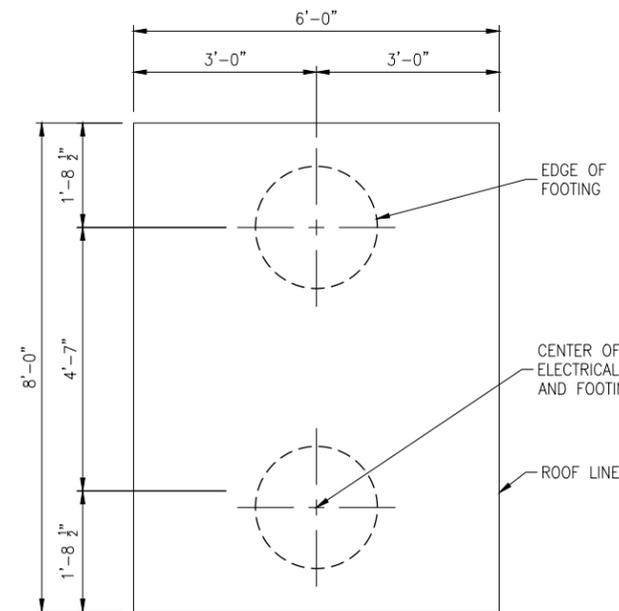
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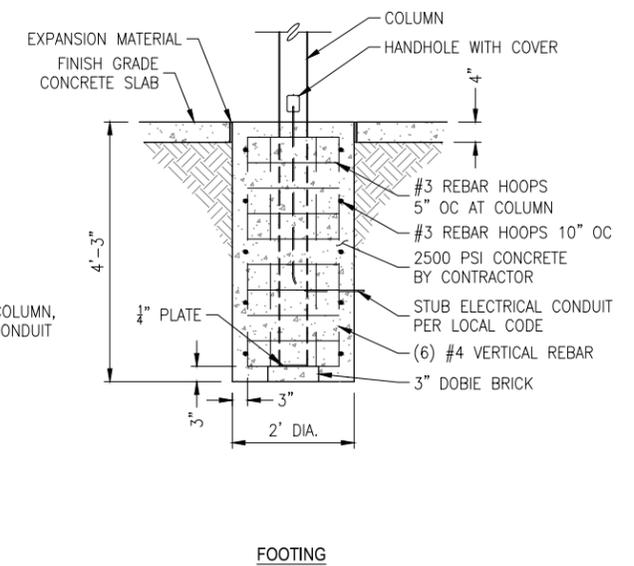
1 WALL DRAIN
NOT TO SCALE



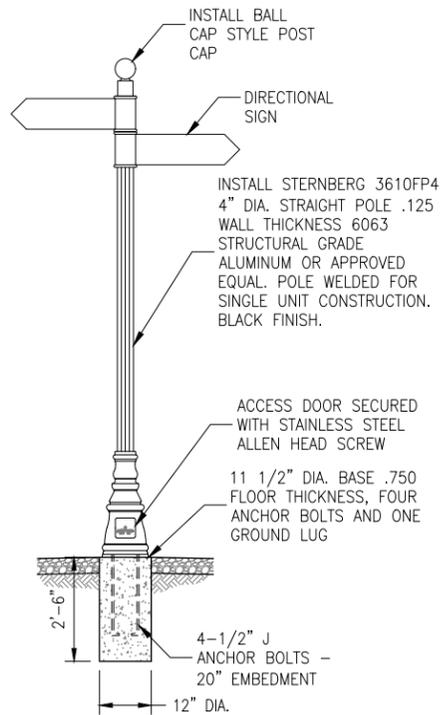
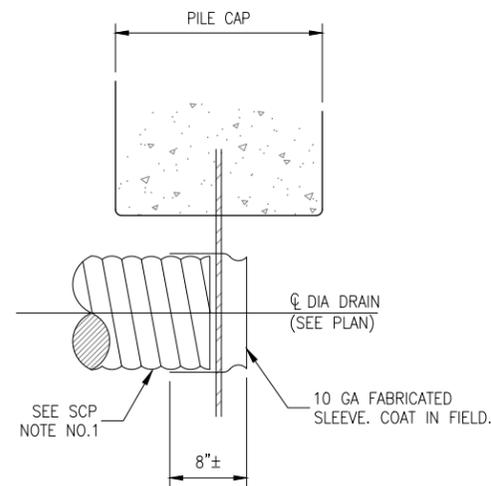
2 PIPE PENETRATION
NOT TO SCALE



3 DECORATIVE SIGN DETAIL
NOT TO SCALE



4 PATH KIOSK
NOT TO SCALE



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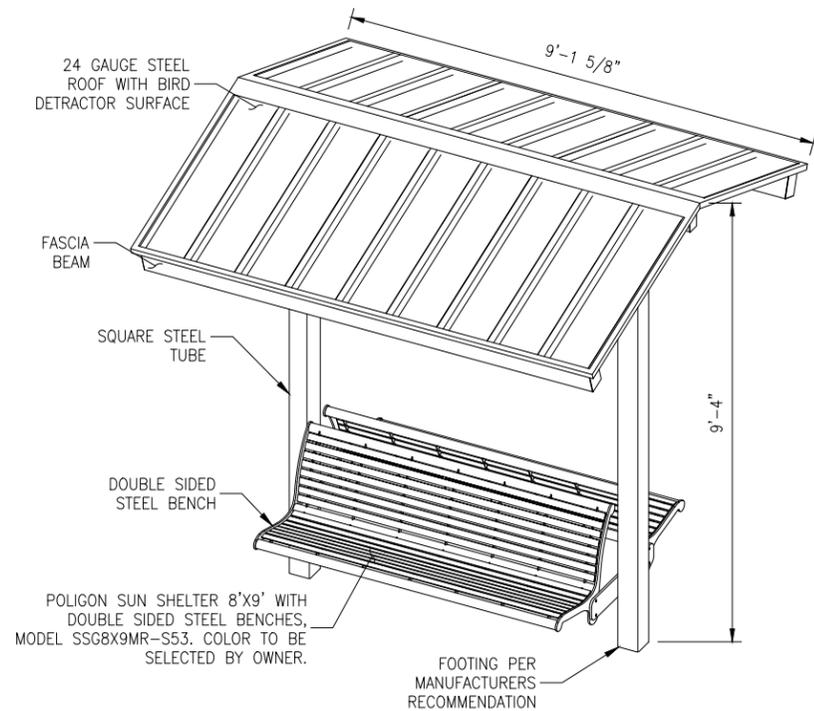
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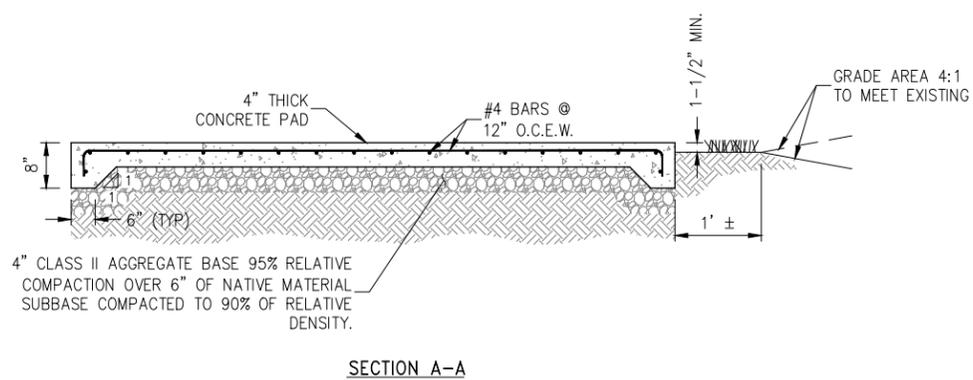
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
LEVEE WALL AND PATH SIGNAGE
CONSTRUCTION DETAILS

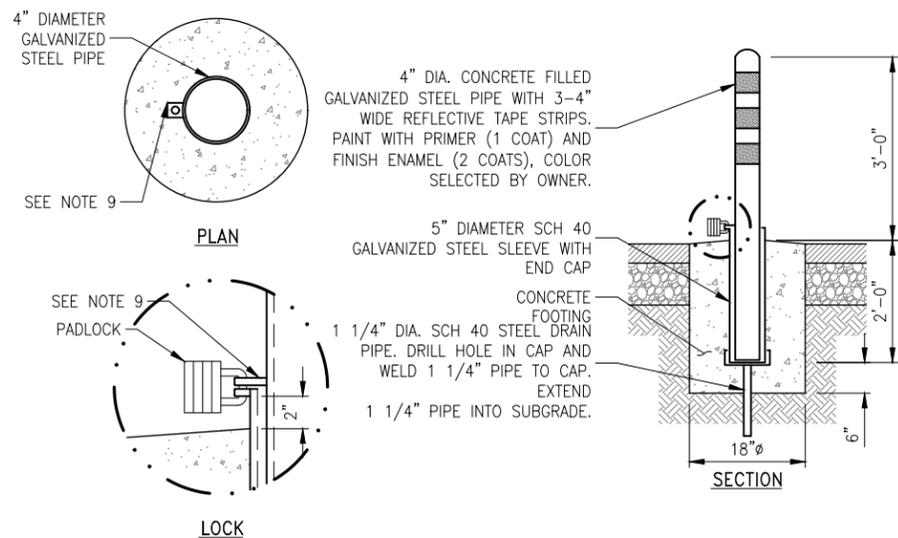
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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



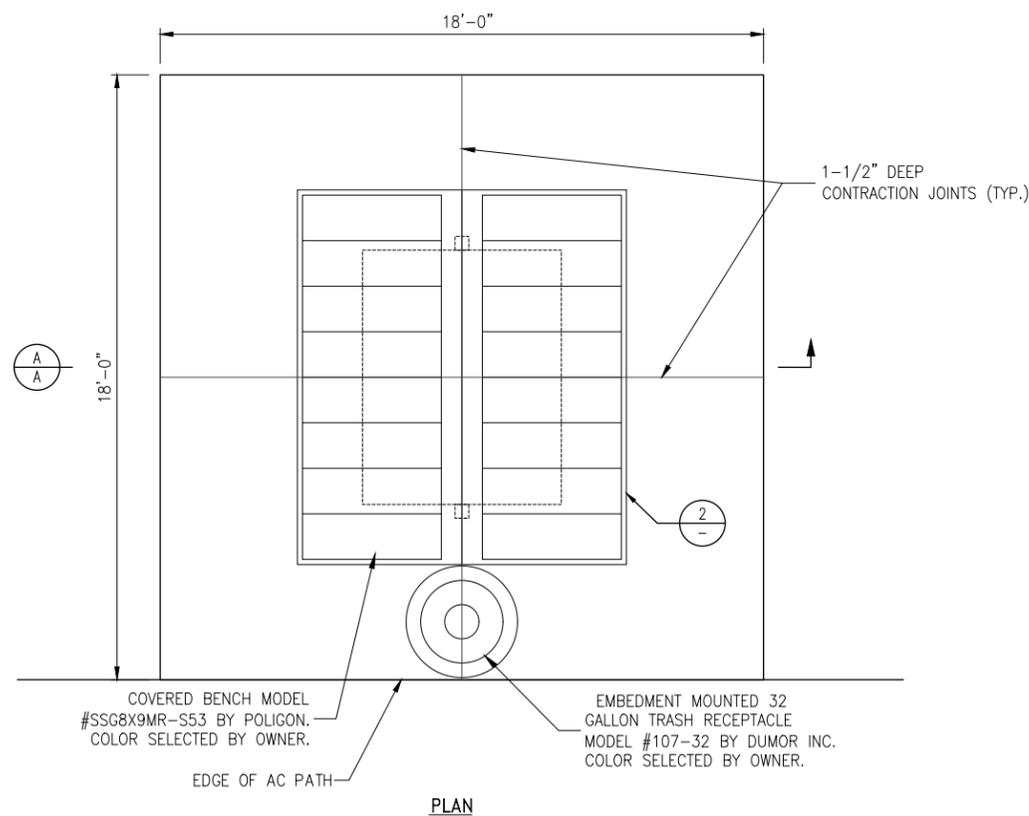
1 TYPICAL COVERED BENCH
NOT TO SCALE



2 REST STOP CONSTRUCTION
NOT TO SCALE



3 REMOVABLE BOLLARD
NOT TO SCALE



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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
PATH AMENITY CONSTRUCTION DETAILS

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DRAWN BY DGR	DATE 04/20/22	SHEET 33
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Firebaugh Multi-Benefit Flood Management Project

Attachment 3

Draft FEMA Flood Zone Map Update

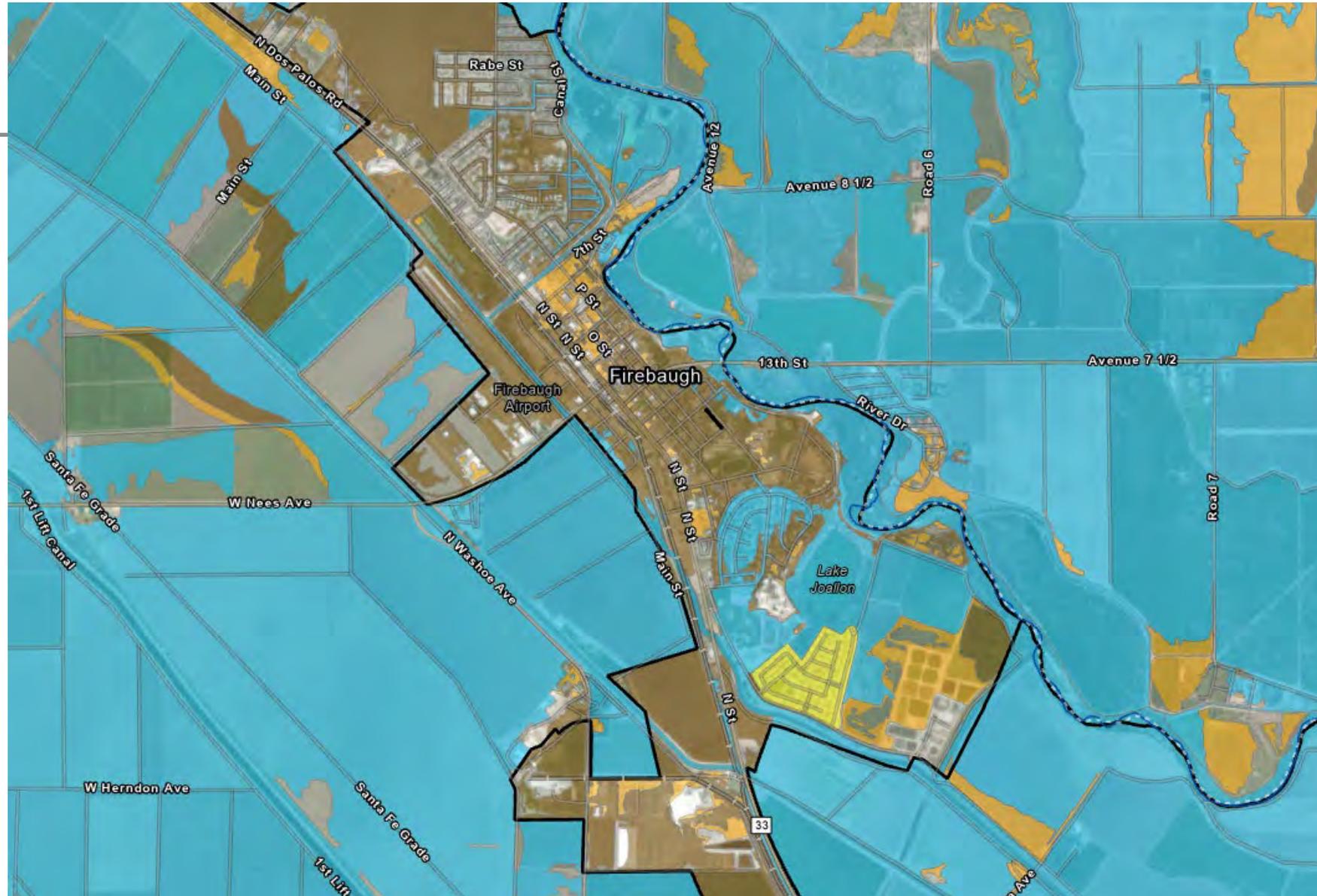
City of Firebaugh

Revised Mapping:

Shallow flooding less than 1 foot is shown in brown. Area was previously flooded on effective maps.

Flood Hazard Area Zones

- Zone AE
- Zone AE, Floodway
- Zone X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
- Zone X, 1 PCT DEPTH LESS THAN 1 FOOT
- Zone X, REDUCED FLOOD HAZARD ACCREDITED LEVEE SYSTEM



FEMA

FINAL

CITY OF FIREBAUGH



FIREBAUGH MULTI-BENEFIT FLOOD MANAGEMENT PROJECT FLOOD RISK REDUCTION FEASIBILITY STUDY

FINAL REPORT

June 2022

PREPARED BY



GOUVEIA ENGINEERING, INC.
CONSULTING ENGINEERS
456 SIXTH STREET
GUSTINE, CA 95322

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7.4 Project Area 4A	

Executive Summary

The purpose of this report is to present the Firebaugh Flood Risk Reduction Feasibility Study prepared for the Firebaugh Multi-benefit Flood Management Project. The purpose of the study is to determine the feasibility of the project elements identified by the San Joaquin Basin-Wide Feasibility Study (DWR, 2016) and to formulate a final levee alignment and project components that can be constructed to provide the City of Firebaugh with multiple benefits including flood risk reduction, ecosystem restoration, and recreational facilities.

The major project elements include:

- Replacement levees: 34,850 linear feet
- Recreational Trails: 44,350 linear feet
- New Berm: 2,800 linear feet
- Riparian scrub and forest, and seasonal wetland: 605 acres
- Sheet Piles for Erosion Control: 500 linear feet

The project is divided into four project areas to facilitate funding by phase. Project areas 1 through 3 are considered Near-Term projects and Project area 4, long term levees, as well as improvements in Eastside Acres are considered long term projects.

Current estimates for the proposed project components total about \$139 million as noted below:

- Project Area 1 - Setback levee and riparian restoration at the Wastewater Treatment Plant: \$15.7 million
- Project Area 2 - Stabilization of the eroding bank at a sharp bend in the San Joaquin River: \$3.4 million
- Project Area 3 - Setback levee to protect the Firebaugh Water Treatment Plant near the Rodeo Grounds: \$2.9 million
- Project Area 4 (Long term) - Ecosystem Restoration Projects: \$70.3 million
- Additional Long Term Projects: \$46.6 million

Following this Final Report, the next step is to seek funding for detailed design for project implementation. The City Firebaugh is a Disadvantaged Community and is not in a position to raise sufficient funds to implement the proposed capital projects. Therefore, a combination of federal and State funding assistance is critical for the implementation of the project components. DWR will continue to engage and coordinate with the City of Firebaugh for keeping informed of any future State and non-State funding opportunities to assist with the financing and implementation of the projects.

1.0 Introduction

1.1 Purpose

The purpose of this report is to document the work performed under the Firebaugh Flood Risk Reduction Feasibility Study for the Firebaugh Multi-benefit Flood Management Project. The purpose of the study is to determine the feasibility of the project elements identified by the San Joaquin Basin-Wide Feasibility Study (DWR, 2016) and to formulate a final levee alignment and project components that can be constructed.

The primary goal is to implement an achievable flood protection project that offers up to a 100-year level of flood protection based on the Federal Emergency Management Agency (FEMA) standard for the City of Firebaugh and Eastside Acres. This endeavor is called the Firebaugh Multi-Benefit Flood Management Project. It is a multi-benefit flood management project along Reach 3 of the San Joaquin River (SJR) that will reduce flood risks for the small disadvantaged communities and support public safety, local economic stability, ecosystem vitality, enriching experiences, and recreational use of the river.

This report was prepared from the information presented in the San Joaquin Basin-Wide Feasibility Study (DWR, 2016), the Central Valley Flood Protection Plan Update (DWR, 2017, 2022), the Upper San Joaquin Regional Flood Management Plan (SJRFCPA, 2015), as well as the technical memoranda prepared as part of this study.

Following this introductory chapter, are descriptions of the project area, project objectives, hydrology and hydraulics, environmental impacts, geotechnical design criteria, alternatives evaluation, finance strategy, and capital improvement program.

1.2 Project Execution and Coordination

This study was completed in collaboration with the California Department of Water Resources (DWR), the Upper San Joaquin Regional Flood Management Group (Regional Group), the City of Firebaugh and other interested parties.

The interested parties included the grantor, project team, and project work group which are described in the following sections.

1.3 Grantor

This study was funded by DWR (Grantor) from Proposition 1E Grants. DWR’s project officers are shown in Table 1.1. The DWR’s project manager was the grantor’s representative with authority to make determinations and findings with respect to each controversy under or in connection with the interpretation, performance, or payment for work performed under the grant agreement. The DWR’s program manager was responsible for executing the agreement and any amendments.

Table 1.1. Grantor Project Officers

Position	Name	Email	Telephone
Project Manager	Mehdi Mizani	mehdi.mizani@water.ca.gov	916-480-5351
Program Manager	Jeremy Arrich	jeremy.arrich@water.ca.gov	-

1.4 Project Team

The grantee project team was comprised by the City of Firebaugh and its consulting engineer, Gouveia Engineering. The City of Firebaugh as the grantee was responsible for the overall Program Management. Gouveia Engineering was responsible for managing, preparing, and delivering the study requirements. The grantee project officers are shown in Table 1.2.

Table 1.2. Grantee Project Officers

Position	Name	Email	Telephone
Grantee Project Manager	Ben Gallegos	bgallegos@ci.firebaugh.ca.us	559-659-2043
Grantee Consultant	Mario Gouveia	mgouveia@gouveiaengineering.com	209-854-3300

1.5 Firebaugh Multi-Benefit Flood Management Project Working Group

The following list includes the members of the Firebaugh Multi-Benefit Flood Management Project Working Group (Work Group). The responsibility of the Work Group was to provide support for the planning and implementation of the study.

The Project Work Group met five times during the study to provide comments on the work products and guidance. One of these meetings was a public meeting to solicit public comments on the project. Their broad interests and goals are as follows:

City of Firebaugh: Goals include reducing flooding and mandatory flood insurance requirements, increasing jobs, and connecting existing trails into a riverfront trail network.

California Department of Water Resources: Goal is to provide 100-year flood protection for small communities and achieve a broad range of public benefits.

San Joaquin River Restoration Program (SJRRP): The US Bureau of Reclamation is the lead agency for the SJRRP whose Settlement Restoration Goal is to restore and maintain naturally reproducing and self-sustaining populations of salmon and other fish. This project provides an opportunity to obtain rearing habitat for salmon, and also address groundwater seepage concerns of landowners as required in Public Law 111-11.

Lower San Joaquin Levee District (LSJLD): Goal is to manage its floodway in accordance with existing maintenance agreements. The portion of the San Joaquin River where the project will be located is included in the LSJLD boundary and was part of the Lower San Joaquin River Flood Control Project built by the Central Valley Flood Protection Board. Maintenance of the channel (but not the levees) is the responsibility LSJLD.

Madera County/Community of Eastside Acres: Goals include reducing flooding, increasing jobs and having access to the riverfront for recreation. This project will help reduce the cost of living because residents may not have to pay for flood insurance. Eastside Acres is in Madera County.

Fresno County: Because Firebaugh is in Fresno County, the county's goals are aligned with those of the City of Firebaugh.

Central California Irrigation District: Goals include protection of their irrigation canals and other infrastructure.

Columbia Canal Company: Goals include protection of their irrigation canals and other infrastructure.

Migratory Bird Conservation Partnership (MBCP): Collaboration between Audubon California, Point Blue Conservation Science, and The Nature Conservancy – is involved in both the SJRRP and Upper San Joaquin River RFMP with the intent of maximizing migratory bird habitat along the San Joaquin River.

San Joaquin River Partnership: Goal is to support the SJRRP, as well as other environmental and community benefits projects in the San Joaquin Valley.

River Partners: Mission is to create wildlife habitat for the benefit of people and the environment. This non-profit seeks to promote the development of an integrated project for Firebaugh and assist however possible in the management of riverside lands for public safety, agriculture and wildlife values.

American Rivers: Mission is to protect wild rivers, restore damaged rivers, and conserve clean water for people and nature.

San Joaquin River Parkway and Conservation Trust – Mission is to preserve and restore SJR lands having ecological, scenic or historic significance, to educate the public on the need for stewardship, to research issues affecting the river, and to promote educational, recreational and agricultural uses consistent with the protection of the river’s resources.

US Army Corps of Engineers: This portion of the San Joaquin River is part of the Lower San Joaquin River Flood Control Project of the US Army Corps of Engineers.

California Department of Fish and Wildlife: Mission is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public.

2.0 Project Area

2.1 Location

The City of Firebaugh (City or Firebaugh) is located in Fresno County in the Central San Joaquin Valley of California. It is approximately 35 miles west of the City of Fresno. State Highway 33 runs through the City and Interstate Highway 5 is approximately 15 miles west of the City. The location of Firebaugh is shown in Figure 2.1.

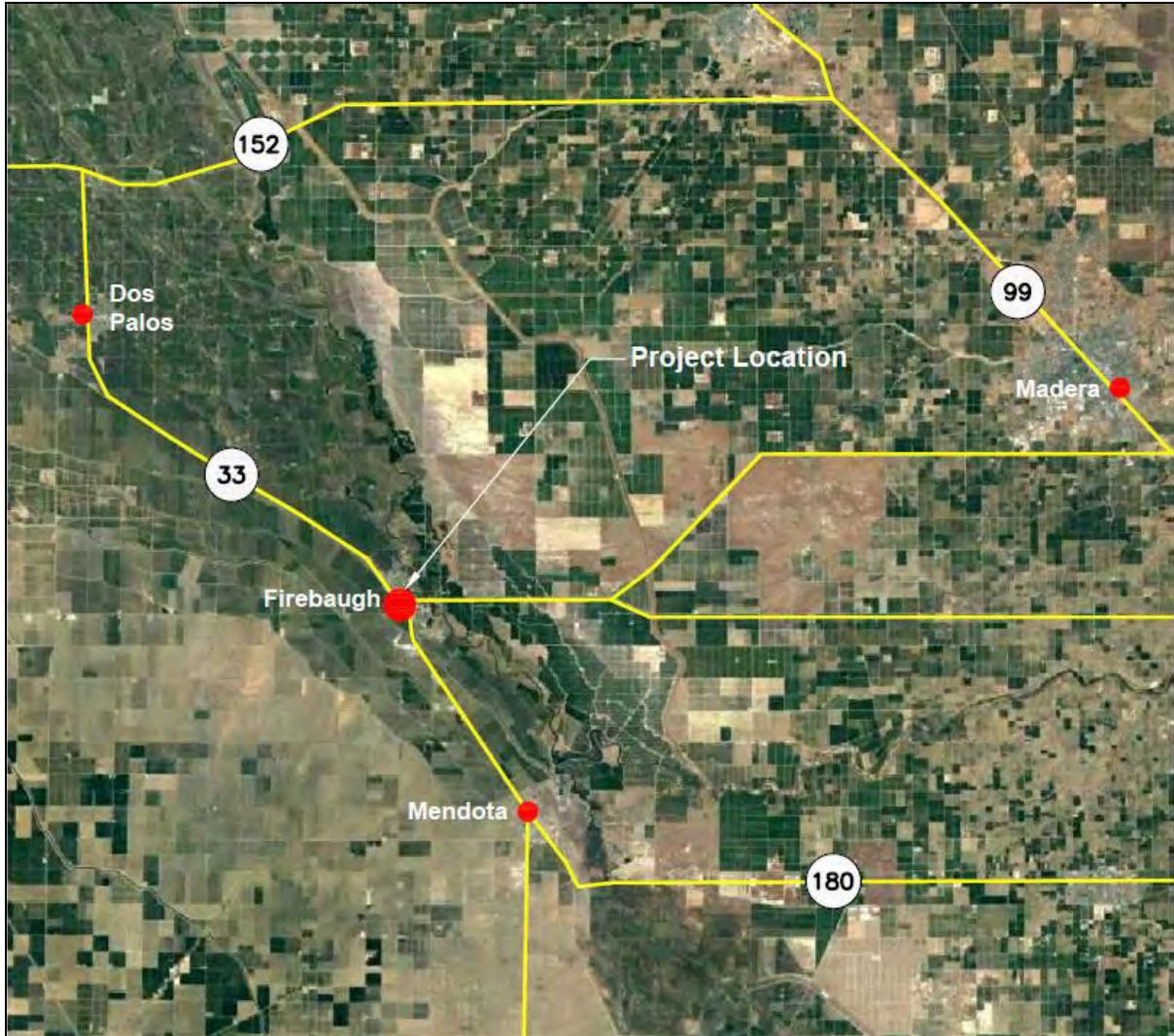


Figure 2.1. Location Map

Firebaugh currently occupies an area of approximately 3.6 square miles. It has a population of 8,132 residents as of 2019 according to the California Department of Finance (DOF, 2019).

2.2 Land Use

The existing area within Firebaugh’s city limits is approximately 2,309 acres. The existing land use is classified as areas occupied by nonagricultural land uses and served by a storm drainage system. The predominant land use is low density residential. This category provides for residential development at densities that are typical for existing single-family residential subdivisions within the City. The permitted density range is up to 6.0 units per acre or 21 persons per acre.

The land use area within Firebaugh's ultimate buildout boundary is approximately 3,410 acres. The City's land use is projected to grow by approximately 48 percent by buildout of the 2030 General Plan. This growth is expected to increase storm water runoff in the City significantly.

2.3 Topography

The City generally has a flat topography with a gradual downward slope to the northeast towards the San Joaquin River. Elevations generally range from 140 to 155 feet above mean sea level.

2.4 Climate

The climate of the City is relatively cool and moist in the winter and warm and dry in the summer. Approximately 90 percent of the annual precipitation falls between the months of November and April. The mean annual rainfall is 8.27 inches. Snow fall is a rare occurrence.

Firebaugh enjoys a very high percentage of sunshine, receiving more than 80 percent of the possible amount during all but the four months of November through February. Reduction of sunshine during these months is caused by fog and short periods of stormy weather.

Due to clear skies during the summer and the protection of the San Joaquin Valley from marine effects, the normal daily maximum temperature reaches the 90s during the latter part of July. Relative humidity is approximately 15 percent on summer afternoons but readings as low as 8 percent have been recorded. In contrast to this, humidity readings average 90 percent during the morning hours in December and January. As a result of the high temperatures and low humidity, water evapotranspiration is generally much higher during the summer months.

3.0 Project Objectives

3.1 Problem Definition

Even though the San Joaquin River is flanked by levees, they are too short in many areas in Firebaugh and sand-bagging is required even during routine flood events with return periods less than 10 years. Firebaugh therefore does not have protection against the 100-year rainfall event.

The following locations and facilities have been identified as most vulnerable:

- Firebaugh's wastewater treatment plant is located near the west bank of the San Joaquin River at the south end of Firebaugh. Flood flows in the river have threatened the treatment plant in recent years.

- The San Joaquin River makes a sharp turn to the northeast near the intersection of 9th and Q Streets in Firebaugh. The west bank at this turn is steep, unstable, and less than 50 feet from several residences. These residences are threatened due to bank erosion and the next major storm is likely to flood these homes.
- One of Firebaugh’s water treatment plants (Well No. 11) is located south of 13th Street, near the City’s rodeo grounds and park. Flood flows in the river have inundated the rodeo grounds and threatened the treatment plant in recent years.

Degraded Ecosystem

The San Joaquin River near Firebaugh is extremely degraded as a result of water diversions at Friant Dam, conversion of riparian habitat to farmland, and channelization of the river for flood control. The aquatic, marsh, and riparian ecosystems near the area have been drastically reduced in size, quality, and connectivity compared to historical conditions. Loss of habitat has greatly diminished the river’s function as a wildlife habitat.

Few Recreational Facilities

Firebaugh has very few trails and recreational facilities in the City. The Andrew Firebaugh Historical Park and rodeo grounds get inundated during wet years and hence cannot be used during those periods. The City has identified several trails and recreational facilities within its General Plan. However, funding is a major challenge.

Disadvantaged Community

Firebaugh is a small and economically disadvantaged community. It has an annual Median Household Income of \$43,971 as of 2017 (City-Data, 2019). Funding structural improvements to address flood risks, ecosystem restoration, and recreational facilities is therefore a major challenge for the City.

3.2 Opportunities

A single purpose flood project to increase flood protection to a 100-year level for the City of Firebaugh is difficult to fund locally. However, a multi-benefit project may be able to attract State and federal funding. Synergy may be gained from the multi-disciplinary nature of a multi-benefit project that addresses flood risks, ecosystem restoration and recreational facilities.

Depending on how the project components are packaged, it may be possible to obtain funding from different State and federal sources with or without the need for local matching funds. Furthermore, phasing the project will make the project components easier to implement. The following opportunities have therefore been identified encompassing local, State, and federal opportunities.

Local Master Plans

The City of Firebaugh has a general plan that identifies development goals and objectives for buildout of the City by 2030 (City of Firebaugh, 2009). Several plans have been developed in support of the General Plan that are pertinent to addressing flood risk in the City, including the Storm Drainage Master Plan and the Parks and Trails Plan. With strategic planning, part of the funding for these programs could be used as local matching for state and federal programs in order to provide Firebaugh with the needed 100-year flood protection.

The City's Storm Drainage Master Plan (Gouveia Engineering, 2013) identified capital improvement programs targeted at flooding. The estimated total capital cost for storm drainage network improvements that should be completed by the buildout of the City of Firebaugh's 2030 General Plan area is approximately \$55 million. This capital investment should help in reducing local flooding within the City.

Furthermore, the City of Firebaugh's Parks and Trails Plan outlined a vision for how the community can access and enjoy the San Joaquin River. Significant components of the plan include a community center at the river front, Andrew Firebaugh Historic Park, a multipurpose trail linking its community center to West Hills Community College fronting on the river, and Maldonado Park. Integrating a well planned and managed recreation into the levee projects will enhance Firebaugh's recreational resources while providing flood protection.

San Joaquin River Restoration Program

Firebaugh is within the planning area of the San Joaquin River Restoration Program (SJRRP). This is a long-term effort by the federal government to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river (SJRRP, 2009). The SJRRP is being implemented by the US Bureau of Reclamation (Reclamation) with support from the California Department of Water Resources (DWR) and other agencies.

The full restoration flow release of the SJRRP into the San Joaquin River is 4,500 cubic feet per second (cfs), which is above the 4,000 cfs which causes flood threats in Firebaugh. This flooding threat presents an opportunity for collaboration. The SJRRP is pursuing a variety of seepage management actions such as slurry walls, easements, and acquisitions to mitigate seepage impacts of restoration flows.

Several landowners have shown willingness for land dispossession, such as easements or acquisitions, for groundwater seepage mitigation. The SJRRP is also very interested in creating floodplain habitat to support restoration of salmon fisheries in the San Joaquin River. This presents an opportunity for a multi-benefit project that could leverage SJRRP efforts and use ecosystem benefits to help justify levee improvements to achieve 100-year level of protection in Firebaugh.

Federal Efforts

The Firebaugh Multi-Benefit Project presents a great opportunity for the US Army Corp of Engineers' (USACE) Flood Plain Management Services (FPMS) Program to undertake flood risk management studies in the Central San Joaquin Basin. It already has well established governance structures to implement the project and has public and institutional support, all of which are prerequisites for a successful project.

Firebaugh Multi-Benefit Flood Management Project Working Group Efforts

As a first step towards leveraging the opportunities in Firebaugh, DWR under its Basin-Wide Feasibility Studies Project and Regional Flood Management Planning effort formed the Firebaugh Working Group in 2015. The Working Group members and their goals have been described in the introductory chapter of this report.

The efforts of the Working Group were documented in the San Joaquin Basin-Wide Feasibility Study (SJBFS) of 2016 as well as the Central Valley Flood Protection Plan Updates.

The United States Bureau of Reclamation (Reclamation), a member of the Working Group, worked to advance the Firebaugh Multi-Benefit Project through the purchase of fee simple interests from willing sellers on properties totaling approximately 294 acres along 1.5 miles of the San Joaquin River in 2019 and 2020 (shown as Area 4B in Figure 3.1). These properties were purchased as part of the Reclamation's San Joaquin River Restoration Program to allow for seepage projects to allow rising groundwater levels resulting from the planned Restoration Flows. This land acquisition with the intended improvements will benefit the Firebaugh Multi-Benefit Project.

3.3 Project Elements

The project area and elements proposed in the San Joaquin Basin-Wide Feasibility Study (DWR, 2016) are shown in Figure 3.1. The project is divided into four main project areas as follows:

1. Construction of a setback levee to protect the Firebaugh Waste Water Treatment Plant and provide recreational and habitat enhancements along this reach of the San Joaquin River.
2. Stabilization of the eroding bank at a sharp bend in the San Joaquin River in Firebaugh.
3. Construction of a setback levee to protect the Firebaugh Water Treatment Plant near the Rodeo Grounds.
4. Construction of ecosystem restoration projects.

Project areas 1 through 3 are considered Near-Term projects and Project area 4, long term levees (in between near-term projects) as well as the Eastside Acres Improvements are considered long term projects. The Eastside Acres Improvements comprise ring levees, structure raises, Eastside

levee closure structure and pump station. These are not the focus of this study but shown from Basinwide Feasibility Study as two rings on the right side of the river (near project areas 1, 2, and 3) in Figure 3.1.

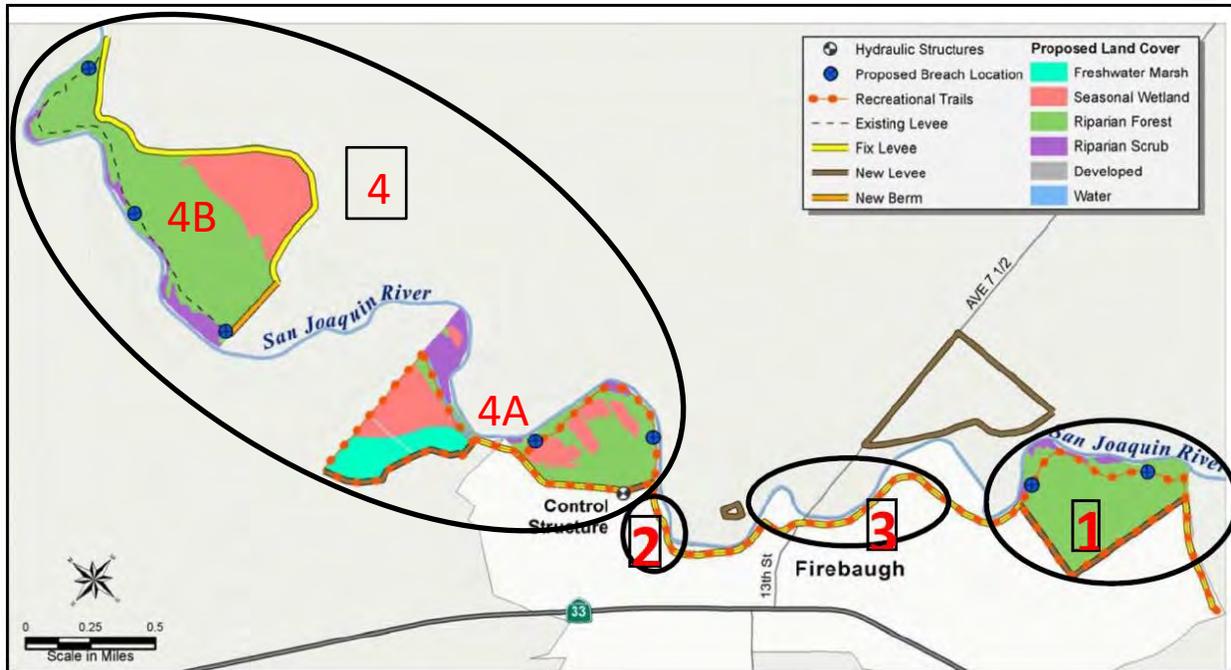


Figure 3.1. Firebaugh Feasibility Study Area

Notes:

Project Area 1 - Setback levee and riparian restoration at wastewater treatment plant.

