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October 25, 2021

Ms. Andrea L. Lobato, P.E., Manager
Delta Levees Program
Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

RE: Reclamation District No. 341 (Sherman Island)
Project Funding Agreement SH-18-1.1-SP

Dear Ms. Lobato:

Enclosed for you review and approval, is the revised Five-Year Plan submitted on the behalf of Reclamation District No. 341 (District). For your convenience, the comments in your letter dated February 23, 2021, are provided below in italics followed by the District's response:

- *Section 2.1 requires an estimated flood frequency of historical flood problem events. Please provide this information.*

  Section 2.1.1 (Historical Flood Problems) includes the following statement:

  Based on historical high stage data from the California Nevada River Forecast Center (Table 1), major flood events on the Sacramento River occur around every 10 years.

- *For Section 2.1, please clarify what portion of the levee is at Bulletin 192-82, what portion of the levee is above Bulletin 192-82, and what portion of the levee is below the HMP Standard.*

  Section 2.1.2.3 (Bulletin 192-82 Standard) has been added and includes the following statement:

  No evaluation of the Sherman Island levee system, in accordance with the Bulletin 192-82 Standard, was conducted as part of this Five-Year Plan. The District's intent is to improve the entire non-project levee system to the PL 84-99 Standard before considering improvements to the Bulletin 192-82 Standard. However, the design incorporated to meet the PL 84-99 Standard will also help facilitate future improvements to the Bulletin 192-82 Standard and to account for climate induced water surface elevation changes, storm surges, and wind wave actions.

Section 2.1.2.1 (Hazard Mitigation Plan Standard) includes the following statement:

All 9.8 miles of the Sherman Island non-project levee system meet the HMP Standard …

- *For Section 2.2, please include a statement of whether the 2009 Five-Year Plan objectives were achieved, or the level of achievement (percentage). If objectives were not achieved, provide a summary of why and what should be done differently to achieve the goals outlined in this Plan.*

  Section 2.2 has been revised to include the following statement:

  As a result, 100% of the District's objectives, from the May 2009 Five-Year Plan, were achieved.

- *For Section 4, please describe the opportunities and significant constraints for achieving the list of objectives provided.*

  The requested information is included in Section 3.1.8 (Constraints and Obstacles).

- *The Plan indicates that to date, the District has been awarded $42,455,450 in funding from the Special Projects Program for 39 projects. Please indicate if any of these projects are West Delta Projects.*

  West Delta Projects include PFAs SH-06-1.0 (Implementation of Sherman Island Subsidence Projects) and SH-08-1.0 (Mayberry Farms).

- *Please include information regarding funding provided by the Delta Levees Maintenance Subventions Program.*

  The Delta Levees Maintenance Subventions Program will fund the District's routine maintenance programs summarized in Section 3.1.2.3 (Routine Maintenance).

- *Please include in the Plan any work completed since the 2009 Five Year Plan, under PFA SH-10-2.7.*

  Section 2.2 (Previous Five-Year Plan Progress Report) summarizes work completed since the 2009 Five-Year Plan.

- *If possible, please provide a figure showing some of the significant features detailed in the historical flooding account. For example, identify the 3,000-foot Cross Levee between Sacramento River and Mayberry Slough, and sites of significant levee breaches.*

Figure 2 (Location Map) has been revised to include the Cross Levee and sites of significant levee breaches.

- *The executive summary states that the District "aims to address waterside deficiencies along the San Joaquin River through the construction of setback levees and habitat benches." Please clarify if the setback levees and habitat benches will be continuous or not.*

  The number of setback levees and habitat benches will be determined during the planning and design phase of the San Joaquin River Multi-Benefit Project – Phase II. Due the presence of levee encroachments including but not limited to gas lines, private residences, powerlines, siphons, etc., the Project will not be able to be constructed as a single continuous setback levee.

- *For Section 3.1.2, please clarify if any "mitigation credit" is mitigation credit to be used at the Parcel 11 mitigation site or purchased credit from elsewhere.*

  Section 3.1.2.2 has been revised to include the following statement for the San Joaquin River PL 84-99 Rehabilitation Project and the Highway 160 Erosion Repair Project:

  Mitigation credits purchased from approved mitigation bank(s).

- *For Section 3.1.2, it is unclear if there is an agreement with CDFW that the multibenefit project will be self-mitigating. Please clarify that mitigation actions will be determined in consultation with CDFW.*

  Section 3.1.2 has been revised to include the following statement for the San Joaquin River Multi-Benefit Project – Phase II:

  The District expects the Project to be self-mitigating, however actual mitigation requirements will ultimately be determined in coordination with CDFW.

- *Under permitting, please include Section 7 consultation (USFWS & NMFS) for any waterside work.*

  Section 4.2.1.8 has been revised to include the following statement:

  … to ensure they comply with Section 10 of the River and Harbors Act and Section 404 and 401 of the Clean Water Act and associated Section 7 consultation with the National Marine Fisheries Service and United State Fish and Wildlife Service

- *For Section 4.1.1.2, please specify that State and Federal avoidance and minimization measures will be followed.*

  Section 4.1.1.2 has been revised to include the following statement:

With standard avoidance and minimization measures … and avoidance measures developed in consultation with State and Federal agencies, direct impact to these species will be unlikely.

- *Section 4.1.1.3, states that the District can mitigate on-island "with the expansion of Parcel 11." Please clarify.*

  Section 4.1.1.3 has been revised to include the following:

  …the District can mitigate on-island with the expansion of Parcel 11 if funding is provided by DWR for establishment and long-term management. Parcel 11 was last proposed to be expanded in 2012 due to habitat impacts from work performed under PFA SH-08-2.0. However, the proposal was abandoned due to lack of DWR funding.

- *Please include that the IS/MND will be provided for review as part of the draft SOW before a MND is filed.*

  Section 4.2.1.1 has revised to include the following statement:

  ISMNDs will be provided for review by DWR and CDFW, as part of the Draft Scope of Work, before Mitigated Negative Declarations are filed.

I trust the enclosed satisfies the requirements of the Department. If you have any questions or require additional information, please contact Martin Berber at mberber@wbecorp.com or (916) 768-9099.

Very truly yours,

WAGNER & BONSIGNORE
CONSULTING CIVIL ENGINEERS

Robert C. Wagner, P.E.
District Engineer

Enclosure

cc: Mr. Juan Mercado, Jr.

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RECLAMATION DISTRICT NO. 341
SHERMAN ISLAND

FIVE-YEAR PLAN

Prepared for:
Reclamation District No. 341
P.O. Box 140
Isleton, CA 95641

Prepared by:
Wagner & Bonsignore,
Consulting Civil Engineers
2151 River Plaza Drive, Suite 100
Sacramento, CA 95833
(916) 441-6850

October 2021

TABLE OF CONTENTS

TABLES

FIGURES

EXHIBITS

ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
BFE	Base Flood Elevation
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
County	Sacramento County
CVP	Central Valley Project
Delta	Sacramento – San Joaquin Delta
District	Reclamation District No. 341
DRMS	Delta Risk Management Strategy
DWR	California Department of Water Resources
FEMA	Federal Emergency Management Agency
FM	Freshwater Marsh
HMP	Hazard Mitigation Plan
ISMND	Initial Study/Mitigated Negative Declaration
MHW	Mean High Water
NAVD 88	North American Vertical Datum of 1988
NGVD 29	National Geodetic Datum of 1929
PG&E	Pacific Gas and Electric Company
PL 84-99	Delta Specific PL 84-99
PFA	Project Funding Agreement
RF	Riparian Forest
RSS	Riparian Scrub-Shrub
SRA	Shaded Riverine Aquatic
Sta.	Station
SWP	State Water Project
USACE	US Army Corps of Engineers

TABLE OF REQUIRED TABULATED INFORMATION

Required Information	Value/Units	Discussion
Total acreage protected by Local Agency levees	10,000 acres	
Total levee miles maintained by Local Agency	19.5 miles	Project levee: 9.7 miles Non-project levee: 9.8 miles
Levee miles in the Local Agency service area that not maintained through the Delta Levees Program	0 miles	
Percentage of Local Agency's levee system at or above HMP Levee Standard	100%	The entire 9.8-mile non-project levee system meets the HMP Standard.
Miles of Local Agency's levee system raised to meet the minimum HMP Standard through the Delta Levees Special Projects Program	0	HMP work was done through the Subventions Program.
Percentage of Local Agency's levee system at or above the PL 84-99 Standard	97%	Approximately 97% of the levee system meets minimum PL 84-99 geometry. Approximately 7 miles of the levee system contain counterbalance berms.
Miles of Local Agency's levee system raised to meet the PL 84-99 Standard through the Delta Levees Special Projects Program	6 miles	Sta. 368+00 – 690+00 has been recently raised to the PL 84-99 Standard.
Number of levee rehabilitation projects funded through the Delta Levees Special Projects Program for the Local Agency	26	According to District records, at least 26 levee projects have been funded through the Special Projects Program.
Total State funds expended for levee rehabilitation projects on the Local Agency's Island/Tract through the Delta Levees Special Projects Program	$38,800,000	According to District records, at least $38,800,00 in State funds have been expended for levee projects through the Special Projects Program.
List of local and non-local assets and critical infrastructure protected by the Local Agency's levee system	State Water Project, Central Valley Project, State Highway 160, approximately 2,000 acres of wetlands, 5 high voltage powerlines, 6 fish release facilities, natural gas lines and wells, marinas, RV parks, Sherman Island County Park, recreational activities (e.g. windsurfing, fishing, etc.), private property and residences for a population of approximately 200	

1 EXECUTIVE SUMMARY

The objective of this Five-Year Plan is to identify levee improvement and habitat enhancement projects for the Sherman Island levee system. It is intended that with this Five-Year Plan in place, projects will be identified and ready to implement as funding becomes available through the Delta Levees Special Projects Program. This Five-Year Plan was prepared in accordance with the 2018 Requirements for the Five-Year Plan.

The Sherman Island levee system consists of approximately 19.5 miles of levee: 6.4 miles along the Sacramento River, 3.3 miles along Threemile Slough, 6.6 miles along the San Joaquin River, and 3.2 miles along Mayberry Slough. The entire Sherman Island non-project levee system meets the minimum Hazard Mitigation Plan Standard; however, the desired level of protection is the Delta Specific PL 84-99 Standard. Over the course of this Five-Year Plan, the District aims to achieve the PL 84-99 Standard along all non-project levees. Additionally, the District aims to repair waterside slopes along the Highway 160 levee. Finally, the District aims to address waterside slope deficiencies along the San Joaquin River through the construction of setback levees and habitat benches.

The Delta Levees Special Projects Program will contribute to the District's five-year goals by providing funding for levee rehabilitation projects through Project Solicitation Packages or Directed Actions. Additionally, the Delta Levees Subventions Program will contribute to the District's five-year goals by reimbursing the District's routine maintenance programs. Finally, the California Department of Fish and Wildlife will ensure that projects are consistent with Water Code Section 12314, which requires no net long-term loss of habitat, and net habitat improvement.