Project Area 2 - Stabilize eroding bank at sharp bend in river.

Project Area 3 - Setback levee segment to protect water treatment plant/rodeo grounds.

Project Area 4 – Ecosystem restoration projects.

Project Area 1: Setback levee and riparian restoration at the Wastewater Treatment Plant

The City of Firebaugh's Wastewater Treatment Plant is located near the west bank of the San Joaquin River at the south end of Firebaugh. Flood flows in the river have threatened the treatment plant in recent years. Constructing an earthen levee between the river and the treatment plant would protect it against future flooding. Vacant land along the upper floodplain of the river is available for the proposed levee. Untreated effluents from the City's Waste Water Treatment Plant would threaten the water quality of the San Joaquin River in case of catastrophic flooding in the area. This study will evaluate the feasibility of the levee alignment and the inclusion of recreation and environmental enhancement components.

Project Area 2: Stabilization of the eroding bank at a sharp bend in the San Joaquin River

Just north of 13th Street (Firebaugh Boulevard) the San Joaquin River turns due west toward downtown Firebaugh. It then makes a sharp turn to the northwest and parallels the downtown area. A bank stabilization project was constructed at this turn that included sheet piling and rock-filled wire cages as shown in Figure 3.2. About 0.25 mile downstream of this project, the river makes another sharp turn to the northeast near the intersection of 9th Street and Q Street. The west bank at this turn is steep, unstable, and less than 50 feet from several residences. A second bank stabilization structural improvement with a similar configuration to the first project is needed at this location. This study will evaluate the feasibility of this structural improvement.

Project Area 3: Setback levee to protect the Firebaugh Water Treatment Plant near the Rodeo Grounds

One of Firebaugh's Water Treatment Plants is located south of the 13th Street (Firebaugh Boulevard) bridge that crosses the San Joaquin River. The City's rodeo grounds and a park area are located north of the bridge. Flood flows in the river have inundated the rodeo grounds and threatened the treatment plant in recent years. Constructing an earthen levee between the river and the facilities would protect them from future flooding. Vacant land along the upper floodplain of the river is available for the proposed levee. This study will evaluate the feasibility of the levee alignment and the inclusion of recreation and environmental enhancement components.

Project Area 4: Ecosystem Restoration Projects

In order to restore the ecology and incorporate multi-benefit features into the project, freshwater marsh, seasonal wetland, and riparian vegetation were proposed for project area 4. The levee tops near the City can be used as recreational trails.



Figure 3.2. Bank Stabilization

4.0 Hydrology and Hydraulics

4.1 Flooding Sources

The main flooding source in Firebaugh is the San Joaquin River originating from the Sierra Nevada. However, the North Fork of the Kings River could also cause flooding in Firebaugh as it is upstream of the City. These flooding sources are documented in the Challenges, Opportunities and Project Objectives Technical Memorandum of this study (Firebaugh, 2020E).

The San Joaquin River originates from the Sierra Nevada and has its first reach starting from Friant Dam. It abruptly turns north near Mendota and flows through the San Joaquin Valley and terminates at the Sacramento-San Joaquin Delta.

The Kings River also originates from the Sierra Nevada and has its first reach starting from Pine Flat Dam. Pine Flat Dam is located approximately 20 miles south of Friant Dam. The Kings River flows west and forks into two at approximately 6 miles north west of the City of Hanford. The South Fork Kings River flows south to the Tulare Lake Bed and the North Fork Kings River flows north towards Firebaugh and terminates at the Mendota Dam.

The topography of the San Joaquin River reach near Firebaugh is characterized by a sandy, meandering channel (SJRRP, 2009). Reach 3 of the river starts from Mendota Dam and terminates at Sack Dam. This reach conveys perennial flows of Delta water released from the Mendota Pool to Sack Dam, where flows are diverted to the Arroyo Canal.

The channel meanders approximately 23 miles through a predominantly agricultural area except where the City borders the river's west bank for 3 miles. One bridge crosses the river in this reach in Firebaugh. A narrow, nearly continuous band of riparian vegetation consisting primarily of cottonwood riparian forest is present on at least one side of the channel, and several pump facilities and the Arroyo Canal are located along this reach.

Firebaugh is subject to frequent flooding according to the City's General Plan, Firebaugh Storm Drainage Master Plan, and the Upper San Joaquin River Regional Flood Management Plan. Significant rainfall events in the Central Valley have affected Firebaugh dating from the 1800s (SJRFPCA, 2015). These events have been documented in the Challenges, Opportunities and project Objectives Technical Memorandum of this study (Firebaugh, 2020E).

4.2 Hydrology

The flooding issues in the City of Firebaugh are documented in the Flood Insurance Study (FIS) for Fresno County and Incorporated Areas (BakerAECOM, 2016). The original study for the FIS, with hydrologic and hydraulic analyses, was performed in July 2001. It covered all significant flooding sources affecting Fresno County. The hydrologic and hydraulic analyses from the FIS report dated November 20, 1998, were performed by Borcalli & Associates, Inc., for FEMA, under Contract No. EMW-92-C-3818. That work was completed in December 1996.

According to the FIS (BakerAECOM, 2016), portions of Firebaugh are subject to inundation for the 100-year event which produces a peak discharge of 8,700 cubic feet per second (cfs) upstream of Firebaugh. However, Reach 3 of the San Joaquin River near Firebaugh has an original design capacity of 4,500 cfs based on the Operations and Maintenance Manual for the Lower San Joaquin River Flood Control Project. Even though, levees line both banks of the San Joaquin River throughout the river reach in Firebaugh, there are many low areas in the levees.

The City therefore experiences flood threats at flows greater than 4,000 cfs in the river and must resort to sand bagging and flood fighting for additional protection. The City's Base flood elevations range from 149 feet in the south to 141 feet in the north with average flood depths ranging from one to three feet based on the Storm Drain Master Plan (Gouveia, 2013). According to flow-frequency curves developed by the San Joaquin Basin-Wide Feasibility Study (DWR, 2016), flows of 4,000 cfs and 4,500 cfs approximate 8-year and 9-year events, respectively.

Approximately 60% of the population of Firebaugh lives within the 100-year floodplain. Flooding occurred along the San Joaquin River, in the Firebaugh and surrounding areas, frequently. Firebaugh experienced flooding due to seepage in 1983 at the local high school when the freeboard was said to be less than 3 feet. In 1997, much of the City was ordered to evacuate due to flood threats as flows reached approximately 6,500 cfs near Firebaugh. This flow approximates a 10-year event according to flow-frequency curves developed by the San Joaquin Basin-Wide Feasibility Study (DWR, 2016). Levee breaks and overtopping upstream of the Chowchilla Bypass Bifurcation structure eventually helped to alleviate flooding in Firebaugh.

The river nearly overtopped its banks in 2006 as flows peaked at approximately 4,700 cfs. Only flood-fighting including the quick placement of sand bags prevented flooding of certain neighborhoods. Approximately \$1 million was spent on channel improvements when a county-wide state of emergency was declared following the major floods in 2006. Parts of Firebaugh were flooded in 2011 including the Andrew Firebaugh Historical Park which was under 5 feet of water and damages to portions of the City's water and sewer systems were reported by the City. These same areas were flooded in 2018 and most recently in 2019. The park is prone to flooding, but because of water releases out of Friant Dam, the floodwaters continued to rise. As a result, water covered the rodeo grounds in Firebaugh, and because of that, one rodeo event was canceled according to a May 29, 2019 report by KFSN (a local radio station affiliated with ABC).

Hydrologic data from the Central Valley Hydrology Study (CVHS) (DWR and USACE, 2015), which was conducted in partnership with the United States Army Corps of Engineers (USACE) and the Central Valley Floodplain Evaluation was used for this study. The CVHS developed comprehensive tools to predict flood frequency for the Sacramento and San Joaquin River Basins using historical data and updated hydrologic models.

According to the CVHS data (see Table 4.1), the 100-year storm event will produce approximately 6,200 cubic feet per second (cfs) which is equivalent to a 100 percent of the 1997 historical flow. The 100-year storm event with climate change will produce approximately 9,140 cfs which is equivalent 150 percent of the 1997 historical flow. Climate change therefore

increases the 100-year peak flow by 50 percent. Furthermore, the 500-year storm event generates a flow of 11,838 cfs which represents 200 percent of the 1997 historical flow.

Table 4.1. Frequency-based Flows

Frequency		Without Climate Change		With Climate Change	
Annual Exceedance Probability (AEP)	1/AEP, Years	Flow, cfs	CVHS Event	Flow, cfs	CVHS Event
0.5	2	3,694		3,688	
0.1	10	4,486		4,543	
0.04	25	4,592		4,620	
0.02	50	4,635		5,451	
0.01	100	6,197	1997_100%	9,138	1997_150%
0.005	200	8,273	1997_130%	9,855	
0.002	500	11,838	1997_200%	10,690	

4.3 Hydraulics

Analyses of the hydraulic characteristics of flooding from the San Joaquin River were carried out to provide estimates of flood elevations for various flow conditions likely to occur in Firebaugh. A one-dimensional (1-D) steady-state Hydrologic Engineering Centers River Analysis System (HEC-RAS) model of the segment of the San Joaquin River in the study area shown in Figure 4.1 was developed from the 2017 Central Valley Flood Protection Plan (CVFPP) model.

The CVFPP model was originally developed for riverine hydraulics investigations as part of the Basin-wide Feasibility Study (BWFS) and 2017 CVFPP to produce comprehensive in-channel stage and flow frequency curves for each index point in the riverine hydraulics study area for baseline conditions and for multiple system elements and system configurations. These stage-frequency curves were then used for flood damage calculations for the 2017 CVFPP.

The detailed hydrologic and hydraulic analysis is contained the Hydrology and Hydraulics Technical Memorandum (Firebaugh, 2020D).

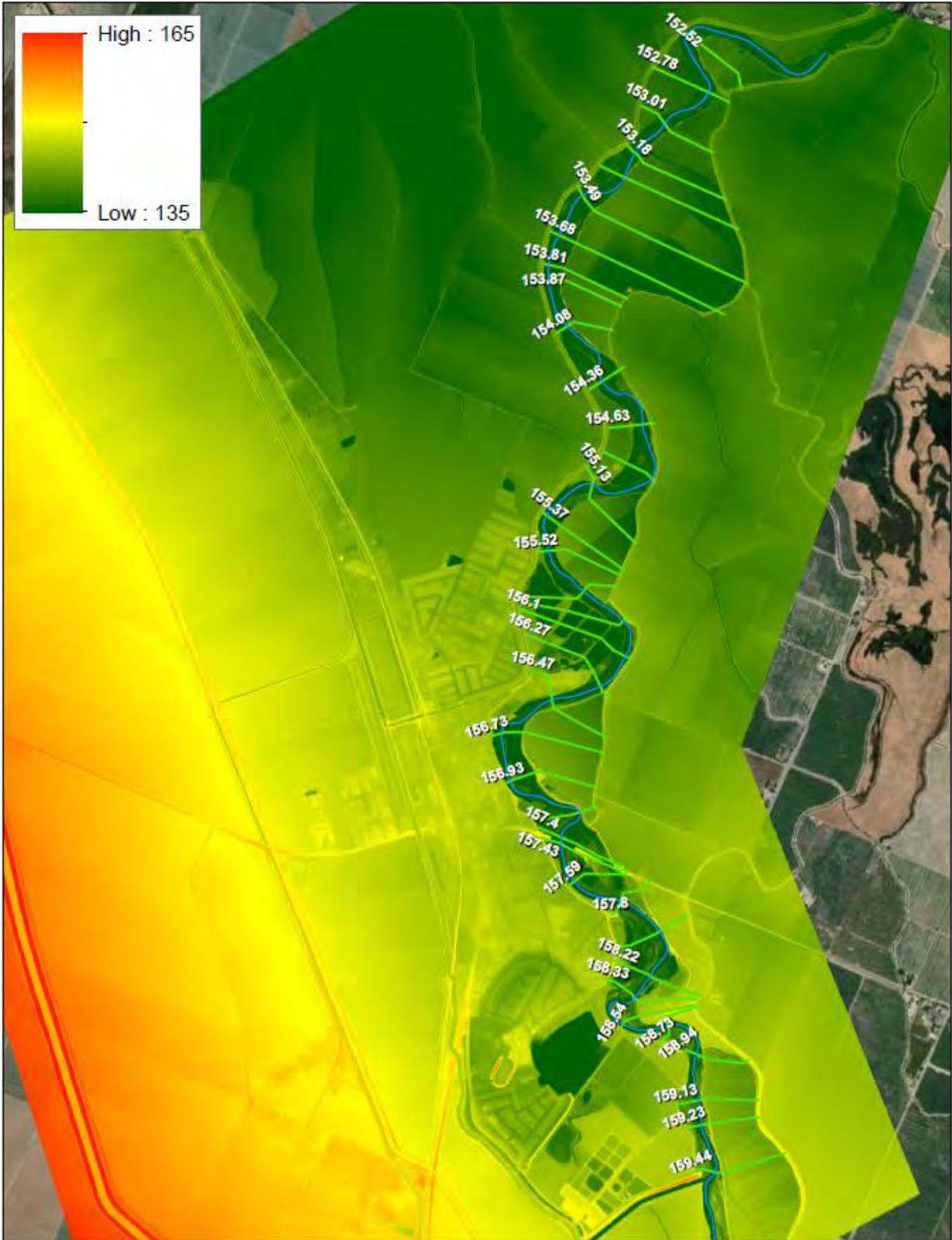


Figure 4.1. Firebaugh Model Elements and LiDAR

Topography and Model Geometry

The blue station line in Figure 4.1 represents the center of the main flow path through the San Joaquin River. The cross-sections start at River Station (RS) 159.44 and terminate at RS 152.52 as shown in Figure 4.1. The river stationing is in miles and is referenced from the confluence of the San Joaquin River with the Merced River being River Station (RS) 0.

There is evidence of subsidence throughout the Upper San Joaquin Valley and James Bypass area, including areas near Firebaugh. The topography in Firebaugh may therefore have changed since the 2008 LiDAR was taken which this model is based on. How much of an effect this subsidence has had on flow and stage in the river along Firebaugh and how it affects the results in this technical memorandum has not been quantified.

However, the United States Bureau of Reclamation conducts subsidence surveys in July and December of each year for the San Joaquin River Restoration Program which investigates the effects of subsidence on the river channel in Firebaugh (Reclamation, 2020). They show that the Firebaugh reach is subsiding at about the same rate, therefore, subsidence is not likely to have a significant effect on the river channel flow capacity. Even if it does have a small effect, it would be towards increasing flow capacity because of the steepening channel slope.

Hydraulic Modeling Results

The hydraulic analyses focused on the CVFPP modeling study. As noted on the CVFPP study, the 100-year event would produce a peak flow of 6,197 cfs in the Firebaugh reach of the San Joaquin River while a 100-year event plus climate change would produce 9,138 cfs (DWR, 2017). The peak discharge used by FEMA for flood insurance is 8,700 cfs (BakerAECOM, 2016). Therefore, to ensure a United States Army Corps of Engineers (USACE)/FEMA certification that the 100-year level of flood protection has been provided, the CVFPP 100-year plus climate change peak flow of 9,138 was adopted for this study. The recommended project levee profile is shown in Figure 4.2 of Appendix A. Table 4.2 summarizes the levee raises and lengths based on the hydraulic analysis for this study.

Table 4.2. Levee Improvements Needed for 100-Year Flood Event for Firebaugh

Scenario	Average Levee Raise (ft)	Levee Crest Width (ft)	Levee Length (ft)
Near-Term	1.6	12	9,900
Full Project	1.8	12	27,300

For the Near-Term project areas, on average, an approximately 1.6-foot levee height raise will be needed for approximately 9,900 feet of the levee length to attain 100-year flood protection for Firebaugh. In the low-lying areas, the levee height may be raised as much as 3.6 feet.

For the full project, on average, an approximately 1.8-foot levee height raise will be needed for approximately 27,300 feet of the levee length to attain 100-year flood protection. In the low-lying areas, the levee height may be raised as much as 3.6 feet similar to the Near-Term project areas.

5.0 Environmental Impacts

The following sections present the environmental assessment and strategy for the project as presented in the Environmental Compliance and Permitting Strategy Technical Memorandum (Firebaugh, 2021B). The assessment and strategy are based on the environmental report prepared for this project titled *Initial Study/Mitigated Negative Declaration Firebaugh Flood Feasibility Project* (Firebaugh, 2020B). The focus for this environmental study was on biological and cultural resources.

5.1 Environmental Assessment

The following tasks were conducted to evaluate how the project may affect biological resources under the California Environmental Quality Act (CEQA):

1. Obtained lists of special-status species from the California Department of Fish and Wildlife, the United States Fish and Wildlife Service, and the California Native Plant Society
2. Reviewed other relevant background information such as aerial images and topographic maps
3. Conducted a field reconnaissance survey of the project site

The biological resources evaluation summarized existing biological conditions on the project site, the potential for special-status species and regulated habitats that exist on or near the project site, the potential impacts of the project on biological resources and regulated habitats, and measures to reduce those potential impacts to a less-than-significant level under CEQA.

It was concluded that the project could impact the following eight special-status species:

- California Rare Plant Ranked (CRPR) 1B.2 Sanford's arrowhead (*Sagittaria sanfordii*)
- Federally and state-listed as threatened giant garter snake (*Thamnophis gigas*)
- State-listed as threatened Swainson's hawk (*Buteo swainsoni*)
- State-listed as threatened tricolored blackbird (*Agelaius tricolor*)

- Four state species of special concern:
 - a. northwestern pond turtle (*Actinemys marmorata*)
 - b. burrowing owl (*Athene cunicularia*)
 - c. red bat (*Lasiurus blossevillii*)
 - d. western mastiff bat (*Eumops perotis californicus*)

Nesting migratory birds could also be impacted. Impacts to all species listed above can be reduced to less-than-significant levels with mitigation.

Furthermore, a record search of site files and maps was conducted at the Southern San Joaquin Valley Archaeological Information Center (IC), California State University, Bakersfield. A Sacred Lands File Request was also submitted to the Native American Heritage Commission (NAHC). These investigations determined that seven cultural resource studies have been conducted within the project area and 20 additional studies conducted within the one-half mile radius.

There are two known resources within the project area and five recorded resources within the one-half mile radius including:

1. A historic era ferry
2. Four historic era canals
3. A historic era railroad
4. A prehistoric era lithic scatter with burials

There are no recorded resources within the proposed project area.

5.2 Environmental Strategy

The following mitigation measures will be taken to limit impacts to endangered species in the project area. To the extent practicable, construction shall be scheduled to coincide with the seasons to have limited impacts on the endangered species identified.

A qualified biologist shall conduct a pre-construction survey for the endangered plant and animal species found during the environmental field work. The survey shall be conducted no more than 14 days prior to the initiation of construction activities to determine if the endangered species are present in the project site. During the survey, the qualified biologist shall inspect all sections of aquatic habitat within 300 feet of planned work activities, including adjacent upland areas, for the species. If any of the species is found within 300 feet of the worksite; a qualified biological inspector shall remain on site during construction to ensure that none of the species are impacted by the work activities. Other mitigation methods identified in the Initial Study/Mitigated Negative Declaration shall be followed.

All construction staff will undergo cultural training before construction begins so that in case they encounter any object of cultural significance during construction they will know what guidelines to follow. Furthermore, a cultural expert will be on staff during construction to advise.

5.3 Permitting Strategy

Several permits will be needed for land access and environmental purposes prior to construction of the project. The permitting process will be started after completion of the detailed engineering design for the project. A decision will also be made then on whether to apply for general programmatic or individual project permits for each permit type.

For land access, encroachment permits will be needed from landowners. Furthermore, because the San Joaquin River is considered waters of the United States, the following permits will be required prior to construction:

- CA Fish & Wildlife – Lake and Streambed Alteration Agreement
- U.S. Army Corps of Engineers – 404 Permit (Clean Water Act)
- Regional Water Quality Control Board – 401 Permit
- Central Valley Flood Protection Board
- Fresno County Floodplain Management

A detailed permitting strategy is contained in the Environmental Compliance and Permitting Strategy Technical Memorandum for this study (Firebaugh, 2021B).

6.0 Geotechnical Design Criteria

6.1 General Criteria

The Geotechnical Engineering Investigation (Firebaugh, 2020C) performed as part of this feasibility study was used in establishing the geotechnical design criteria used in recommending the replacement levees and determining the height of the levee in conjunction with the findings presented in the Hydrology and Hydraulics Technical Memorandum (Firebaugh, 2020D).

The geotechnical investigation showed that free groundwater was encountered at 13.5 to 18 feet below existing grade. However, records show that groundwater wells in the project vicinity have been as shallow as 2 feet below grade.

Approximately 4 to 7 feet of fill material was encountered within the borings drilled at the project site. The fill material was predominantly gravelly silty sand, gravelly clayey sand and

sandy silt with clay. It was recommended that the fill material should be moisture-conditioned and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557 for construction purposes.

It was recommended that the upper 2 feet of soil within any slabs-on-grade be non-expansive fill. The fill material must be well-graded silty sand or sandy silt soil. The recommended slope for depths up to 15 feet was 2:1 for stability. However, slopes of 3:1 are recommended for interior slopes. Furthermore, interior slopes were recommended to be lined with a riprap barrier or seeded to protect against erosion.

Imported fill material should be predominantly non-expansive granular material with a plasticity index less than 10 and an expansion index less than 15. Imported fill should be free from rocks and lumps greater than 4 inches in diameter. Native soils may be used for constructing the levee embankment. However, no brush, roots, sod or other perishable or unsuitable material shall be placed in the embankment. The side slopes may be protected from erosion by implementing a vegetative measure. Establishing and maintaining good plant cover can stabilize slopes and protect against erosion.

6.2 Levee Improvements

The San Joaquin River Restoration Program identified geometry and free board repairs, and replacement levees as the best methods to remediate the levees in Reach 3 of the San Joaquin River (Kleinfelder, 2010). However, based on the Geotechnical Engineering Investigations (Firebaugh, 2020C) and the Hydrology and Hydraulics Technical Memorandum (Firebaugh, 2020D) prepared for this project, it is recommended that only replacement levees be used to provide the 100-year flood protection for the City of Firebaugh. This method is consistent with the assumptions in the San Joaquin Basin-Wide Feasibility Study (DWR, 2016).

Generally, levees must guard against four potential issues associated with levee seepage and stability (Kleinfelder, 2010). These include:

- River-side levee erosion due to overbank flows
- River-side levee toe erosion due to lateral channel migration
- Land-side levee slope failure
- Land-side ground surface seepage

The replacement levees would remediate both through-seepage and stability deficiencies in the existing levees. However, the replacement levees would not mitigate against underseepage. This condition should be good for the ecosystem restoration portion of the project as the underseepage water would irrigate the ecosystem restoration plants.

The replacement levees will have a crest width of 12-feet, a side slope of 2H:1V on the land side, and slope of 3H:1V on the river side for the ratio of horizontal distance to every foot of vertical

height. This is consistent with the California Code of Regulations (Title 23, Waters) and the USACE standards. Each levee will include an inspection trench of side slope 1:1 with a base width of 12 feet and height of 6 feet as shown in the Figure 6.1 of Appendix A. The required levee height at each location of the reach were determined and presented in the HH Memo and include a free board of 3 feet.

7.0 Alternatives Evaluation

This section discusses the feasibility of the project elements. The feasibility is based on the technical analyses from the geotechnical investigation (Firebaugh, 2020C), environmental study (Firebaugh, 2020B), and Land Acquisition Assessment and Strategy Technical Memorandum (Firebaugh, 2020A), performed as part of this study.

7.1 Project Area 1

The geotechnical and environmental analyses showed that the project elements proposed in Project Area 1 are feasible because nothing was discovered that could not be mitigated. However, the landownership investigation determined that the parcel tagged 16 and a portion of parcel tagged 18 will be needed from the City of Firebaugh for the eco-restoration habitat. Additionally, on April 19, 2019, the City of Firebaugh leased Project Area 1 to The Neil Jones Food Company doing business as TomaTek. The lease term is five years and is for wastewater disposal from TomaTek's food processing facility. The facility processes tomatoes and generates non-hazardous but highly acidic discharges that are disposed off within Project Area 1. The lessee is not permitted to use, generate, store, dispose of or discharge any hazardous materials, any hazardous or toxic substances, or any hazardous wastes on the leased premises.

Approximately 90 percent of the discharges occur from July through September, each year. This lease agreement does not preclude the City from developing a riparian forest on the land. Further, a setback levee that allows river water to pond on the land seasonally may not be incompatible with the lease agreement and the existing land use. Care must however be taken during operations to not inundate the riparian field from July through September with river water when TomaTek is making most of its discharges. Finally, a riparian forest may help to reduce the Biological Oxygen Demand from TomaTek's discharges because the trees planted will be able to take up some of the nutrients from the waste discharge.

Therefore, Project Area 1 does not need any revision: A setback levee is recommended together with a riparian restoration forest near the Wastewater Treatment Plant. The setback levee's height must be based on the 100-year flood level established in the hydrologic and hydraulic analysis performed for this study. This will prevent flood flows from the San Joaquin River from

threatening the Waste Water Treatment Plant. Untreated effluents from the City's Waste Water Treatment Plant would no longer threaten the water quality of the San Joaquin River. The levee top can be used as a recreational trail.

A riparian forest will be planted as part of project for ecosystem restoration to cover the project area which is approximately 115 acres. The riparian forest will be bounded by the existing levee and the setback levee shown in Figure 7.1 of Appendix A. The existing levees will be removed to improve the frequency of inundating the riparian forest.

Project Area 1 elements include:

- 4,850 feet of setback levees
- 4,850 feet (1 mile) of recreational trail
- 115 acres of riparian forest

7.2 Project Area 2

The geotechnical, environmental, and land acquisition analyses showed that the project elements proposed in Project Area 2 are feasible as proposed. Project Area 2 is the stabilization of the eroding bank at the sharp bend in the San Joaquin River near the intersection of 9th Street and Q Street. The west bank at this turn is steep, unstable, and less than 50 feet from several residences. The project consists of sheet piling the river bank for a length of approximately 500 feet and depth of 20 feet. The slopes will have rock-filled wire cages as shown in Figure 3.2 for a similar 400-foot structure near the City of Firebaugh Public Works Yard just north of 13th Street. Project area 2 is shown in Figure 7.3 of Appendix A.

7.3 Project Area 3

The geotechnical, environmental, and land acquisition analyses showed that the project elements proposed in Project Area 3 are feasible as proposed in the San Joaquin Basin-wide Feasibility Study. Project Area 3 would protect one of the water treatment facilities of the City of Firebaugh. The Water Treatment Plant is located south of the 13th Street (Firebaugh Boulevard) bridge that crosses the San Joaquin River. The City's rodeo grounds and a park area are located north of the bridge.

Flood flows in the river have inundated the rodeo grounds and threatened the treatment plant in recent years. Constructing an earthen levee between the river and the water facility would protect it from future flooding. It was discovered during a site visit that there is not sufficient room to allow for a levee between the rodeo grounds and the river. Project Area 3 elements therefore include approximately 1,000 feet of new levees around the water treatment plant only as shown in Figure 7.2 of Appendix A.

7.4 Project Area 4A

To restore the ecology and increase the multi-benefit features of the project, freshwater marsh, seasonal wetland, riparian forest, and riparian scrub were proposed for Project Area 4A. The levee tops near the City will be used as recreational trails.

Parcels in Project Area 4A total approximately 196 acres. Of this total, only approximately 31 acres (16 %) belong to the City of Firebaugh. The remaining land parcels are owned by private families and trusts. Project Area 4A is shown in Figure 7.4 of Appendix A.

Preliminary inquiries indicate that the owners may be willing to sell. Furthermore, the technical analyses did not discover any geotechnical and environmental issues that would render the project infeasible. Part of the levees are along the Poso Canal; therefore, the Basin-Wide Feasibility Study identified a hydraulic structure for control of water into and out of the canal as shown in Figure 3.1 as “Control Structure”. Therefore, Project Area 4A is feasible as proposed.

The Project Area 4A elements include:

- 8,000 feet of levees remediated and raised
- 17,500 feet (3.3 miles) of recreational trail
- 196 acres of riparian scrub and forest, and seasonal wetland
- Poso Canal Control Structure

7.5 Project Area 4B

Project Area 4B improves on the ecological and multi-benefit features of the project. Riparian forest, seasonal wetland, and riparian scrub were proposed for Project Area 4B.

The United States Bureau of Reclamation (Reclamation) worked to advance the potential for restoration projects as part of the Firebaugh Multi-Benefit Project through the purchase of fee simple interests from willing sellers on the properties totaling approximately 294 acres along 1.5 miles of the San Joaquin River in 2019 and 2020. The properties are tagged M1, M2, and M3 in Figure 7.5 of Appendix A.

Reclamation’s San Joaquin River Restoration Program (SJRRP) purchased these properties as seepage projects to allow rising groundwater levels resulting from the planned Restoration Flows. As the larger Firebaugh Multi-Benefit Project moves forward, entities of the Firebaugh Multi-Benefit Project could engage further with Reclamation to add a flood flowage easement allowing flood flows to inundate the property, a seepage easement to satisfy Reclamation’s seepage projects, and restored floodplain habitat. This could allow flood-compatible agriculture

to continue, providing valuable economic support for the community while allowing increased flood protection. Based on the technical analyses conducted, Project Area 4B is feasible as proposed.

The Project Area 4B elements include:

- 9,000 feet of levees remediated and raised
- 1,800 feet of new berm
- 294 acres of riparian scrub and forest, and seasonal wetland

7.6 Long Term Levees

The hydrology and hydraulics analysis performed for this feasibility study (Firebaugh, 2020D) identified that for the full project, on average, approximately 1.8-foot levee height improvements will be needed for an approximate length of 27,300 feet to attain 100-year flood protection. To achieve this, approximately 13,000 feet of levees will need to be remediated and raised in addition to the levees identified in the previous sections of this TM for project areas 1 through 4. These levee tops would also be used as recreational trails. The long term levees are located in Project Area 4 and in between the near-term projects.

7.7 Preferred Alternative

The final project elements determined to be feasible based on the technical analyses performed for the project are summarized in Table 7.1 and shown in Figure 7.6 of Appendix A.

Table 7.1. Preferred Project Elements

Project Area /Phase	Levees/ Recreational Trails (ft)	New Berm (ft)	Riparian scrub and forest, and seasonal wetland (acres)	Sheet Pile for Erosion Control (ft)
1	4,850/4,850		115	
2				500
3		1,000		
4A (Long Term)	8,000/17,500		196	
4B (Long term)	9,000/9,000	1,800	294	

Other Long Term	13,000/13,000			
Total	34,850/44,350	2,800	605	500

The near-term projects comprise those in Project Areas 1, 2, and 3. Project Area 4 and the long term levees are identified as long term project elements. The long term projects also include the projects located in Eastside Acres. These have not been analyzed in this study but identified by ring levees on the right side of the river in Figure 3.1. The quantifiable potential project benefits are shown in Table 7.2. The Expected Annual Damage is from the DWR Basin-wide Feasibility Study but updated to account for inflation.

Table 7.2. Project Benefits

Goal	Objective	Metric	Value
Improve Flood Risk Management	Reduce flood damages and life loss	Flood Risk Reduction (Expected Annual Damages) (\$/year)	\$468,350
		Life Risk Reduction (Annual life loss)	0
Promote Local Economic Stability	Promote Local Economic Stability	Temporary and permanent jobs created (no.)	100
Ecosystem Benefits	Habitat	Riparian/Wetland Habitat (acres)	605
Recreation Benefits	Use	Potential Visitor Use Days	~4,900

8.0 Finance Strategy

The purpose of this section is to describe the potential sources of funding available for the implementation of the Firebaugh Multi-benefit Flood Management Project. This project intends to increase flood protection to the 100-year level for the City of Firebaugh with flood risk reduction, ecosystem restoration, and recreational facilities in order to attract funding from diverse sources.

Potential funding is expected to come from a combination of local, State, and federal sources as described below.

8.1 Local Funding Sources

The City of Firebaugh could use local funding from property taxes, impact fees, and sales taxes to fund part of the Firebaugh Multi-benefit Flood Management Project. However, because Firebaugh is a Disadvantaged Community (DAC) having an annual Median Household Income of \$43,971 as of 2017 (City-Data, 2019), local funding would not be sufficient for the entire project. Therefore, federal and State funding sources are critical to the City for implementing flood protection projects.

The Public Policy Institute of California (PPIC) report, *Paying for Water in California* (2018), described past expenditures for public agencies on flood management. It stated that from 2014 to 2016, annual funding for flood management in the State was \$2.3 billion annually. Of this amount federal funding accounted for 3 percent, State funding for 12 percent, and local funding for 85 percent. This shows that it is difficult to procure State and federal funding for single-benefit flood projects.

8.2 State Funding Sources

Funding sources from the State can be grouped into two main categories. These include grant programs with a focus on public safety and those with a focus on environmental stewardship. Many of the grant programs fund projects that provide both benefits, but this TM classified each source by its main objective for simplicity.

The main source of flood management financing at the State level is through bonds with Propositions 84 and 68 being the most recent authorizations of flood management funding. The Flood Future Report of 2013 detailed the history of State water bonds and their challenges. It is the first statewide report to be developed through collaboration between the California Department of Water Resources (DWR) and the United States Army Corps of Engineers (USACE). It was developed as a companion plan to the California Water Plan Update of 2013.

DWR's 2020 Strategic Plan (DWR, 2020) goals 9, 11, 14, 15, and 22 are of particular relevance to disadvantaged communities. Goal 9 is to provide effective flood emergency response. Goal 11 is to identify and implement new capital improvement projects that reduce flood risk and enhance the environment. Goal 14 is to provide communities with technical, financial, and policy assistance that respond to local challenges and opportunities. Goal 15 is to restore critical ecosystem function to California's watersheds through multi-benefit habitat and flood-risk reduction projects. Goal 22 is to achieve sustainable outcomes in DWR's mission and daily activities through a revitalized focus on accountability and implementation. These goals promote, encourage, and actively support local and regional agency management of water resources consistent with the State vision and policies. They also provide financial and technical

opportunities for disadvantaged communities' involvement in project planning and implementation.

Further, the ongoing 2022 Update to the 2017 Central Valley Flood Protection Plan (CVFPP) (DWR, 2017), which is California's strategic blueprint to improve flood risk management in the Central Valley, will evaluate progress made since the passage of major State bonds in 2007 and will recommend future management actions led by State, local, and/or federal agencies to continue implementation of the CVFPP.

Focus is also shifting to Integrated Regional Water Management (IRWM). Funding for IRWM has been increasing in recent years. This reflects the State's interest in promoting multi-benefit approaches to water management. DWR's commitment to the IRWM approach will likely lead to future funding focused on these types of projects.

Finally, the Governor's Water Resilience Portfolio Goals 25.4 and 27 (California, 2020A) are aimed at updating and refining the regional flood management strategy in the CVFPP to account for the projected impacts of climate change in order to protect vulnerable communities and infrastructure and to restore floodplains along the San Joaquin River and its tributaries. The multi-benefit focus should help the Firebaugh Multi-Benefit Flood Management Project with funding for implementation. The available State public safety grant programs are summarized in Table 8.1 and Table 8.2 summarizes the State grant programs that support environmental stewardship.

Table 8.1. State Public Safety Grants Program

Agency	Program	Scope	Cost Share
DWR	Flood Control Subventions Program	DWR and the Central Valley Flood Protection Board (CVFPB) provide financial assistance to local agencies cooperating in the construction of federally authorized flood control projects. The CVFPB is responsible for the State's financial assistance share for major USACE State Plan of Flood Control projects in the Central Valley, while DWR is responsible for disbursing funds for all other projects authorized by the State.	50%-70%
	Floodplain Management, Protection, and Risk Awareness Grant Program (Proposition 68)	The Floodplain Management, Protection and Risk Awareness (FMPRA) Grant Program supports local agency efforts to prepare for flooding by providing financial assistance for flood risk reduction activities related to stormwater flooding, mudslides, and flash floods. The Program supports both the Public Safety Initiative announced by Governor Brown's Administration in February 2017 and the Headwaters to Floodplains (H2F) Flood Safety Partnership Program.	Minimum local cost share is 25%. This can be reduced or waived for projects that benefit a Disadvantaged Community or Severely Disadvantaged Community.
	Flood Corridor Program (Proposition 13, the "Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act." Additional funding provided by Proposition 84 and Proposition 1E)	This program is for nonstructural flood management projects throughout the state that include wildlife habitat enhancement and/or agricultural land preservation. It includes acquisition, restoration, enhancement, and protection of real property while preserving sustainable agriculture and enhancing wildlife habitat in and near flood corridors.	-

	Urban Flood Risk Reduction	This program is for Urban Local Agencies to plan, design, and construct flood risk reduction projects. The projects must rehabilitate, reconstruct, replace, or improve SPFC facilities in ways that improve flood protection. Projects may include feasibility studies, design projects, or construction projects. Population greater than 10,000.	50%-90%
	Flood System Repair Project	This program provides funding to evaluate (feasibility) system improvements, design, and construct repairs of non-urban SPFC facility (such as levees, channels, structures) deficiencies.	50%-90%
	Statewide Flood Emergency Response Grants	This funding program is to support local Emergency Action Plans and fund communications equipment to further interoperability.	-
	IRWM Grants Program (Proposition 1 – Chapter 7)	IRWM grants focus on multiple benefits such as flood risk reduction, water supply, and protection of water quality and the environment.	Up to 75%

Table 8.2. State Environmental Stewardship Grant Programs

Agency	Program	Scope	Cost Share
Department of Parks and Recreation	Habitat Conservation Fund	This program seeks to protect and restore sensitive habitats in California. Habitat improvement categories include Wetlands, Anadromous Salmonids and Trout Habitat, Riparian Habitat, and wildlife area activities. \$2 million available annually.	50%
Wildlife and Conservation Board (WCB)	Relevant California WCB Programs: <ul style="list-style-type: none"> • Ecosystem Restoration Agricultural Lands • Habitat Enhancement & Restoration • Inland Wetlands Conservation • Land Acquisition • Rangeland, Grazing Land & Grassland Protection • Riparian Habitat Conservation 	The primary responsibilities of WCB are to select, authorize, and allocate funds for the purchase of land and waters suitable for recreation purposes and the preservation, protection, and restoration of wildlife habitat.	Varies
CNRA	California River Parkways Program (Proposition 68 for purposes of the California River Parkways Act of 2004)	Eligible system improvements must promote recreation and one other condition—land conversion, enhancement, provide habitat, or flood management.	-
	Urban Greening for Sustainable Communities – Projects/Planning (Assembly Bill (AB) 32, California Global Warming Solutions Act of 2006)	This program grants funds for urban greening plans and projects in urban areas that provide multiple benefits, including a decrease in air and water pollution, a reduction in the consumption of natural resources and energy, an increase in the reliability of local water supplies, or an increased adaptability to climate change.	-

DWR	Urban Streams Restoration Program	<p>Projects funded must be designed for a creek, stream, or river that crosses residential, commercial, or industrial property, or which crosses land that will soon be developed with these types of developments. Outcomes must include protection, restoration, or enhancing of ecosystems, and must provide flood control benefits.</p> <p>The projects have included: Stream cleanups, Bank stabilization projects, Revegetation efforts, Recontouring of channels to improve floodplain function, and occasional acquisition of strategic floodplain properties or easements</p>	-
SWRCB	319(h) Nonpoint Source Grant Program	This program is interested in funding projects that control nonpoint source pollution. This is funded in collaboration with the USEPA	-

8.3 Federal Funding Sources

Similar to State funding, federal funding sources are grouped into two categories. They include programs with focus on public safety or environmental stewardship.