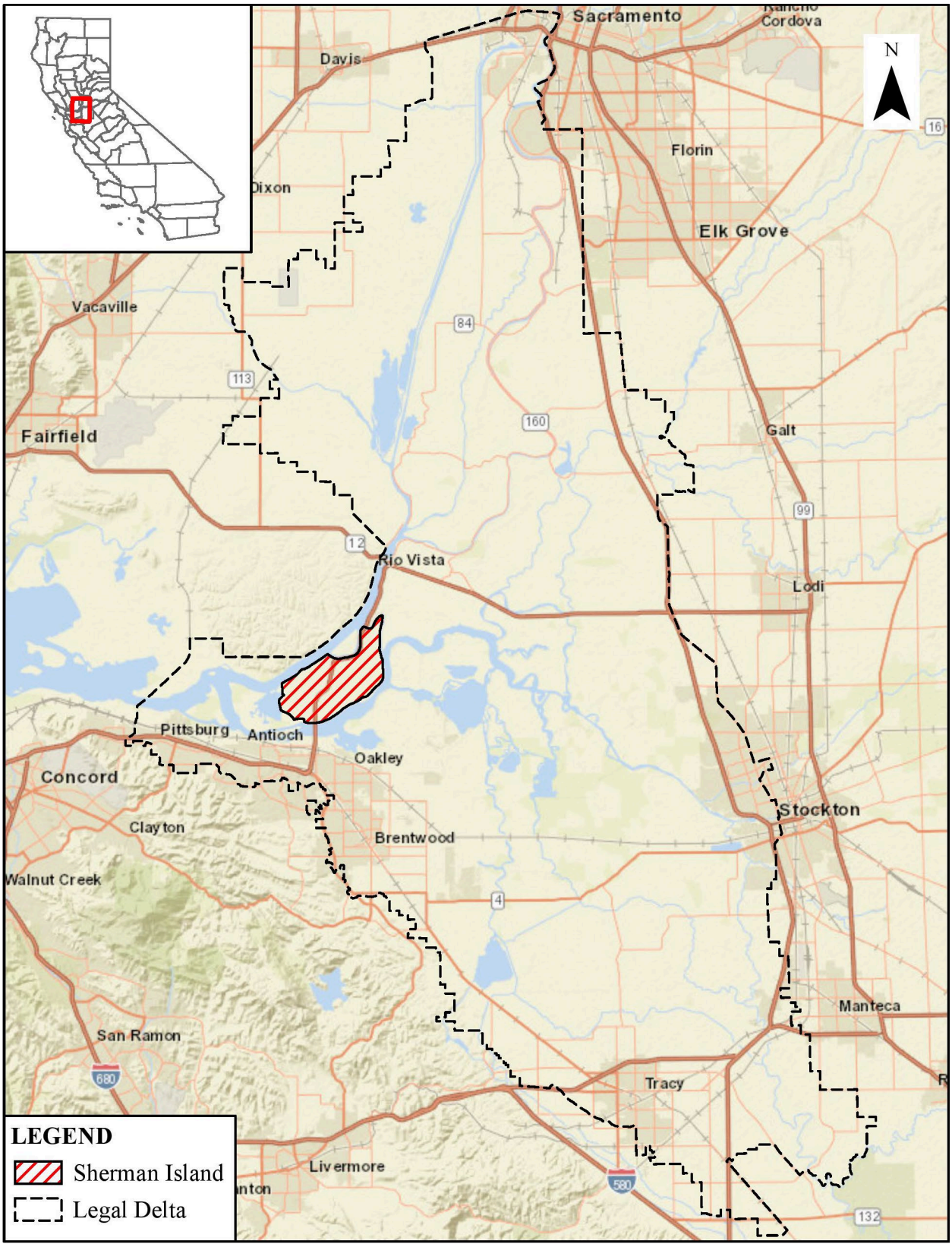


Figure 1. Vicinity Map

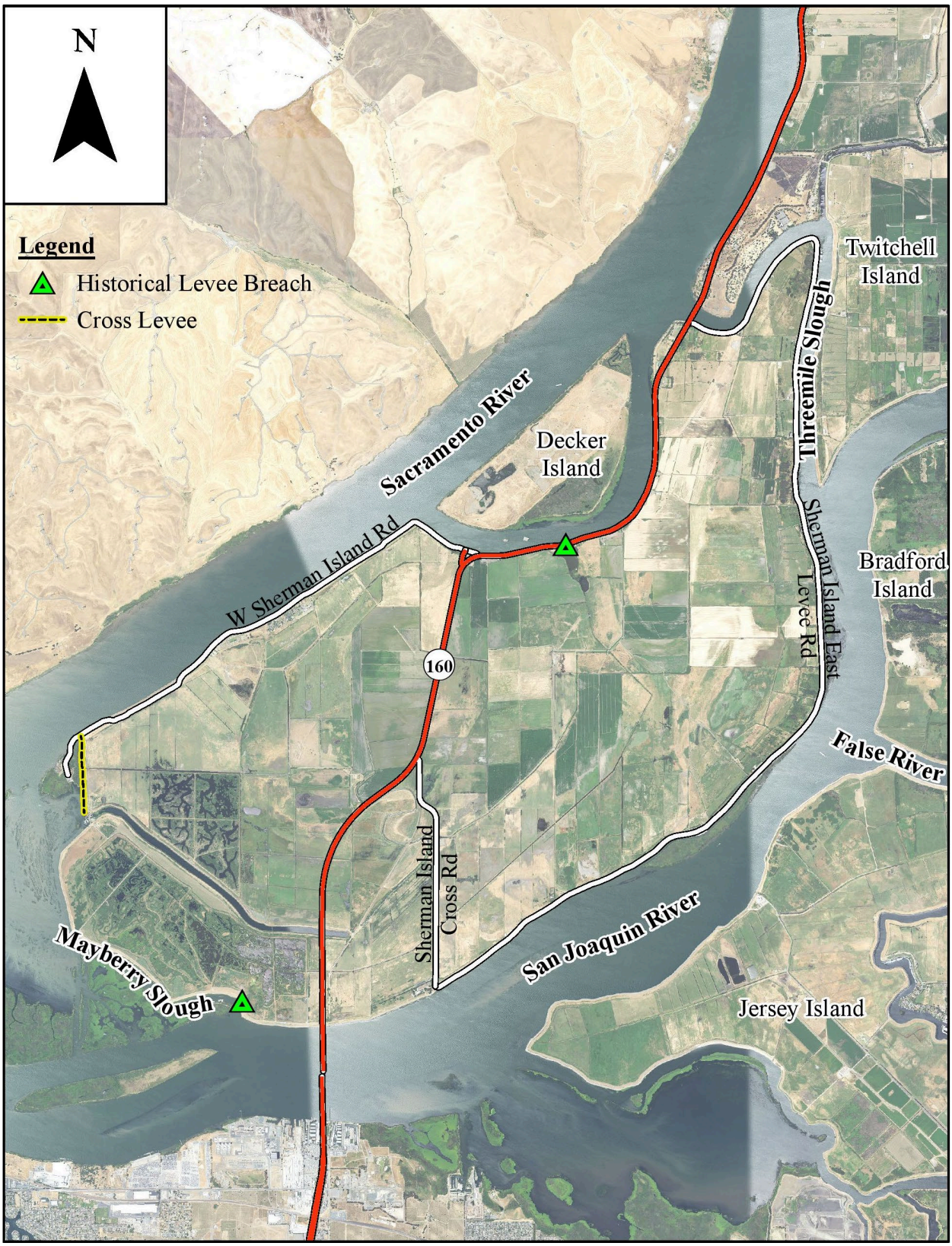


Figure 2. Location Map

2 BACKGROUND

Sherman Island is a 10,000-acre Sacramento – San Joaquin Delta (Delta) island located in southwestern Sacramento County (County), California (Figure 1). The island is bordered by the Sacramento River and Threemile Slough to the north, and the San Joaquin River and Mayberry Slough to the south (Figure 2). The island is north of the cities of Antioch and Oakley.

Sherman Island was one of the first islands in the Delta to be reclaimed during the period 1868 – 1879. The island is primarily used as pasture area, although agricultural farming, mainly of corn, grains, and alfalfa, is also predominant in the central and northeastern parts of the island. Elevations within the island vary from 0 to -23 feet relative to sea level. The island has been identified as high priority in the Delta due to its geographical location, which influences the salinity and water quality within the Delta.

2.1 Assessment of the Status of Existing Levee System

The Sherman Island levee system consists of approximately 19.5 miles of levee: 6.4 miles along the Sacramento River, 3.3 miles along Threemile Slough, 6.6 miles along the San Joaquin River, and 3.2 miles along Mayberry Slough. The levee system along the Sacramento River and Threemile Slough are project levees, constructed by the US Army Corps of Engineers (USACE), and the levee system along the San Joaquin River and Mayberry Slough are non-project levees. The entire levee system is maintained by Reclamation District No. 341 (District). The District also maintains 5 modern drainage pumping stations on Sherman Island: 3 on the San Joaquin River, 1 on the Sacramento River, and 1 on Mayberry Slough. The drainage pumps are part of a larger system of siphons, ditches and canals that are used to circulate water for irrigation and drainage.

2.1.1 Historical Flood Problems

The first significant flooding affecting Sherman Island agriculture occurred during the 1861/62 season and caused wide-spread damage throughout the Delta, and Sherman Island farmers lost most of their livestock as a result when the Sacramento River breached the low levees constructed along its banks. After completion of the levee system in 1869, Sherman Island suffered several floods. Sherman Island levees failed during the winters of 1871/72, 1874/75, 1876, and 1878. Several crevasses cut through the north and south levees west of Mayberry Slough in the 1874 levee failure, resulting in the loss of all but 100 acres of cropland in the western portion of the island. The subsequent levee reconstruction featured a 12-foot-high peat levee with 120 feet widths at the base. Even so, the 1876 flood covered the western portion of the island again. The flood of 1878 devastated the entire island.

Subsequent levee breaks on the San Joaquin River submerged most of the land and Sherman Island's 700 inhabitants fled to higher ground. The beleaguered reclamation districts were faced with underwriting thousands of dollars in assessments to replace most of the levee system. Landowners regrouped, and in March 1878, Reclamation District 252 formed out of a portion of RD 54. Sherman Island landowners reorganized again, and RD 54 and RD 252 combined to form Reclamation District No. 341 (RD 341) on June 17, 1879. Although reclamation efforts continued in RD 50 west of Mayberry Slough for several years after the 1879 floods, landowners eventually

dropped reclamation efforts, and after the land flooded during the 1940s, ownership of the land reverted to the State for taxes.

By spring 1880, most of the new RD 341 was again under cultivation until high waters collapsed levee sections again in August later that year. Although an assessment of $13,141 was made for levee repair following the 1880 break, most of the land remained under water until 1894 when reclamation efforts were renewed.

In 1894, RD 341 encompassed 10,303.71 acres of land east of Mayberry Slough and the 3,000-foot cross-levee between Sacramento River and Mayberry Slough. The Sacramento and San Joaquin rivers are connected by Threemile Slough, which forms the eastern and northern boundary of the Island. The district included 24.76 miles of levee, much of it at the time destroyed by previous floods. At the time, much of Sherman Island had been underwater for fifteen years. Although some stretches of levee were intact, much of the levee had sunk to the ground level of the island or below. The Horseshoe Bend area of the Sacramento River had several breaks; one about 500 feet in width, with resulting scar holes measuring about 75 feet deep. The San Joaquin River levees on the south side of the island were essentially destroyed from Gallagher Slough, near the modern-day location of Eddo's Resort, to the mouth of Mayberry Slough.

During the first decade of the twentieth century, RD 341 conducted frequent levee upgrading and restoration projects on Sherman Island. RD 341 leased four dredges in 1900 that worked in tandem around Sherman Island. Flooding occurred in some section of the Delta almost annually during the period from 1900 to 1910, and serious levee breaks and major flooding of RD 341 occurred during 1904 when a crevasse opened on Mayberry Slough, and in 1906 and 1909, when water again inundated the island. RD 341 trustees contracted with Franks Dredging Company for levee construction and repair work between 1908 and 1920.

The 1986 flood event in the Delta resulted in the passage of Senate Bill 34 (SB34) by the State legislature in 1988 providing $120 million over a ten-year period for the California Department of Water Resources (DWR) to rebuild levees in the Delta and help reclamation districts improve levees. Subsequent voter approved bond measures have provided funding for reclamation district levee improvement projects.

Since the passage of SB 34, numerous major storm events have threatened to compromise the levee system protecting Sherman Island, fortunately no levee failures have occurred since the 1969 levee failure. Based on historical high stage data from the California Nevada River Forecast Center (Table 1), major flood events on the Sacramento River occur around every 10 years.

Table 1. Historical High Stage Events (Sacramento River at Rio Vista Bridge)

Water Year	Stage (ft)	Date
1986	11.50	Feb 20, 1986
1997	11.18	Jan 05, 1997
1998	10.55	Feb 06, 1998
2006	10.60	Jan 02, 2006
2017	9.79	Feb 11, 2017

Note:
(1) Monitor Stage: 7.4 Feet
(2) Flood Stage: 11.9 Feet
(3) Datum changed from NGVD 29 to NAVD 88 on 10/01/2006. The difference is -0.6 ft and must be applied to all data before date to convert to NAVD 88.

2.1.1.1 1969 Failure

The southern levee on the San Joaquin River side failed and flooded the island on January 20, 1969 at approximate levee Sta. 520+00. Upon finding the break, a large quantity of rock was placed on the upstream and downstream ends of the levee to protect against further erosion from high velocities into and out of the break due to tide. Without placement of the rock, the break which was approximately 275 feet wide and about 45 feet below mean sea level, would have been greatly enlarged. After the break, the water inside the island and in the San Joaquin River was at the same level. The flooding created a deep hole in the channel on the waterside and a deep lake on the landside toe of the levee at the site of the break. Pumps to dewater the Island were rented (District pumps were entirely submerged). Pumping with the rented equipment commenced February 28, 1969 and continued through August 9, 1969, at which point District pumps continued to remove the remaining water from the island. All 93,000 feet of District drainage ditches were cleaned and/or excavated, primarily by drag line and ditcher operations before District ditches were operable. USACE spent approximately $600,000 in emergency funds to repair, reslope, and regrade the levee break area after the 1969 break. Seepage and settlement in the area of the break have been ongoing issues requiring constant levee improvements.

2.1.1.2 1998 and 2006 Flood Events

Due to the large fetch on the San Joaquin River in the vicinity of Sherman Island, the San Joaquin River levee experienced severe wind wave erosion in the 1998 (Figure 3) and 2006 (Figure 4) flood events. The levee section has since been rehabilitated and armored with riprap slope protection on the waterside. Additionally, the levee section features a riprap splash cap on the waterside hinge for protection against wind wave runup.

Figure 3. 1998 Erosion

Figure 4. 2006 Wind Wave Runup

2.1.1.3 January 2017 Emergency Repair

On January 13, 2017, the District was contacted by the California Department of Transportation (Caltrans) regarding the sighting of boils on a portion of the levee system that supports Highway 160. The boils were located behind the District Office at approximate Sta. 960+00. The District contacted the County Office of Emergency Services and DWR State-Federal Flood Operations Center requesting assistance in containing the boils which were increasing in number and size. However, the District was unable to attain assistance from either. As a result, the District contacted the Rio Vista Fire Department, and with the assistance of the Fire Department, the District constructed sandbag rings around the boils (Figure 5).

Figure 5. Boils at Sta. 960+00

On January 15, the District determined that with the high river stage and forecast for additional rain there was potential for levee failure and an emergency repair was required immediately. Emergency repairs began on January 16 and included the installation of filter fabric, ballast rock, soil cover and perforated pipe to capture and route seepage away from the levee slope and toe. Construction was completed on January 19.

2.1.2 Existing Level of Protection

The most recent Sherman Island levee system survey was conducted in October and November 2015. 1,000-foot levee cross sections from the survey are included as Exhibit 1. The cross sections include the minimum levee prisms associated with the Hazard Mitigation Plan (HMP) Standard, Delta Specific PL 84-99 (PL 84-99) Standard and USACE Standard. A map showing the Level of Protection provide by the Sherman Island levee system is included as Exhibit 2.

2.1.2.1 Hazard Mitigation Plan Standard

All 9.8 miles of the Sherman Island non-project levee system meet the HMP Standard, which consists of a waterside slope of 1.5:1, landside slope of 2:1, 16-foot-wide crest, and 1-foot of freeboard above the 100-year Base Flood Elevation (BFE). Flood elevations for the HMP Standard correspond to those cited in the Federal Emergency Management Agency (FEMA) letter to the Office of Emergency Services dated April 23, 1987. The flood elevations are summarized in Table 2.

Table 2. HMP Standard Base Flood Elevation

Station	Base Flood Elevation (ft)	
	(NGVD 29)	*(NAVD 88)*
175+00	6.5	9.3
691+60	6.5	9.3

2.1.2.2 Delta Specific PL 84-99 Standard

Approximately 18.9 miles of the 19.5-mile Sherman Island levee system meet the PL 84-99 Standard minimum geometry which consists of a waterside slope of 2:1, landside slope of 3:1, 16-foot-wide crest, and 1-foot of freeboard above the 100-year BFE. Flood elevations for the PL 84-99 Standard are based on the Sacramento – San Joaquin Delta Hydrology Special Study, by USACE, Sacramento District, dated February 1992. The flood elevations are summarized in Table 3.

Table 3. PL 84-99 Standard Base Flood Elevation

Station	Base Flood Elevation (ft)	
	(NGVD 29)	*(NAVD 88)*
0+00	7.9	10.7
70+00	7.6	10.4
175+00	6.5	9.3
691+60	6.5	9.3
860+00	7.5	10.3
1025+64	7.9	10.7

Additionally, approximately 7 miles of the Sherman Island levee system contains counterbalance berms in accordance with the PL 84-99 Standard. Levee sections that contain counterbalance berms are summarized in Table 4.

Table 4. Counterbalance Berms

Start Sta.	End Sta.	Length (ft)
368+00	640+00	27,200
660+00	740+00	8,000
	Total	**35,200**

2.1.2.3 Bulletin 192-82 Standard

The Bulletin 192-82 Standard consists of a waterside slope of 2:1, landside slope of 3:1 – 7:1, 16-foot-wide crest, and 1.5 feet of freeboard above the 300-year BFE. Flood elevations for the Bulletin 192-82 Standard are based on the Sacramento – San Joaquin Delta Hydrology Special Study by the US Army Corps of Engineers, Sacramento District, dated February 1992. The flood elevations are summarized in Table 5.

Table 5. Bulletin 192-82 Standard Base Flood Elevation

Station	Base Flood Elevation (ft)	
	(NGVD 29)	*(NAVD 88)*
0+00	8.3	11.1
70+00	7.9	10.7
175+00	6.8	9.6
691+60	6.8	9.6
860+00	7.8	10.6
1025+64	8.3	11.1

No evaluation of the Sherman Island levee system, in accordance with the Bulletin 192-82 Standard, was conducted as part of this Five-Year Plan. The District's intent is to improve the entire non-project levee system to the PL 84-99 Standard before considering improvements to the Bulletin 192-82 Standard. However, the design incorporated to meet the PL 84-99 Standard will also help facilitate future improvements to the Bulletin 192-82 Standard and to account for climate induced water surface elevation changes, storm surges, and wind wave actions.

2.1.2.4 US Army Corps of Engineers Standard

Approximately 7 miles of the 9.7-mile Sherman Island project levee system meet the USACE Standard, which consists of a waterside slope 3:1, landside slope of 2:1, 20-foot-wide crest, and 3 feet of freeboard above BFE. Flood elevations for the USACE Standard are based on the Supplement to Standard Operation and Maintenance Manual, Sacramento River Flood Control Project, Unit No.101, Reclamation District No. 341, Sherman Island by USACE, Sacramento District, dated February 1962. The flood elevations are summarized in Table 6.

Table 6. USACE Standard Base Flood Elevation

Station	Base Flood Elevation (ft)	
	(NGVD 29)	*(NAVD 88)*
0+00	9.0	11.8
175+00	9.0	11.8
691+60	8.5	11.3
1025+64	9.0	11.8

2.2 Previous Five-Year Plan Progress Report

The District submitted a Five-Year Plan, dated May 2009, to the Delta Levees Program under PFA SH-08-3.0. The 2009 Five-Year Plan outlined three goals for the Sherman Island levee system: 1) improve levees to reduce risk of levee failure and impacts to water quality, water supply reliability, other non-local assets and local assets; 2) ecosystem restoration and habitat enhancement; and 3) reverse land subsidence.

Under PFA SH-10-1.0, the District improved the levee section from 368+00 – 690+00 to the PL 84-99 Standard. PFA SH-10-1.0 also included design work from Sta. 330+00 – 368+00, however due to a lack in funding construction work was not completed. Construction work from Sta. 330+00- 368+00 would have resulted in the entire Sherman Island non-project levee system meeting PL 84-99 Elevation. The District also constructed approximately 600 acres of wetlands as part of the Whale's Mouth Wetland Restoration Project, in conjunction with the Scour Pond Habitat Enhancement Project (PFA SH-12-1.0). As a result, 100% of the District's objectives, from the May 2009 Five-Year Plan, were achieved.

2.3 History with the Delta Levees Program

To date, the District has been awarded funding from the Special Projects Program for the projects listed in Table 7.

Table 7. Delta Levees Special Project Funding Agreements

PFA	Short Description		Amount
SH-97-1.0	Threemile Slough Project (Planning and Design)	$	400,000
SH-97-2.0	Habitat Development	$	312,000
SH-98-1.0	Seepage Control System and Counterbalance Berm	$	462,000
SH-98-2.0	Emergency Levee Work	$	500,000
SH-98-3.0	Seepage Control System and Counterbalance Berm	$	1,400,00
SH-00-1.0	Beneficial Reuse	$	160,000
SH-00-2.0	Levee Crown Raise and Landside Slope Repair	$	160,000
SH-00-3.0	Levee Crown Raise and Replacement of Levee Road	$	150,000
SH-00-4.0	Root Wad Transportation	$	115,000
SH-00-5.0	Threemile Slough Project (Construction)	$	2,500,000
SH-01-1.0	Mayberry Slough Setback Levee (Planning and Design)	$	200,000
SH-01-2.0	San Joaquin River Riprap Slope Protection	$	200,000
SH-01-3.0	Parcel #11 (Planning and Design)	$	50,000
SH-02-1.0	Levee Improvements and Engineering Study	$	335,000
SH-02-2.0	San Joaquin River Riprap Slope Protection	$	800,000
SH-02-3.0	Parcel #11 (Construction)	$	400,000
SH-03-1.0	Counterbalance Berm	$	1,500,000
SH-03-2.0	Parcel #11 Endowment Account	$	100,000
SH-05-1.0	Mayberry Slough/Scour Lake Area Long Term Fix	$	1,000,000
SH-05-2.0	San Joaquin River Splash Cap	$	1,250,000
SH-06-1.0	Implementation of Sherman Island Subsidence Projects	$	250,000
SH-06-2.0	Mayberry Slough Setback Levee (Planning and Design)	$	500,000
SH-06-3.0	Horseshoe Bend Drainage Improvements	$	200,000
SH-07-1.0	Electromagnetic Anomaly Survey	$	39,000
SH-07-2.0	Cross Levee Slope Repair Project	$	250,000
SH-07-3.0	Mayberry Slough Setback Levee (Landside Construction)	$	2,500,000
SH-08-1.0	Mayberry Farms	$	1,610,000
SH-08-2.0	Highway 160 Landside Clearing	$	275,000
SH-08-3.0	Five-Year Plan	$	150,000
SH-08-4.0	Mayberry Slough Setback Levee (Waterside Construction)	$	2,400,000
SH-08-5.0	Groundwater Monitoring Wells	$	200,000
SH-09-1.0	Scour Pond Bench Work	$	2,300,000
SH-09-2.0	Sacramento River Splash Cap (Planning and Design)	$	500,000
SH-09-4.0	Engineering and Beneficial Reuse Study for Dredged Material	$	229,500
SH-10-1.0	PL 84-99 Levee Repair Project	$	5,300,000
SH-10-2.0	Highway 160 Seepage Repair Project	$	2,481,000
SH-12-1.0	Scour Pond Habitat Enhancement Project	$	3,014,000
SH-17-1.0-SP	San Joaquin River Multi-Benefit Project	$	9,626,550
SH-18-1.0-SP	Five-Year Plan	$	35,000
		$	**42,455,450**

In addition to the Special Projects Program, the District has also executed funding agreements with the West Delta Program, Bay-Delta Office, and Flood System Repair Project.