This TM also makes special note of sources that provide funding for planning documents and studies, and potentially for grant writing. Federal sources that provide funds specifically for these needs include:

- Federal Emergency Management Administration (FEMA) Flood Mitigation Assistance Program grants give up to \$25,000 for local planning
- FEMA Building Resilient Infrastructure and Communities Program (formerly Pre-Disaster Mitigation Program) grant gives up to \$600,000 for scoping and planning
- USACE Planning grants

Federal grant programs on flood management with a public safety focus in California have generally been administered through the USACE. USACE assistance in the Upper San Joaquin Region where Firebaugh belongs is not as prevalent as other parts of the Central San Joaquin Valley, State, or nation. This lack of assistance is exacerbated by the deauthorization of the San Joaquin River Flood Control Project (SJRFCP), to which the Firebaugh area belongs, from the State Plan of Flood Control in 2015 by the USACE. Getting the USACE involved in the financing of projects in Firebaugh is therefore a challenge.

FEMA administers the Flood Mitigation Assistance Program and the Building Resilient Infrastructure and Communities (BRIC) Program which has now replaced the Pre-Disaster Mitigation Program as part of the Disaster Mitigation Act of 2000. FEMA grants make cost-share adjustments for small impoverished communities similar to the DAC classification by DWR. FEMA defines these communities as smaller than 3,000 people with a per capita income of less than 80 percent of the national per capita income and with an unemployment rate that is at least 1 percent greater than the national average. This classification by FEMA raises the federal cost-share from FEMA grants up to 90 percent of the total cost paid under the program.

Two other Federal agencies administer grant programs that can contribute to the financing of the Firebaugh Multi-benefit Flood Management Project. The United States Bureau of Reclamation (Reclamation) and the USDA provide federal assistance for programs that improve water efficiency or increase water supply in rural communities. Table 8.3 describes the available federal public safety grant programs.

Table 8.3. Federal Public Safety Grant Programs

Agency	Program	Scope	Cost Share
FEMA	Flood Mitigation Assistance Program	The Flood Mitigation Assistance Program is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	75%-90%
	Building Resilient Infrastructure and Communities Program (formerly Pre-Disaster Mitigation Program)	This program provides funds for hazard mitigation planning studies and projects annually. Funds may be used for capacity and capacity building activities, mitigation projects and management costs.	75%-90%
Reclamation	WaterSMART Grants	This program provides funds for projects that seek to improve water efficiency, protect endangered and threatened species, and address climate-related impacts.	50%
USACE	Flood Risk Management Program	The USACE Flood Risk Management Program (FRMP) works across the agency to focus the policies, programs and expertise of USACE toward reducing overall flood risk. This includes the appropriate use and resiliency of structures such as levees and floodwalls, as well as promoting alternatives when other approaches (e.g., land acquisition, flood proofing, etc.) reduce the risk of loss of life, reduce long-term economic damages to the public and private sector, and improve the natural environment. Projects must be federally authorized to be eligible for this type of funding.	Varies

USDA	Emergency Community Water Assistance Grants	This program helps eligible communities prepare, or recover from, an emergency that threatens the availability of safe, reliable drinking water. Populations less than 10,000 qualify.	100%
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Several federal grant programs provide funds for projects promoting environmental benefits and Firebaugh may be eligible for some of those programs. Many of the federal grant programs that seek to support projects promoting environmental benefits have the desired outcome of putting farmland into easement.

The largest federal program in the easement category is the Natural Resources Conservation Service (NRCS) Agricultural Conservation Easement Program (ACEP). The ACEP replaced the Wetlands Reserve Program, the Grassland Reserve Program, and the Farm and Ranch Land Protection Program. NRCS also administers the Emergency Floodplain Easement Program and the Environmental Quality Incentives Program.

The other Federal agencies that administer grant programs focusing on environmental stewardship are the USFWS, the National Park Service (NPS), and Reclamation. The NPS administers the North American Land and Conservation Fund that is interested in cost sharing when recreational and additional environmental benefits are involved.

Reclamation has two programs that apply to the Central Valley, and one program that is specific to the San Joaquin River. The Central Valley Project Implementation Act (CVPIA) Habitat Restoration Program and the water use efficiency program are available to any implementing agency in the Central Valley.

Furthermore, Reclamation is the lead agency for the San Joaquin River Restoration Program (SJRRP), which funds system improvements that could provide some flood benefits depending on how they are implemented. The USFWS has three programs that deal with endangered species, waterfowl, and anadromous fish – all relevant to the Firebaugh area. The USFWS is also an implementing agency for some of the National Wildlife Refuge system improvements in the Upper San Joaquin River Regional Flood Management Plan (SJRFMP, 2015). Table 8.4 summarizes the available Federal environmental stewardship grant programs.

Table 8.4. Federal Environmental Stewardship Grant Program

Agency	Program	Scope	Cost Share
NRCS	Agricultural Conservation Easement Program	This program provides financial and technical assistance to help conserve agricultural lands and wetlands, and their related benefits. It helps landowners, land trusts, and other entities protect, restore, and enhance wetlands, grasslands, and working farms and ranches through conservation easements.	Varies
	Emergency Watershed Protection Program – Floodplain Easement	Floodplain easements restore, protect, maintain, and enhance the functions of floodplains while conserving their natural values such as fish and wildlife habitat, water quality, floodwater retention, and ground water recharge. Structures, including buildings, within the floodplain easement must be demolished and removed, or relocated outside the 100-year floodplain or dam breach inundation area. It helps local communities recover after a natural disaster strikes.	Up to 100%
	Environmental Quality Incentives Program	This program provides financial and technical assistance to agricultural producers in order to address natural resource concerns and deliver environmental benefits such as improved water and air quality, conserved ground and surface water, reduced soil erosion and sedimentation, or improved or created wildlife habitat.	50%
USFWS	Anadromous Fish Restoration Program	The goal of this program is to expand the accessible range of habitat and improve the quality of fish habitat in an effort to restore natural stocks of anadromous fish.	Varies

	Endangered Species Act Section 6 Grant Program	The goal of this program is to work cooperatively with landowners, communities, and tribes to foster voluntary stewardship efforts on private lands for the recovery of endangered species.	75%-90%
	North American Wetland Conservation Act	This program provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico for the benefit of migratory birds and other wildlife associated with wetlands.	50%
NPS (National Park Service of US Department of Interior)	Land and Water Conservation Fund	This program provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities (as well as funding for conservation strategies).	50%
Reclamation	CVPIA Habitat Restoration Program and Conservation Program	These two programs seek projects that protect and restore native habitats, and that stabilize and improve populations of native species in California's Central Valley.	N/A
	Bay-Delta Restoration Water Use Efficiency	This program seeks programs that improve water use efficiency and reduce the demand for Bay-Delta water resulting in significant benefits to water quality, water supply reliability, and in-stream flows.	50%

9.0 Capital Improvement Program

9.1 Total Capital Costs

The total capital cost for the Firebaugh Multi-benefit Flood Project is about \$139 million as shown in Table 9.1. The costs are shown by project area and are based on the unit costs calculated in the Cost Analysis Technical Memorandum prepared for this feasibility study (Firebaugh, 2022). The project components are based on the Project Preferred Alternative Technical Memorandum (Firebaugh, 2021A).

Table 9.1. Project Costs

Item	Description	Quantity/ Units		Cost/Unit (\$)	Amount (\$)
Project Area 1 - Setback levee and riparian restoration at the Wastewater Treatment Plant					
1	Replacement Levees	4,850	LF	1,547	\$7,502,950
2	Recreational Trails	4,850	LF	250	\$1,212,500
3	Riparian/Wetland Habitat Land Purchase	115	AC	27,175	\$3,125,125
4	Riparian/Wetland Habitat Implementation	115	AC	2,000	\$230,000
5	Other Costs (30%)				\$3,621,173
Subtotal Items 1 through 5					\$15,691,748
Project Area 2: Stabilization of the eroding bank at a sharp bend in the San Joaquin River					
1	Sheet Pile	500	LF	5,000	\$2,500,000
2	Recreational Trails	500	LF	250	\$125,000
3	Other Costs (30%)				\$787,500
Subtotal Items 1 through 3					\$3,412,500
Project Area 3: Setback levee to protect the Firebaugh Water Treatment Plant near the Rodeo Grounds					
1	Replacement Levees	1,000	LF	1,547	\$1,547,000
2	Recreational Trails	1,000	LF	250	\$250,000
3	Riparian/Wetland Habitat Land Purchase	15	AC	27,175	\$407,625
4	Riparian/Wetland Habitat Implementation	15	AC	2,000	\$30,000
5	Other Costs (30%)				\$670,388
Subtotal Items 1 through 5					\$2,905,013
Project Area 4A: Ecosystem Restoration Projects					
1	Replacement Levees	8,000	LF	1,547	\$12,376,000
2	Recreational Trails	17,500	LF	250	\$4,375,000
3	Poso Canal Control Structure	1	LS	2,015,500	\$2,015,500

4	Riparian/Wetland Habitat Land Purchase	196	AC	40,763	\$7,989,450
5	Riparian/Wetland Habitat Implementation	196	AC	2,000	\$392,000
6	Other Costs (30%)				\$8,144,385
Subtotal Items 1 through 6					\$35,292,335
Project Area 4B: Ecosystem Restoration Projects					
1	Replacement Levees	9,000	LF	1,547	\$13,923,000
2	Recreational Trails	9,000	LF	250	\$2,250,000
3	New Berm	1,800	LF	1,200	\$2,160,000
4	Riparian/Wetland Habitat Land Purchase	294	AC	27,175	\$7,989,450
5	Riparian/Wetland Habitat Implementation	294	AC	2,000	\$588,000
6	Other Costs (30%)				\$8,073,135
Subtotal Items 1 through 6					\$34,983,585
Long Term Projects					
1	Replacement Levees	13,000	LF	1,547	\$20,111,000
2	Recreational Trails	13,000	LF	250	\$3,250,000
3	Eastside Acres Improvements (Ring Levee)	1	LS	12,505,670	\$12,505,670
4	Other Costs (30%)				\$10,760,001
Subtotal Items 1 through 4					\$46,626,671
Total (Rounded)					\$138,912,000

9.2 Unit Costs

The unit costs are based on the Cost Analysis Technical Memorandum (Firebaugh, 2022) as stated in the previous section of this report.

A unit cost of \$1,547 per linear foot was used for the replacement levees. The replacement levees will have a crest width of 12-feet, a side slope of 2:1 on the land side, and slope of 3:1 on the river side for the ratio of horizontal distance to every foot of vertical height. Each levee will include an inspection trench of side slope 1:1 with a base width of 12 feet and height of 6 feet as shown in the Figure 6.1 of Appendix A. The required levee heights at each location of the reach were determined and presented in the HH Memo and include a free board of 3 feet.

The unit cost assumes that on average a replacement levee will have a height of 7.5 feet. This is based on the hydraulic analysis for this feasibility study which established that on average levees will have to be raised about 1.8 feet to achieve the 100-year flood protection. Further, the geotechnical investigations determined that approximately 4 to 7 feet of fill material was encountered at existing levees. The fill material will have to be excavated and recompacted. Therefore, the replacement levees on average will have heights of 5.8 feet to 8.8 feet making the average levee height about 7.5 feet.

The unit costs for the recreational trails include pavement for the levee tops as well as signs, benches, and other amenities. The placement of the signs and benches will be determined during the detailed design stage of the project.

A land cost comparison was performed by a real estate broker in July 2021 for the approximately 164 acres of land parcels needed to be purchased or leased to determine the unit costs for land purchase for the riparian/wetland habitats. An average land cost of about \$27,175 per acre was determined. This unit cost was used for lands owned by the United States federal government and the City of Firebaugh. However, a 50 percent escalation was applied to capture the likely true costs of these lands under the current market conditions for the private land owners only. Therefore, the unit cost of land for project area 4A is \$40,763 per acre.

The unit costs for the riparian/wetland habitat implementation is based on approximately 600 to 800 trees per acre to be planted along with specific environmental permits, and costs for a biologist to be present during construction.

The costs for the Poso Closure Structure and Eastside Acres Improvements were estimated by updating the previous lump sum costs in the San Joaquin Basin-wide Feasibility (DWR, 2016). A ratio of approximately 1.45 was applied based on the respective California Construction Cost Indices to bring the cost to the present value.

9.3 Other Costs

An additional cost equivalent of 30 percent of the estimated capital costs for the recommended projects has been included to cover “other” project-related costs such as:

- Design – 7.5%
- Permitting, regulatory compliance, and CEQA – 2.5%
- Construction management – 10%
- Program implementation – 5%
- Project construction contingency - 5%

Design services include preparation of design drawings and specifications for construction. Construction management covers items such as contract management, inspection during construction, and engineering support. Program implementation costs cover items such as legal fees, environmental/CEQA compliance requirements, financing expenses, administrative costs, and interest during construction. Project contingency is for unexpected construction conditions, the need for unforeseen mechanical items, and variations.

9.4 Implementation Strategy

Following this Final Report, the next step is to seek funding for detailed design for project implementation. Firebaugh is a Disadvantaged Community and is not able to come up with sufficient funds to implement the proposed capital projects. Therefore, a combination of federal and State funding assistance is critical for the implementation of the project components.

The project is divided into four project areas to facilitate funding by phase. Project areas 1 through 3 are considered Near-Term projects. As part of this study, 30 percent design plans were prepared for the Near-Term projects as shown in Appendix B. Project area 4, long term levees, as well as improvements in Eastside Acres are considered long term. No detailed design plans have been prepared for them yet.

Current estimates for the proposed project components from Table 9.1 are:

- Project Area 1 - Setback levee and riparian restoration at the Wastewater Treatment Plant: \$15.7 million
- Project Area 2 - Stabilization of the eroding bank at a sharp bend in the San Joaquin River: \$3.4 million
- Project Area 3 - Setback levee to protect the Firebaugh Water Treatment Plant near the Rodeo Grounds: \$2.9 million
- Project Area 4 (long term) - Ecosystem Restoration Projects: \$70.3 million
- Additional Long Term Projects: \$46.6 million

DWR will continue to engage and coordinate with Firebaugh to keep informed of any future State and non-State funding opportunities to assist with the financing and implementation of the projects.

10.0 References

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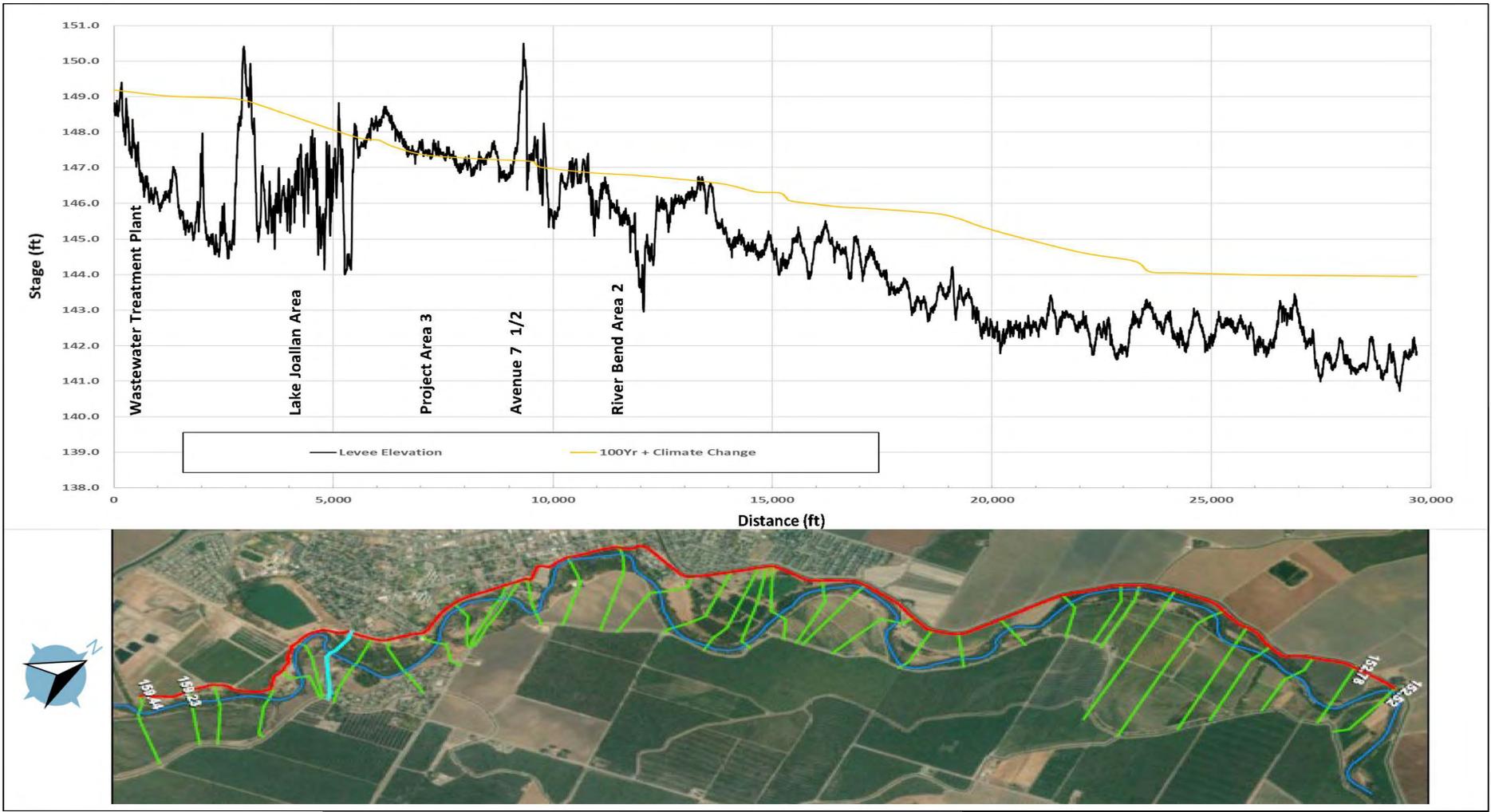
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Appendices

Appendix A

FIGURES

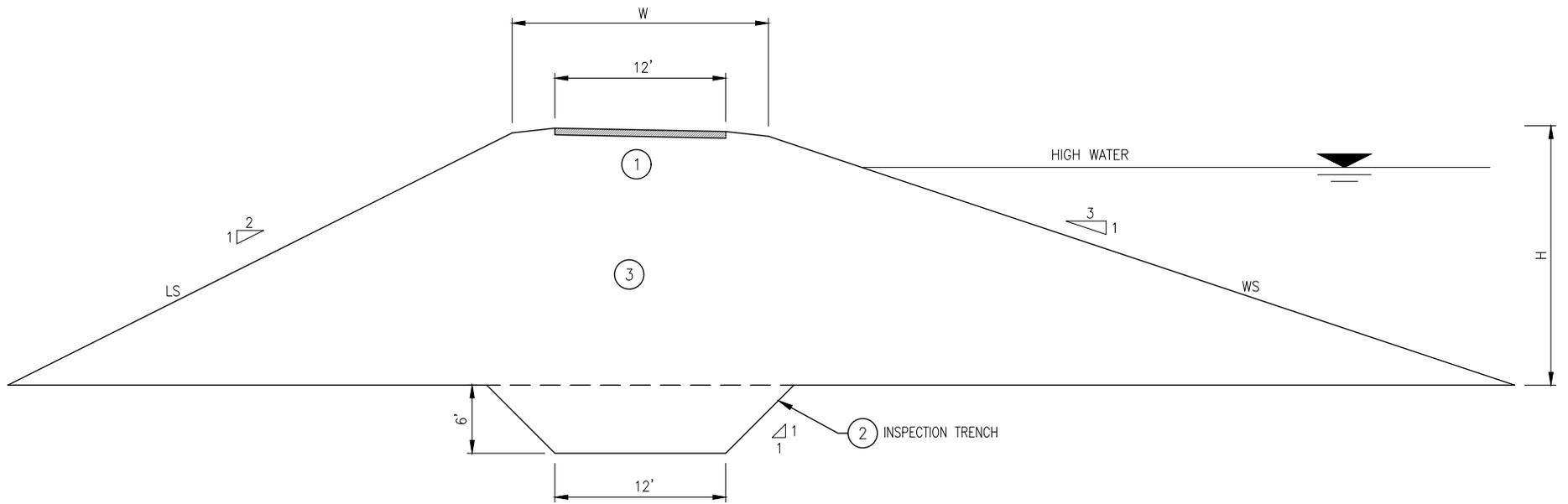


FIREBAUGH FLOOD RISK REDUCTION PROJECT LEVEE PROFILE FOR 100-YEAR FLOOD EVENT (9,138 CFS) PLUS 3-FEET FREEBOARD

DWN BY:
 DATE: 09/13/21

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Levee Profile for 100-Year Storm Event

Fig 4.2



EXAMPLE SCHEMATIC OF A REPLACEMENT LEVEE.

DWN BY:
DATE: 09/13/21

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Levee Section

Fig 6.1



OWNERSHIP INFORMATION

TAG	APN #	OWNER NAME	OWNER ADDRESS	TAG	APN #	OWNER NAME	OWNER ADDRESS
10	007-100-03ST	Mendota Delta Canal	N/A	16	007-100-22ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
11	007-100-04ST	Mendota Delta Canal	N/A	17	007-100-25ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
12	007-100-05ST	UNITED STATES OF AMERICA	N/A	18	007-100-26ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
13	007-100-10ST	UNITED STATES OF AMERICA	N/A	19	007-100-27P	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
14	007-100-13ST	UNITED STATES OF AMERICA	N/A	20	007-180-05S	Lake Joallen, LLC	8051 Main St., Stanton, CA 90680
15	007-100-18S	Roger A & Daniel M Miller	1 Deer Hill Rd., Morgan Hill, CA 95037	25	008-020-11	Thomason Tractor Co of California	P.O. Box 97, Firebaugh, CA 93622

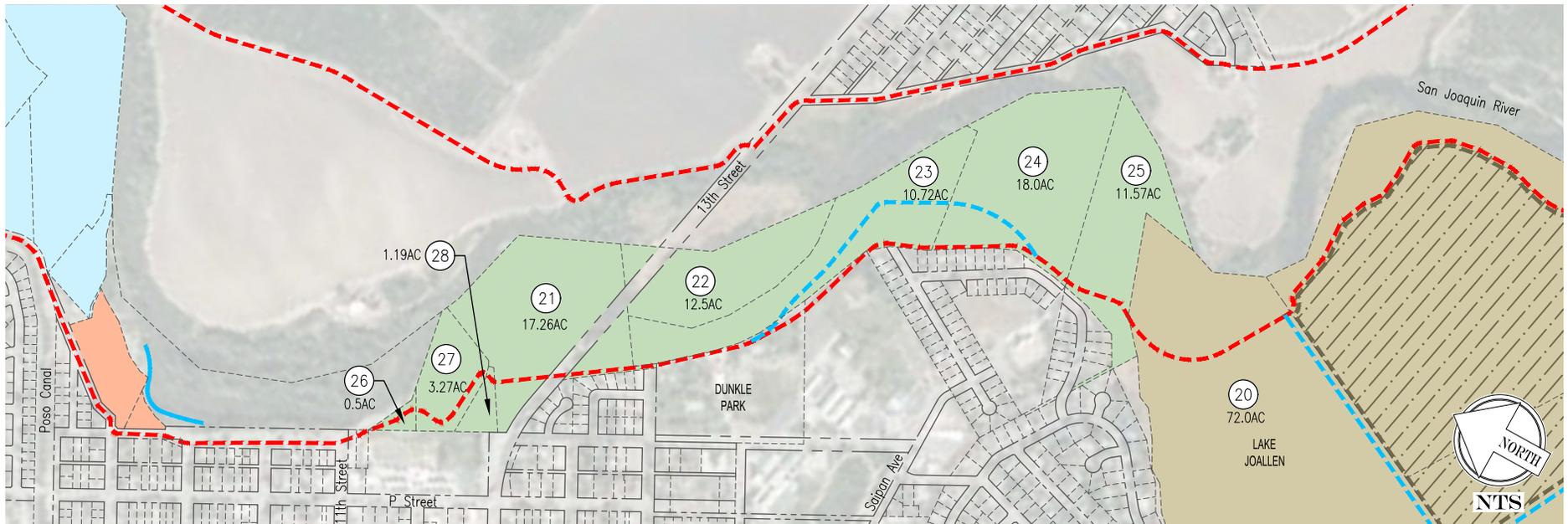
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DWN BY: DGR
 DATE: 02/20/21

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Area 1

Fig 7.1



OWNERSHIP INFORMATION

TAG	APN #	OWNER NAME	OWNER ADDRESS
20	007-180-05S	Lake Joallen, LLC	8051 Main St., Stanton, CA 90680
21	008-020-07T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
22	008-020-08T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
23	008-020-09T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
24	008-020-10T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
25	008-020-11	Thomason Tractor Co of California	P.O. Box 97, Firebaugh, CA 93622
26	008-060-02T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
27	008-060-03T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
28	008-060-04ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622

LEGEND

	PROJECT 1		PROJECT 2		EXISTING LEVEE
	PROJECT 3		PROJECT 4		PROJECT LEVEE ALIGNMENT

OWN BY: DGR
 DATE: 08/13/20

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Area 2

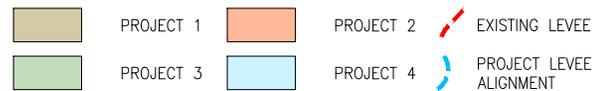
Fig 7.2



OWNERSHIP INFORMATION

TAG	APN #	OWNER NAME	OWNER ADDRESS
⑥	007-062-12	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
⑦	007-062-13	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
⑧	007-062-14	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
⑨	007-062-15T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
②⑥	008-060-02T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
②⑦	008-060-03T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
②⑨	008-110-02	Ramon & Cecilia Echeveste	1888 7th Street, Firebaugh, CA 93622
③①	008-110-09	Italo & Henry P Rebecchi Trust	35 Orchard Heights Ln, Watsonville, CA 95076
③①	008-110-16	Oscar M & Marcia E. Sablan	P.O. Box 306, Firebaugh, CA 93622
③②	008-110-19	Pete C & Esther M Ramirez	1754 Ramirez Dr., Firebaugh, CA 93622

LEGEND

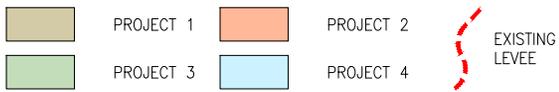


OWN BY: DGR
 DATE: 08/13/20

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Area 3

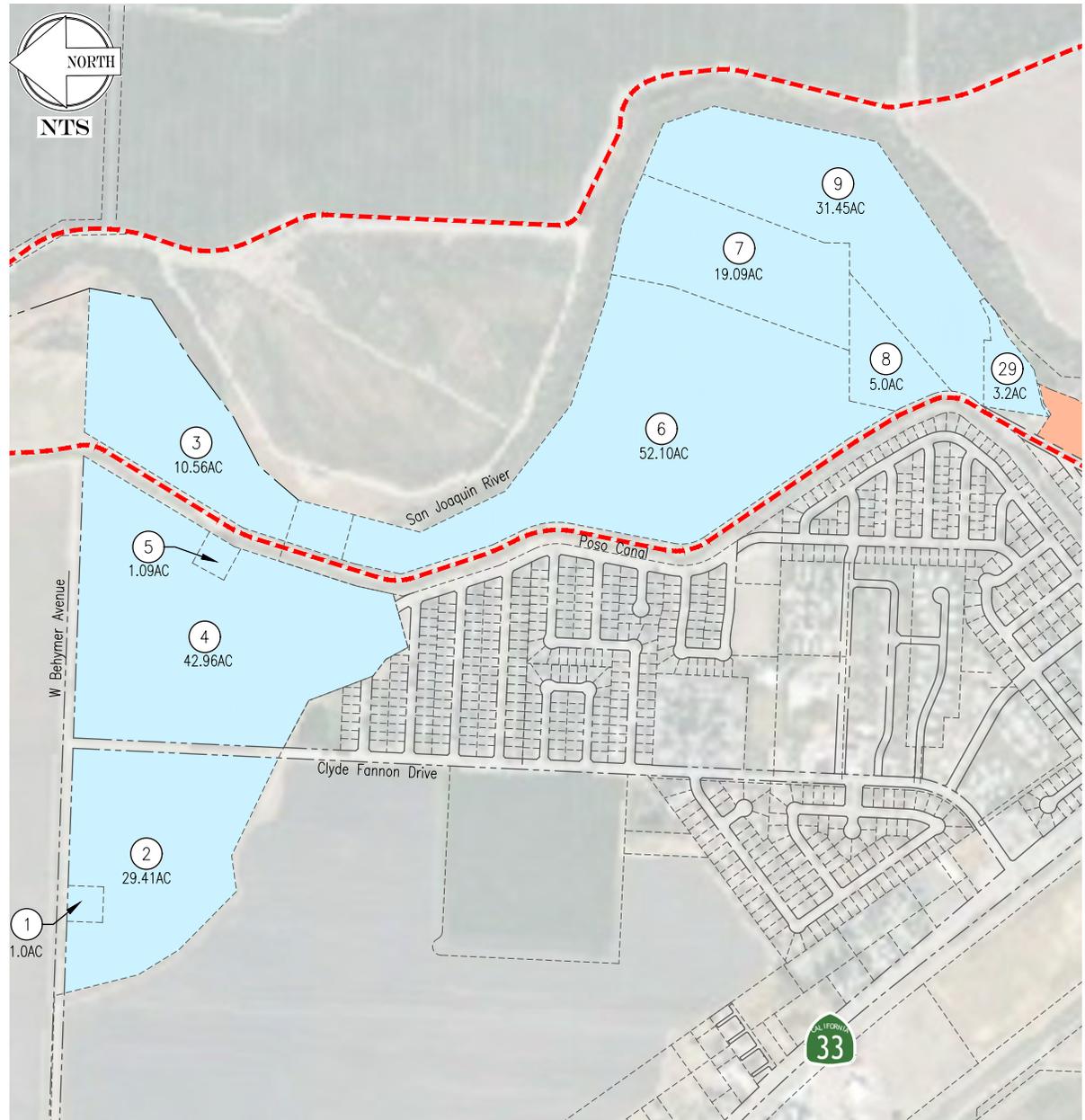
Fig 7.3

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OWNERSHIP INFORMATION

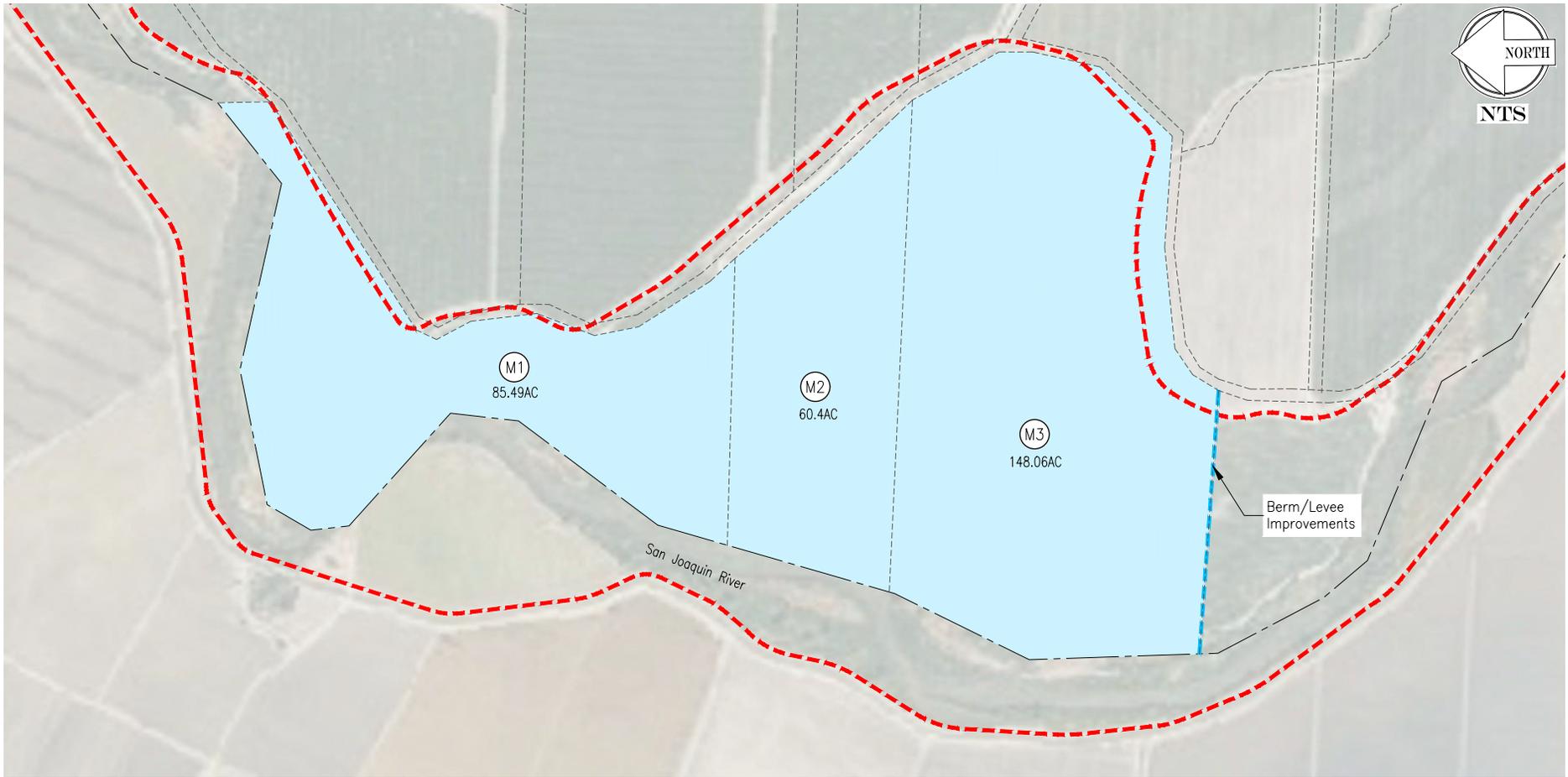
TAG	APN #	OWNER NAME	OWNER ADDRESS
①	007-061-11	Floyd & Winnita Covey	2531 E. Pacheco Blvd., Los Banos, CA 93635
②	007-061-23	Marion G Santos	2531 E. Pacheco Blvd., Los Banos, CA 93635
③	007-062-01	James E & Marilynne E Dedmon	P.O. Box 695, Firebaugh, CA 93622
④	007-062-02	Lorna Lucille Cox & Sandra Bush	1550 W Ashlan Ave. #115, Fresno, CA 93705
⑤	007-062-03	Lorna Lucille Cox & Sandra Bush	1550 W Ashlan Ave. #115, Fresno, CA 93705
⑥	007-062-12	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
⑦	007-062-13	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
⑧	007-062-14	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
⑨	007-062-15T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
②9	008-110-02	Ramon & Cecilia Echeveste	1888 7th Street Firebaugh, CA 93622



DWN BY: DGR
 DATE: 02/20/21

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Area 4A

Fig 7.4



OWNERSHIP INFORMATION

TAG	APN #	OWNER NAME	OWNER ADDRESS
(M1)	041-070-002	UNITED STATES OF AMERICA	N/A
(M2)	041-070-003	Alexander F & Jackie M Lehman	15715 Avenue 13, Madera CA 93637
(M3)	041-130-001	UNITED STATES OF AMERICA	N/A

LEGEND



DWN BY: DGR
 DATE: 02/20/21

City of Firebaugh - Flood Risk Reduction Feasibility Study - Project Area 4B

Fig 7.5



OWNERSHIP INFORMATION

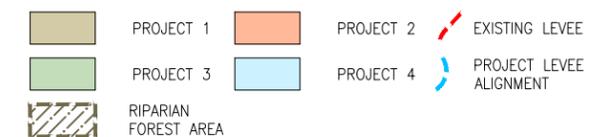
TAG	APN #	OWNER NAME	OWNER ADDRESS
1	007-061-11	Floyd & Winnita Covey	2531 E. Pacheco Blvd., Los Banos, CA 93635
2	007-061-23	Marion G Santos	2531 E. Pacheco Blvd., Los Banos, CA 93635
3	007-062-01	James E & Marilynne E Dedmon	P.O. Box 695, Firebaugh, CA 93622
4	007-062-02	Lorna Lucille Cox & Sandra Bush	1550 W Ashlan Ave. #115, Fresno, CA 93705
5	007-062-03	Lorna Lucille Cox & Sandra Bush	1550 W Ashlan Ave. #115, Fresno, CA 93705
6	007-062-12	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
7	007-062-13	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
8	007-062-14	Stephen F & Kellie L Hurt Craig J & Margery Knight	1751 Vasquez Dr., Firebaugh, CA 93622
9	007-062-15T	City of Firebaugh	1133 P Street, Firebaugh, CA 93622
10	007-100-03ST	Mendota Delta Canal	N/A

TAG	APN #	OWNER NAME	OWNER ADDRESS
11	007-100-04ST	Mendota Delta Canal	N/A
12	007-100-05ST	UNITED STATES OF AMERICA	N/A
13	007-100-10ST	UNITED STATES OF AMERICA	N/A
14	007-100-13ST	UNITED STATES OF AMERICA	N/A
15	007-100-18S	Roger A & Daniel M Miller	1 Deer Hill Rd., Morgan Hill, CA 95037
16	007-100-22ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
17	007-100-25ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
18	007-100-26ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
19	007-100-27P	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
20	007-180-05S	Lake Joallen, LLC	8051 Main St., Stanton, CA 90680

TAG	APN #	OWNER NAME	OWNER ADDRESS
21	008-020-07T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
22	008-020-08T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
23	008-020-09T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
24	008-020-10T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
25	008-020-11	Thomason Tractor Co of California	P.O. Box 97, Firebaugh, CA 93622
26	008-060-02T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
27	008-060-03T	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
28	008-060-04ST	City of Firebaugh	1133 P Street, Firebaugh, Ca 93622
29	008-110-02	Ramon & Cecilia Echeveste	1888 7th Street, Firebaugh, CA 93622
30	008-110-09	Italo & Henry P Rebecchi Trust	35 Orchard Heights Ln, Watsonville, CA 95076

TAG	APN #	OWNER NAME	OWNER ADDRESS
31	008-110-16	Oscar M & Marcia E Sablan	P.O. Box 306, Firebaugh, CA 93622
32	008-110-19	Pete C & Esther M Ramirez	1754 Ramirez Dr., Firebaugh, CA 93622
M1	041-070-002	UNITED STATES OF AMERICA	N/A
M2	041-070-003	Alexander F & Jackie M Lehman	15715 Avenue 13, Madera CA 93637
M3	041-130-001	UNITED STATES OF AMERICA	N/A

LEGEND



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Fig 7.6

Appendix B

NEAR-TERM 30 PERCENT DESIGN PLANS

BENCHMARK

VERTICAL AND HORIZONTAL DATUM:

VERTICAL AND HORIZONTAL DATUM INFORMATION WAS TAKEN FROM THE NGS DATA SHEET FOR PID GU0681.
 VERTICAL DATUM: NAVD88
 ELEVATION: 150.4'
 HORIZONTAL DATUM: NAD83-1992, CALIFORNIA SPCS, ZONE 4

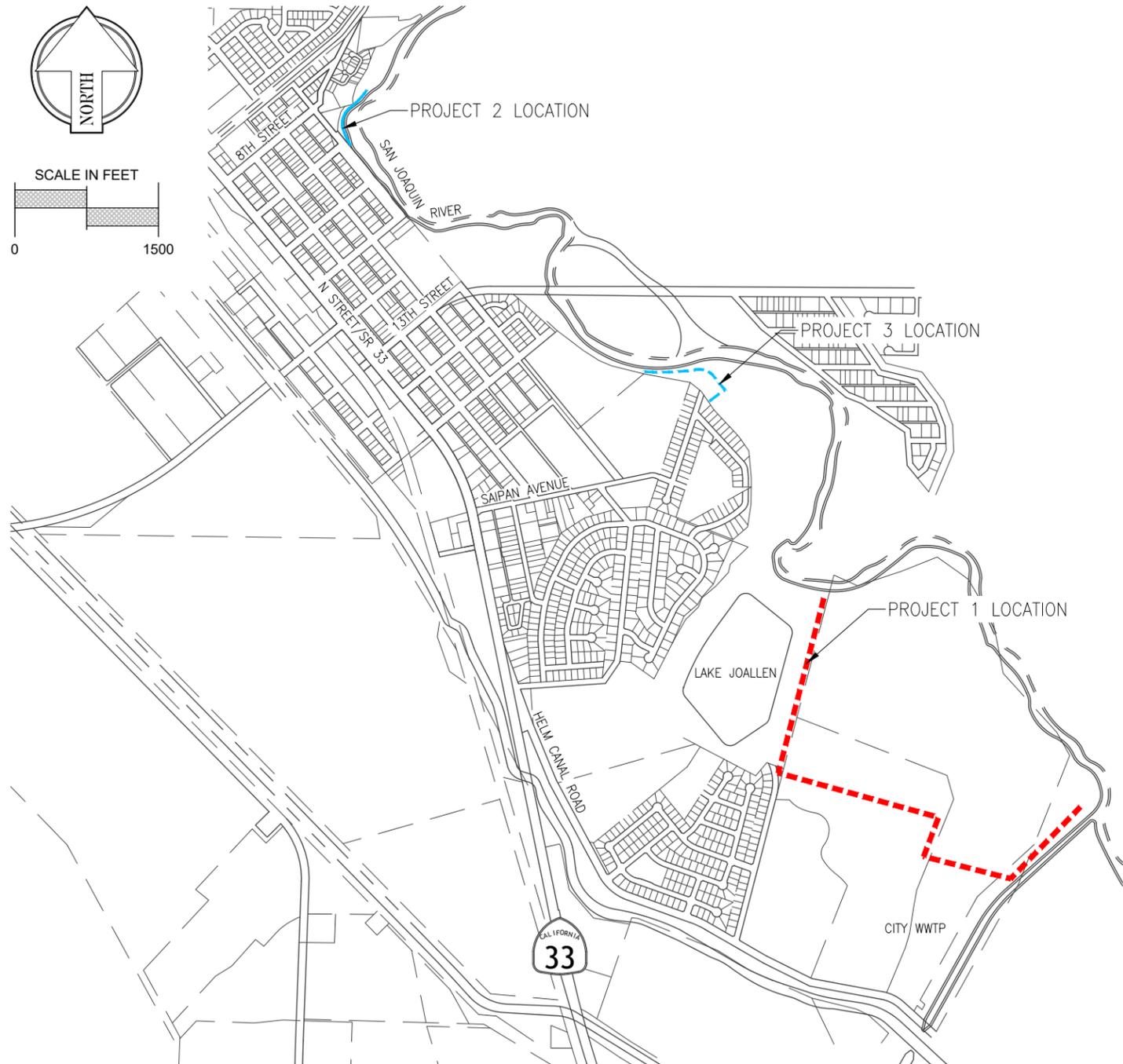
DESCRIPTION: THE STATION MARK IS A C AND GS TRIANGULATION STATION DISK STAMPED FIREBAUGH 1943 SET IN THE TOP OF A 10-INCH SQUARE CONCRETE POST PROJECTING 0.3 FOOT ABOVE THE GROUND AND IS 142.0 FEET NORTHEAST OF THE NORTHEAST RAIL OF A RAILROAD TRACK, 41 FEET SOUTHWEST OF THE CENTERLINE OF THE HIGHWAY, 7.9 FEET NORTHWEST OF THE WEST CORNER OF HIGHWAY BRIDGE 42-34, 3.6 FEET SOUTHWEST OF A GUARD RAIL, 1.4 FEET NORTHEAST OF A METAL WITNESS POST, ABOUT LEVEL WITH THE HIGHWAY, AND ABOUT 2 FEET LOWER THAN THE RAILROAD TRACK.