3 PLAN FOR FLOOD PROTECTION

3.1 Desired Level of Protection and Strategy to Meet this Goal

The District's goals for this Five-Year Plan are to achieve the PL 84-99 Standard along all non-project levees, repair erosion along the Highway 160 levee, and address waterside slope deficiencies along the San Joaquin River through the construction of setback levees and habitat benches.

3.1.1 Proposed Cross Sections

From Sta. 199+00 – 270+00, the levee embankment section will incorporate a 28-foot-wide crest, 2:1 waterside slope, 3:1 landside slope, a counterbalance berm for stability. Additionally, the levee section will be setback to allow for habitat restoration on the waterside (Figure 6).

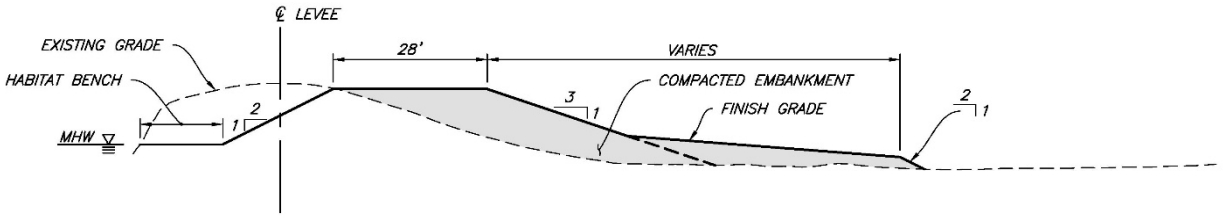


Figure 6. Typical Cross Section I, Sta. 199+00 – 270+00

From Sta. 330+00 – 368+00, the levee embankment section will incorporate a 28-foot-wide crest, 2:1 waterside slope, 3:1 landside slope, and a counterbalance berm for stability (Figure 7).

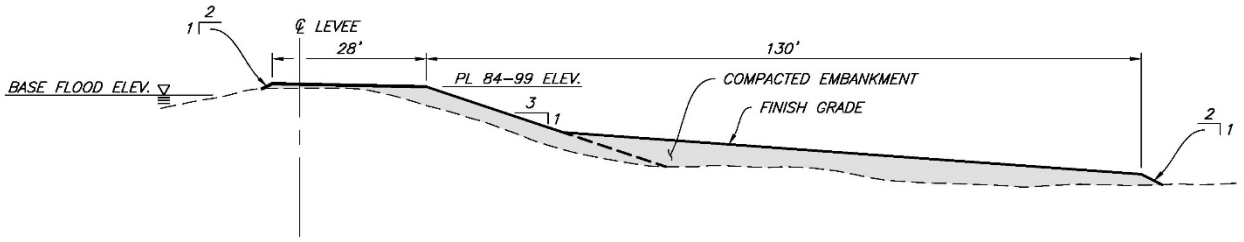


Figure 7. Typical Cross Section II, Sta. 330+00 – 368+00

From Sta. 875+00 – 990+00, the levee section will incorporate a 2:1 waterside slope comprised of riprap and fill material (Figure 8).

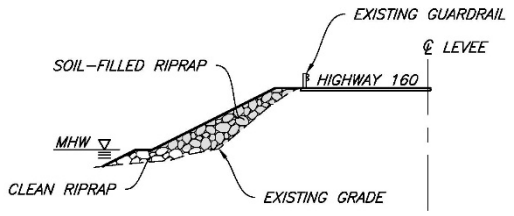


Figure 8. Typical Cross Section III, Sta. 875+00 - 990+00

3.1.2 Proposed Projects to Achieve Five-Year Goal

3.1.2.1 Current Projects

Project:	*SH-10-2.0 Highway 160 Seepage Repair Project*
Project Description:	Repair seepage along Horseshoe Bend from Sta. 879+00 – 933+00.
Status:	Pre-Construction

Project:	*SH-12-1.0 Scour Pond Habitat Enhancement Project*
Project Description:	Filling of scour pound from Sta. 520+00 – 530+00.
Status:	Habitat Monitoring

Project:	*SH-17-1.0-SP San Joaquin River Multi-Benefit Project*
Project Description:	Construction of a setback levee and habitat bench from Sta. 175+00 – 199+00.
Status:	Scope of Work

3.1.2.2 Proposed Projects

Project:	*San Joaquin River PL 84-99 Rehabilitation Project*
Project Description:	Rehabilitate San Joaquin River levee from Sta. 330+00 – 368+00 to the PL 84-99 Standard and reconstruct Sherman Island East Levee Road to County Rural Road Standards.
Fill Material:	83,000 CY
Aggregate Base:	2,800 CY
Asphalt Concrete:	1,000 CY
CEQA:	Initial Study/Mitigated Negative Declaration
Permits:	Section 404 Permit
Mitigation:	Mitigation Credits purchased from approved mitigation bank(s)
Status:	Proposed

Project:	*San Joaquin River Multi-Benefit Project – Phase II*
Project Description:	Rehabilitate San Joaquin River levee from Sta. 199+00 – 368+00 to the PL 84-99 Standard and reconstruct Sherman Island East Levee Road to County Rural Road Standards.
Fill Material:	127,000 CY
Aggregate Base:	5,100 CY
Asphalt Concrete:	1,800 CY
Riprap	6,600 CY
CEQA:	Initial Study/Mitigated Negative Declaration
Permits:	Streambed Alteration Agreement, Section 401 Water Quality Certification, Delta Plan Consistency Determination, Section 404 Nationwide Permit 27, CVFPB Encroachment Permit
Mitigation:	The District expects the Project to be self-mitigating, however actual mitigation requirements will ultimately be determined in coordination with CDFW
Status:	Proposed

Project:	*Highway 160 Erosion Repair Project*
Project Description:	Repair erosion along the Highway 160 levee at various sections from Sta. 875+00 – 990+00.
Fill Material:	4,700 CY
Riprap	14,000 CY
CEQA:	Initial Study/Mitigated Negative Declaration
Permits:	Streambed Alteration Agreement, Section 401 Water Quality Certification, Delta Plan Consistency Determination, Section 404 Permit, CVFPB Encroachment Permit, Caltrans Encroachment Permit
Mitigation:	Self-Mitigating/Mitigation Credits purchased from approved mitigation bank(s)
Status:	Proposed

3.1.2.3 Routine Maintenance

Project:	*Subsidence Repair Program*
Project Description:	Repair levee subsidence as areas are identified.
CEQA:	Notice of Exemption
Permits:	None
Mitigation:	None
Status:	Ongoing

Project:	*Seepage Repair Program*
Project Description:	Repair seepage as areas are identified.
CEQA:	Notice of Exemption
Permits:	None
Mitigation:	None
Status:	Ongoing

Project:	*Riprap Slope Protection Repair Program*
Project Description:	Repair riprap slope protection as areas are identified.
CEQA:	Notice of Exemption
Permits:	None
Mitigation:	None
Status:	Ongoing

Project:	*Levee Crest Patrol Road Repair Program*
Project Description:	Repair levee crest patrol road as areas are identified.
CEQA:	Notice of Exemption
Permits:	None
Mitigation:	None
Status:	Ongoing

3.1.3 Estimated Project Costs

Table 8 summarizes the project costs for the San Joaquin PL 84-99 Leve Rehabilitation Project, San Joaquin River Multi-Benefit Project – Phase II, and Highway 160 Erosion Repair Project.

Table 8. Estimated Project Costs

Project	Construction	Engineering & Project Management	Construction Monitoring	Environmental Review & Permitting	Total Project Cost
PL 84-99 Project	$4,600,000	$450,000	$360,000	$90,000	$5,500,000
Multi-Benefit Project	$10,000,000	$900,000	$800,000	$300,000	$12,000,000
Erosion Repair	$4,800,000	$480,000	$380,000	$150,000	$5,810,000
Total	**$19,400,000**	**$1,830,000**	**$1,540,000**	**$540,000**	**$23,310,000**

Construction costs assume the use of imported borrow material. Cost for engineering, project management, construction monitoring, and environmental review are estimates based on percentages of the total construction cost for each project.

3.1.4 Potential Cost Sharing Partners

Besides the Delta Levees Special Projects and Delta Levees Maintenance Subventions Programs, the District will attempt to secure funding partners through other agencies. Possible funding partners include but are not limited to: Sacramento County, Caltrans, Delta Conservancy, USACE, and the California Department of Fish and Wildlife (CDFW).

3.1.5 Requested Cost-Share with the Delta Levees Special Projects Program

The District requests a State cost-share of 95% for the proposed projects in this Five-Year Plan. The Base State cost-share for projects within the Primary Zone of the Delta, as defined under the Water Code Section 12220, is set at 75%. The State cost-share may be increased, by as much as 20%, if the proposed projects achieve a significant contribution to specific public purposes.

Legislature recognized the importance of protection of the eight western islands in the Delta, the largest of which is Sherman Island. Protection of Sherman Island is legislatively mandated in Water Code Section 12311.

3.1.6 Estimated Schedule

An estimated schedule is included as Figure 9, however the schedule could be delayed due to a lack of State funding and/or permitting issues.

	Year				
Project	**1**	**2**	**3**	**4**	**5**
San Joaquin River PL 84-99 Rehabilitation Project					
Highway 160 Erosion Repair Project					
San Joaquin River Multi-Benefit Project - Phase II					
Subsidence Repair Program					
Seepage Repair Program					
Riprap Slope Protection Repair Program					
Levee Crest Patrol Road Repair Program					

Figure 9. Estimated Schedule of Work

3.1.7 Agency Contributions to Five-Year Goals

The Delta Levees Special Projects Program will contribute to the District's five-year goals by providing funding for levee rehabilitation projects through Project Solicitation Packages or Directed Actions. Additionally, the Delta Levees Subventions Program will contribute to the District's five-year goals by reimbursing the District's routine maintenance programs. CDFW will ensure that projects are consistent with Water Code Section 12314, which requires no net long-term loss of habitat, and net habitat improvement.

3.1.8 Constraints and Obstacles

3.1.8.1 State Funding

The District will rely primarily on the Delta Levees Special Projects Program for levee rehabilitation projects. The District can fund levee rehabilitation projects through the Delta Levees Subventions Program, however funding through the Subventions Program is very limited and the District can only receive advance payments up to 35% of the total project cost for projects over $1,000,000. On the other hand, the District can receive advance payments up to 90% of the total project cost through the Special Projects Program.

3.1.8.2 Permitting

From the District's experience, acquiring permits for waterside work can take anywhere from 12 to 18 months. For work that needs to occur on the levee waterside (e.g. habitat restoration, erosion repairs, etc.,), the District will design projects above Mean High Water (MHW) to minimize impacts and streamline the permitting process.

3.1.8.3 Sacramento County Roads

Levee rehabilitation projects that encompass a County road will require reconstruction of the road. Additionally, due to safety concerns with a 16-foot-wide road, the County has required the District to reconstruct County roads to at least a 28-foot width (i.e.10-foot travel lanes along with 2-foot shoulders). To reduce costs to the District and State, the District will attempt to acquire funding from the County for projects that require reconstruction of a County road.

3.1.8.4 State Highway 160

The Sherman Island levee system supports approximately 2.2 miles of State Highway 160 from Sta. 875+00 – 990+00. The presence of the Highway makes maintenance of the waterside levee slope difficult under the District's routine maintenance program. Work along the Highway 160 levee waterside slope would require one-way traffic control on the Highway and temporary removal of the guardrail on the waterside hinge.

3.1.8.5 Island Security

Due to Sherman Island's remote location and access to fishing, boating, and windsurfing along the Sacramento and San Joaquin Rivers, the District has had ongoing issues with loitering, trespassing, vandalism, littering and theft. Most of the activity comes along the Sacramento River, on West Sherman Island Road, due to the availability of parking and waterside river access. This becomes an issue for the District when patrons physically alter the levee prism by removing riprap slope protection to make fires or temporary housing.

To combat these issues the District installed multiple Arlo GO 3G/4G LTE wireless security cameras to monitor entry points and District facilities. Additionally, the District installed 14 signs warning visitors of prohibited activities and 4 signs notifying the presence of the security cameras (Figure 10).

Figure 10. Security Camera and Signs

3.2 Inventory of Assets Protected by the Sherman Island Levee System

According to the 2010 census, Sherman Island has a population of 190 people, with 100 occupied dwelling units. The County General Plan designates approximately 500 acres of recreational land and about 10,000 acres of agricultural cropland/resource conservation area. Sherman Lake is designated as a natural preserve.

In addition to agricultural uses, several recreational vehicle parks and marinas for local and public use are located on Sherman Island including Rio Viento on the Sacramento River side, Eddos Harbor and RV park which includes a 70 berth marina on the San Joaquin River side, Sherman Lake Marina on Sherman Lake, and the Outrigger Marina located on the Island's northeast corner. In total, the Island provides 368 marina berths, a boat launch maintained by the County and one fishing access site. A map showing the assets protected by the Sherman Island levee system is included as Exhibit 4.

3.2.1 Local Assets

According to the Delta Risk Management Strategy (DRMS), dated February 2009, the Sherman Island levee system protects approximately $110,416,000 in local assets (*Table 12-6*). Accounting for inflation, the levee system currently protects approximately $138,000,000 in local assets. Table 9 and Table 10 provide a breakdown of local assets for which the District can levy assessments:

Table 9. District Land Use

Description	Acres
Agricultural	5,379.09
Agricultural - Irrigated from District Facilities	3,673.73
Recreational & Commercial	997.13
Residential	188.01
Utilities	0.75
Total	**10,238.71**

Table 10. Utility Easements

Description	Acres
California Resources Production Corporation	4.70
Lodi Gas Storage	13.20
Nextel Communications	0.20
Pacific Gas and Electric Co.	469.34
Western Area Power Administration (WAPA)	83.54
Total	**570.98**

The local assets described above include recreational facilities, easements for infrastructure and local infrastructure. Sherman Island Levee Road, a 10 to 24-foot-wide road both paved and graveled, runs on the levee crown. The road provides access to the recreational vehicle parks and marinas for local and public use, and recreational resources such as fishing, windsurfing, and Sherman Island County Park.

3.2.2 Habitat Areas

The District has completed several projects which converted farmland into native habitat. The habitat areas on the Island include the following:

- Parcel 11, an approximately 14-acre riparian forest/scrub-shrub mitigation site,
- Mayberry Farms Subsidence Reversal Project, a 300-acre permanent wetland,
- Whale's Mouth Wetland Restoration Project, a 600-acre permanent wetland, and
- Whale's Belly Wetland Restoration Project, a 936-acre permanent wetland.

In addition to the on-island habitat areas, the levee system also supports waterside habitat. 8.5 acres of waterside habitat were constructed as part of the Mayberry Slough Setback Levee Project (SH-08-4.0).

3.2.3 Fish Release Facilities

DWR constructed a Fish Release Facility as a court ordered mitigation for water exports to Southern California. The Fish Release Facility project was implemented to comply with the National Marine and Fisheries Services' 2009 Biological Opinion on the Long-term Operations of the CVP, SWP, and CDFW's Longfin Smelt Incidental Take Permit for the SWP's Delta Facilities and Operations. Specific requirements are to reduce predation of salvaged fish at the fish release sites and increase salvaged fish survivals rates. The project consists of two separate fish release sites: Little Baja and Manzo Ranch (Figure 11). Also, as part of the project, the District rehabilitated the levee section from Sta. 700+00 – 740+00. The project was completed in 2018.

Figure 11. Manzo Ranch Fish Release Facility

In addition to the Fish Release Facility recently constructed by DWR, Sherman Island is home to four other facilities: Curtis Landing which is operated by DWR, Emmaton and Horseshoe Bend which are operated by the U.S. Fish and Wildlife Service, and an additional unnamed facility which is operated by CDFW.

3.2.4 Non-Local Assets

The Sherman Island levee system protects non-local assets which provide a public benefit, including infrastructure, utilities, water quality and water supply reliability. Below is a list of the non-local assets protected by the levee system:

- Water Delivery System
    - State Water Project (SWP)
        - South Bay Aqueduct
        - North Bay Aqueduct
    - Federal Central Valley Water Project (CVP)
        - Delta Mendota Canal
        - California Aqueduct
        - Contra Costa Canal
    - Miscellaneous Diversions Directly from the Delta
        - Western Delta Industry
        - 1800+ Agricultural Diverters
        - City of Vallejo diversion
- Infrastructure
    - State Route 160
    - Highway 160 Drawbridge
    - Dam (forms Mayberry Canal)
- Utilities
    - Major 500kV Transmission Lines
        - WAPA California Oregon Transmission Project
        - PG&E Table Mountain-Tesla line
        - PG&E Vaca Dixon-Tesla line
    - Natural Gas Resources
        - Natural gas pipeline from Canada
        - Natural gas storage area
    - Telecommunication and fiber optic lines
    - US Geological Survey accelerometers

3.3 Risk for Current Land Use Based on the Existing Assets

3.3.1 Consequences of Levee Failure or Breach

In addition to the costs incurred to repair or replace the assets destroyed by a Sherman Island levee failure, an immediate cost would be pumping out the island. To estimate the cost of restoring Sherman Island, we considered the 2004 failure of the Upper Jones Tract, an island of 6,259 acres which cost approximately $120 million to restore. This equates to about $19,100 per acre. Accounting for inflation, the per acre cost would be $23,800. Accordingly, it would cost approximately $238 million to pump out and restore Sherman Island (10,000 acres X $23,800 per/acre = $238,000,000). This estimate is conservative in that it does not account for the elevations on the interior of Sherman Island, which are up to 20 feet below sea level. Sherman Island would likely impound a greater volume of water per acre than Upper Jones Tract, and per acre restoration costs will therefore be greater.

3.3.1.1 State Infrastructure

Sherman Island levees protect State Highway 160 and the drawbridge at Threemile Slough. State Route 160 connects Sherman Island to the mainland Sacramento County on the northeast corner via Threemile Slough Bridge (Bridge 24-0121), and to Contra Costa County on the island's southwest side, via the Antioch Bridge (Bridge 28-0009). Failure of the Sherman Island levee system and resulting loss of State Route 160 and access to the Antioch Bridge would severely impact truck and vehicular traffic relying on this roadway. To determine the reduction in public benefit which would be realized should the levees fail, we reviewed Annual Average Daily Traffic (AADT) counts and Annual Average Daily Truck counts available from Caltrans. AADT is the total volume of traffic from October 1st through September 30th divided by 365 days. The results are shown on Table 11.

Table 11. 2018 State Route 160 Traffic Counts

Count Location	AADT		Truck AADT	
	Back	Ahead	Back	Ahead
Contra Costa/Sac County Line	18,000	18,500	1,980	-
Junction Route 12	20,000	7,600	1,860	563

Notes:

(1) For South to North routes, back AADT represents traffic south of the count location and ahead ADDT represents traffic North of the count location.

The above table shows that in addition to the inconvenience to the general public caused by the loss of a major state highway, truck traffic along State Route 160 is significant, and loss of the roadway would disrupt intrastate commerce.

The DRMS report estimates that closure of State Highway 160 would cost approximately $120,000 per day (*Table 12-13).* Accounting for inflation, closure of Highway 160 would cost approximately $150,000 per day.

3.3.1.2 Transmission Lines

Three major electric transmission lines (greater then 500kV) cross Sherman Island: the California Oregon Transmission Project, operated by the Western Area Power Administration, the Pacific Gas and Electric Company (PG&E) Table Mountain-Tesla line, and the PG&E Vaca-Dixon-Tesla line (Figure 12). These lines work mainly to interconnect California loads and generation with loads and generation in the Pacific Northwest. The three lines through the Delta are operated as a coordinated grouping, with maximum imports or exports limited to provide some joint redundancy to help ensure reliability. The DRMS report estimates that an outage of these transmission lines would cost the State approximately $10.5 million per line per summer month (*Page 12-35*). Accounting for inflation, the cost would be approximately $13 million per line per summer month.

Figure 12. Transmission Lines at Sta. 300+00

PG&E also operates two other lines with less than 500kV capacity to provide local service to Sherman Island and nearby Delta Islands. Failure of the Sherman Island levee system would impact the ability of PG&E to serve the local Delta community.

3.3.1.3 Natural Gas Resources

Sherman Island has 60 natural gas wells and approximately 1,082 acres of gas production fields. In addition, the levees protect 145,514 feet of a natural gas pipeline which originates in Canada and crosses Sherman Island. Failure of the Sherman Island levee system would interrupt gas service through the pipeline and gas production and storage occurring on Sherman Island.

3.3.1.4 Water Quality

Sherman Island levees provide a public benefit by maintaining water quality and water supply reliability for cities and farms in the San Francisco Bay area, San Joaquin Valley, and Southern California. Sherman Island is situated where fresh river water and salty bay water meet and mix. Under typical summer salinity conditions in the lower Sacramento River, salinity rises sharply around Sherman Island. Consequently, the island's levees are critical to controlling salinity

intrusion to the interior Delta. A levee break would increase the rate and area of mixing and would allow the saline bay water to move further upstream, jeopardizing the fresh water supply taken from the Delta for the CVP water supply, the SWP and the Contra Costa intake.

An artificial balance is maintained in the water exchanged between the Delta and the San Francisco Bay. Freshwater inflows regulated by upstream dams and diversions supply water to the Delta ecosystems and to farms and cities in central and southern California. Failure of Sherman Island levees would tip the water exchange balance in favor of more saltwater intrusion, which can ruin the water for agriculture and domestic uses supplied by the SWP and the CVP. Any reductions in the supply of imported Delta water could force water purveyors in many parts of the State to meet water demand with ground-water supplies. This, in turn, could renew land subsidence in the Santa Clara and San Joaquin Valleys and exacerbate subsidence in Antelope Valley and other areas that currently are reliant on imported Delta water supplies and prone to aquifer-system compaction.

The presence of the western Delta islands, Sherman Island in particular, is believed to effectively inhibit the inland migration of the salinity interface between the Bay and Delta. If Sherman Island were to become permanently inundated with saline water, the water available to the massive pumping facilities near the Clifton Court Forebay might become too saline to use. The timing of levee breaks and flooding is critical in this regard. Fortunately, most flooding occurs in winter and spring when major saltwater intrusion is less likely. However, there are occasional levee failures under low-flow conditions. These failures can cause major short-term water-quality problems, even if the flooded areas are later reclaimed. During one such incident, which occurred in summer of 1972, the Andrus Island levee failed, flooding an area slightly larger than Sherman Island. Salt concentrations in the central and western Delta quickly showed an increase up to six hundred percent. It took a large volume of extra reservoir releases to flush the salty water from the west Delta. The Andrus Island levee break may also have been a contributing factor in high mortality of juvenile bass that year. Similar impact could occur if one of Sherman Island's levees were to fail under low flow conditions.