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER MANHOLE	⊙	
UNDERGROUND COMMUNICATIONS LINE	— COM —	
COMMUNICATIONS PEDESTAL	●	
UNDERGROUND ELECTRICAL LINE	— E —	
POWER POLE	⊖	
GAS LINE	— G —	
GAS VALVE	⊗	
FIRE HYDRANT	⊗	
WATER VALVE	⊗	
WATER METER	⊖	
STORM DRAIN MANHOLE	⊙	
DRAIN INLET	⊖	⊖
STREET SIGN	+	+
MONUMENT WELL	⊙	
CONTOUR ELEVATION	109.50	
WROUGHT IRON FENCE	— x —	
WOOD FENCE	— o —	
SAWCUT LINE	---	
AREA OF AC REMOVAL		▨
AREA OF CONCRETE REMOVAL		▩
CONCRETE		■
ASPHALT CONCRETE		■
AREA OF AC REPAIR		■
AREA OF AC PULVERIZATION		■

FOR CLARITY PURPOSES SYMBOLS SHOWN IN THE LEGEND MAY APPEAR SMALLER THAN SHOWN ON THE PLANS.

**PROJECT PLANS FOR CONSTRUCTION OF
 Firebaugh Multi-Benefit Flood
 Management Project
 CITY OF FIREBAUGH**



INDEX OF DRAWINGS

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33	PATH AMENITY CONSTRUCTION DETAILS

SIGNATURE BLOCK

REVIEWED AND APPROVED BY THE CITY OF FIREBAUGH ACTING PUBLIC WORKS DIRECTOR

BY: _____ DATE: _____
 BEN GALLEGOS
 CITY MANAGER/ACTING PUBLIC WORKS DIRECTOR

CITY CONTACT INFORMATION

BEN GALLEGOS	CITY MANAGER/ ACTING PW DIRECTOR	(559) 694-6166
CITY COUNCIL	CITY OFFICIALS	
FREDDY VALDEZ	MAYOR	RITA LOZANO DEPUTY CITY CLERK
BRADY JENKINS	MAYOR PRO TEM	JAMES SANCHEZ CITY ATTORNEY
ELSA LOPEZ	COUNCIL MEMBER	MARIO GOUVEIA CITY ENGINEER
FELIPE PEREZ	COUNCIL MEMBER	
MARCIA SABLAN	COUNCIL MEMBER	



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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
LOCATION MAP AND INDEX OF DRAWINGS

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-101
DRAWN BY DGR	DATE 04/20/22	SHEET 1
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

GENERAL NOTES

1. PROJECT WORK HOURS ARE:
MON - FRI 7AM - 5PM
2. THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CONSTRUCTION ENCROACHMENT PERMIT FROM CALTRANS PRIOR TO PERFORMING ANY WORK.
4. SURVEY MONUMENTS ARE NOT LOCATED AS PART OF THE USA CALL BEFORE YOU DIG PROCESS. THE PROJECT SURVEYOR SHALL LOCATE AND MARK THE MONUMENTS WITHIN THE PROJECT ENVELOPE FOR PRESERVATION.
5. PURSUANT TO SECTION 8771 OF THE CALIFORNIA BUSINESS AND PROFESSIONS CODE, THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND PRESERVATION OF ANY MONUMENTATION FOUND WITHIN OR ADJACENT TO THE PROJECT IMPROVEMENTS. IF PROJECT IMPROVEMENTS ENCROACH UPON AN AREA WHERE MONUMENTATION IS PRESENT, THE ENGINEER OF RECORD MUST BE CONTACTED AND THE MONUMENT MUST BE PROTECTED AND REMAIN UNDISTURBED BY CONSTRUCTION ACTIVITIES. IF AN EXISTING MONUMENT IS DISTURBED DURING CONSTRUCTION, THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL COSTS RELATED TO RESTORATION OF THE MONUMENT INCLUDING THE DOCUMENTATION, RECORDATION, AND RESETTING OF THE MONUMENT (IF REQUIRED) BY THE ENGINEER OF RECORD.
6. EXISTING UTILITY LOCATIONS ARE SHOWN BASED ON USA MARKINGS COLLECTED IN THE FIELD AND RECORD INFORMATION PROVIDED BY THE UTILITY OWNER. ACTUAL BUILT LOCATIONS AND UTILITY DEPTHS MAY VARY. THE ENGINEER DOES NOT GUARANTEE THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE PLANS TO BE EITHER TRUE OR EXACT. THE CONTRACTOR SHALL VERIFY ACTUAL DEPTH AND EXACT LOCATION OF EXISTING UTILITIES PRIOR TO EXCAVATION ACTIVITIES TO THE SATISFACTION OF THE UTILITY OWNER. ALL COSTS RELATED TO LOCATING AND PROTECTING EXISTING UTILITIES AS REQUIRED BY THE RESPONSIBLE UTILITY COMPANY AND/OR GOVERNING AGENCY ARE THE RESPONSIBILITY OF THE CONTRACTOR. THESE COSTS INCLUDE ALL LOCATING AND POT HOLE ACTIVITIES REQUIRED BY THE UTILITY OWNER. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHILE EXCAVATING IN AREAS NEAR NATURAL GAS, TV, PHONE, AND OTHER EXISTING UTILITIES AND IS RESPONSIBLE FOR ALL COSTS RELATED TO DAMAGED LINES OR DISRUPTION OF SERVICE CAUSED BY ANY ACTIVITIES AS THEY RELATE TO THIS PROJECT.
7. THE CONTRACTOR SHALL BE AWARE OF EXISTING OVERHEAD UTILITY LINES AND SHALL EXERCISE CAUTION WHILE WORKING NEAR SUCH LINES. OVERHEAD UTILITY LINES HAVE BEEN OMITTED FROM PLANS FOR CLARITY PURPOSES.
8. THE CONTRACTOR SHALL EXERCISE CARE TO MINIMIZE DAMAGE TO FACILITIES ADJACENT TO PROJECT IMPROVEMENTS SUCH AS EQUIPMENT, FENCING, CONCRETE FLATWORK, LANDSCAPING, LANDSCAPE IRRIGATION, ECT., DESIGNATED TO REMAIN. ANY FACILITIES DAMAGED BY THE CONTRACTOR SHALL BE RESTORED IN KIND AT NO COST TO THE CITY TO THEIR ORIGINAL PRE-CONSTRUCTION CONDITION OR BETTER. DISTURBED AND DAMAGED SURFACES SHALL BE RESTORED AFTER ALL CONSTRUCTION IS COMPLETE AND PRIOR TO CITY ACCEPTANCE.
9. IN INSTANCES WHERE RESTORATION OF THE PAVEMENT IMPACTS ADJACENT FACILITIES SUCH AS EXISTING UTILITY FRAMES AND COVERS, THOSE FACILITIES SHALL BE RAISED TO GRADE AS PART OF THE PROJECT IMPROVEMENTS EVEN IF NOT SHOWN OR ACCOUNTED FOR IN THE PROJECT PLANS AND SPECIFICATIONS.
10. UTILITY CONFLICTS ARE TO BE WORKED OUT IN THE FIELD WITH THE PROJECT ENGINEER AND CITY REPRESENTATIVE.
11. AT THE END OF EACH DAY OR AS DIRECTED BY THE OWNER, THE CONTRACTOR SHALL SWEEP ROADWAYS OF ALL DEBRIS AND EXCESS MATERIAL ATTRIBUTED TO THE CONTRACTOR'S OPERATIONS. UNLESS OTHERWISE APPROVED BY THE OWNER, MECHANICAL STREET SWEEPERS WITHOUT DEBRIS STORAGE COMPARTMENTS WILL NOT BE ALLOWED.
12. UNLESS OTHERWISE APPROVED BY THE OWNER, TARPS OR OTHER EFFECTIVE COVERS ARE REQUIRED ON ALL STOCKPILED MATERIAL AND ON ALL HAUL TRUCKS TO MINIMIZE DUST.
13. CONTRACTOR IS RESPONSIBLE FOR REMOVING EXISTING GRASS, TREES, PLANTS, ALL TREE STUMPS, ALL ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE DELETERIOUS MATERIALS AS REQUIRED FOR CONSTRUCTION.

GENERAL NOTES (Continued)

14. IF EXISTING SPRINKLERS NEED TO BE REMOVED, RELOCATED, OR ARE DAMAGED AS A DIRECT OR INDIRECT RESULT OF CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL CAP AND FLAG THE SPRINKLER LINE BEHIND THE PROPOSED IMPROVEMENTS, AND SHALL RESTORE THE SYSTEM TO ITS PRE-CONSTRUCTION CONDITION AS SOON AS POSSIBLE IN ORDER TO MINIMIZE DOWN TIME AND DAMAGE TO LANDSCAPING AND AT NO ADDITIONAL COST TO THE CITY. IF THE CONTRACTOR DOES NOT REPAIR THE SYSTEM IN A TIMELY MANNER, THE OWNER MAY HAVE THE SYSTEM REPAIRED, AND THE COST WILL BE BACK CHARGED TO THE CONTRACTOR.
15. EXCESS AC GRINDINGS TO BE STOCKPILED AT THE WASTE WATER TREATMENT PLANT LOCATED AT 8000 HELM CANAL ROAD AND SHALL BECOME PROPERTY OF THE OWNER.

TRAFFIC MANAGEMENT NOTES

1. THE CONTRACTOR SHALL COORDINATE TRAFFIC CONTROL EFFORTS WITH THE PUBLIC WORKS DEPARTMENT, AND THE ENGINEER OF RECORD DURING THE CONSTRUCTION OF THE PROJECT.
2. THE CONTRACTOR IS REQUIRED TO MAINTAIN EMERGENCY VEHICLE ACCESS THROUGH THE PROJECT AREA AT ALL TIMES.
3. THE CONTRACTOR SHALL MAINTAIN PROPERTY ACCESS AT ALL TIMES. CONSTRUCTION ACTIVITIES SHALL BE COORDINATED IN SUCH A MANNER TO ALLOW BUSINESSES ADJACENT TO THE PROJECT TO HAVE AT LEAST ONE POINT OF ACCESS DURING CONSTRUCTION.
4. ALL SIGNS AND TRAFFIC CONTROL DEVICES BEING USED SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE MUTCD.
5. THE CONTRACTOR SHALL HAVE ALL SIGNS, DELINEATORS, BARRICADES, ETC., PROPERLY PLACED PRIOR TO COMMENCING CONSTRUCTION AND SHALL BE SOLELY RESPONSIBLE FOR MAINTAINING THE TRAFFIC CONTROL DEVICES BEING IMPLEMENTED THROUGHOUT THE CONSTRUCTION OF THE PROJECT.
6. REFLECTIVE TABS ARE NOT ACCEPTABLE TO BE USED AS TEMPORARY DELINEATION DEVICES.
7. THE CONTRACTOR SHALL DIRECT PEDESTRIANS TO USE ALTERNATE ROUTES WHILE CONSTRUCTION IS TAKING PLACE WITHIN PEDESTRIAN ROUTE.
8. THE CONTRACTOR SHALL NOTIFY ALL OWNERS WITHIN THE AFFECTED AREA AT LEAST 2 FULL BUSINESS DAYS PRIOR TO ANY ROAD CLOSURE.
9. IN AREAS WHERE PARKING WILL BE RESTRICTED DURING CONSTRUCTION, TEMPORARY NO PARKING SIGNS WITH DATES OF RESTRICTION SHALL BE PUT INTO PLACE AT LEAST 3 FULL BUSINESS DAYS PRIOR TO THE IMPLEMENTATION OF RESTRICTED PARKING.



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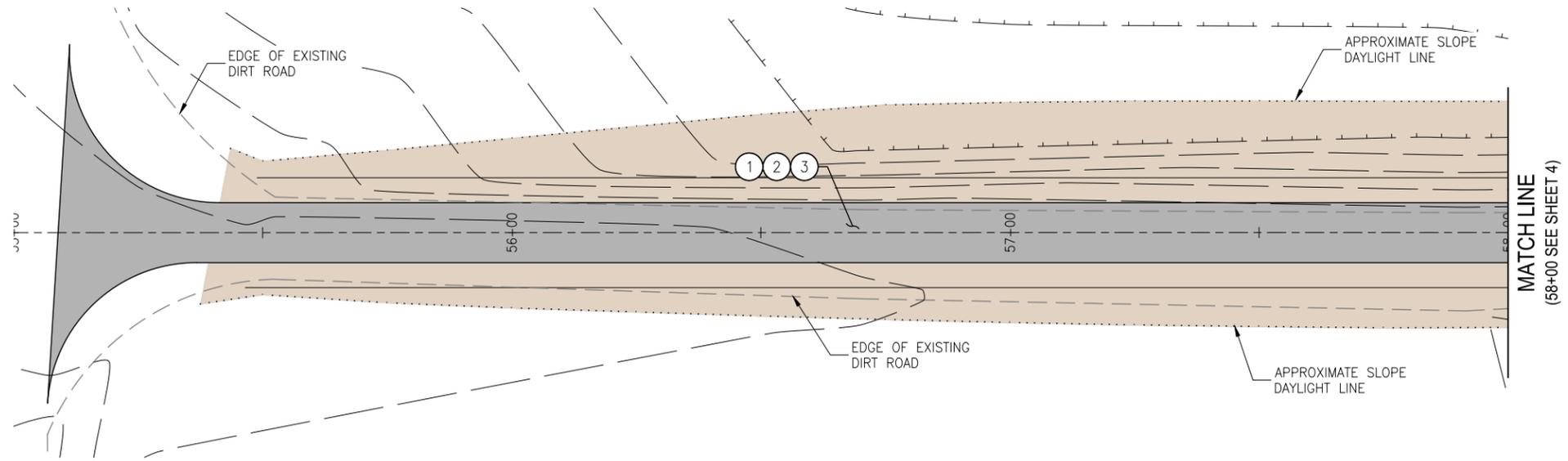
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City of Firebaugh

Firebaugh Multi-Benefit Flood Management Project
GENERAL NOTES AND LEGEND

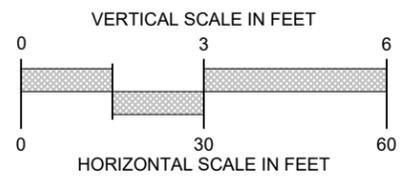
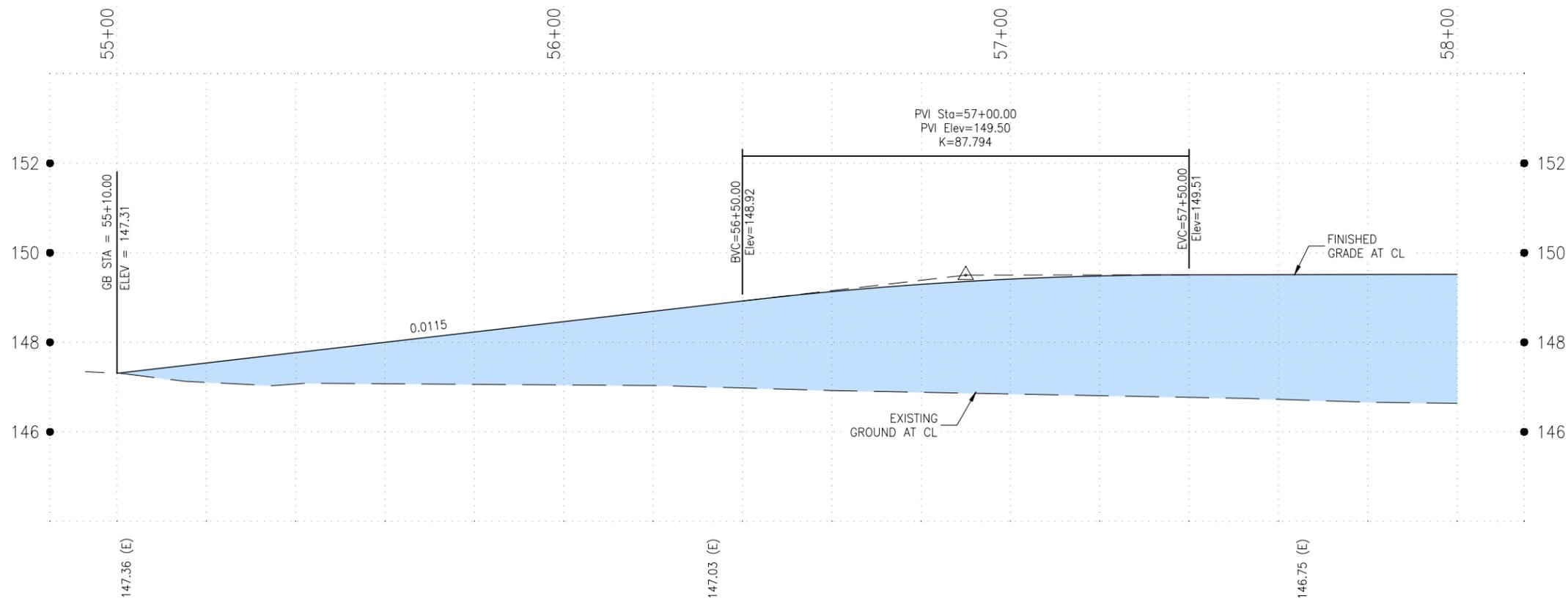
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DRAWN BY DGR	DATE 04/20/22	SHEET 2
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH. PROVIDE A SMOOTH TRANSITION BETWEEN THE PROPOSED AC TRAIL AND THE EXISTING DIRT ROAD.	① 31
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF


Project 1
 STATION 55+00 - 58+00



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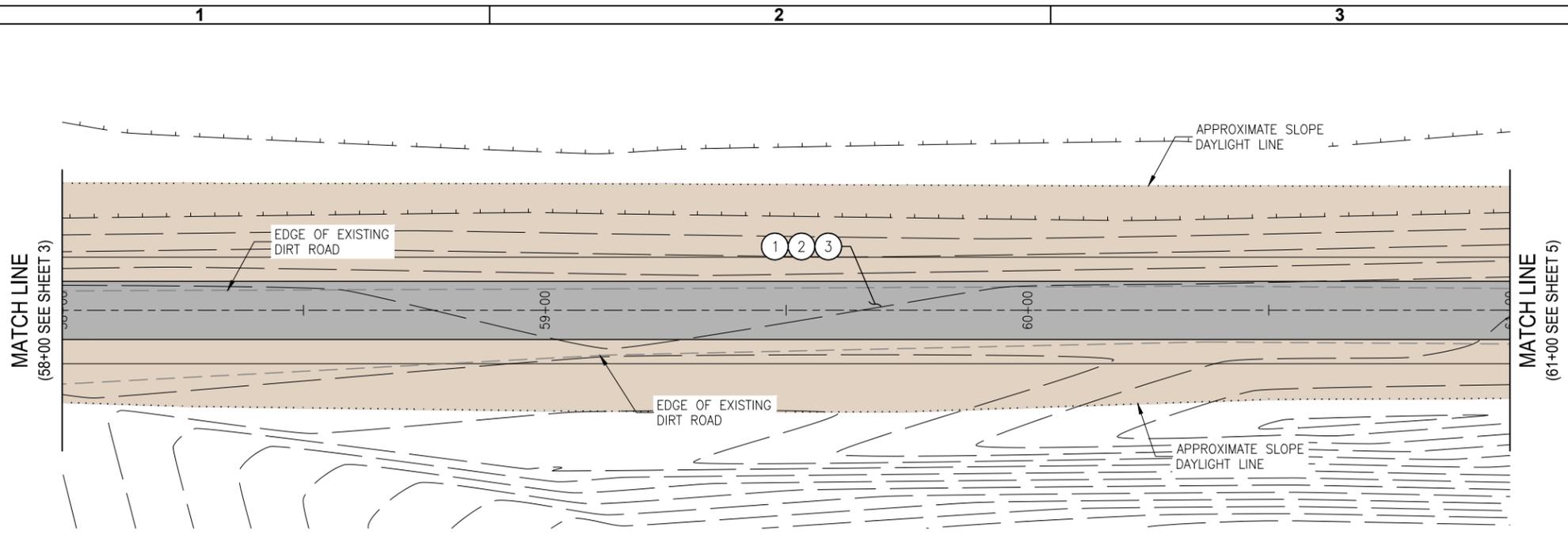
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Project 1 - Plan and Profile
Station 55+00 to 58+00

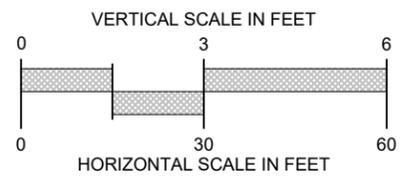
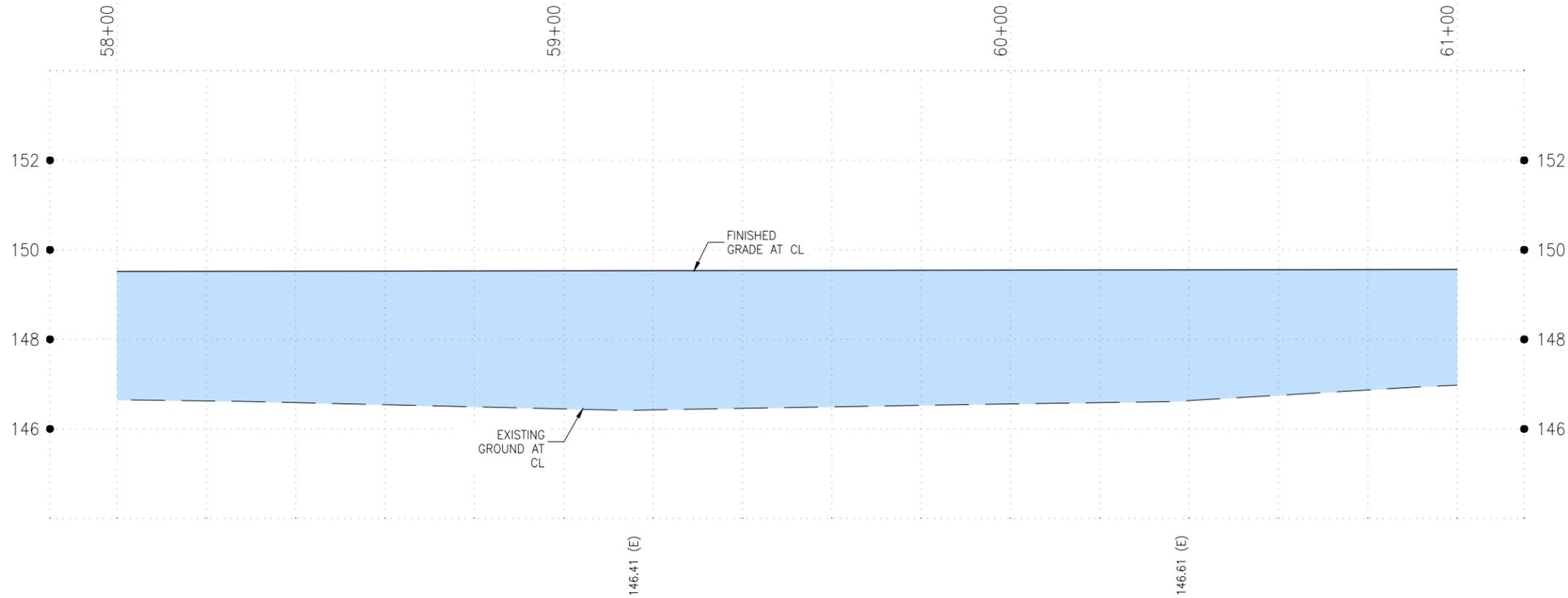
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DRAWN BY DGR	DATE 04/20/22	SHEET 3
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 58+00 - 61+00



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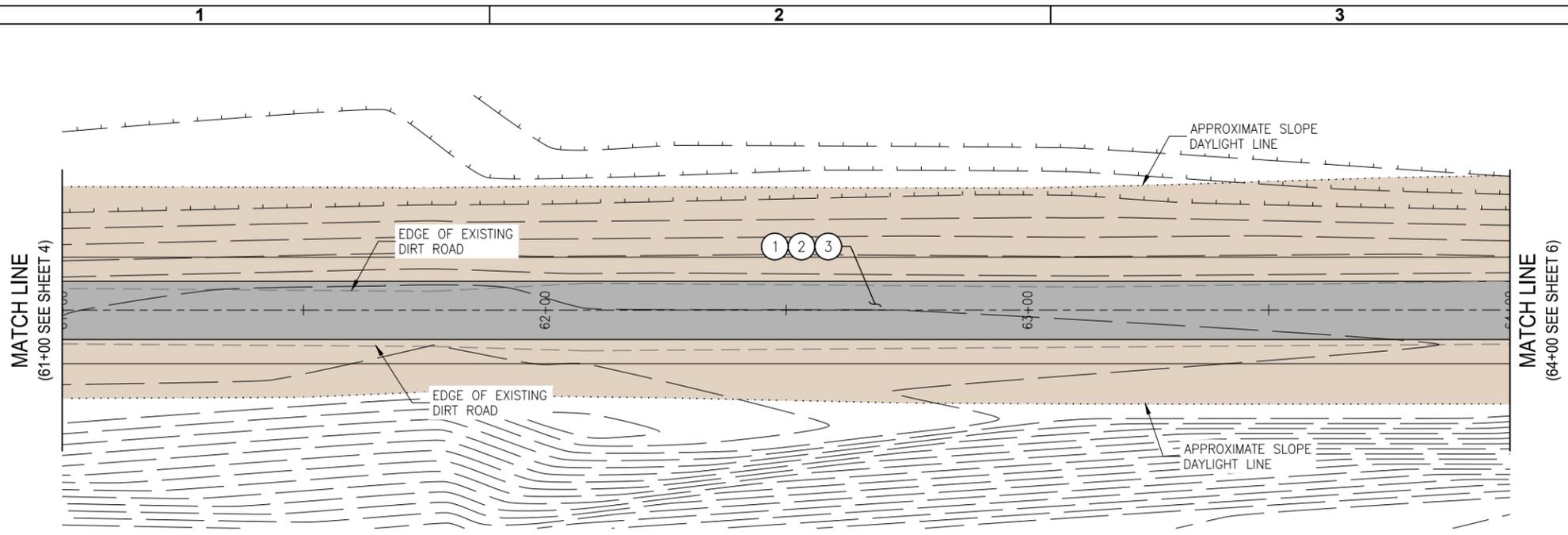
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Project 1 - Plan and Profile
Station 58+00 to 61+00

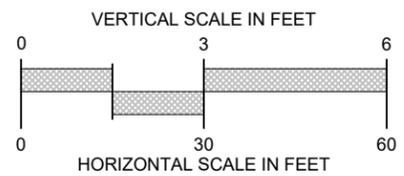
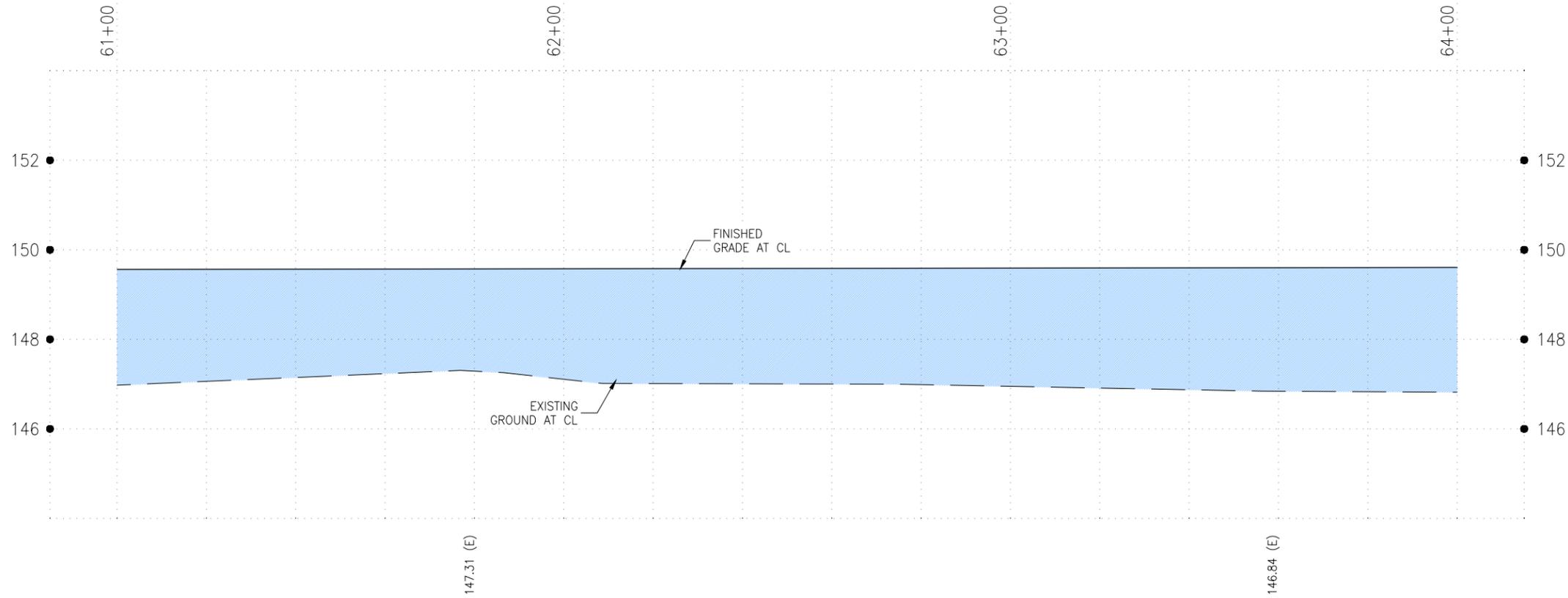
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DRAWN BY DGR	DATE 04/20/22	SHEET 4
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	1 31
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 61+00 - 64+00



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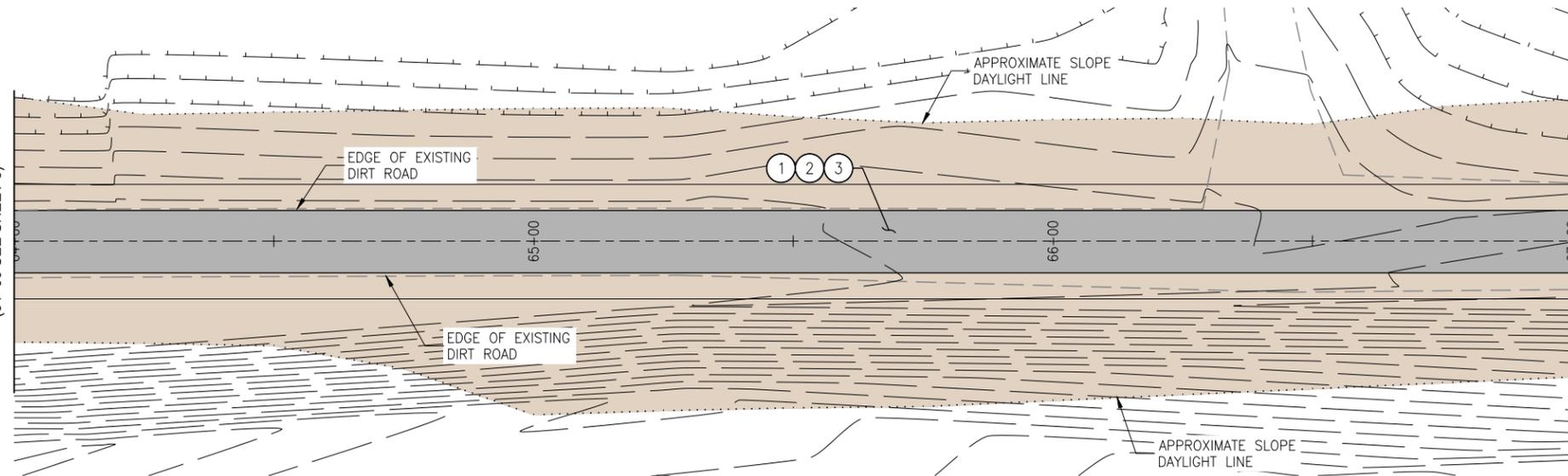
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DRAWN BY DGR	DATE 04/20/22	SHEET 5
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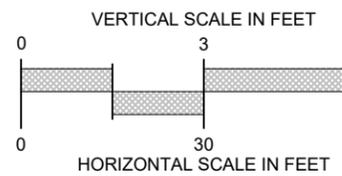
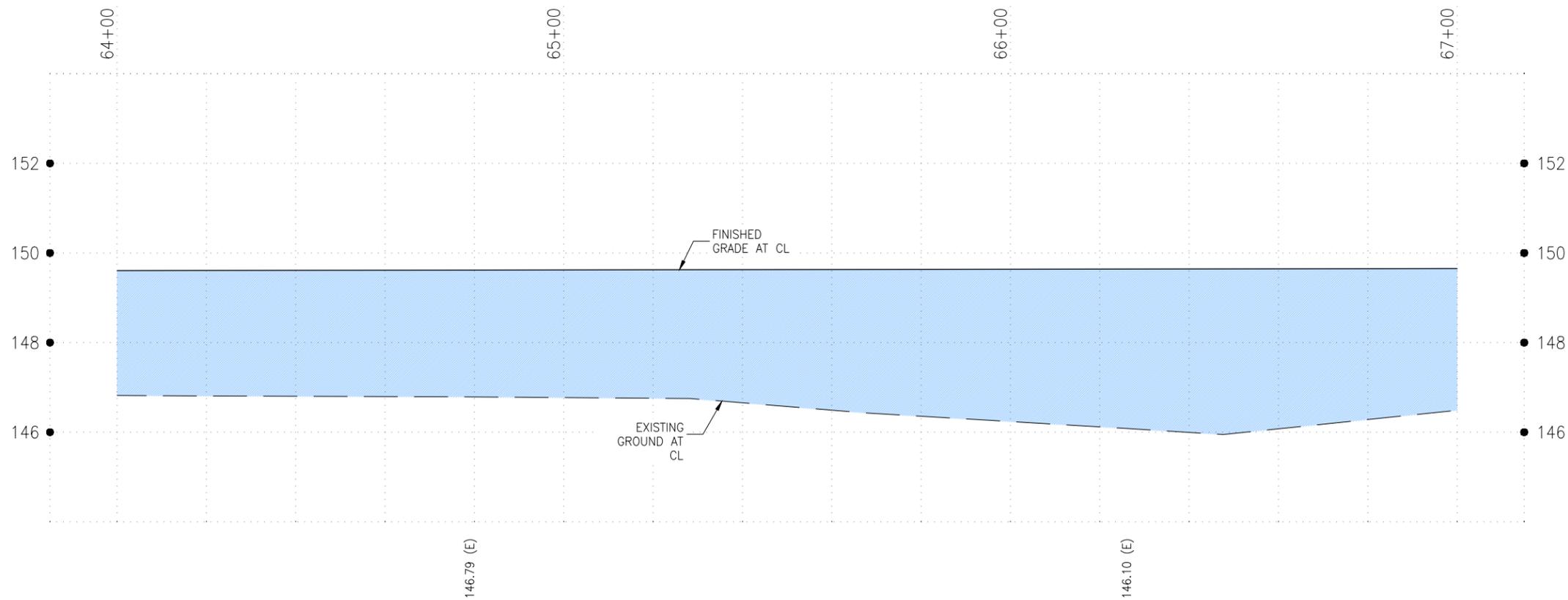
MATCH LINE
(64+00 SEE SHEET 5)

MATCH LINE
(67+00 SEE SHEET 7)