DWR modeled salinity impacts of levee breaches in the Delta with the DWR Delta Simulation Model 1 (DWRSIM1). In particular, DWR modeled the long-term impacts of un-repaired levees. DWRSIM1 accounted for Delta bathymetry, tidal fluctuations, facility configurations, water exports, breach size, and location. The model predicted altered salinity levels and compared them to historical salinity levels over four years at eight locations in the Delta (DWR, 1999). DWR concluded that un-repaired levee breaches on Sherman Island would nearly double salinity near the Contra Costa Water District intakes.

Reducing increased salinity levels hinges on repairing the levee breaks, flushing the Delta with upstream reservoir releases, and pumping out salt water in the south Delta (DWR, 1982). Failure to repair the levees in a timely manner not only perpetuates elevated salinity levels in the Delta but also increases the damage to remaining portions of the levee systems. While the islands are inundated, the interior face of the levee is subject to wind generated wave erosion. The combination of several large levee breaches and waves rapidly eroding the levees from the interior increases the amount of time and material necessary to repair the levees, and subsequently, the amount of time to reduce salinity levels to acceptable levels. If emergency response teams are

unable to repair all the levee breaches and pump water off the islands, it is conceivable that salinity levels will remain elevated and terminate an entire year or more of water exports. If a levee were to break and not be repaired, the situation would continue, resulting in long-term degradation of Delta water quality that would adversely affect several beneficial uses, including fish and wildlife, municipal and industrial, and agricultural uses. The situation would be especially severe on Sherman Island because of the Island's size (approximately 10,000 acres) and interior elevation, which is more than 20 feet below sea level.

The quality of water supplies derived from the Delta depends to a great extent on the path the water takes through the Delta to the export facilities. Water diverted from the Sacramento River upstream of Sherman Island and transported through the Delta waterway to the Delta export facilities maintains good water quality because mixing with saline water from the ocean is minimal or non-existent. Water that takes a reverse flow path around the western end of Sherman Island is of poorer quality because it is forced to blend with ocean-derived water high in chlorides. Increased chloride levels affect the ability of water project operators to meet Delta water quality standards. Permanent flooding of Sherman Island would worsen this situation resulting in even higher chloride concentrations. This would require modifications in project operations involving releases of upstream storage to help offset the chloride levels.

The water supply relied upon by the CVP, SWP and miscellaneous diversions directly from the Delta, and the regions they serve would be negatively impacted should water quality fall below acceptable standards due to a salinity increase caused by failure of Sherman Island levees.

3.3.2 Existing Deficiencies in the Levee System

The Sherman Island levee system contains elevation deficiencies relative to the PL 84-99 and USACE Standards, waterside erosion that could compromise Highway 160, and natural gas line crossings that could pose a threat if they were to fail. A map of Sherman Island levee system deficiencies is included as Exhibit 5. A levee centerline profile, which includes PL 84-99 and USACE design elevations, is included as Exhibit 6.

3.3.2.1 PL 84-99 Elevation Deficiencies

Table 12 summarizes levee sections, to the nearest 500 feet, that are below the PL 84-99 elevation.

Table 12. PL 84-99 Elevation Deficiencies

Start Sta.	End Sta.	Length (ft)
20+00	30+00	1,000
330+00	340+00	1,000
345+00	355+00	1,000
	Total	**3,000**

3.3.2.2 USACE Elevation Deficiencies

Table 13 summarizes project levee sections, to the nearest 500 feet, that are below the USACE elevation.

Table 13. USACE Elevation Deficiencies

Start Sta.	End Sta.	Length (ft)
15+00	50+00	3,500
95+00	115+00	2,000
120+00	145+00	2,500
690+00	705+00	1,500
735+00	750+00	1,500
755+00	765+00	1,000
780+00	790+00	1,000
855+00	875+00	2,000
	Total	**15,000**

3.3.2.3 Highway 160 Waterside Erosion

Table 14 summarizes levee sections along Highway 160 that have been documented by USACE in the 2017 Annual Erosion Reconnaissance Field Report, Sacramento Riverbank Protection Project.

Table 14. Highway 160 Waterside Erosion

Start Sta.	End Sta.	Length (ft)	Status
874+50	881+50	800	Critical
907+00	912+50	550	Eroding
935+50	949+00	1,350	Critical
952+00	964+50	1,200	Critical
979+00	989+00	300	Eroding
	Total	**4,200**	

Under an emergency declaration, in July 2019 the District repaired the waterside levee slope from Sta. 945+50 – 951+00. Erosion in the levee section began to undermine the integrity of the Highway 160 shoulder leaving guardrail posts unsupported (Figure 13).

Figure 13. Highway 160 Erosion, Sta. 948+50

3.3.2.4 Gas Line Crossings

The Sherman Island levee system contains 10 gas line crossings that could pose a threat if the lines were to fail within or near the levee section. Table 15 summarizes the levee sections which contain gas line crossings.

Table 15. Gas Line Crossings

Owner	Sta.
Pacific Gas & Electric Co.	66+50
California Resources Corporation	197+50
Pacific Gas & Electric Co.	294+00
Calpine Corporation	297+00
Pacific Gas & Electric Co.	478+00
Pacific Gas & Electric Co.	484+75
Pacific Gas & Electric Co.	509+75
Pacific Gas & Electric Co.	755+50
Pacific Gas & Electric Co.	816+50
Pacific Gas & Electric Co.	828+00

Note
(1) Gas line crossing at Sta. 484+75 was decommissioned in 2017, however a portion of the line remains in the levee section.

On February 26, 2020, a gas leak appeared near the levee toe at Sta. 478+00. Once the pipe was exposed it was discovered that the leak was a result of a vertical crack on the side of the pipeline adjacent to an elbow where the pipe changes direction (Figure 14). It was also discovered that the gas line was resting on another pipe located directly beneath; the other pipe was an abandoned drip line that used to remove condensation from the gas line to prevent corrosion. PG&E theorized that settlement had caused the two pipes to come together over time and the force between the two caused the crack in the pipeline.

Figure 14. Exposed Fractured Natural Gas Line, Sta. 478+00

3.3.3 Urgency of Repair Work

The District's priority is to achieve PL 84-99 Elevation along the entire non-project levee system. The District's second priority is to repair erosion along the Highway 160 levee. Even though the Highway 160 levee meets both the USACE and PL 84-99 Standard, continued erosion will result in undermining of the highway.

3.4 Multi-Benefit Projects

3.4.1.1 Ecosystem Restoration and Habitat Enhancement

Opportunities of ecosystem restoration and habitat are present within the San Joaquin River Multi-Benefit Project. The construction of setback levees will allow for habitat restoration on the levee waterside.

3.4.1.2 Reversing Land Subsidence

As mentioned in Section 3.2.2, the District has completed several projects that have converted farmland into native wetlands. Wetlands will reverse land subsidence while providing habitat for native species.

3.4.1.3 Ensuring Adequate and Effective Emergency Response Plans

The District is planning to update its emergency response and evacuation plan to include all areas of concern documented in this Five-Year Plan.

3.4.1.4 Improving Water Quality

Failure of the Sherman Island levee system could impact Delta water quality, therefore continued maintenance and rehabilitation of the levee system will protect Delta water quality.

3.4.1.5 Improving Water Supply Reliability

Continued maintenance and rehabilitation of the Sherman Island levee system will improve water supply reliability.

3.4.1.6 Improving Levee Stability and Integrity

Levee stability and integrity can be improved with the construction of counterbalance berms. Counterbalance berms not only reduce the amount of fill material needed to achieve the PL 84-99 Standard; they also prevent levees from becoming taller through the subsidence of peat soils. Once constructed, the berms will cap the peat soils and prevent them from further subsiding near the levee.

3.4.1.7 Addressing Actions listed in the Governor's California Water Action Plan

Continued rehabilitation of the Sherman Island levee system and restoration of the island's habitat will address the following actions from the Governor's California Water Plan: 1) Make conservation a California way of life; 3) Achieve the coequal goals for the Delta; 4) Protect and restore important ecosystems; 7) Provide safe water for all communities; 8) Increase flood protection.

4 PLANS FOR PERMITS AND HABITAT

4.1 Habitat Mitigation and Enhancement

4.1.1.1 Pre-Existing Habitat Conditions

On May 1, 2000, CDFW recorded levee-related fish and wildlife habitat data on Sherman Island. A total of 38.6 acres of levee-associated habitat and 2,855.5 linear feet of Shaded Riverine Aquatic habitat were recorded (Table 16). CDFW's Levee Log is included as Exhibit 7.

Table 16. Sherman Island Habitat Summary

Habitat Type	Quantity	Unit
Freshwater Marsh (FM)	19.64	AC
Riparian Forest (RF)	9.16	AC
Riparian Scrub-Shrub (RSS)	9.8	AC
Shaded Riverine Aquatic (SRA)	2,855.5	LF

4.1.1.2 Anticipated Impacts and Opportunities for Avoidance

The proposed projects have the potential to impact designated critical habitat for listed fish on the levee waterside and occur within 200 feet of aquatic habitat for giant garter snake. With standard avoidance and minimization measures (e.g. appropriately timed botanical surveys, preconstruction surveys, biological monitoring, protective nest buffers, species specific limited operating periods recommended by resource agencies, etc.) and additional avoidance and minimization measures developed in consultation with State and Federal agencies, direct impact to these species will be unlikely.

4.1.1.3 On-Site Habitat Mitigation Opportunities

The construction of setback levees will provide opportunities to establish SRA, RF, and RSS on the levee waterside. Additionally, the District can mitigate on-island with the expansion of Parcel 11 if funding is provided by DWR for establishment and long-term management. Parcel 11 was last proposed to be expanded in 2012 due to habitat impacts from work performed under PFA SH-08-2.0. However, the proposal was abandoned due to lack of DWR funding.

4.1.1.4 On-Site Ecosystem Enhancement Opportunities

As mentioned in Section 3.2.2, the District, in conjunction with DWR, has completed several projects that have converted farmland into native wetlands. Future wetland restoration projects are planned; however, they are contingent on the availability of State funding.

4.2 Compliance with CEQA and Permits

4.2.1.1 California Environmental Quality Act (CEQA)

The District will prepare an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed projects since they have the potential for environmental impacts. Reclamation District No. 341 will act as the Lead Agency under the California Environmental Quality Act. ISMNDs will be provided for review by DWR and CDFW, as part of the Draft Scope of Work, before Mitigated Negative Declarations are filed.

4.2.1.2 California Department of Fish and Wildlife

Any activity in State waters, including work on the landside slope, is covered under Fish and Wildlife Code 1600. This covers the protection and conservation of fish and wildlife resources of the State. Proposed projects that impact the levee waterside slope will require a Streambed Alteration Agreement. Typical requirements will consist of seasonal work restrictions, biological monitoring before and during construction, the use exclusion fencing, and mitigation for habitat impacts.

4.2.1.3 California Department of Transportation

A Caltrans Encroachment Permit must be obtained for any activities related to the placement of encroachments within, under, or over State highway rights of way.

4.2.1.4 California State Lands Commission

The California State Lands Commission is responsible for the management and protection of the State's sovereign lands which include navigable waterways, and tide and submerged lands. Proposed projects within sovereign lands will require a Lease of State Lands from the Commission.

4.2.1.5 Central Valley Flood Protection Board

The Central Valley Flood Protection Board is responsible for ensuring that appropriate standards are met for the construction, maintenance, and protection of adopted flood control plans that will best protect the public from floods. Any work on project levees or waterside work on non-project levees will require a Central Valley Flood Protection Board Encroachment Permit. Typical requirements include construction limitations on the levee or within the levee section during the flood season from November 1st to April 15th.

4.2.1.6 Central Valley Regional Water Quality Control Board

Proposed projects with excavation and placement of fill material within navigable waters are subject to Section 401 of the Clean Water Act. The certification will make a determination of the Project's impacts to State water quality standards.

4.2.1.7 Delta Stewardship Council

The Sacramento-San Joaquin Delta Reform Act of 2009 requires the Delta Stewardship Council to review State and local public agency actions within the Delta to determine the action's consistency with the Delta Plan.

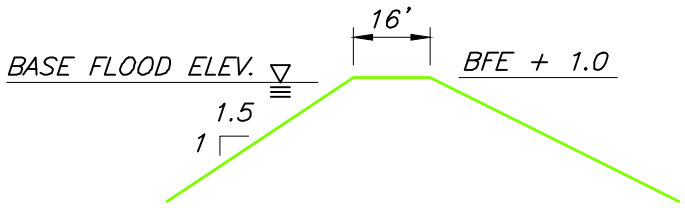
4.2.1.8 US Army Corps of Engineers

USACE must review proposed projects on the levee waterside to ensure they comply with Section 10 of the River and Harbors Act and Section 404 and 401 of the Clean Water Act and associated Section 7 consultation with the National Marine Fisheries Service and United State Fish and Wildlife Service. Typical requirements will consists identifying limits of disturbance in the field with highly visible markers prior to commencement of construction within waters of the U.S. and mitigating the loss of waters of the U.S. USACE must also review proposed projects on federally authorized Civil Works (project levees) under 33 USC 408 (Section 408). Proposed projects must not be injurious to the public interest or impair the usefulness of the USACE project.

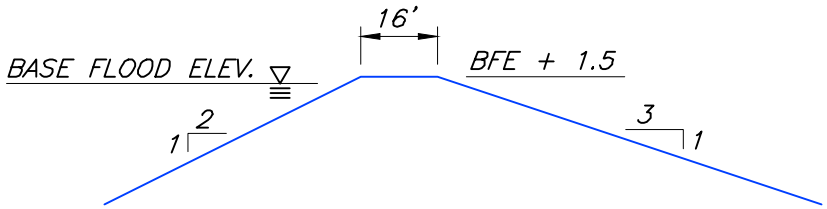
EXHIBIT 1. LEVEE SYSTEM CROSS SECTIONS

NOTES

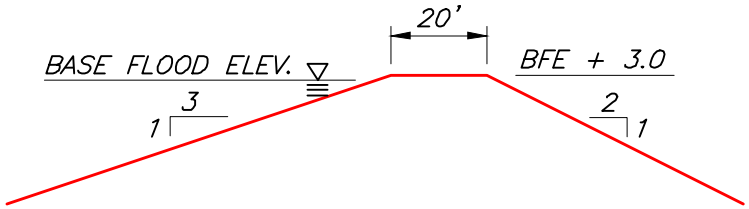
1. BENCHMARK = NOS TIDAL BM 5196 A 1992, ELEVATION 14.76 (NAVD 88).
2. SURVEY PER MUIR CONSULTING, INC., DATED DECEMBER 2015.
3. HMP BASE FLOOD ELEVATION CORRESPONDS TO THE ELEVATIONS CITED IN THE FEMA LETTER TO THE OFFICE OF EMERGENCY SERVICES DATED AUGUST 11, 1987. ELEVATIONS CONVERTED FROM NGVD 29 TO NAVD 88 BY DATUM SHIFT OF +2.8.
4. PL 84-99 BASE FLOOD ELEVATION PER SACRAMENTO-SAN JOAQUIN DELTA CALIFORNIA, SPECIAL STUDY, HYDROLOGY BY US ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT, DATED FEBRUARY 1992. ELEVATIONS CONVERTED FROM NGVD 29 TO NAVD 88 BY DATUM SHIFT OF +2.8.
5. USACE BASE FLOOD ELEVATION PER SUPPLEMENT TO STANDARD OPERATION AND MAINTENANCE MANUAL, SACRAMENTO RIVER FLOOD CONTROL PROJECT, UNIT NO. 101, RECLAMATION DISTRICT NO. 341, SHERMAN ISLAND BY USACE, SACRAMENTO DISTRICT, DATED FEBRUARY 1962. ELEVATIONS CONVERTED FROM NGVD 29 TO NAVD 88 BY DATUM SHIFT OF +2.8.



HAZARD MITIGATION PLAN GEOMETRY



DELTA SPECIFIC PL 84-99 MINIMUM GEOMETRY



US ARMY CORPS OF ENGINEERS GEOMETRY

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
NOTES

REGISTERED PROFESSIONAL ENGINEER
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CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
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Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 0 OF 53 SHEETS

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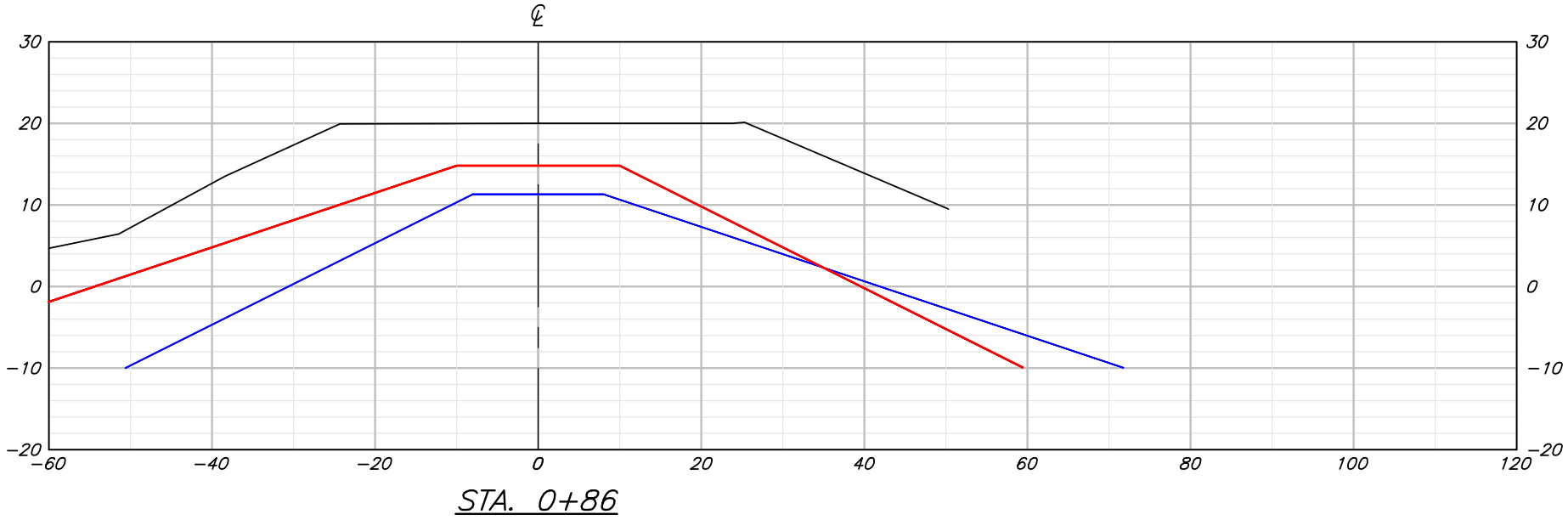

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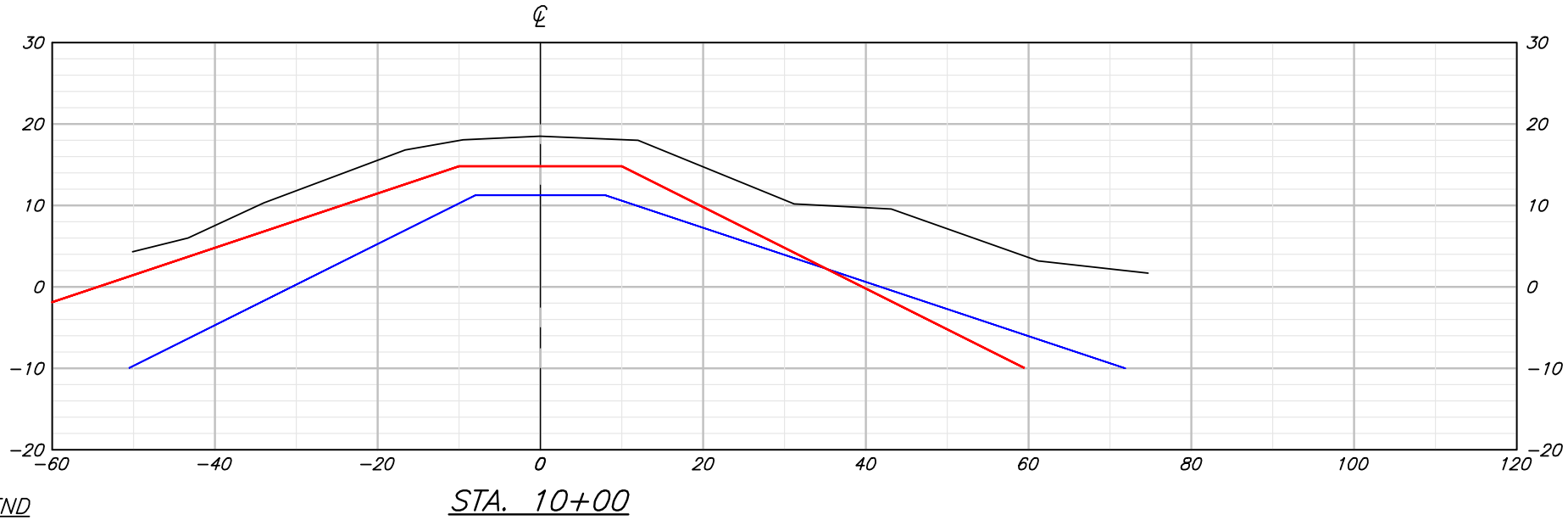

STA. 10+00

LEGEND

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STATION 0+86 AND STATION 10+00

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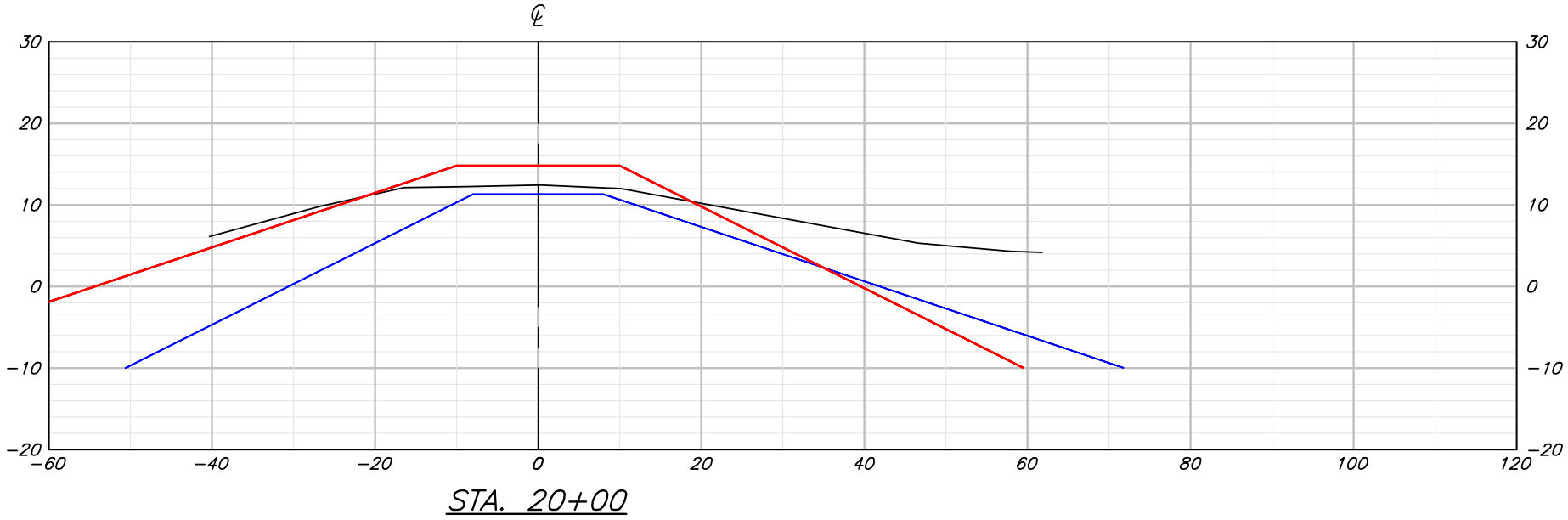