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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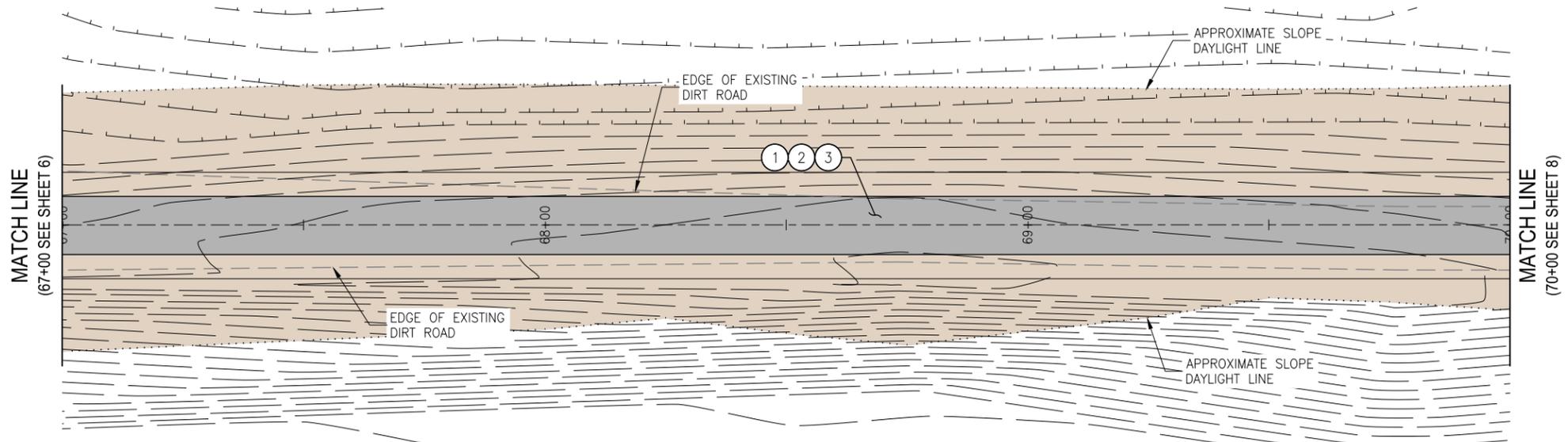
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Project 1 - Plan and Profile
Station 64+00 to 67+00

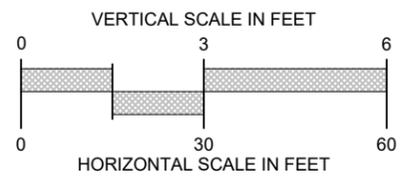
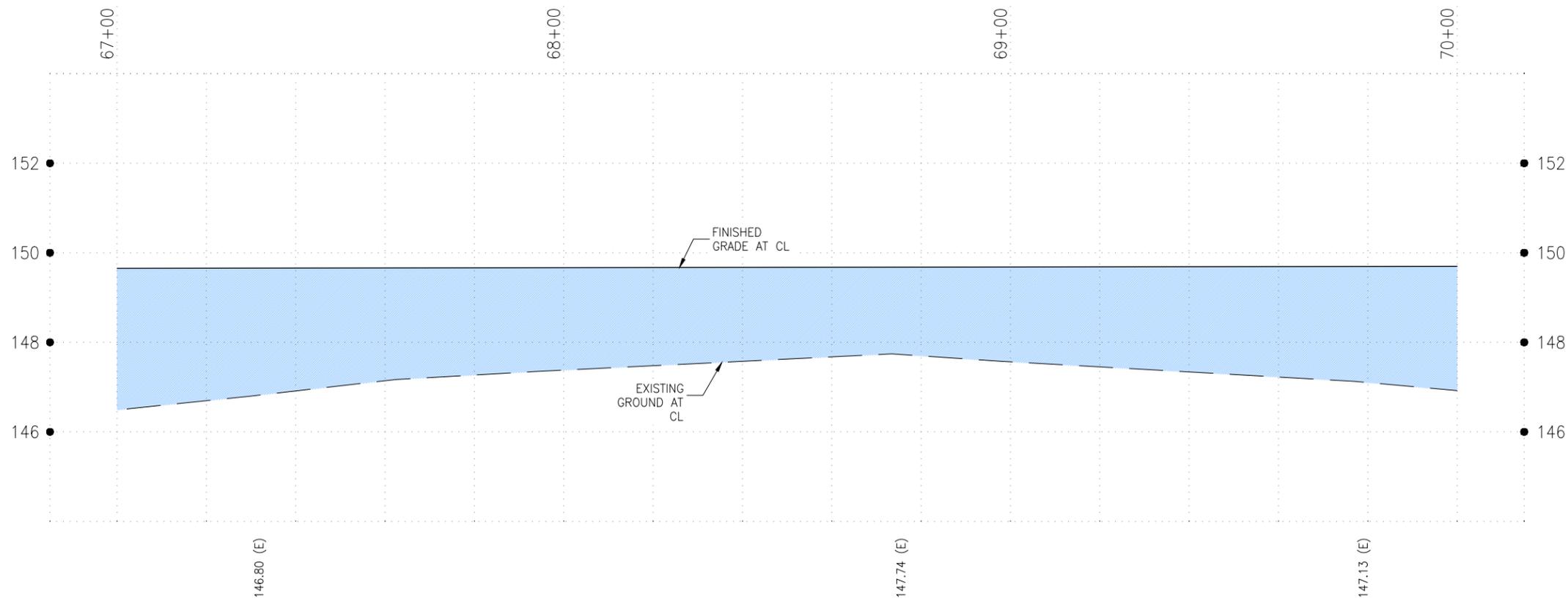
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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 67+00 - 70+00



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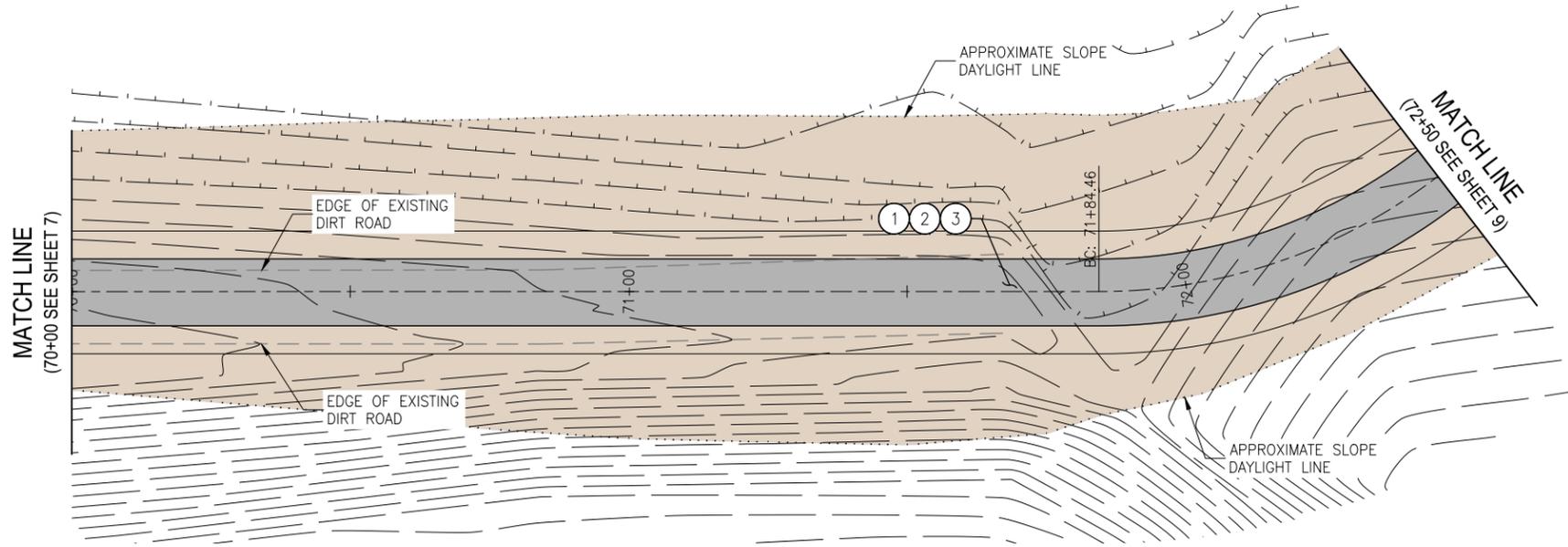
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Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 67+00 to 70+00

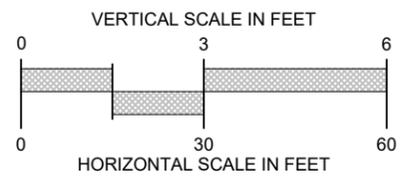
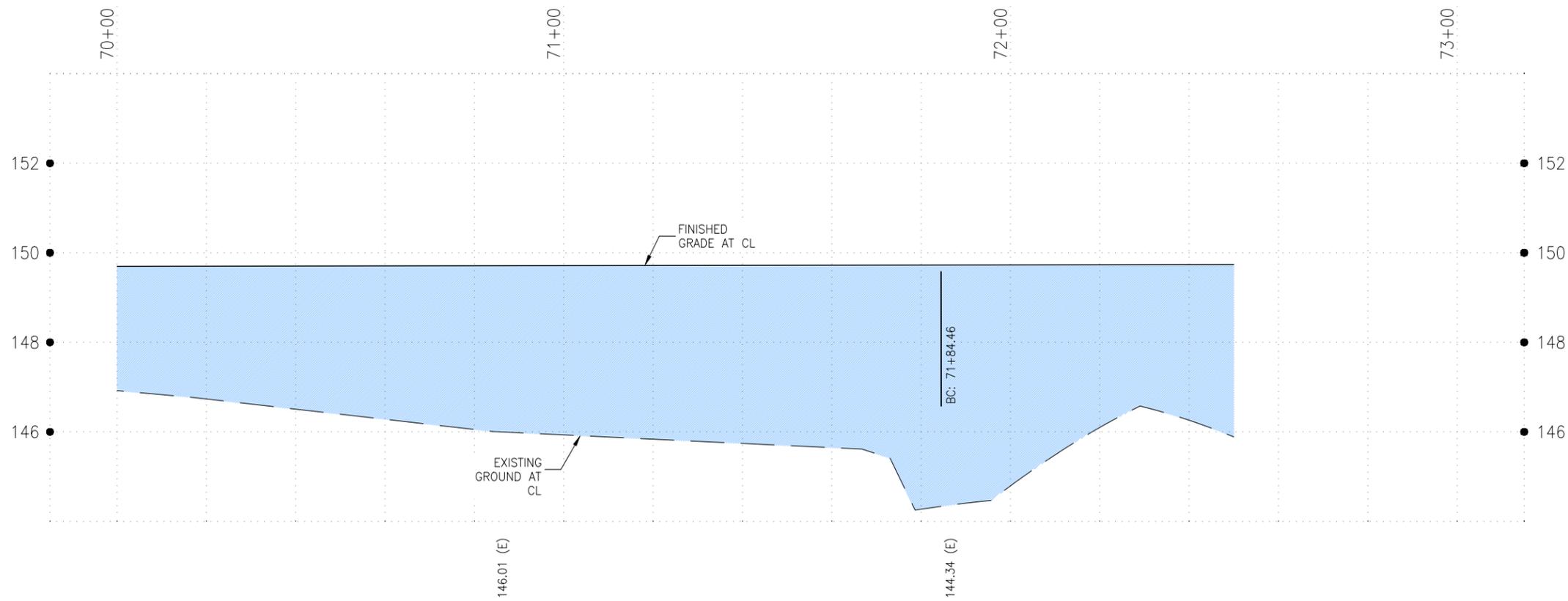
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CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
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CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 70+00 - 72+50



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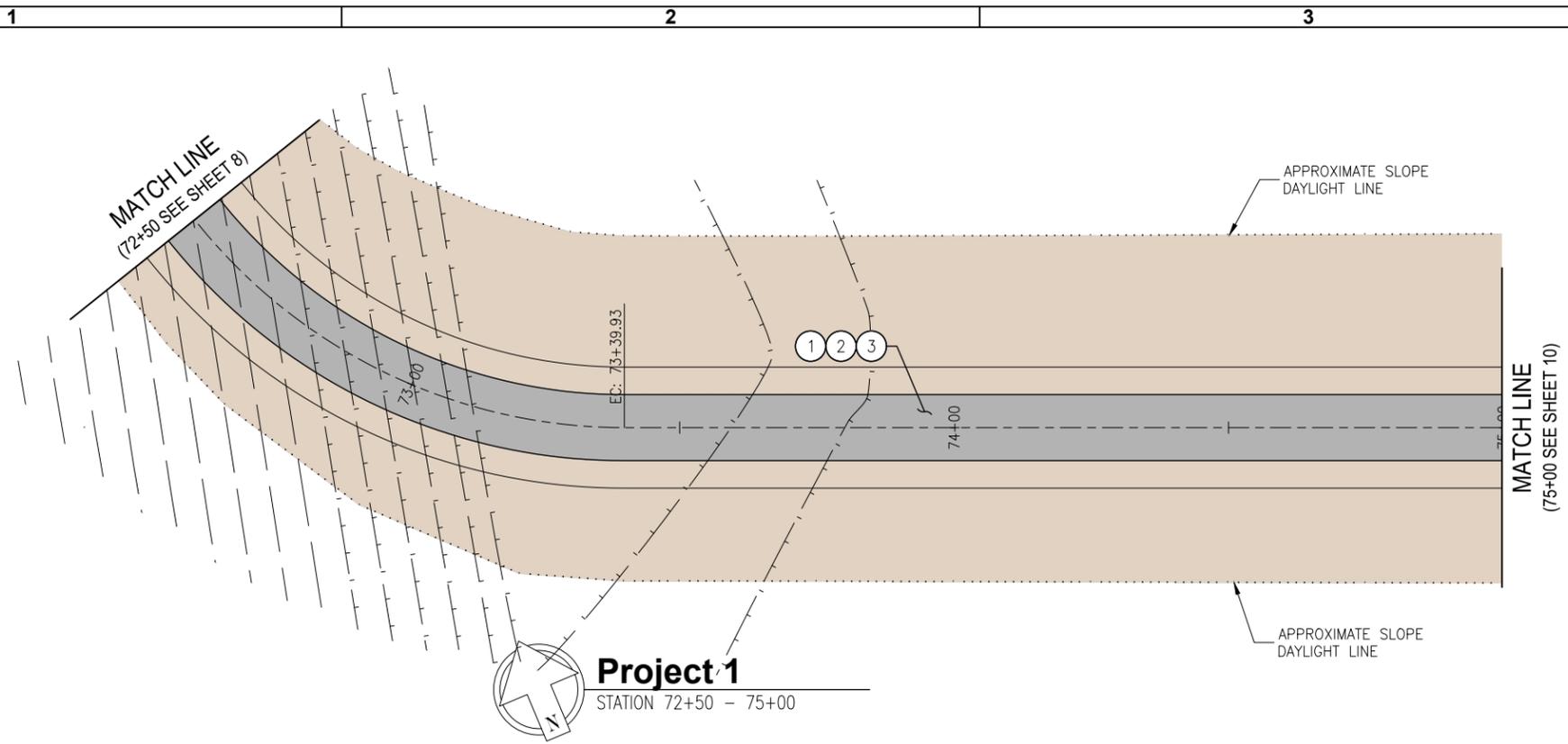
City of Firebaugh

Firebaugh Multi-Benefit Flood Management Project

Project 1 - Plan and Profile

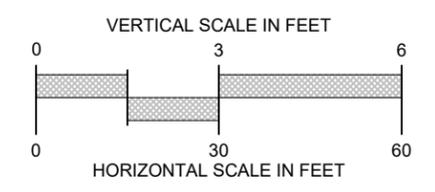
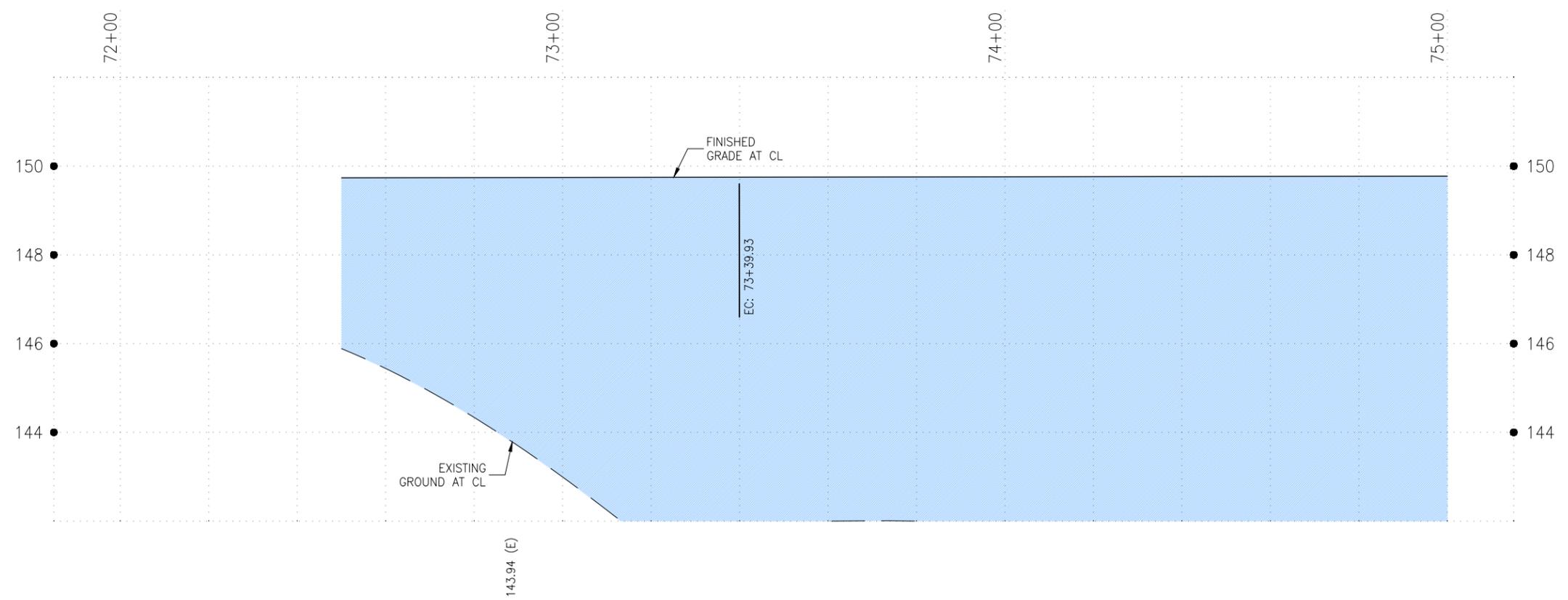
Station 70+00 to 72+50

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CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:29pm
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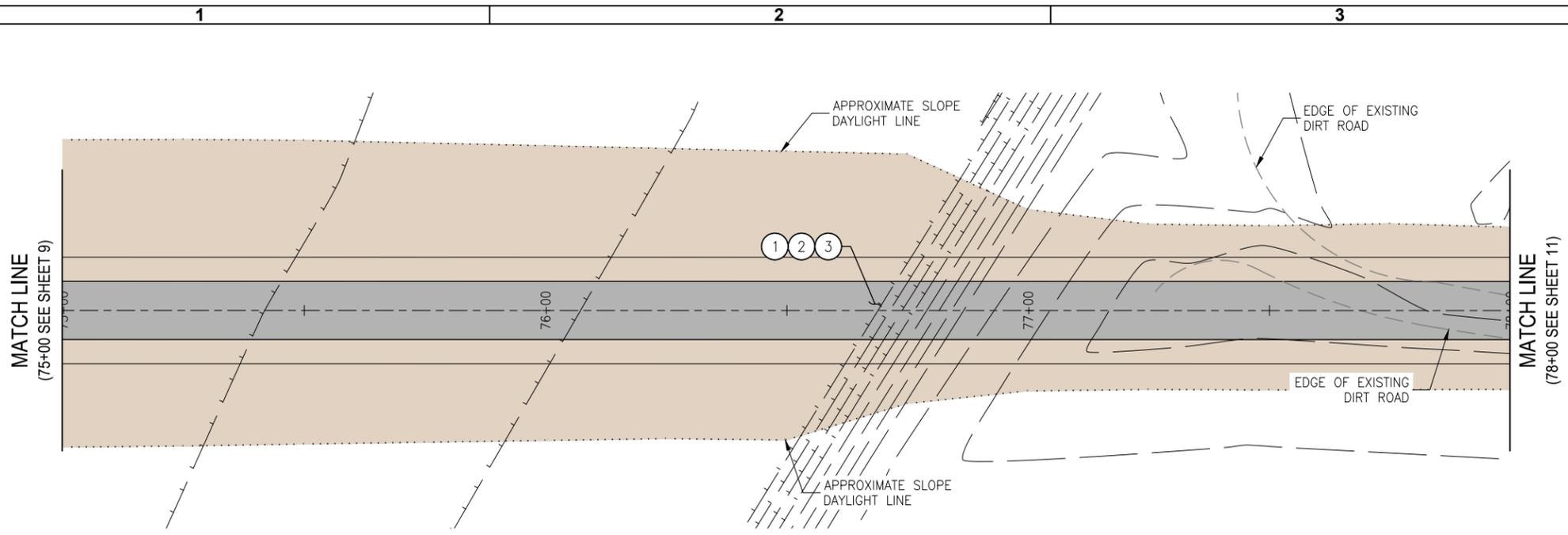
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 72+50 to 75+00

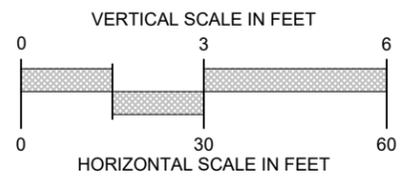
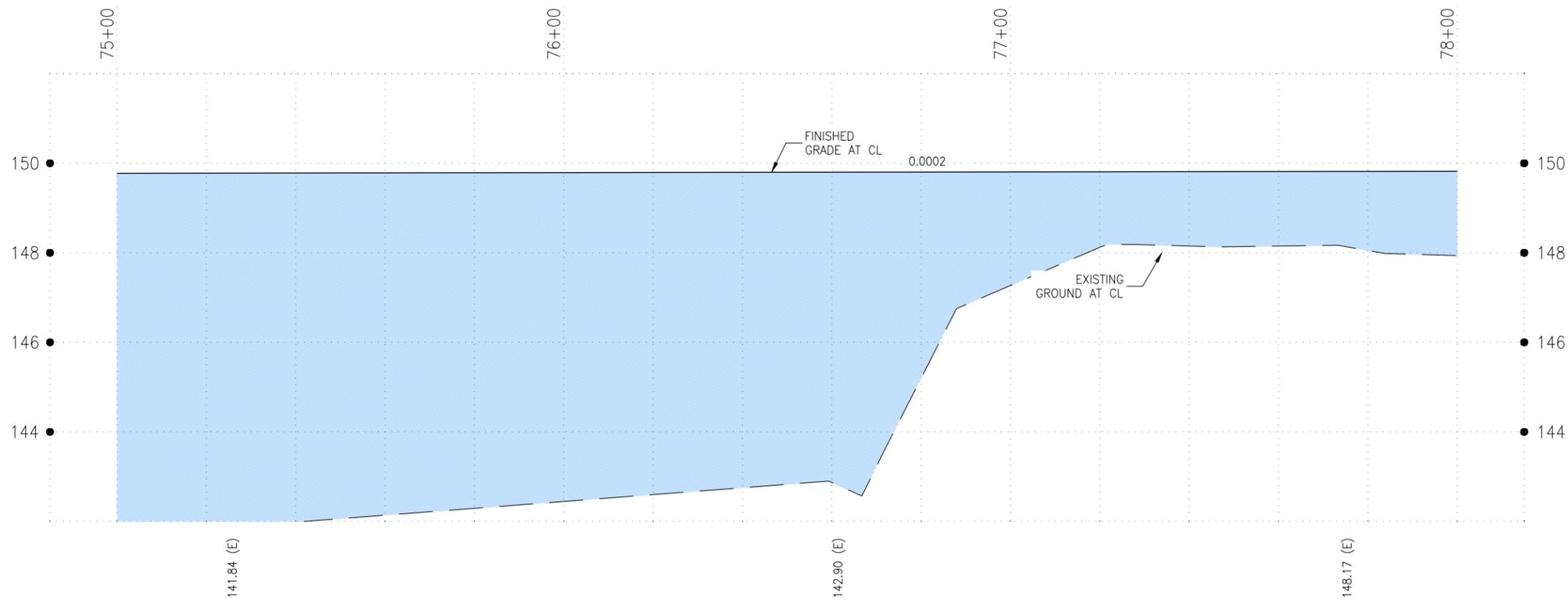
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DRAWN BY DGR	DATE 04/20/22	SHEET 9
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 75+00 - 78+00



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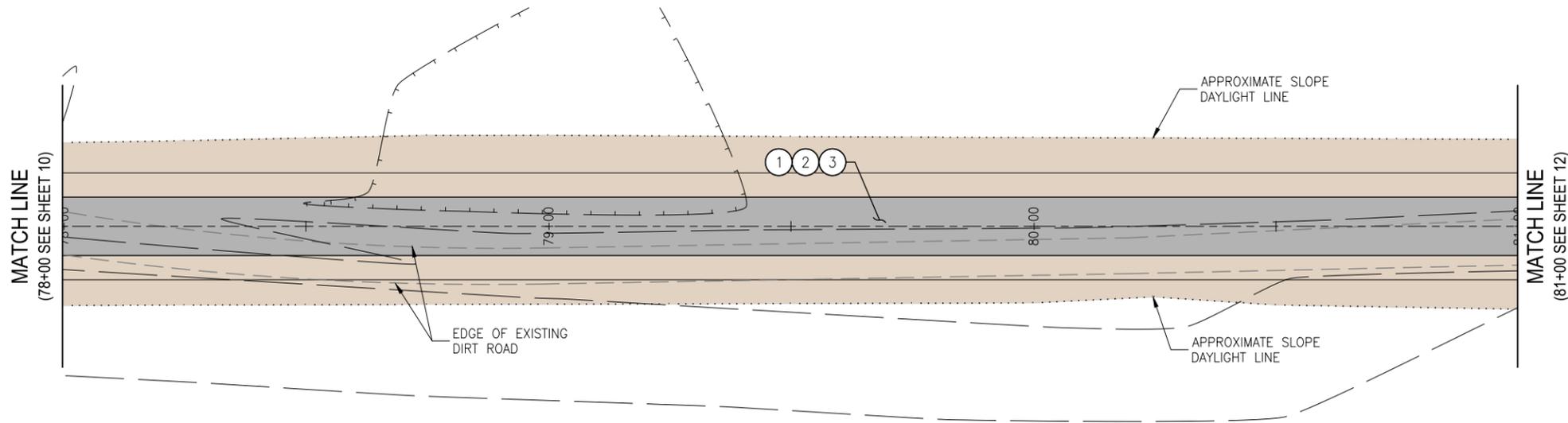
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 75+00 to 78+00

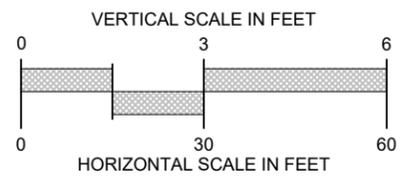
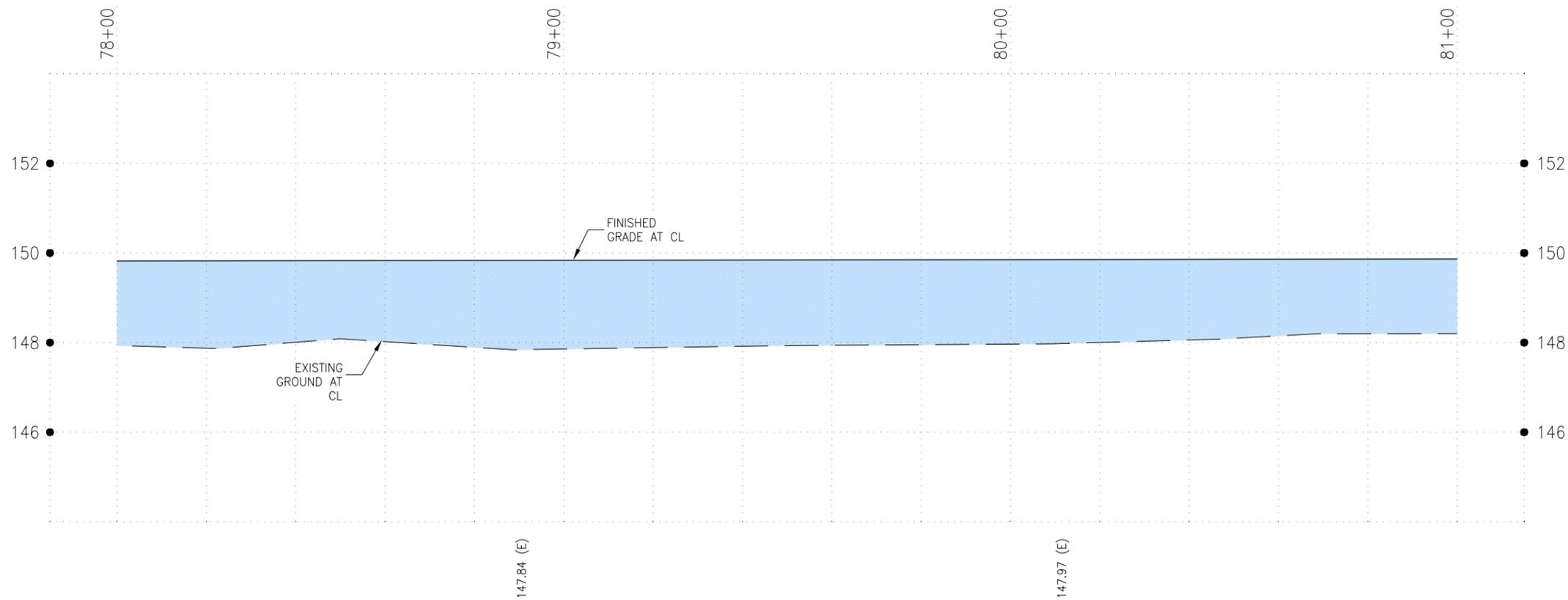
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DRAWN BY DGR	DATE 04/20/22	SHEET 10
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 78+00 - 81+00



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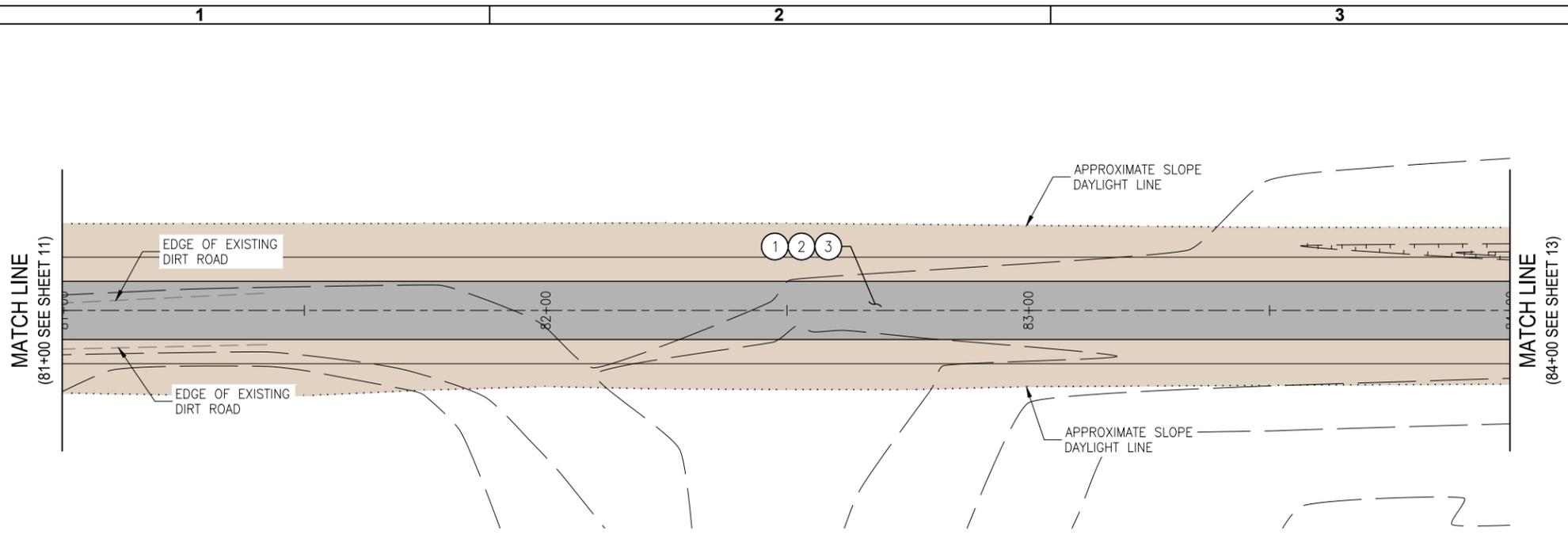
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 78+00 to 81+00

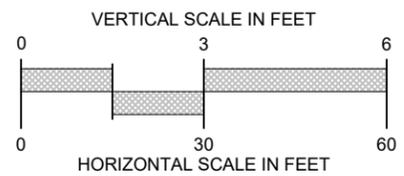
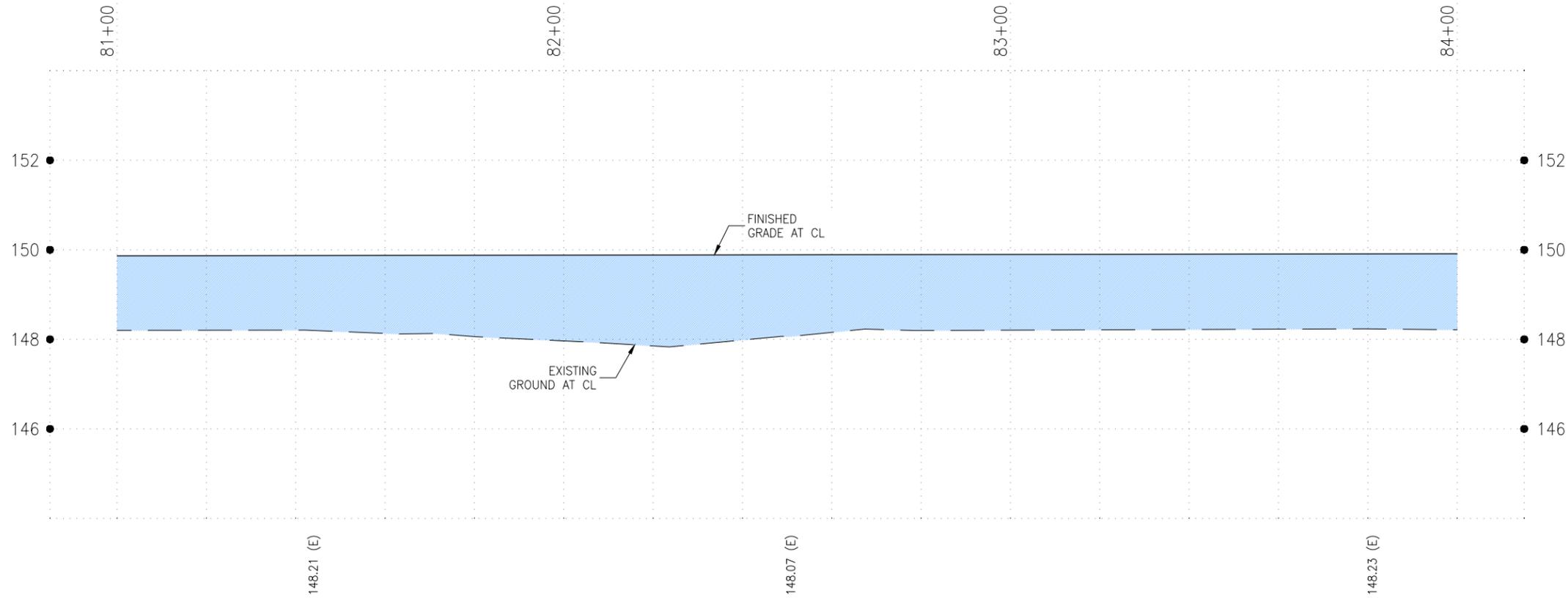
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DRAWN BY DGR	DATE 04/20/22	SHEET 11
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
 STATION 81+00 - 84+00



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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 81+00 to 84+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-112
DRAWN BY DGR	DATE 04/20/22	SHEET 12
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

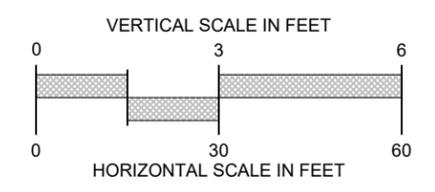
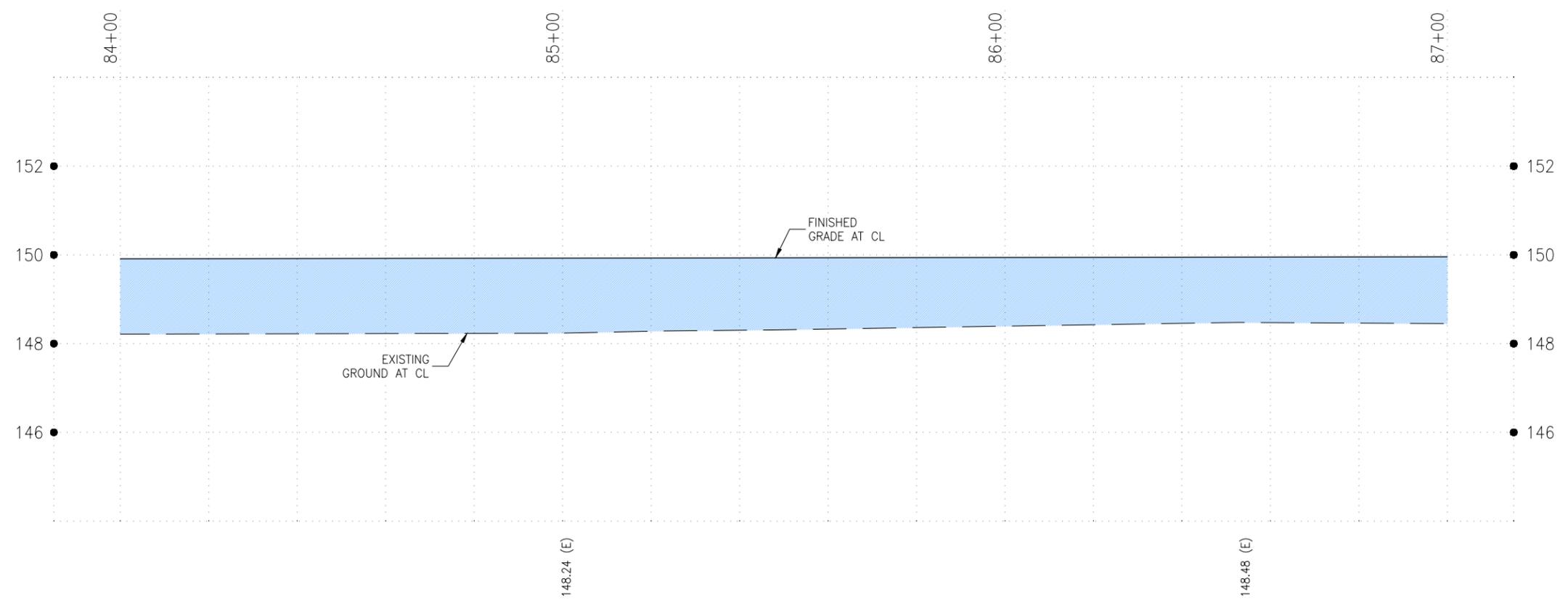
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MATCH LINE
(87+00 SEE SHEET 14)

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 84+00 - 87+00



May 10, 2022 - 1:36pm
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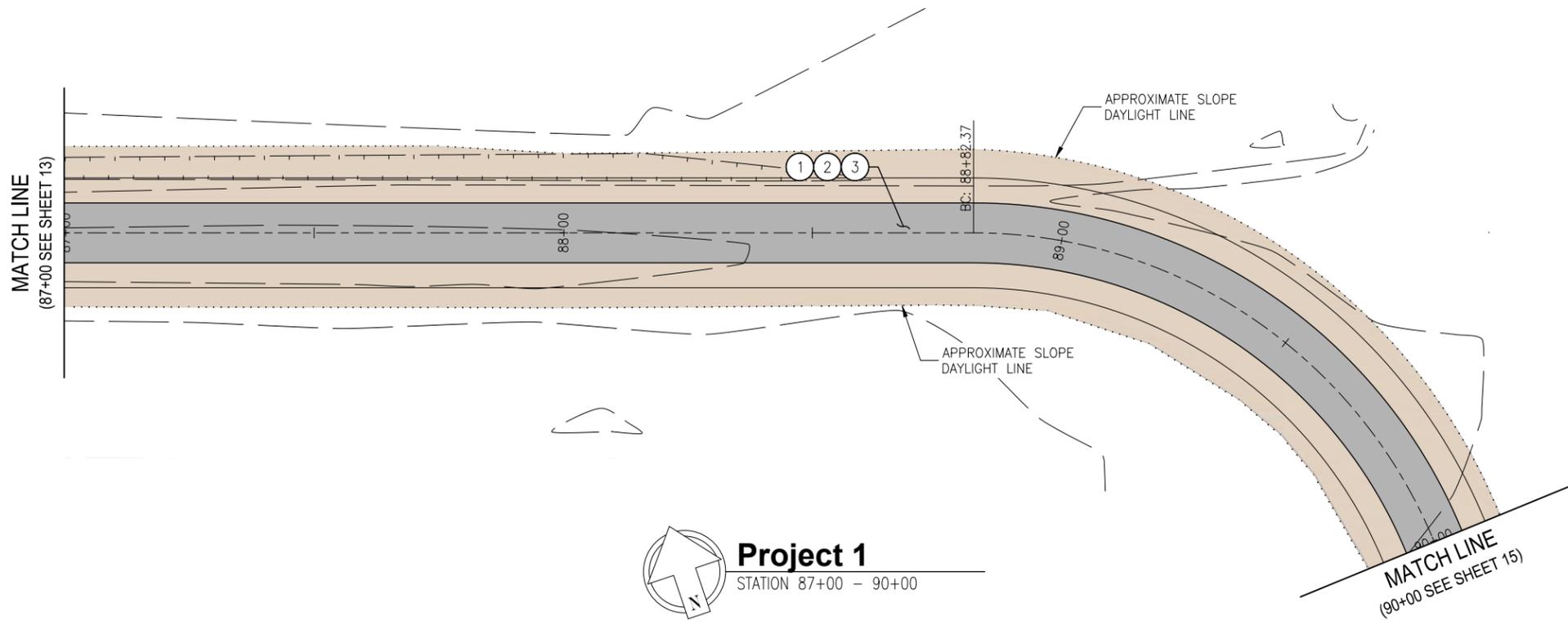
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 84+00 to 87+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-113
DRAWN BY DGR	DATE 04/20/22	SHEET 13
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

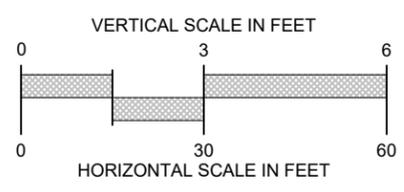
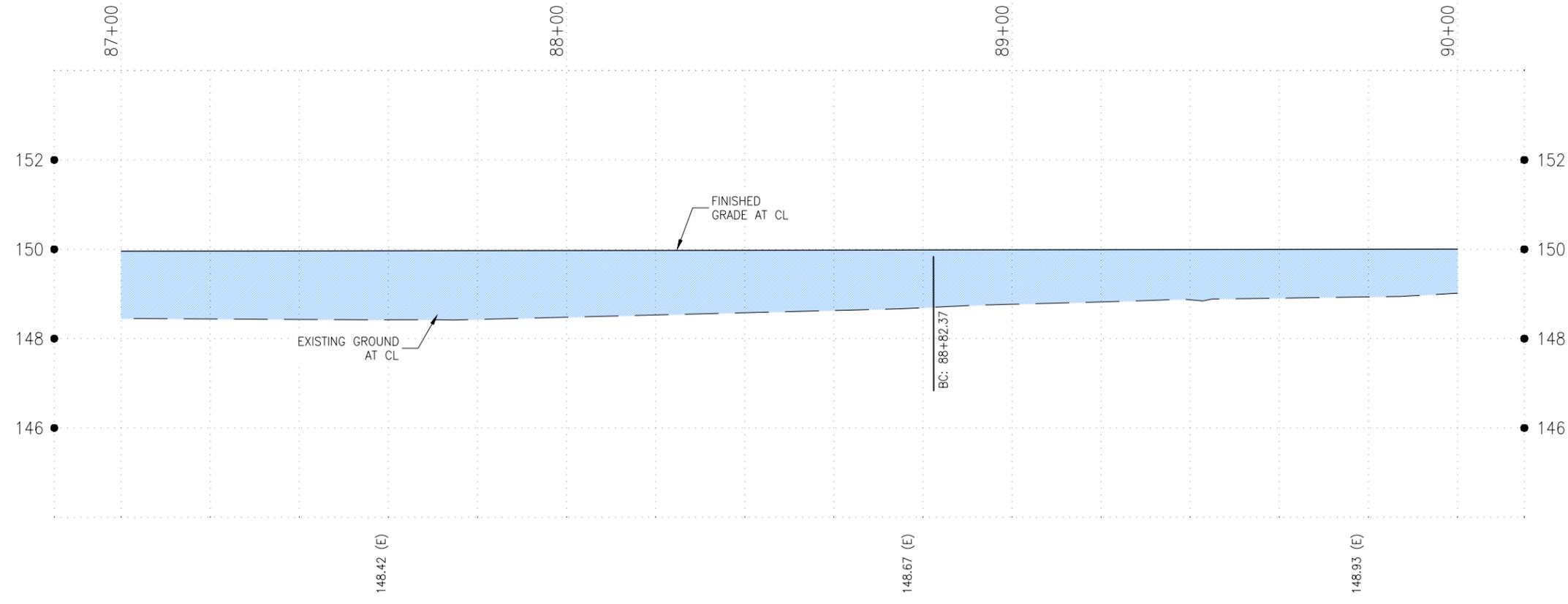
MATCH LINE
(87+00 SEE SHEET 13)



Project 1
STATION 87+00 - 90+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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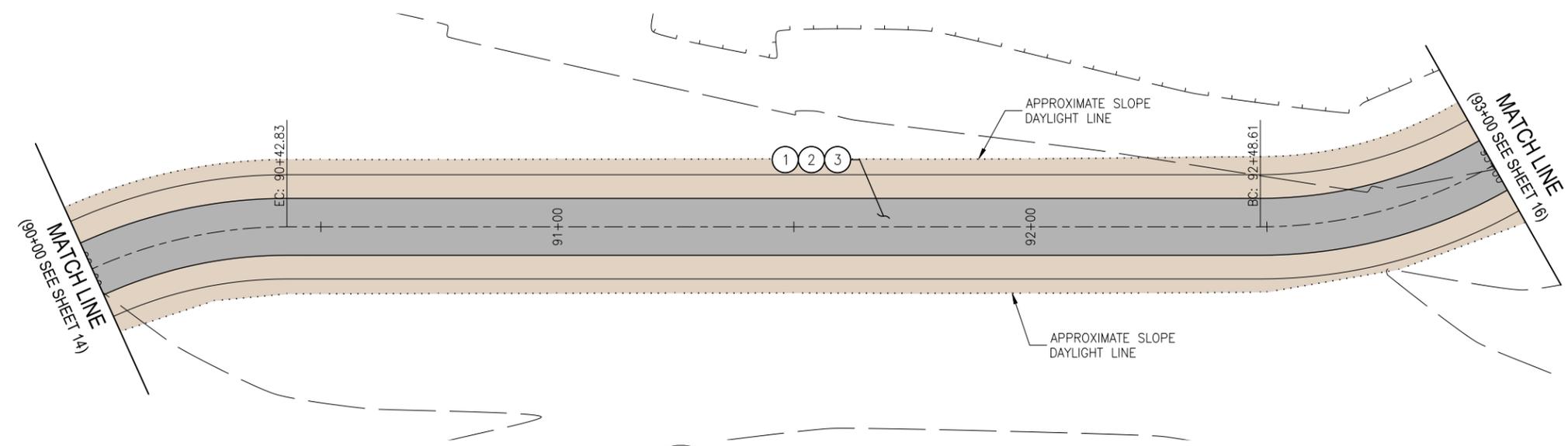
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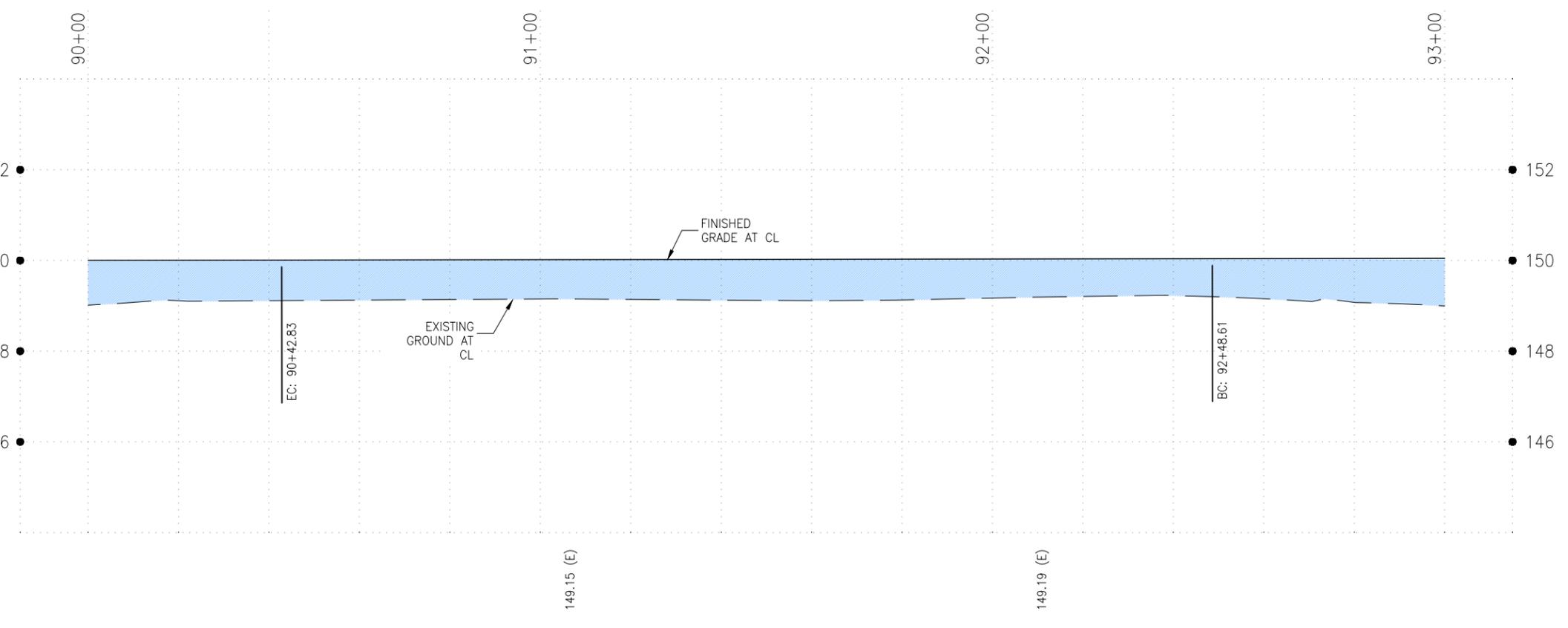
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 87+00 to 90+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-114
DRAWN BY DGR	DATE 04/20/22	SHEET 14
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

May 10, 2022 - 1:37pm
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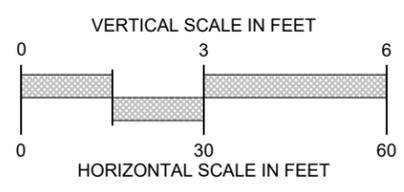


Project 1
STATION 90+00 - 93+00



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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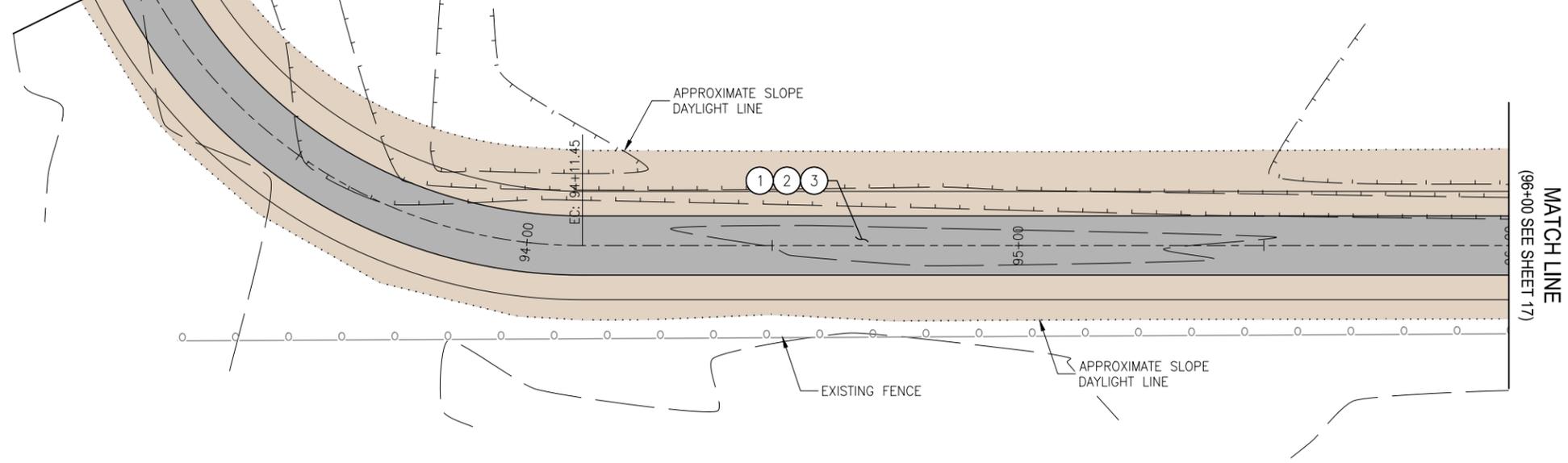
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 90+00 to 93+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-115
DRAWN BY DGR	DATE 04/20/22	SHEET 15
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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

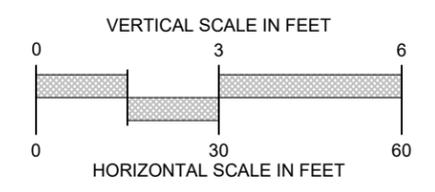
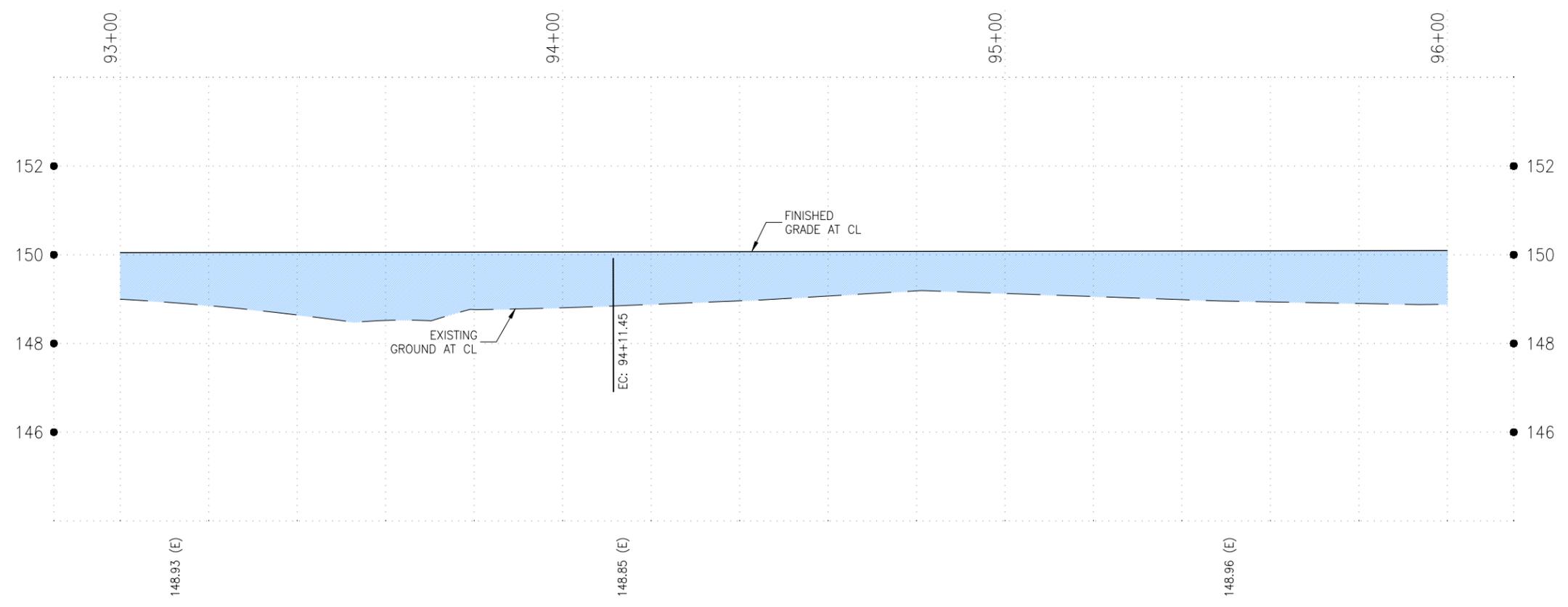
MATCH LINE
(93+00 SEE SHEET 15)

Project 1
STATION 93+00 - 96+00



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:39pm
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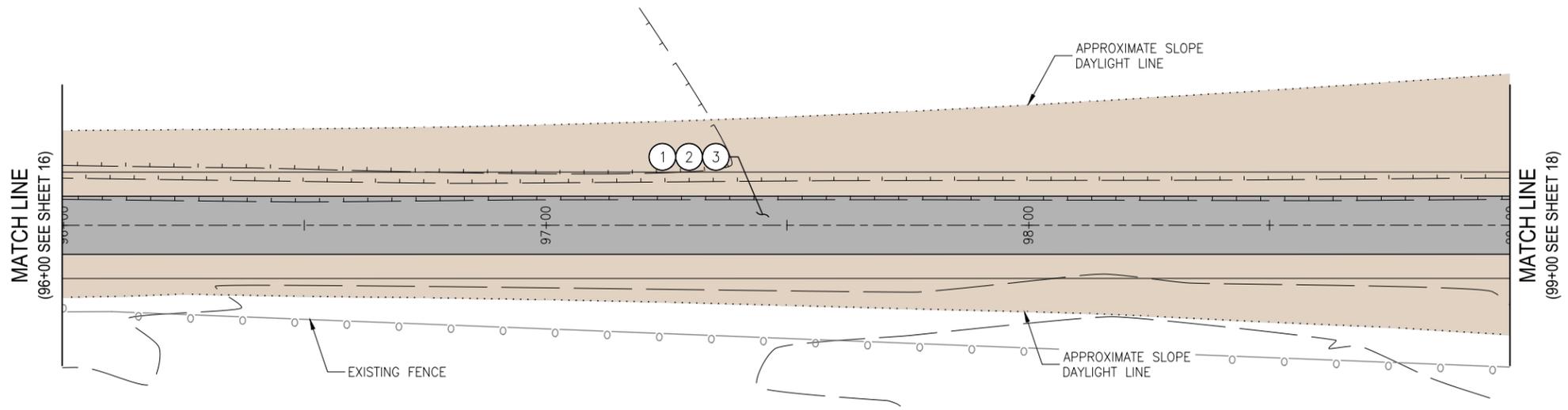
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 93+00 to 96+00

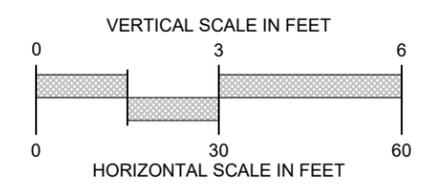
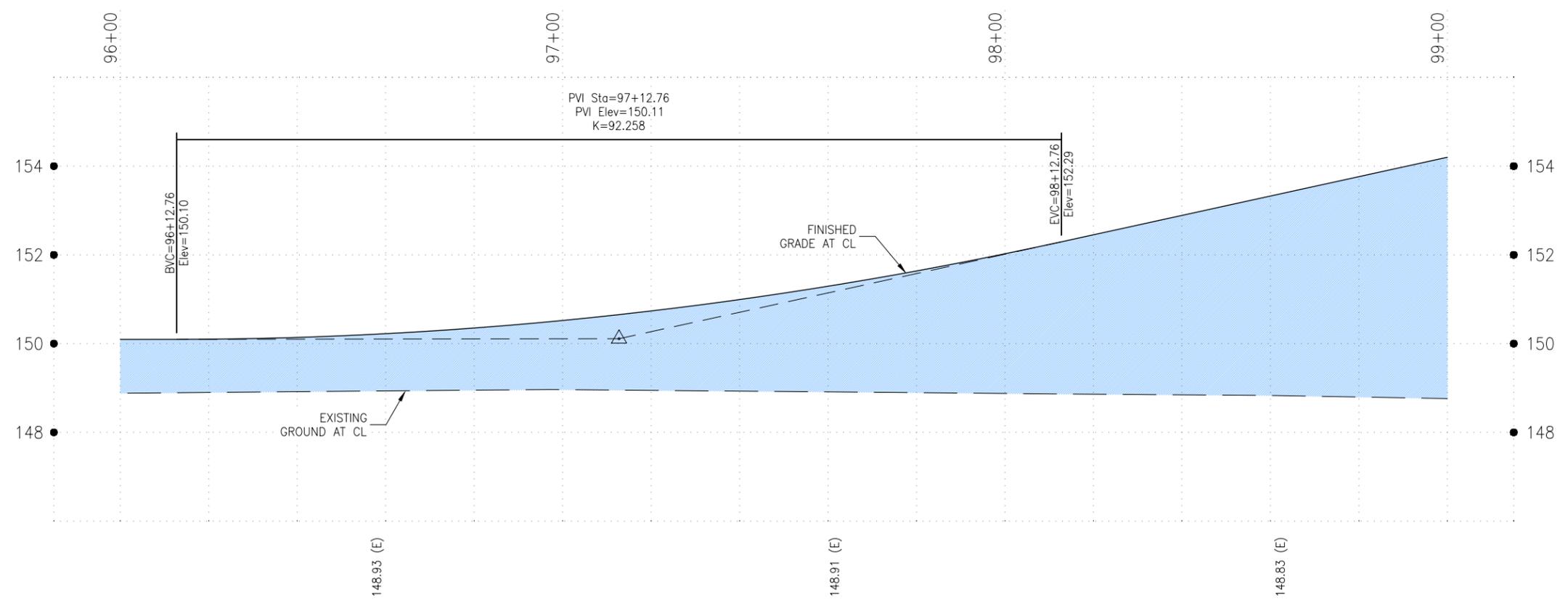
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DRAWN BY DGR	DATE 04/20/22	SHEET 16
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF


Project 1
 STATION 96+00 - 99+00



May 10, 2022 - 1:39pm
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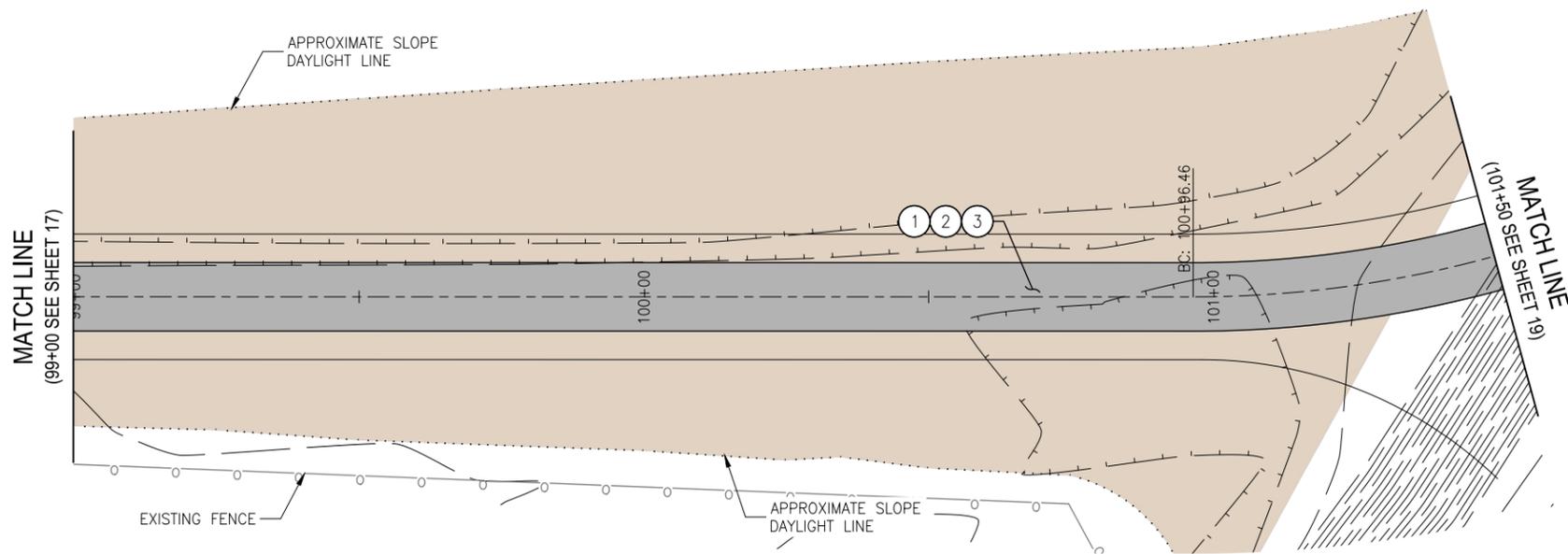
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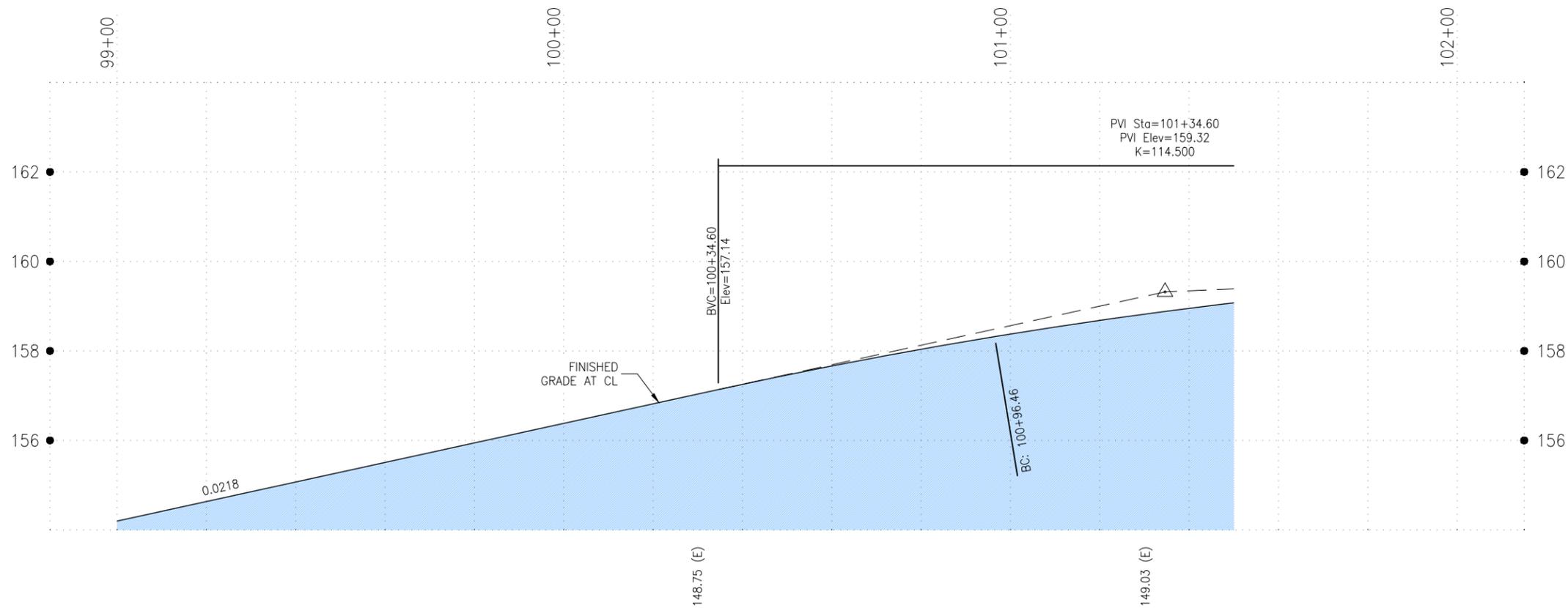

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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 95+00 to 98+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-117
DRAWN BY DGR	DATE 04/20/22	SHEET 17
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 1
STATION 99+00 - 101+50



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	① 31
②	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
③	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:40pm
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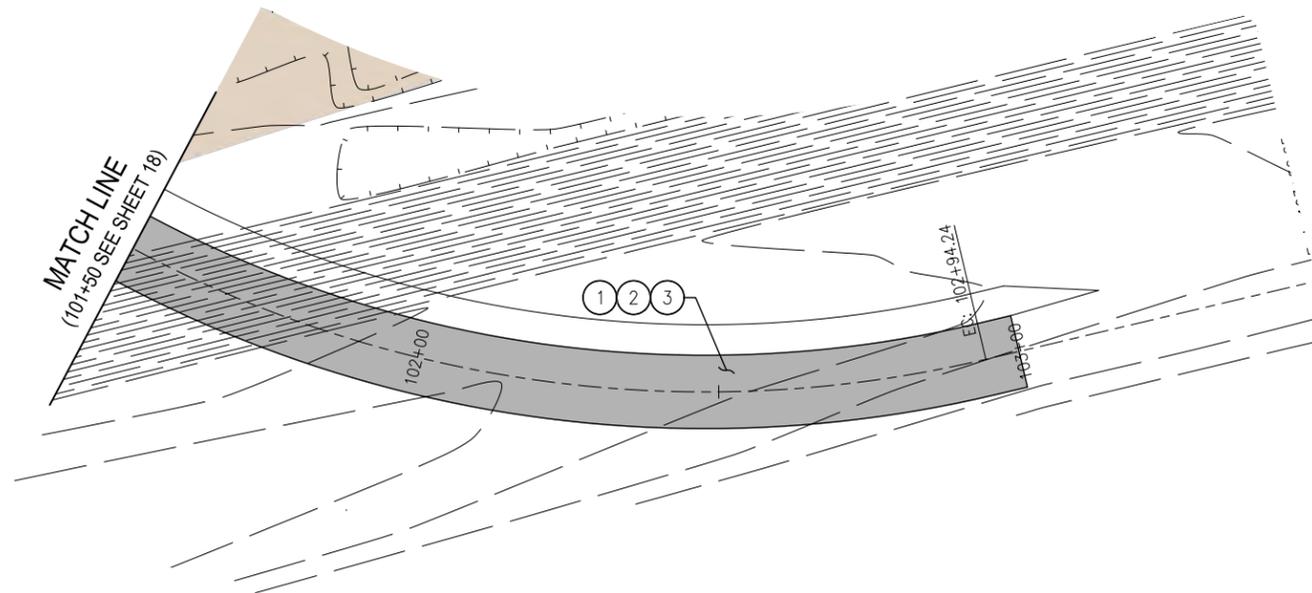
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 99+00 to 101+50

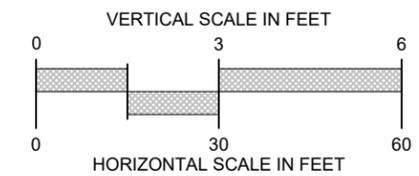
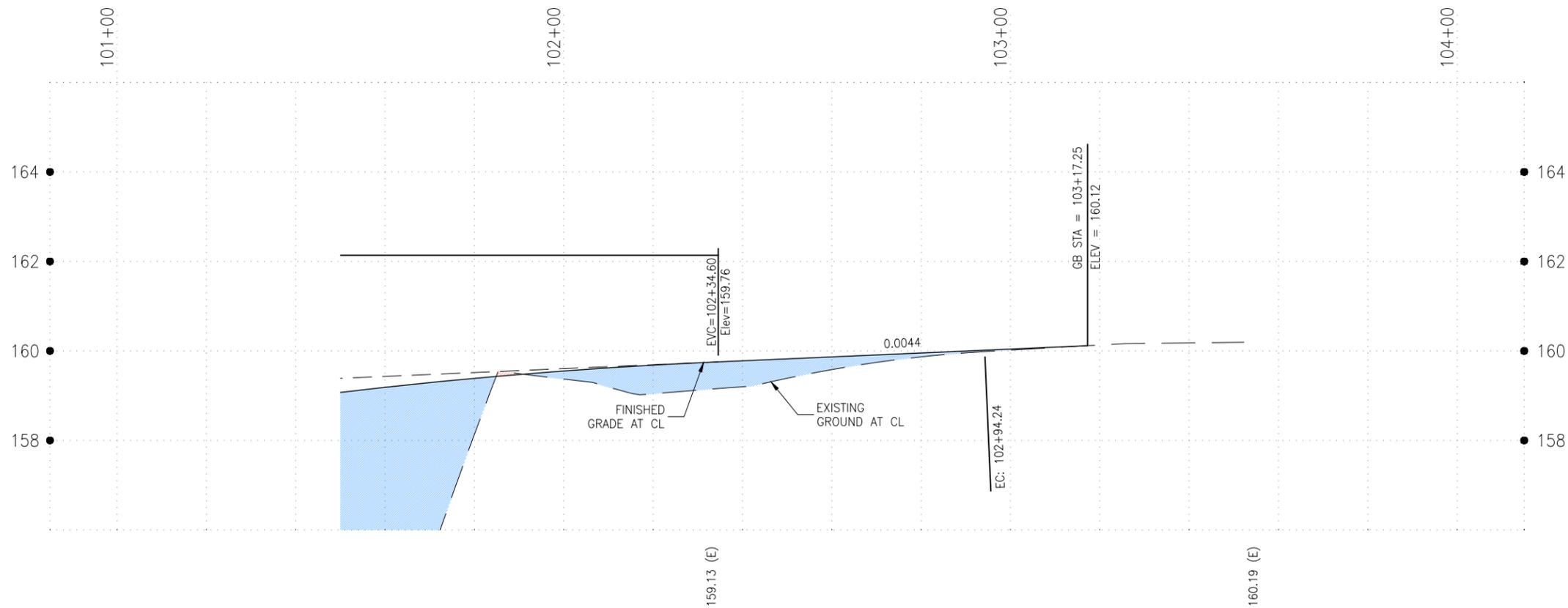
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-118
DRAWN BY DGR	DATE 04/20/22	SHEET 18
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
3	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 1
STATION 101+50 - 103+50



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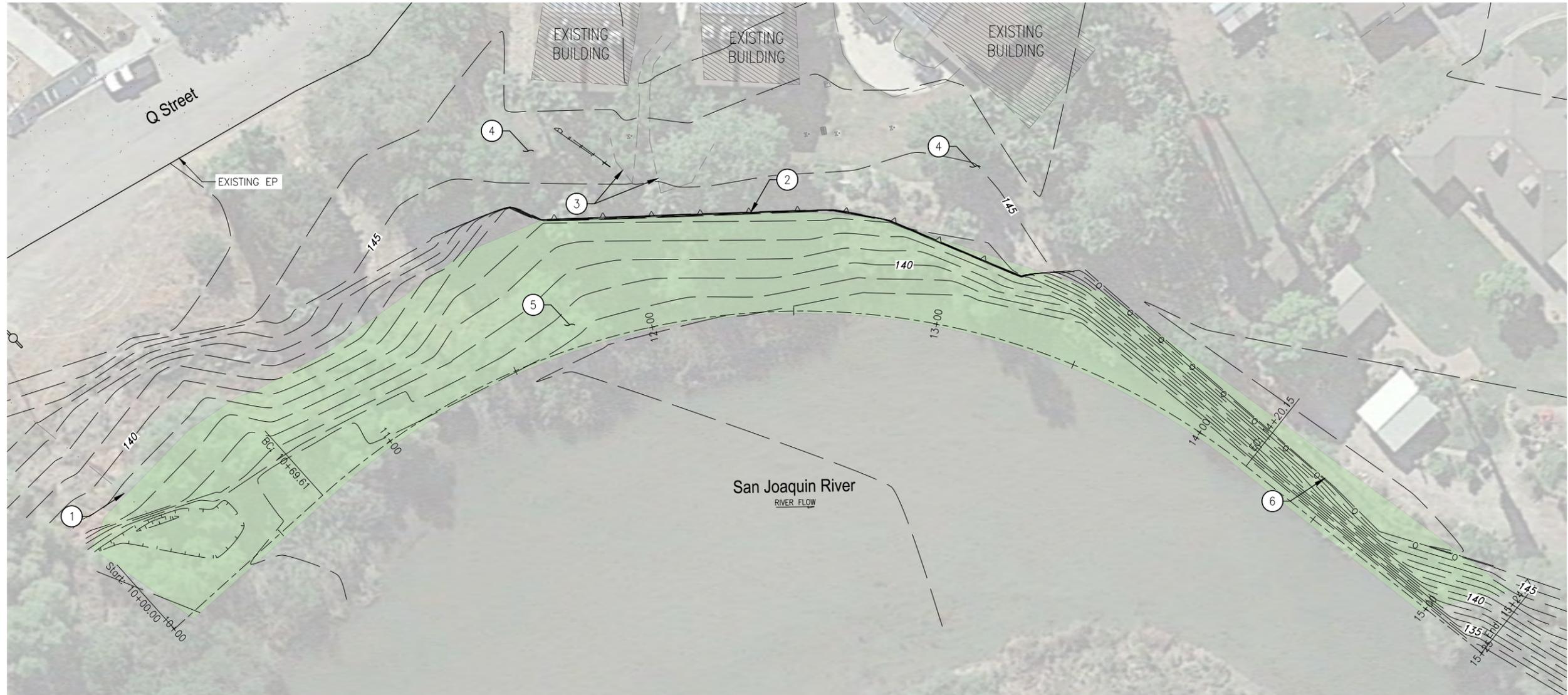
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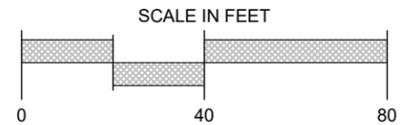
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456 Sixth Street • Gustine, California 95322
Telephone (209) 854-3300

City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 1 - Plan and Profile
Station 101+50 to 103+50

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-119
DRAWN BY DGR	DATE 04/20/22	SHEET 19
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 2
STATION 10+00 - 15+50



CONSTRUCTION NOTES	DETAIL/ SYMBOL
① EXISTING STORM DRAIN PIPE TO REMAIN IN PLACE AND BE PROTECTED.	
② EXISTING RETAINING WALL TO REMAIN IN PLACE AND BE PROTECTED.	
③ EXISTING CONCRETE IMPROVEMENTS TO REMAIN IN PLACE AND BE PROTECTED.	
④ EXISTING PUTTING GREEN IMPROVEMENTS TO REMAIN IN PLACE AND BE PROTECTED.	
⑤ REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	■
⑥ EXISTING FENCE TO BE REMOVED AS NECESSARY TO ACCOMMODATE CONSTRUCTION ACTIVITIES.	



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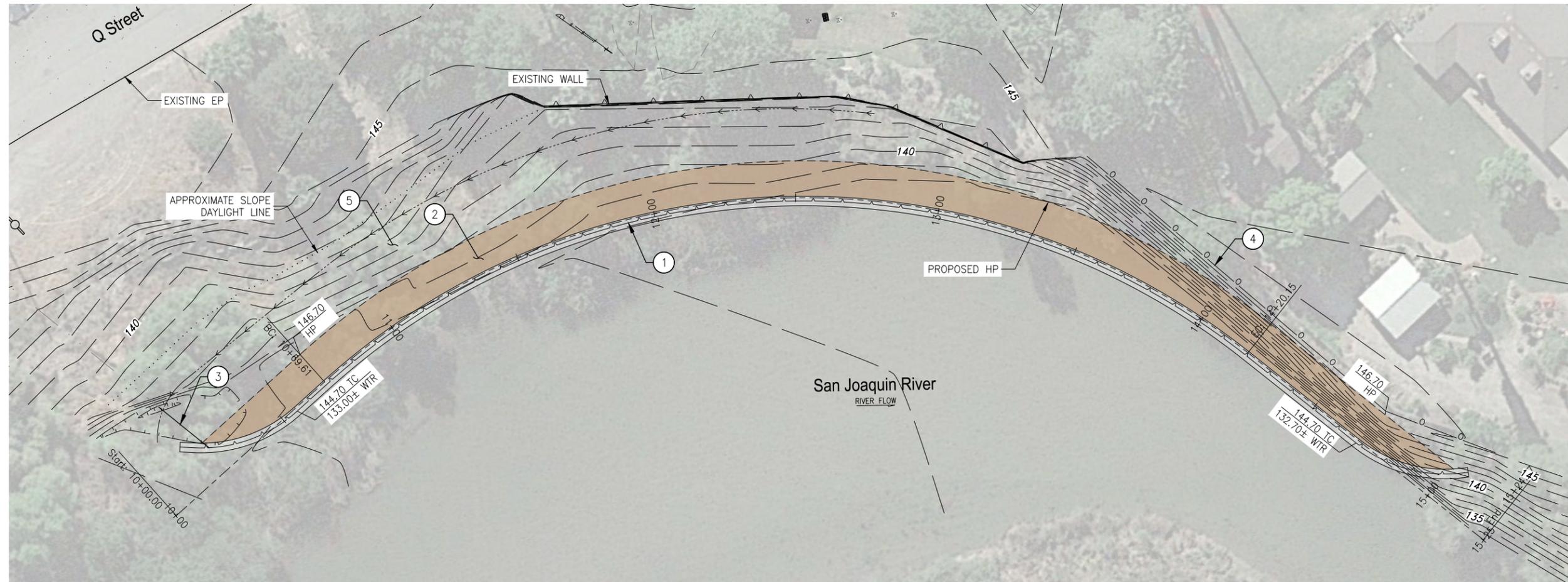
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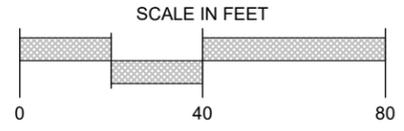
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 2 - Demolition Plan

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-120
DRAWN BY DGR	DATE 04/20/22	SHEET 20
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 2
STATION 10+00 - 15+50



CONSTRUCTION NOTES	DETAIL/SYMBOL
① CONSTRUCT SHEET PILE RETAINING WALL WITH CONCRETE CAP.	
② FURNISH AND PLACE RENO MATTRESS	
③ EXTEND EXISTING 12" STORM DRAIN PIPE.	
④ CONSTRUCT 6'-0" HIGH CHAIN LINK FENCE TO REPLACE REMOVED SEGMENTS.	
⑤ GRADE TO MATCH EXISTING SWALE TO DRAIN.	

ESTIMATED QUANTITIES	
SHEET PILING	498 LF
RENO MATTRESS	5,762 SF
CHAIN LINK FENCE	178 LF
12" SDR-35 PIPE	35 LF



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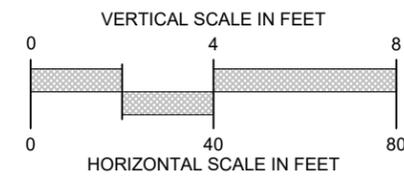
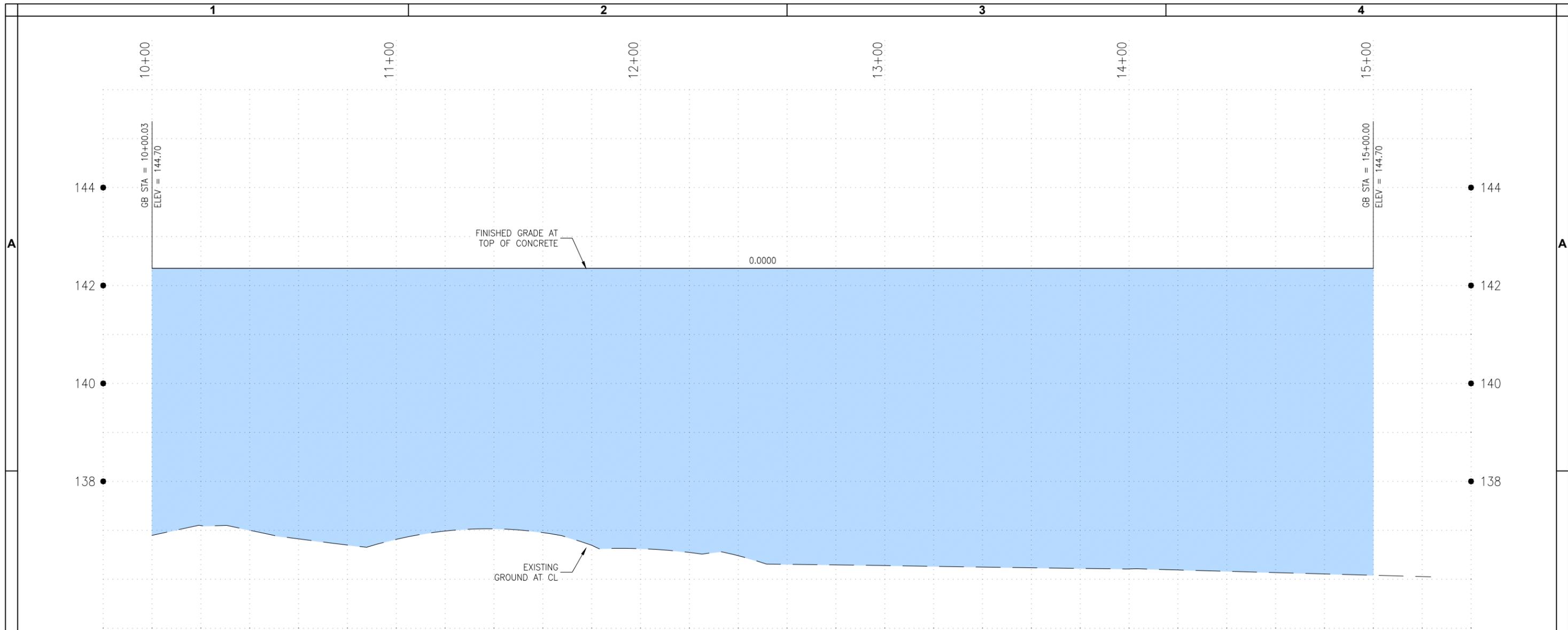
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 2 - Site Plan

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-121
DRAWN BY DGR	DATE 04/20/22	SHEET 21
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

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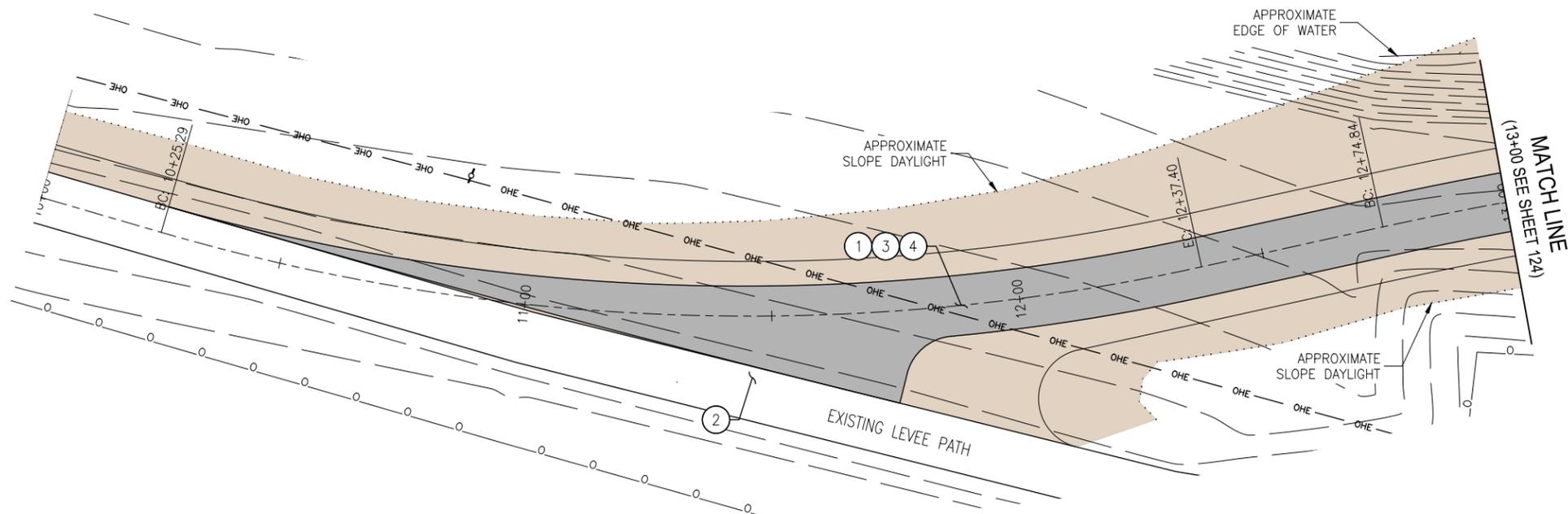
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
PROJECT 2 - Profile

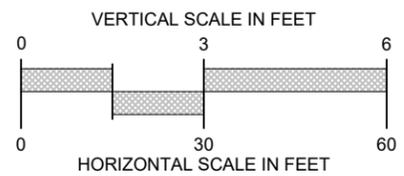
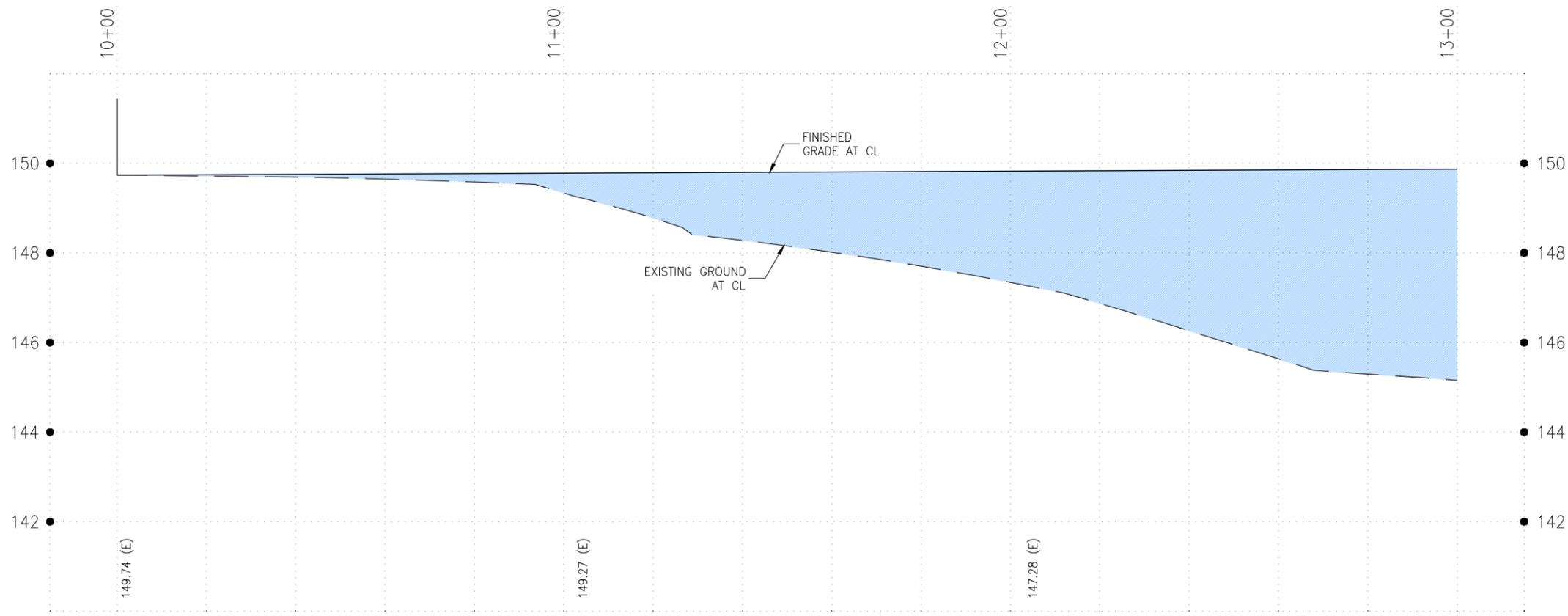
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-122
DRAWN BY DGR	DATE 04/20/22	SHEET 22
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
1	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
2	REMOVE EXISTING AC PATH AS REQUIRED TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
3	CONSTRUCT 12' WIDE SHARED USE AC PATH. PROVIDE A SMOOTH TRANSITION BETWEEN THE PROPOSED AC TRAIL AND THE EXISTING AC TRAIL.	
4	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 3
 STATION 10+00 - 13+00



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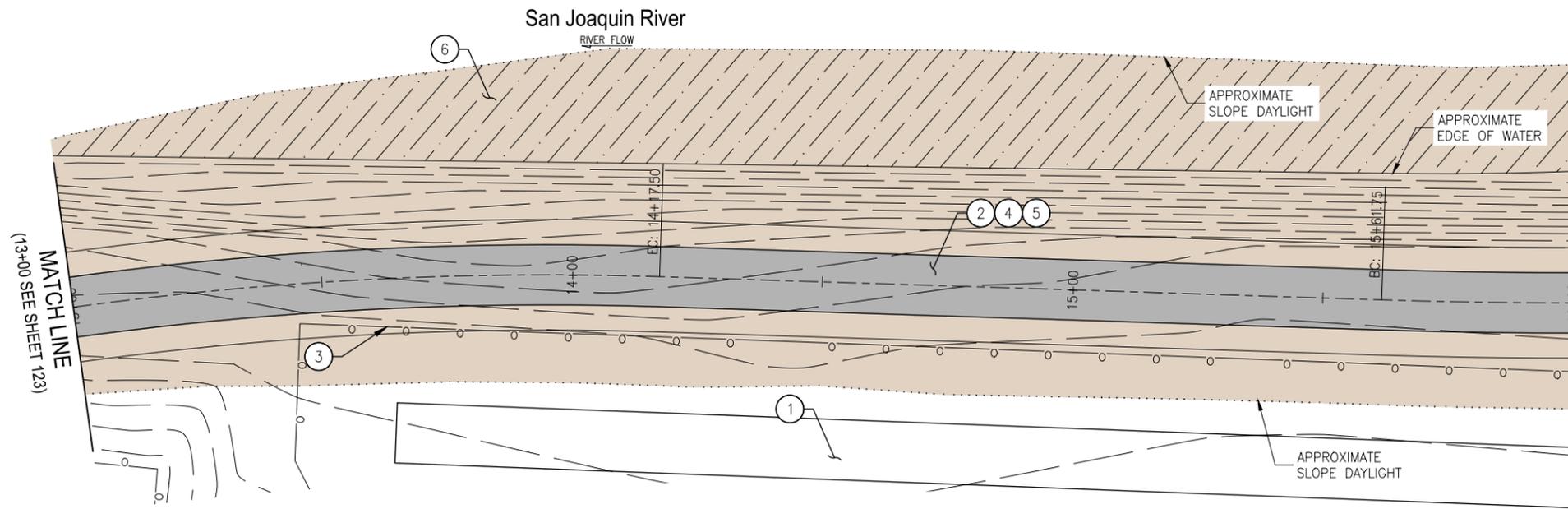
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City of Firebaugh
 Firebaugh Multi-Benefit Flood Management Project
 Project 3 - Plan and Profile
 Stations 10+00 to 13+00

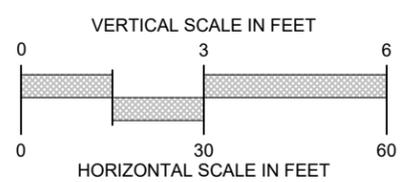
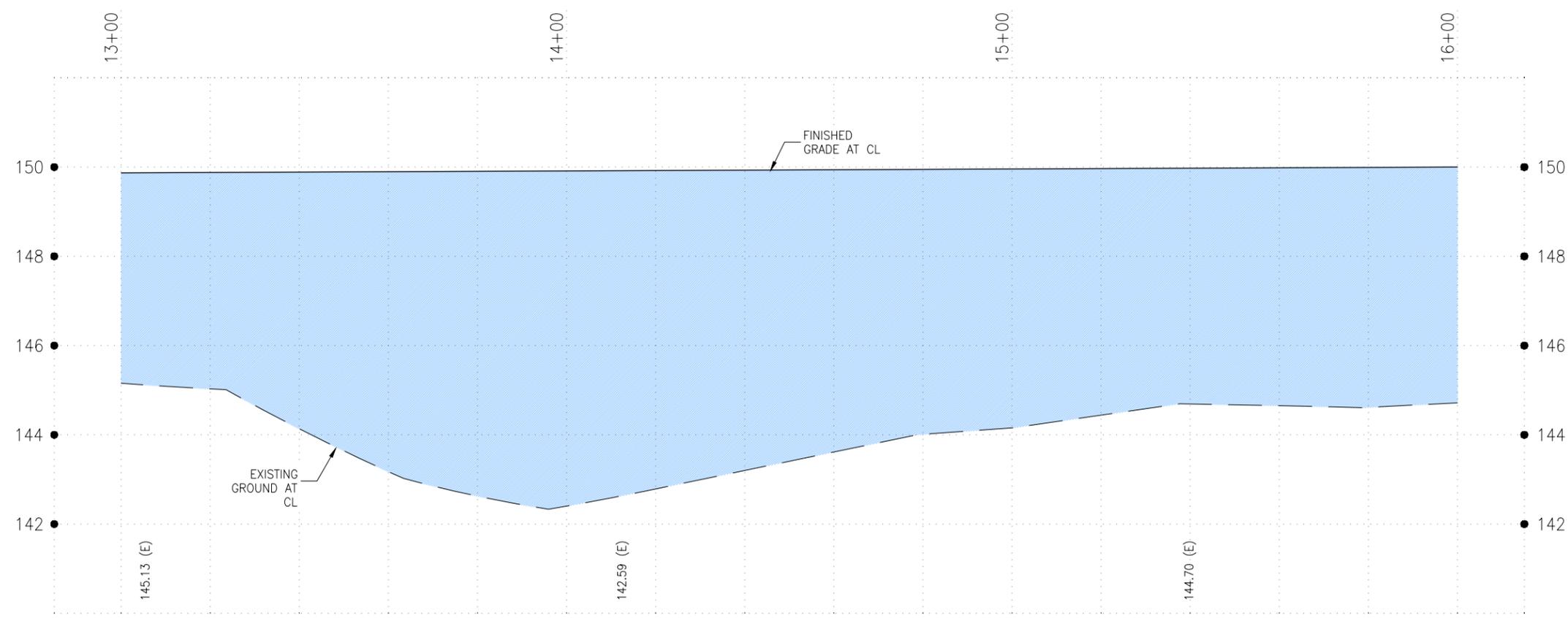
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-123
DRAWN BY DGR	DATE 04/20/22	SHEET 23
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3




Project 3
 STATION 13+00 - 16+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	EXISTING SOLAR FACILITIES TO REMAIN IN PLACE AND BE PROTECTED. EXACT LOCATIONS OF FACILITIES AND SUPPORTING COMPONENTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.	
②	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
③	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
④	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
⑤	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	
⑥	AREA WHERE LEVEE FILL ENCROACHES ON THE EXISTING RIVER WATER LINE.	

ESTIMATED QUANTITIES		
AC PAVEMENT	xx	TN
CLASS II AB	xxx	TN
4" SINGLE DASHED STRIPING	300	LF



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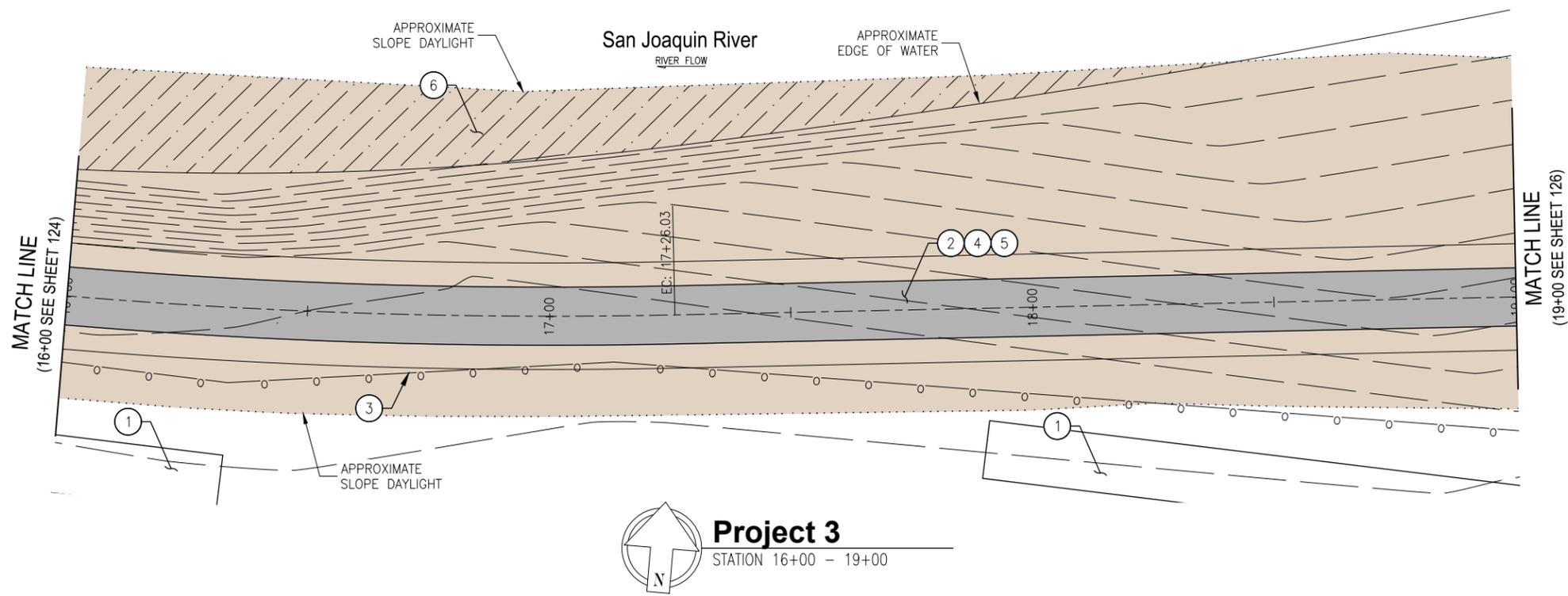
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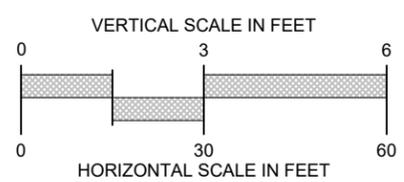
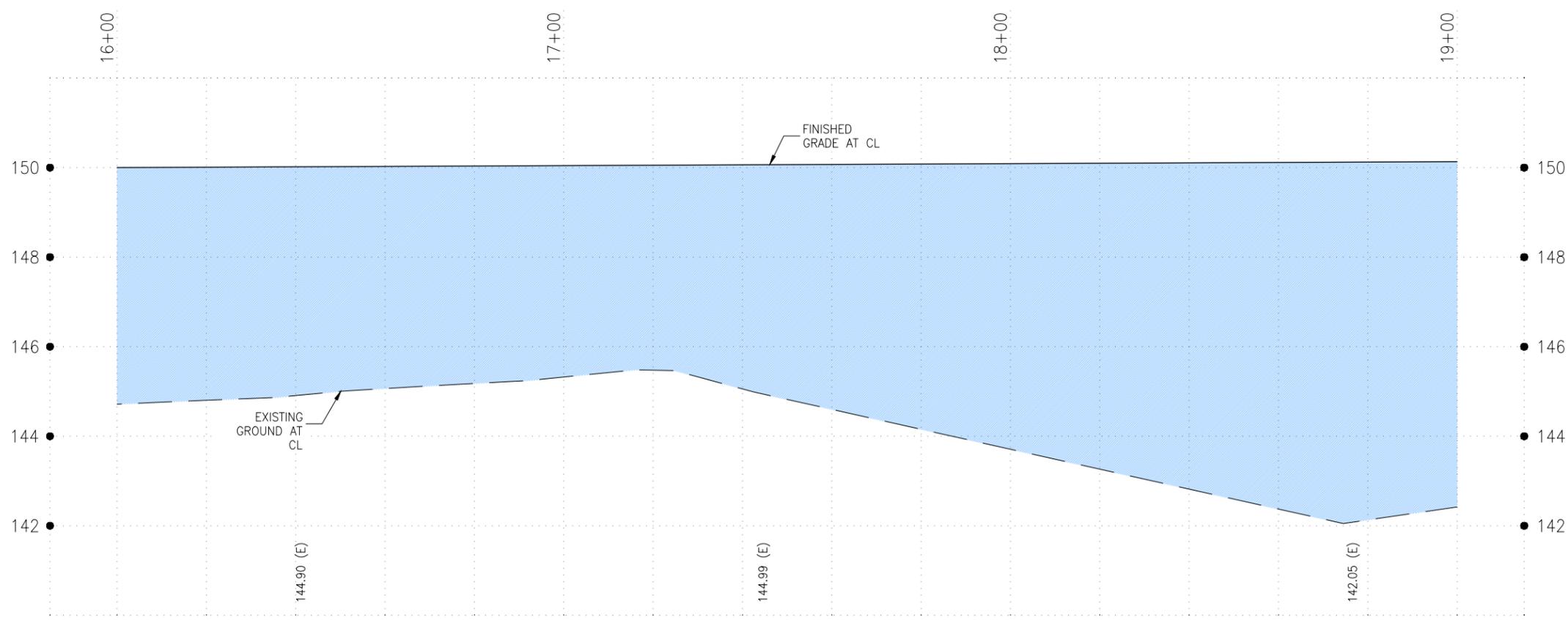
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 13+00 to 16+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-124
DRAWN BY DGR	DATE 04/20/22	SHEET 24
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	EXISTING SOLAR FACILITIES TO REMAIN IN PLACE AND BE PROTECTED. EXACT LOCATIONS OF FACILITIES AND SUPPORTING COMPONENTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.	
②	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
③	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
④	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
⑤	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	
⑥	AREA WHERE LEVEE FILL ENCROACHES ON THE EXISTING RIVER WATER LINE.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



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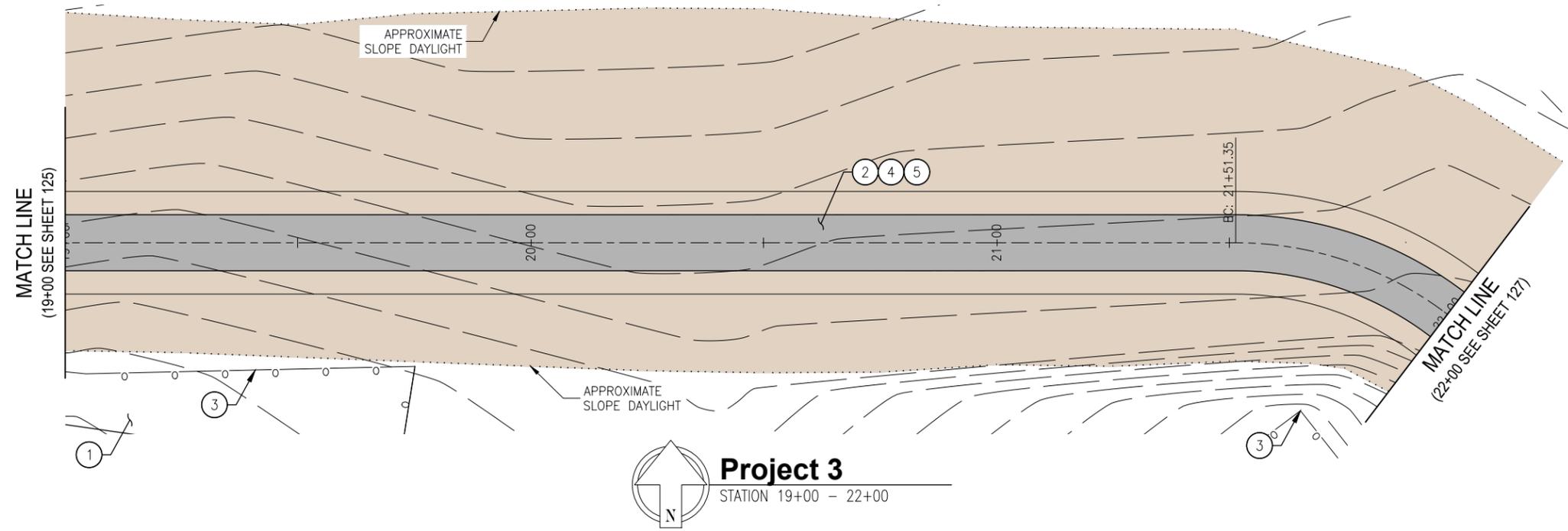
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 16+00 to 19+00

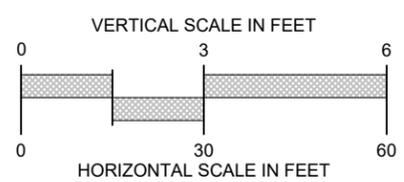
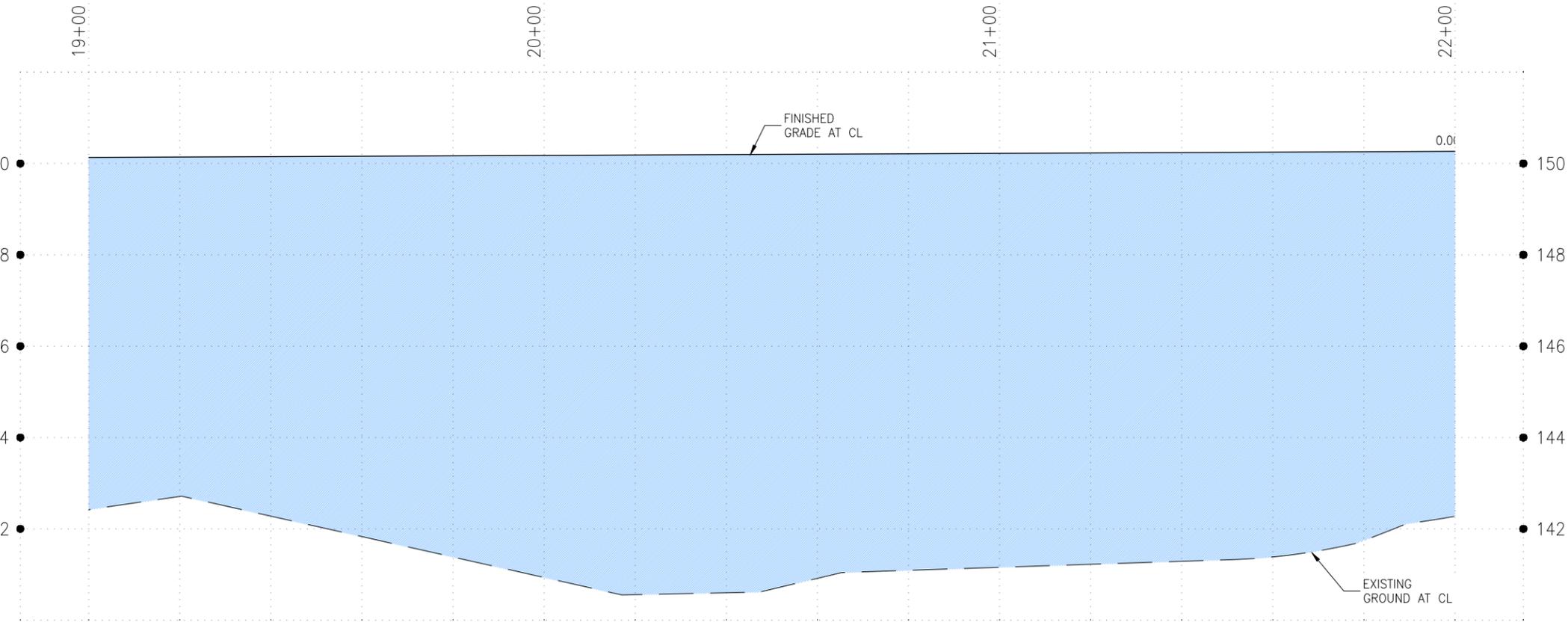
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-125
DRAWN BY DGR	DATE 04/20/22	SHEET 25
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

MATCH LINE
(19+00 SEE SHEET 125)

MATCH LINE
(22+00 SEE SHEET 127)



Project 3
STATION 19+00 - 22+00



CONSTRUCTION NOTES		REFERENCE DETAIL
①	EXISTING SOLAR FACILITIES TO REMAIN IN PLACE AND BE PROTECTED. EXACT LOCATIONS OF FACILITIES AND SUPPORTING COMPONENTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION.	
②	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
③	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
④	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
⑤	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

May 10, 2022 - 1:16pm
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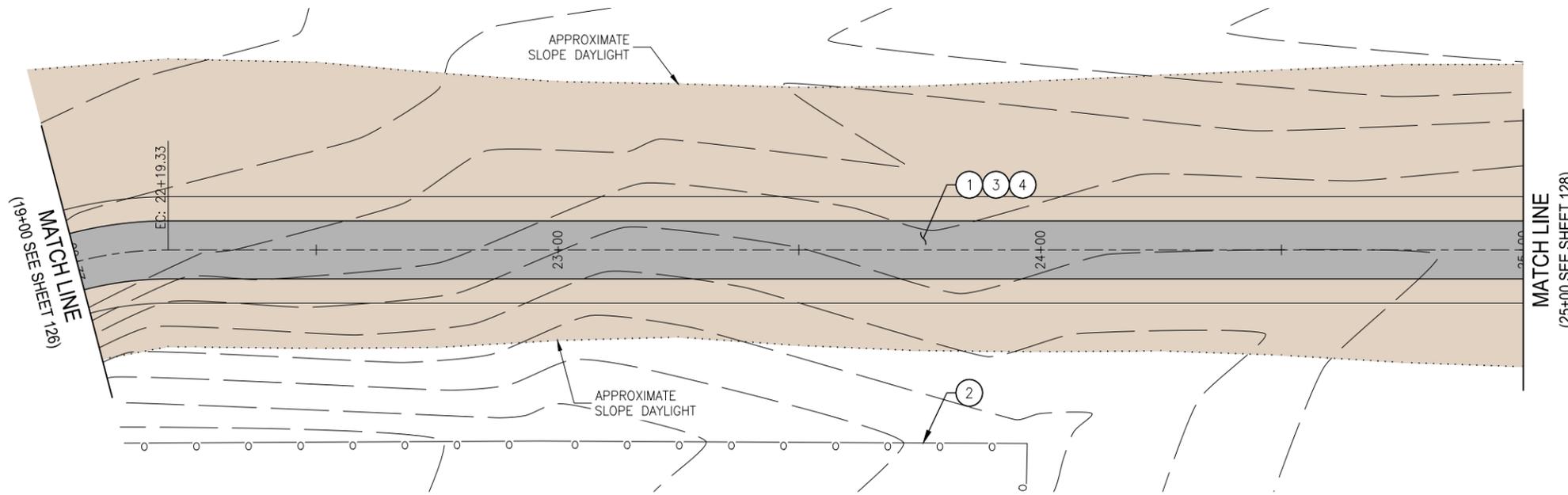
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 19+00 to 22+00

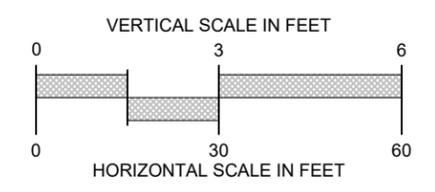
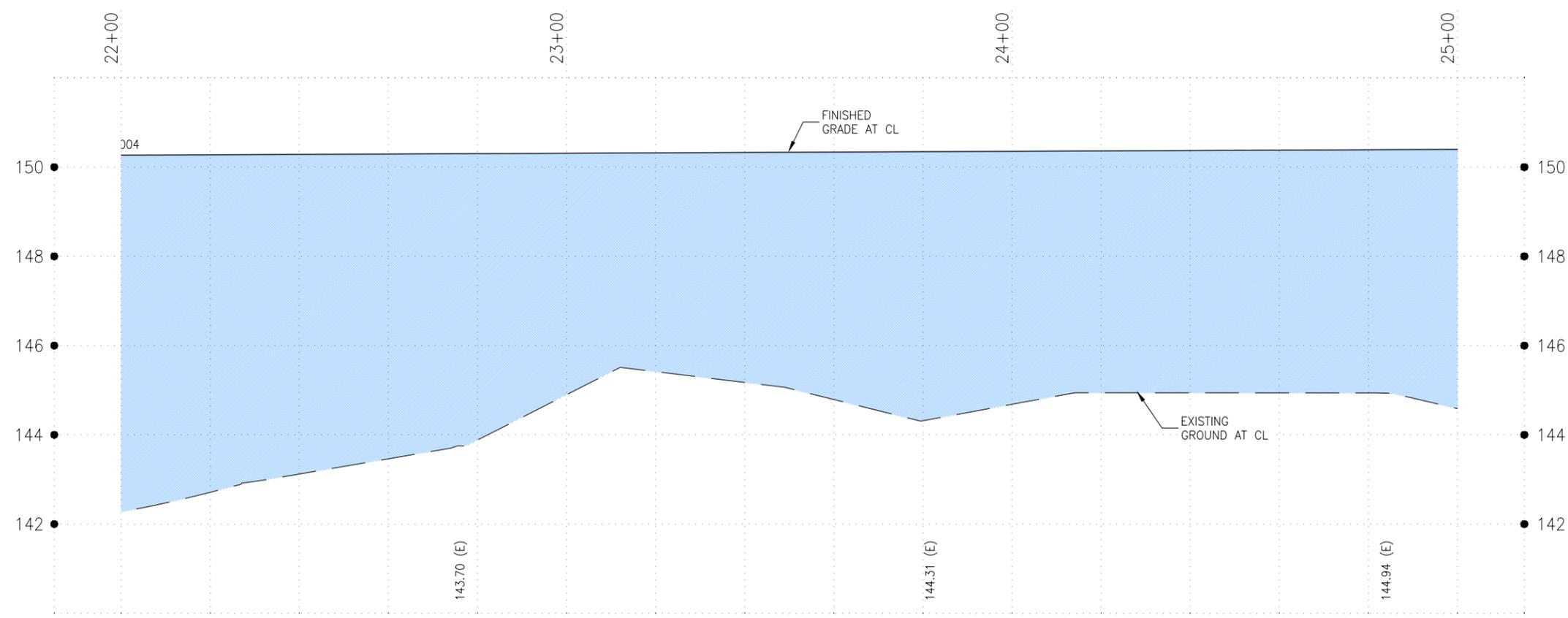
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-126
DRAWN BY DGR	DATE 04/20/22	SHEET 26
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH.	
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF

Project 3
 STATION 22+00 - 25+00



May 10, 2022 - 1:47pm
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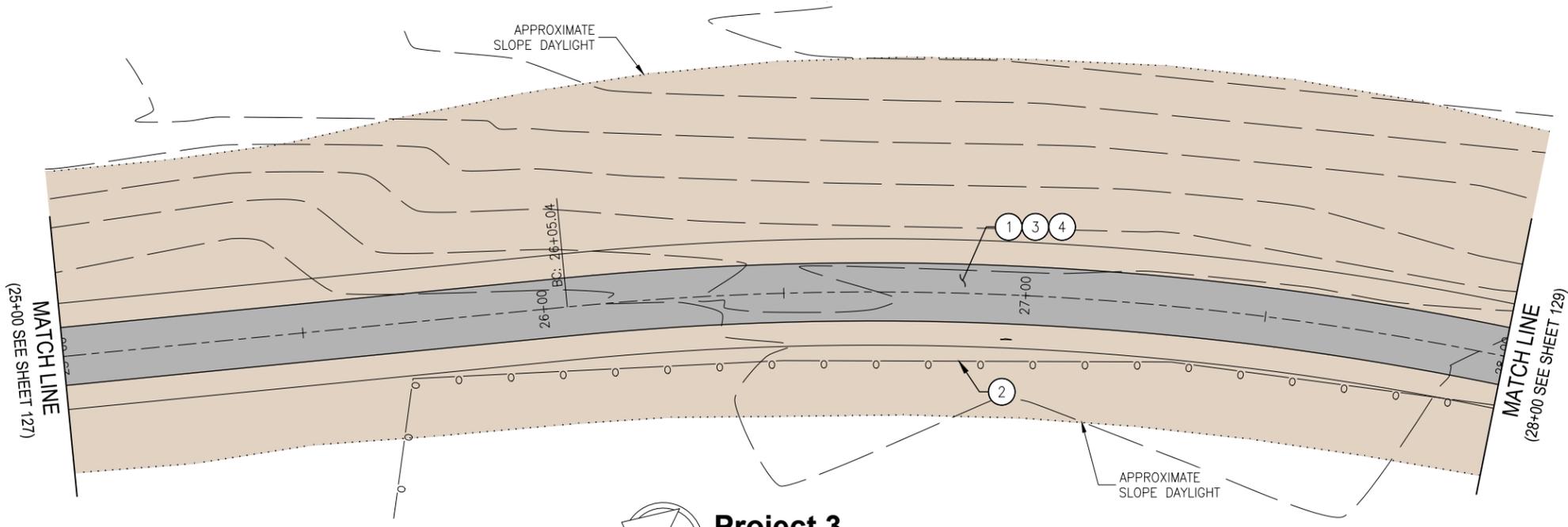
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 22+00 to 25+00

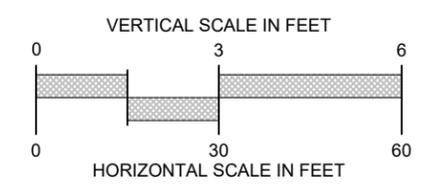
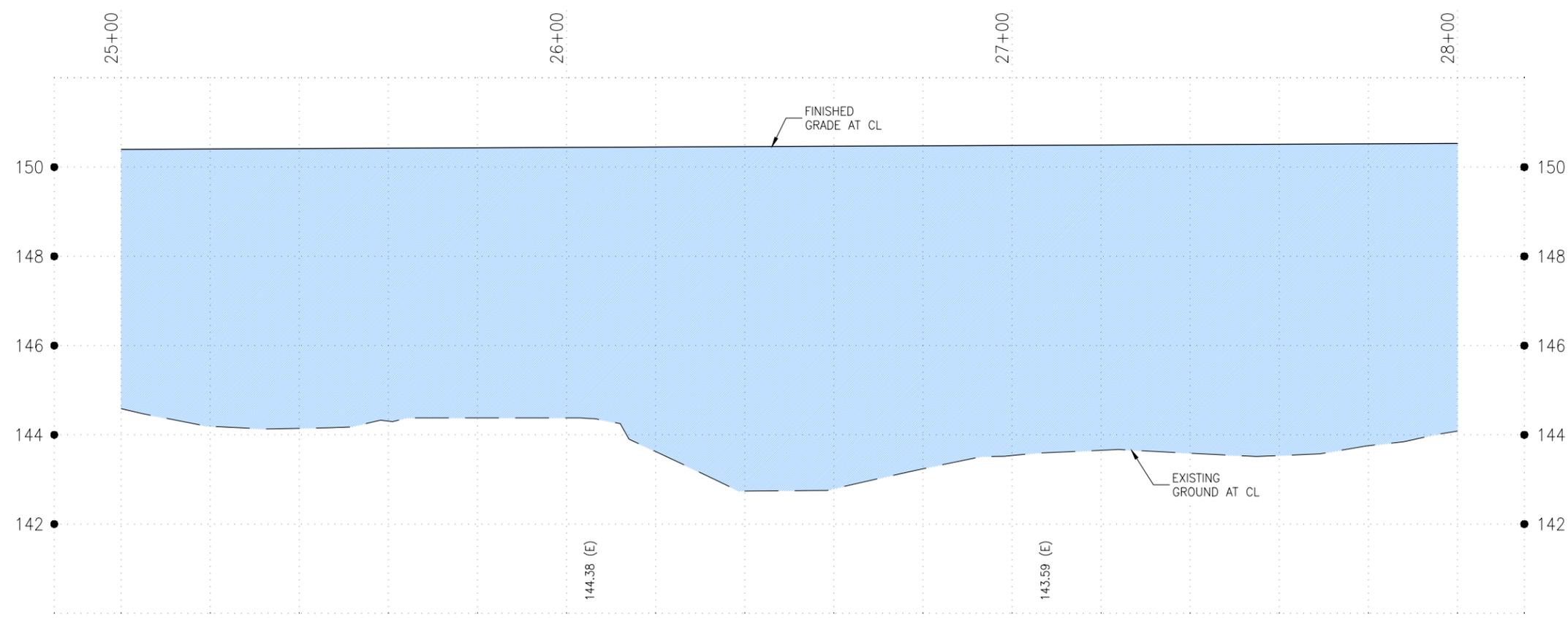
DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-127
DRAWN BY DGR	DATE 04/20/22	SHEET 27
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



Project 3
STATION 25+00 - 28+00

CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:47pm
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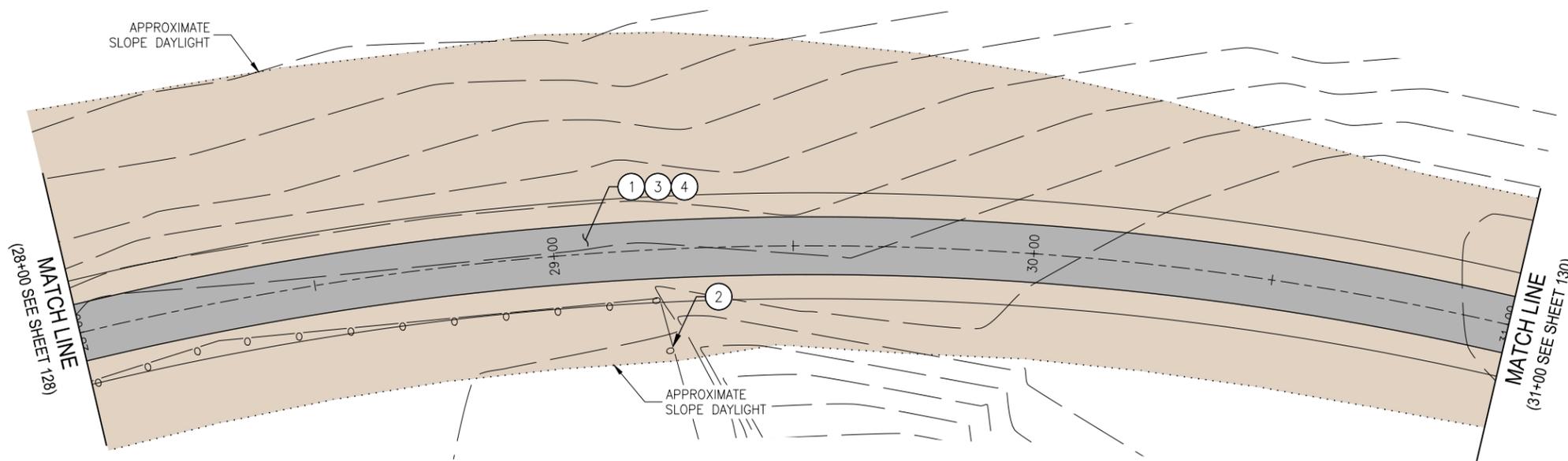
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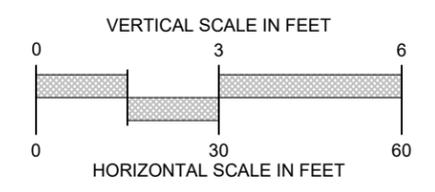
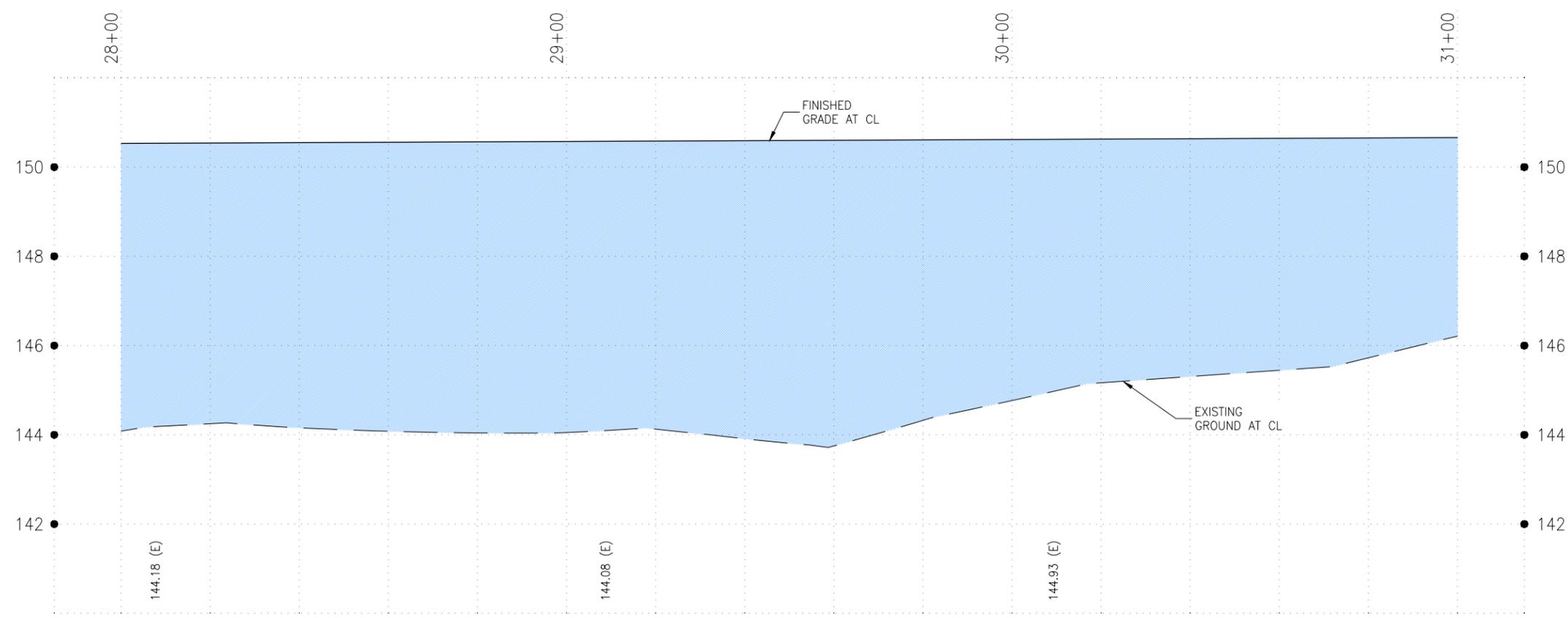
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 25+00 to 28+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-128
DRAWN BY DGR	DATE 04/20/22	SHEET 28
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	EXISTING FENCING TO BE REMOVED AND REPLACED AS NECESSARY TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH.	① 31
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:48pm
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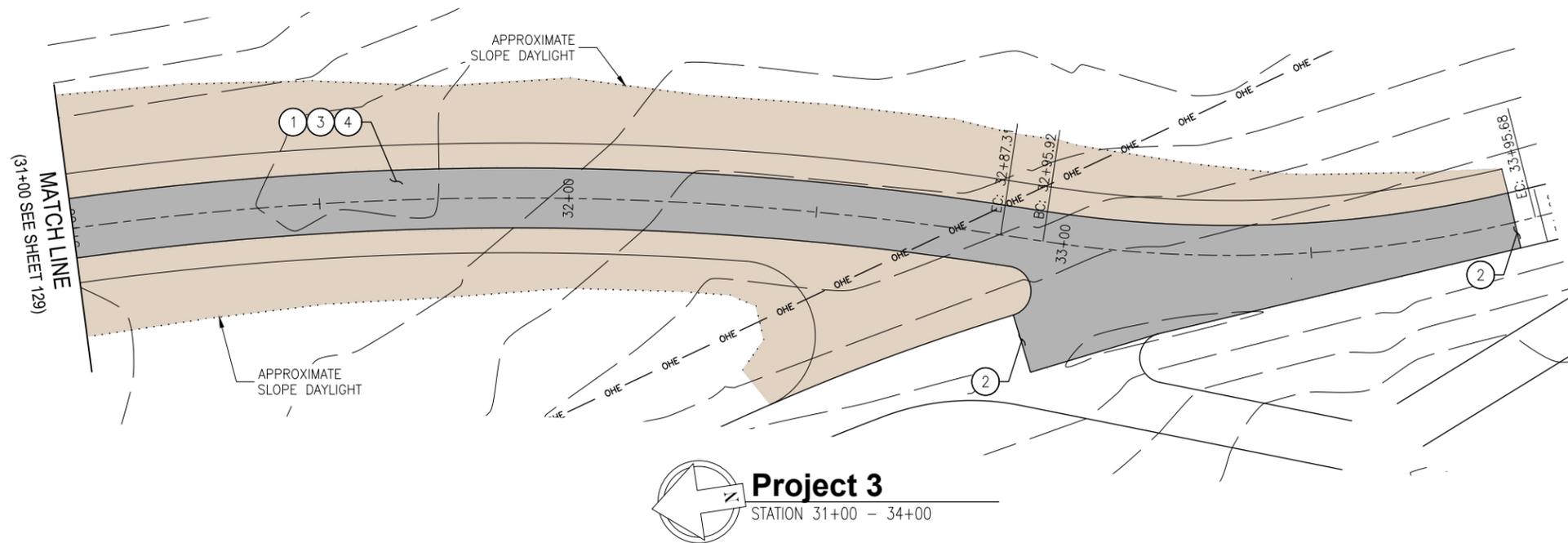
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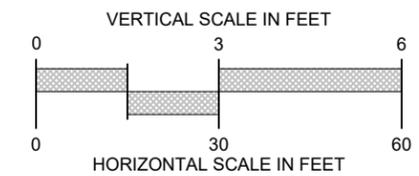
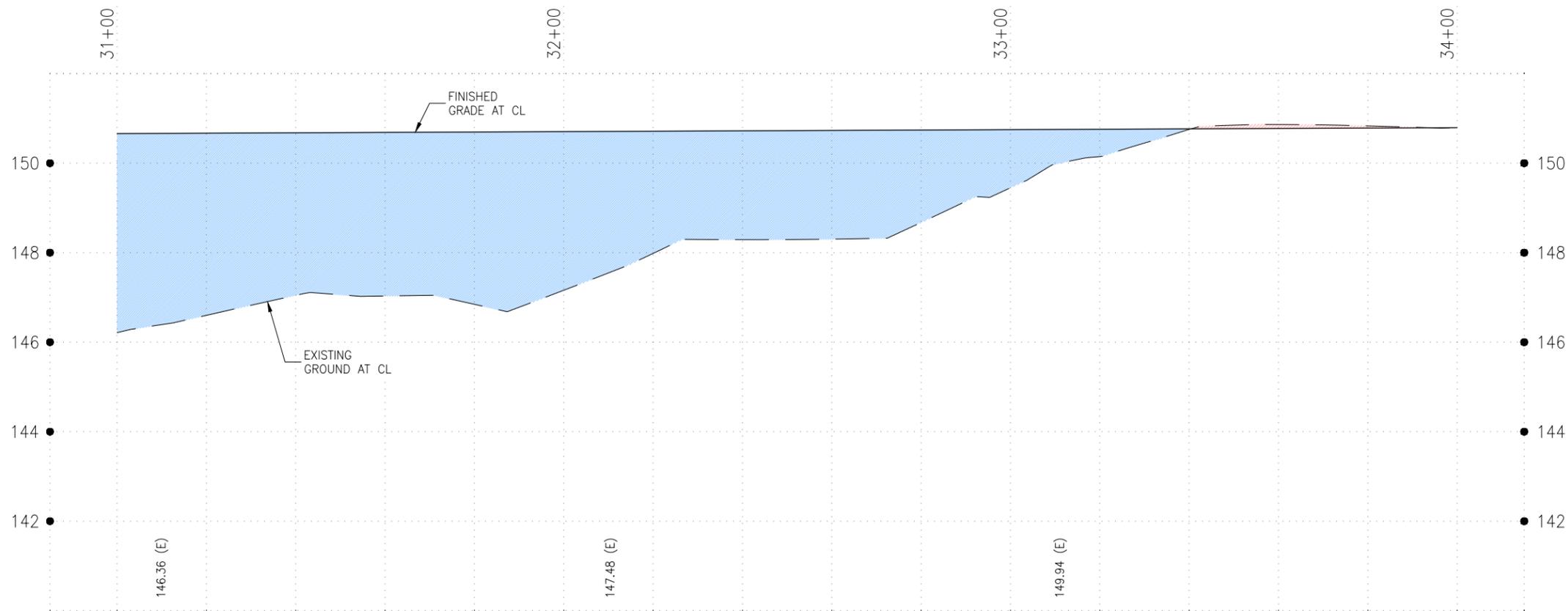
City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
Project 3 - Plan and Profile
Stations 28+00 to 31+00

DESIGNED BY DGR,SD,NM	DATE 00/00/00	DRAWING C-129
DRAWN BY DGR	DATE 04/20/22	SHEET 29
CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



CONSTRUCTION NOTES		REFERENCE DETAIL
①	REMOVE EXISTING GRASS, ROOTS, AND ALL OTHER SURFACE AND SUBSURFACE MATERIALS AS REQUIRED FOR CONSTRUCTION.	
②	REMOVE EXISTING AC PATH AS REQUIRED TO ACCOMMODATE THE PROPOSED IMPROVEMENTS.	
③	CONSTRUCT 12' WIDE SHARED USE AC PATH. PROVIDE A SMOOTH TRANSITION BETWEEN THE PROPOSED AC TRAIL AND THE EXISTING AC TRAIL.	① 31
④	APPLY 4" BROKEN YELLOW CENTERLINE STRIPING PER MUTCD FIGURE 9C-2 CONDITION A - PASSING PERMITTED ALONG THE CENTER OF THE PAVE PATH.	

ESTIMATED QUANTITIES	
AC PAVEMENT	xx TN
CLASS II AB	xxx TN
4" SINGLE DASHED STRIPING	300 LF



May 10, 2022 - 1:48pm
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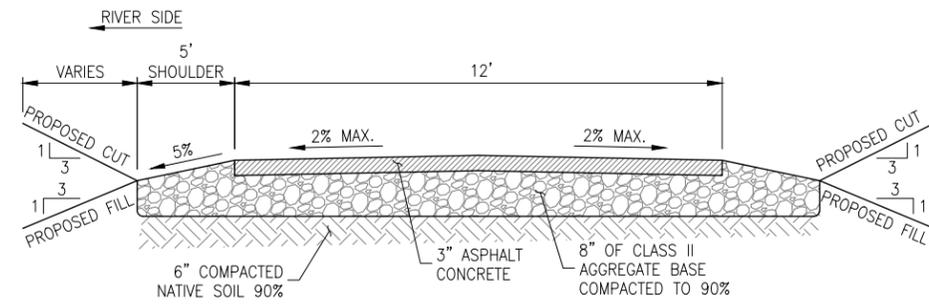
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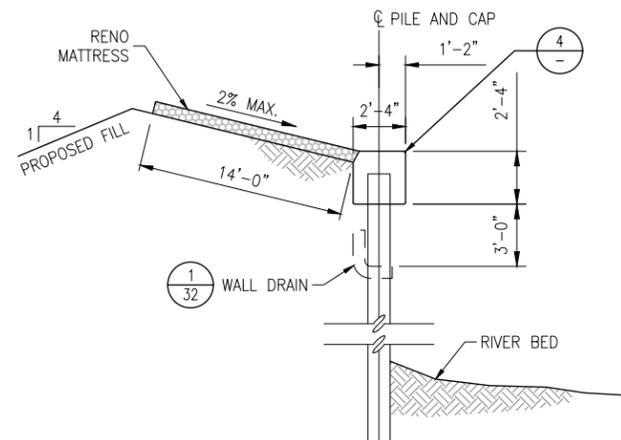
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City of Firebaugh
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Project 3 - Plan and Profile
Stations 31+00 to 34+00

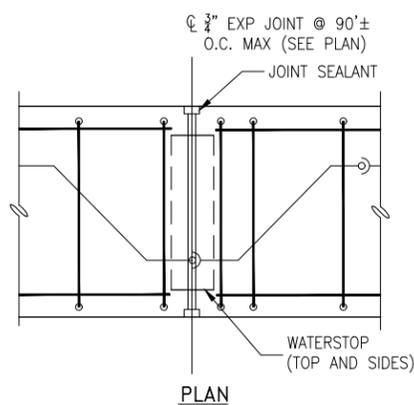
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CHECKED BY SD, MBG	DATE 00/00/00	OF 33 SHEETS
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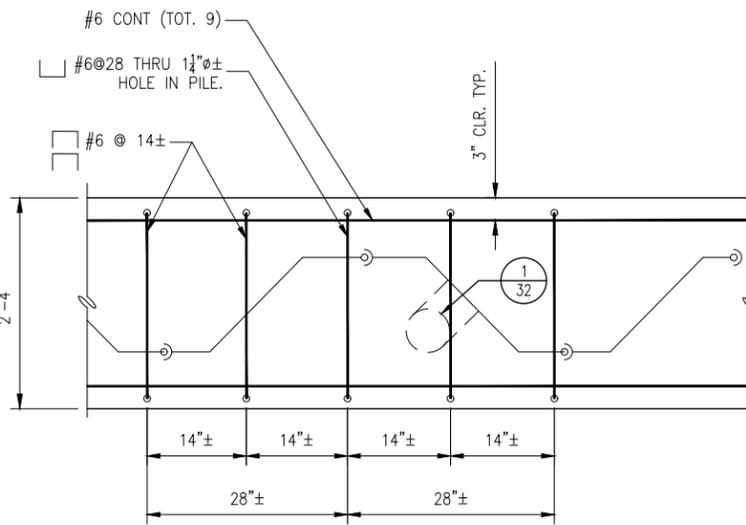
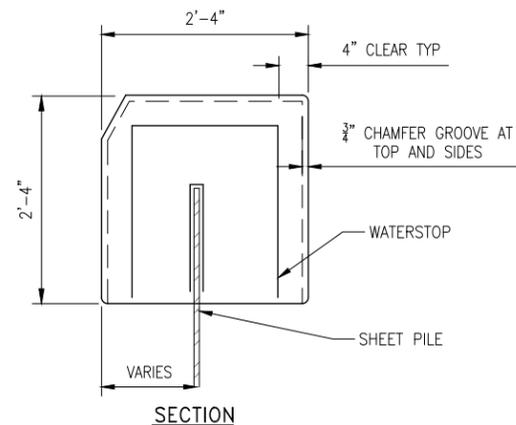
1 AC PATH TYPICAL CROSS SECTION
NOT TO SCALE



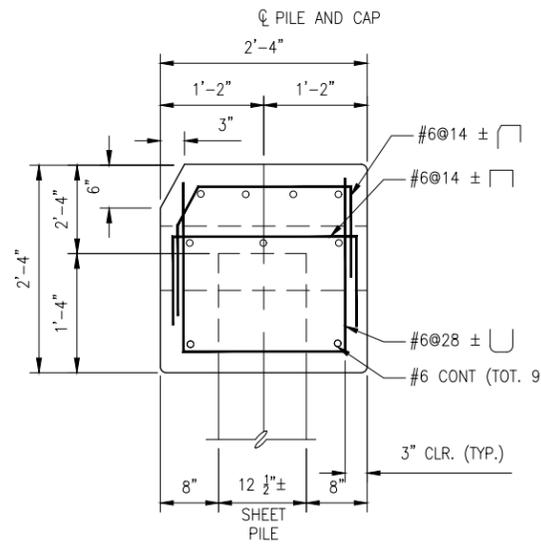
2 WALL SECTION
NOT TO SCALE



3 EXPANSION JOINT
NOT TO SCALE

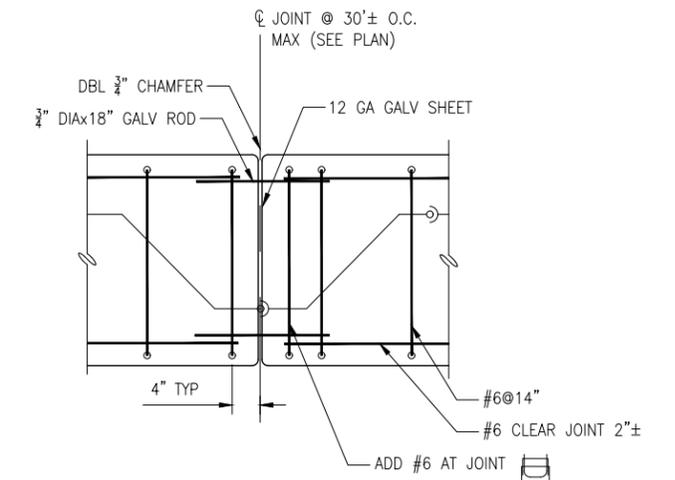


PLAN

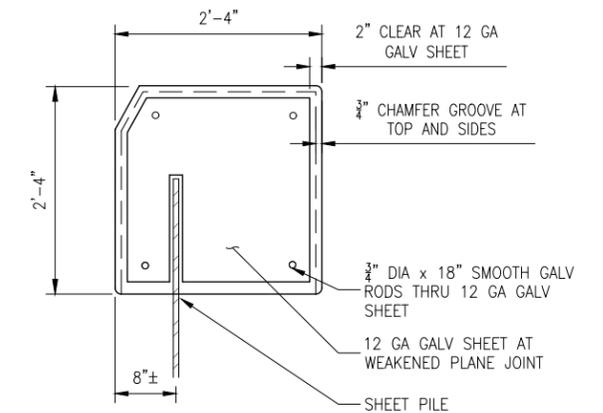


SECTION

4 CONCRETE CAP
NOT TO SCALE



PLAN



SECTION

5 WEAKEND JOINT
NOT TO SCALE



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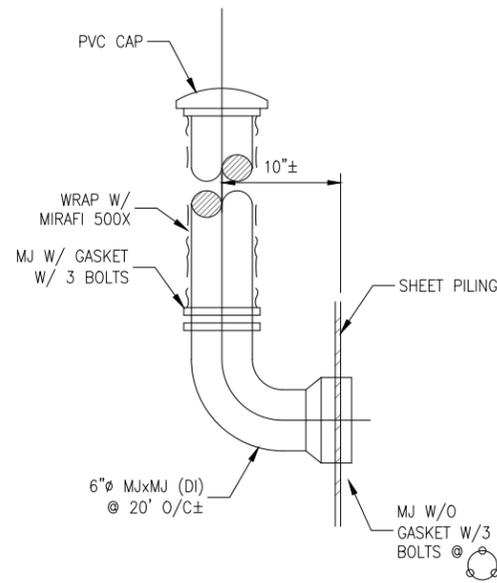
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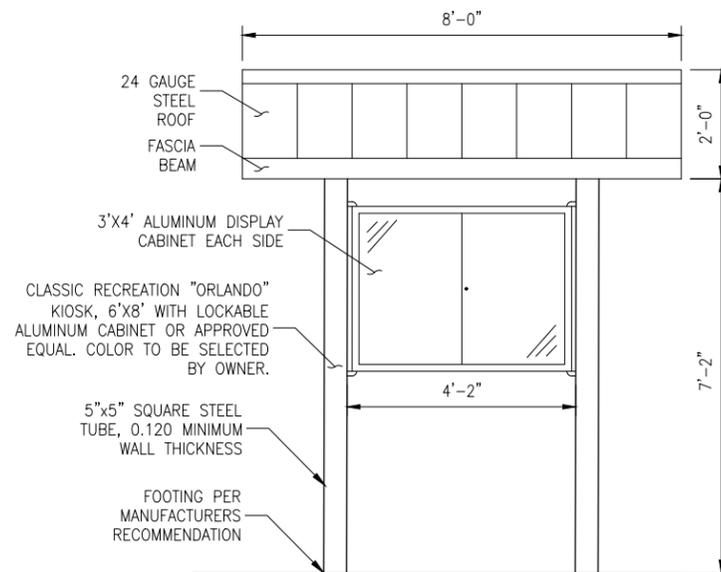
City of Firebaugh

Firebaugh Multi-Benefit Flood Management Project
LEVEE PATH AND WALL CONSTRUCTION DETAILS

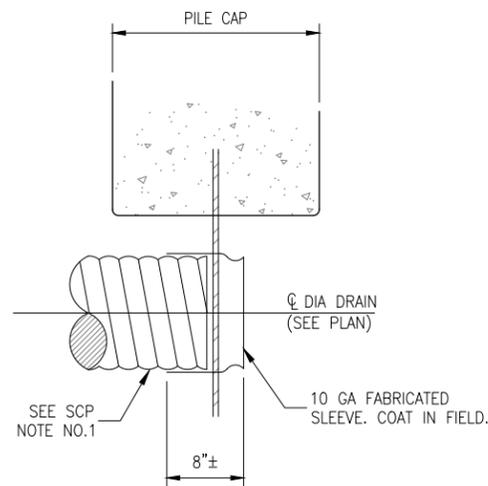
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DRAWN BY DGR	DATE 04/20/22	SHEET 31
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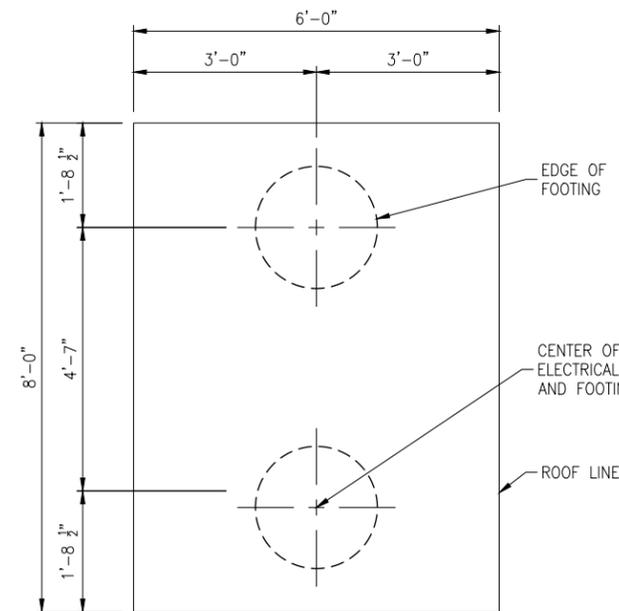
1 WALL DRAIN
NOT TO SCALE



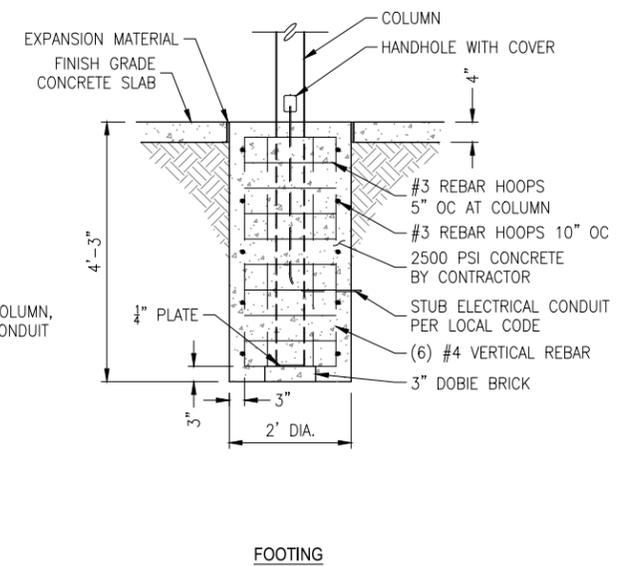
2 PIPE PENETRATION
NOT TO SCALE



3 DECORATIVE SIGN DETAIL
NOT TO SCALE



4 PATH KIOSK
NOT TO SCALE



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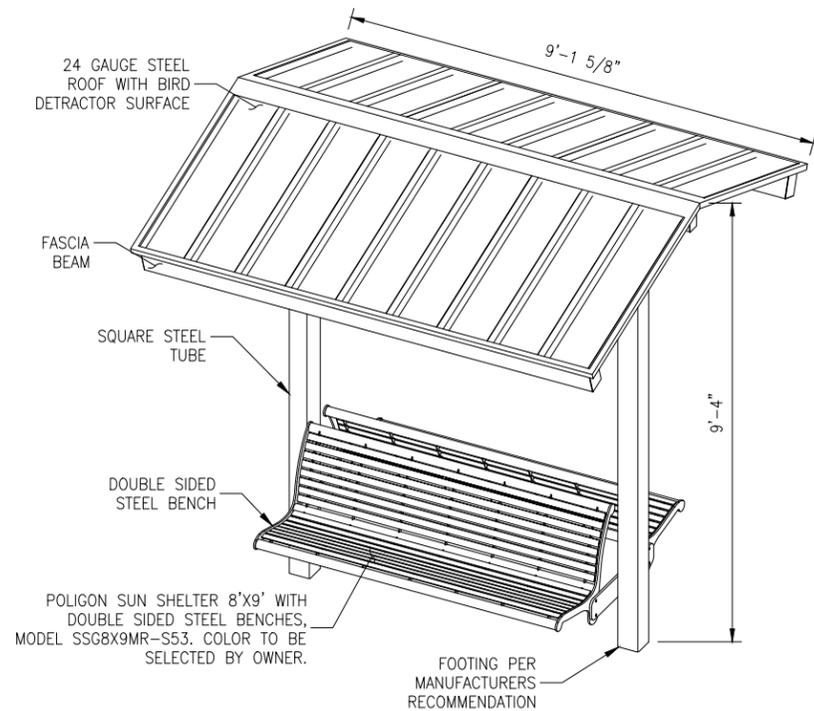
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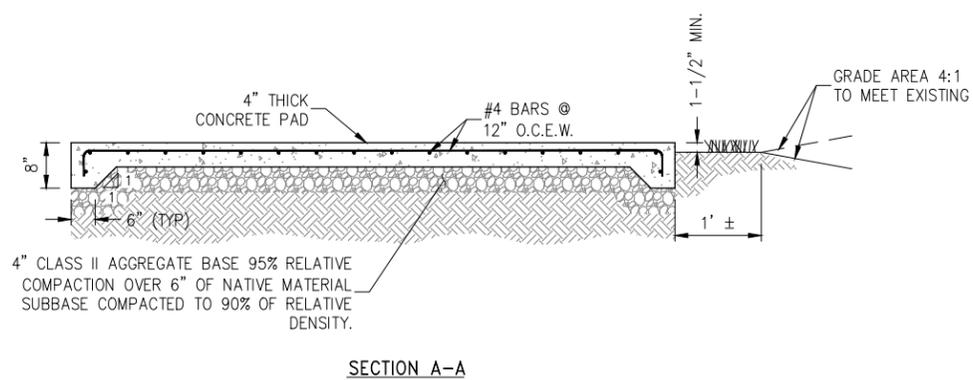
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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
LEVEE WALL AND PATH SIGNAGE
CONSTRUCTION DETAILS

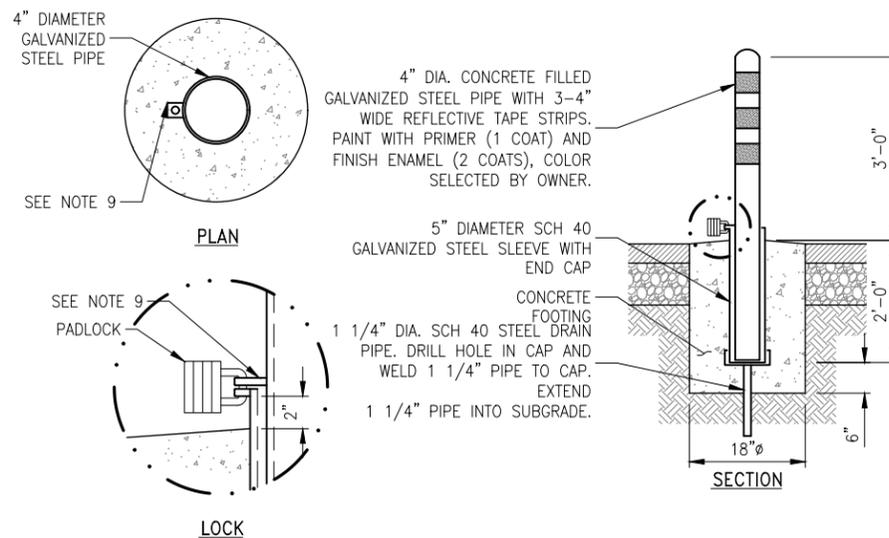
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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3



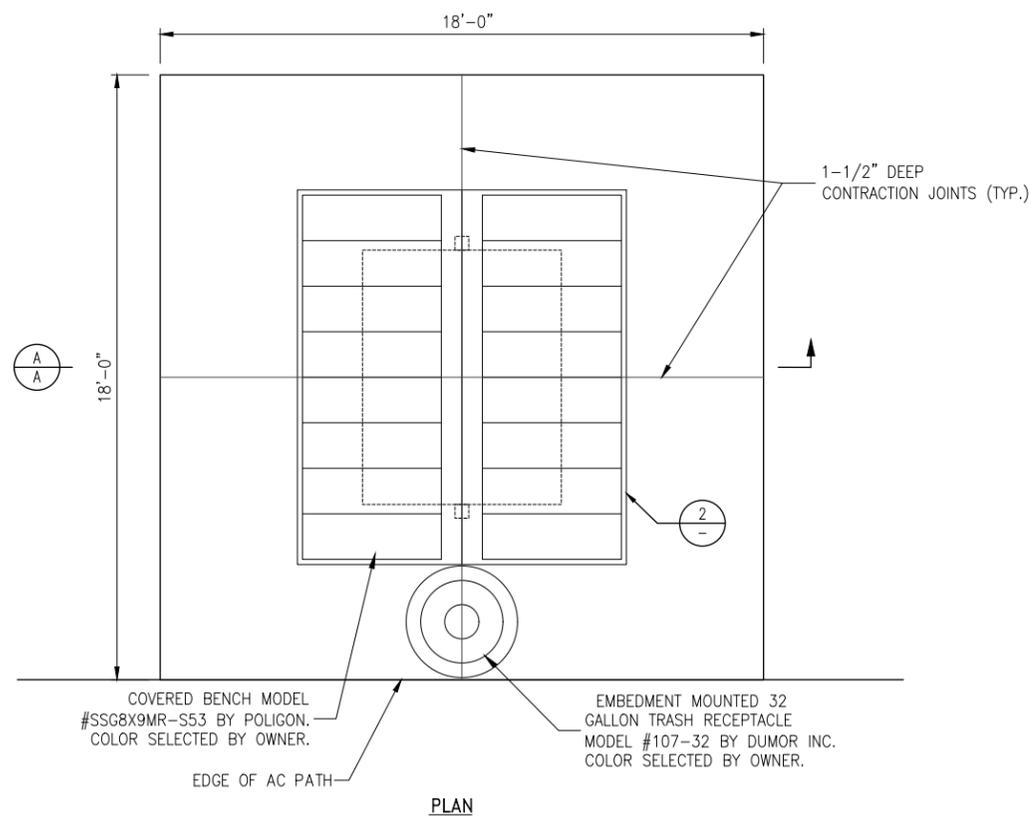
1 TYPICAL COVERED BENCH
NOT TO SCALE



2 REST STOP CONSTRUCTION
NOT TO SCALE



3 REMOVABLE BOLLARD
NOT TO SCALE



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City of Firebaugh
Firebaugh Multi-Benefit Flood Management Project
PATH AMENITY CONSTRUCTION DETAILS

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APPROVED MBG	DATE 00/00/00	PROJECT NUMBER 725.12-3

Firebaugh Multi-Benefit Flood Management Project

Attachment 4

Flood Risk Reduction Feasibility Study