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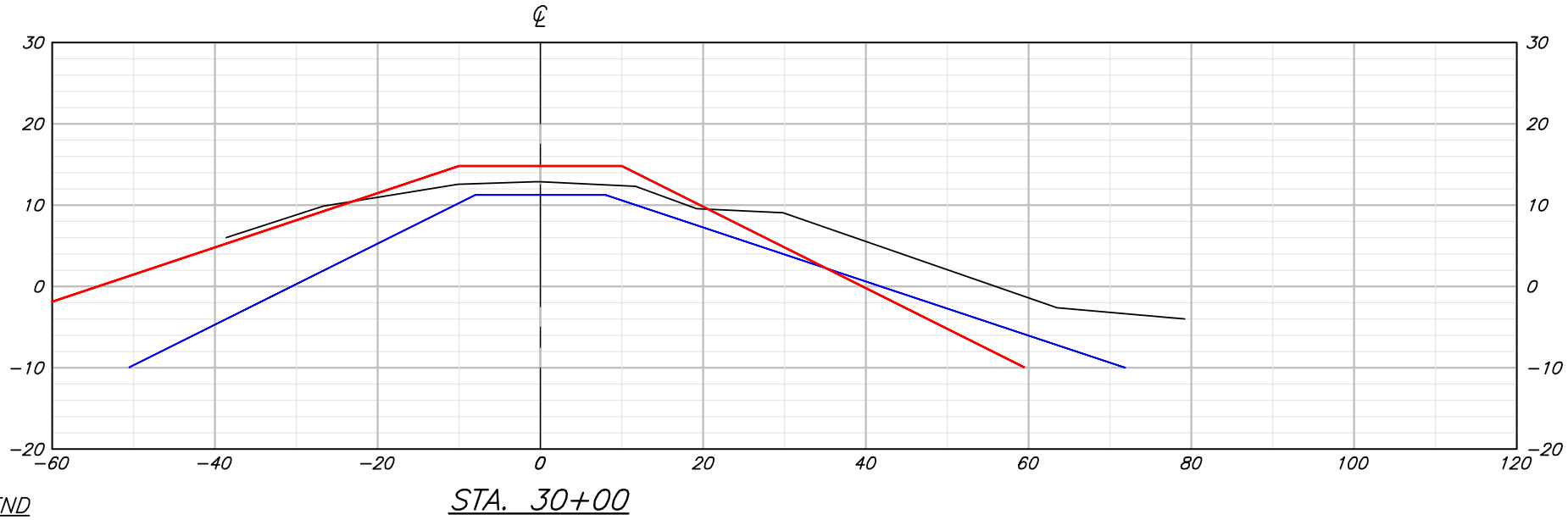

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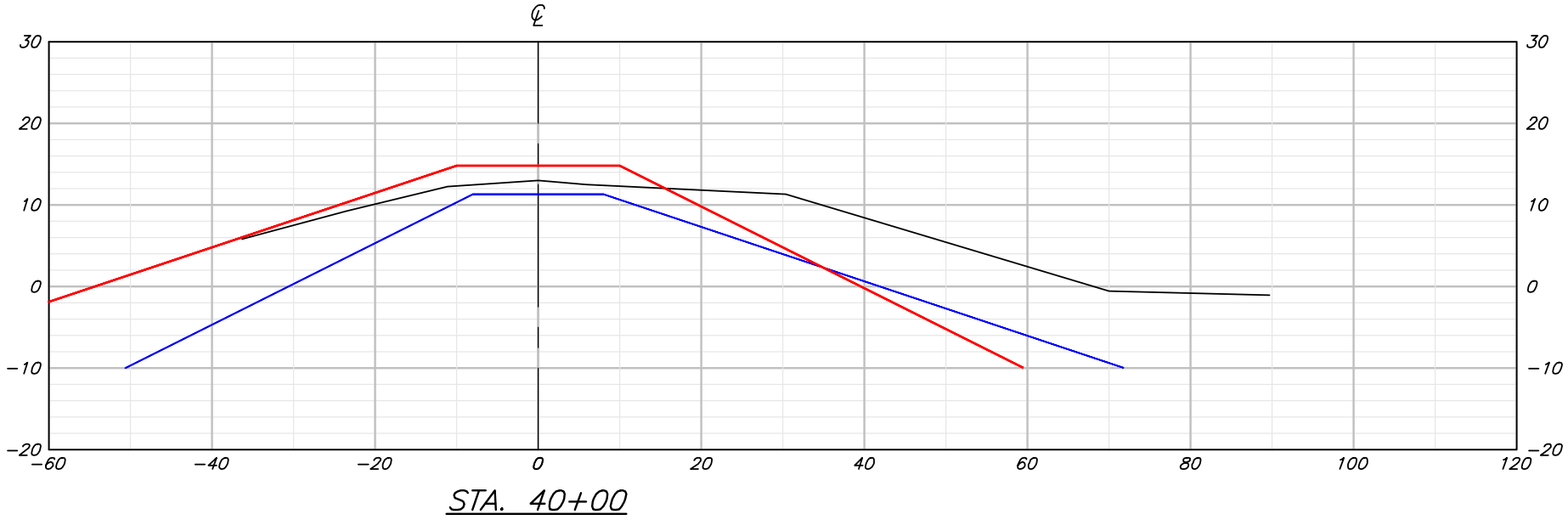

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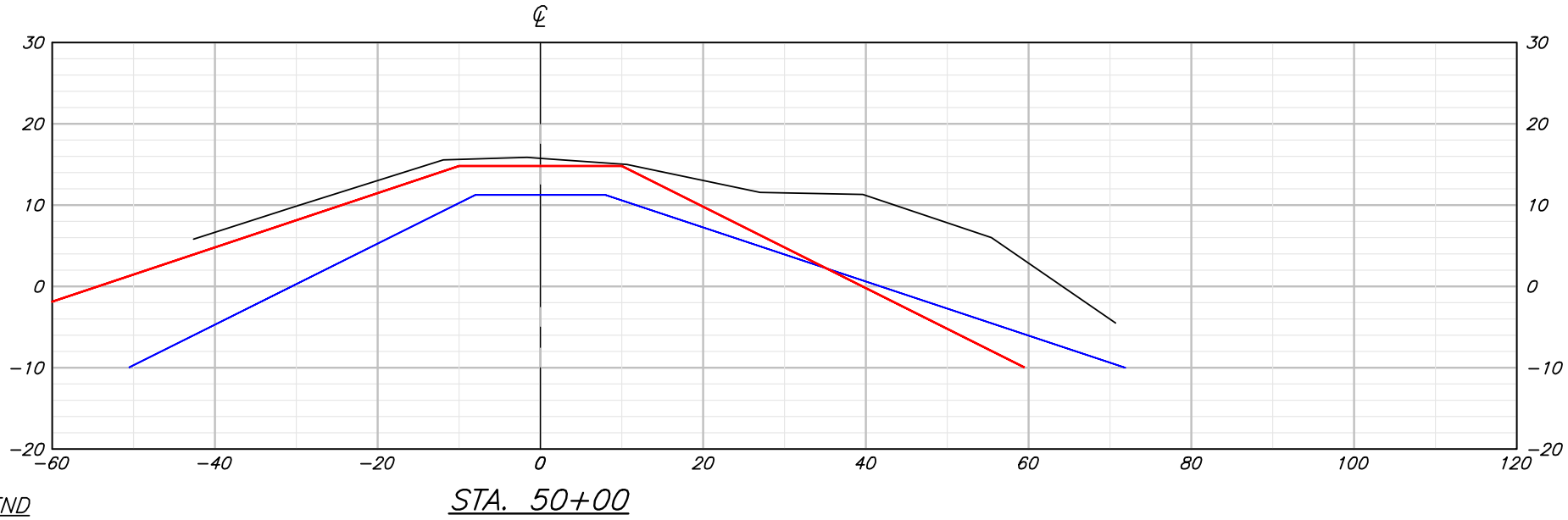

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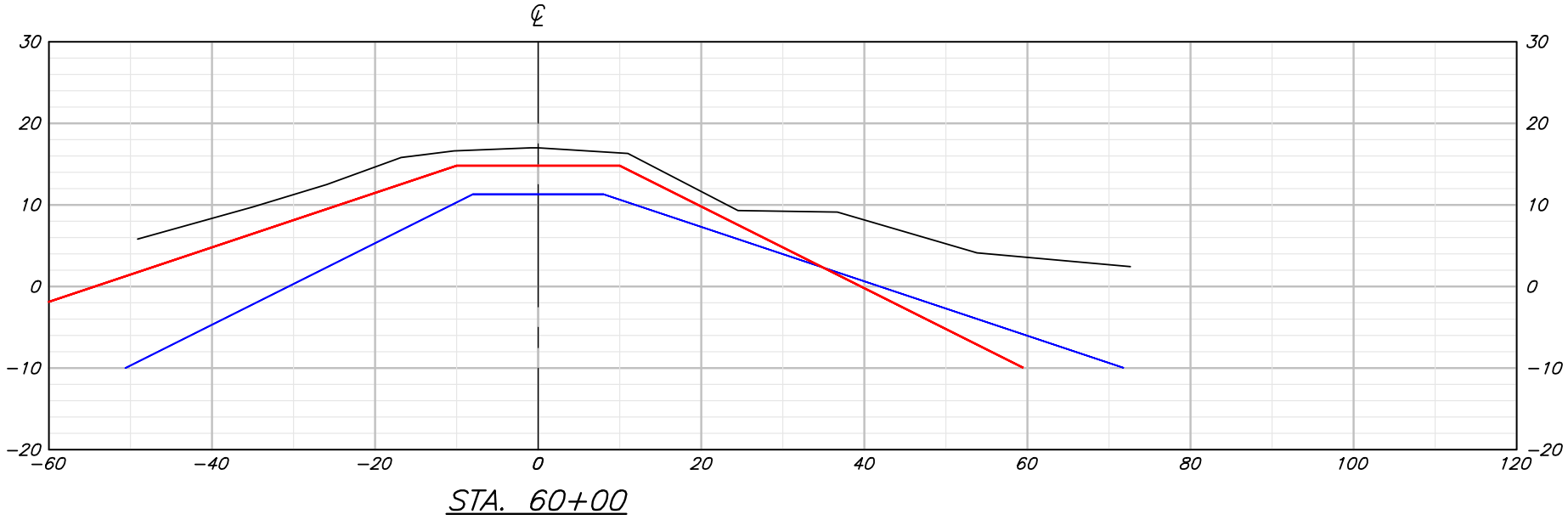

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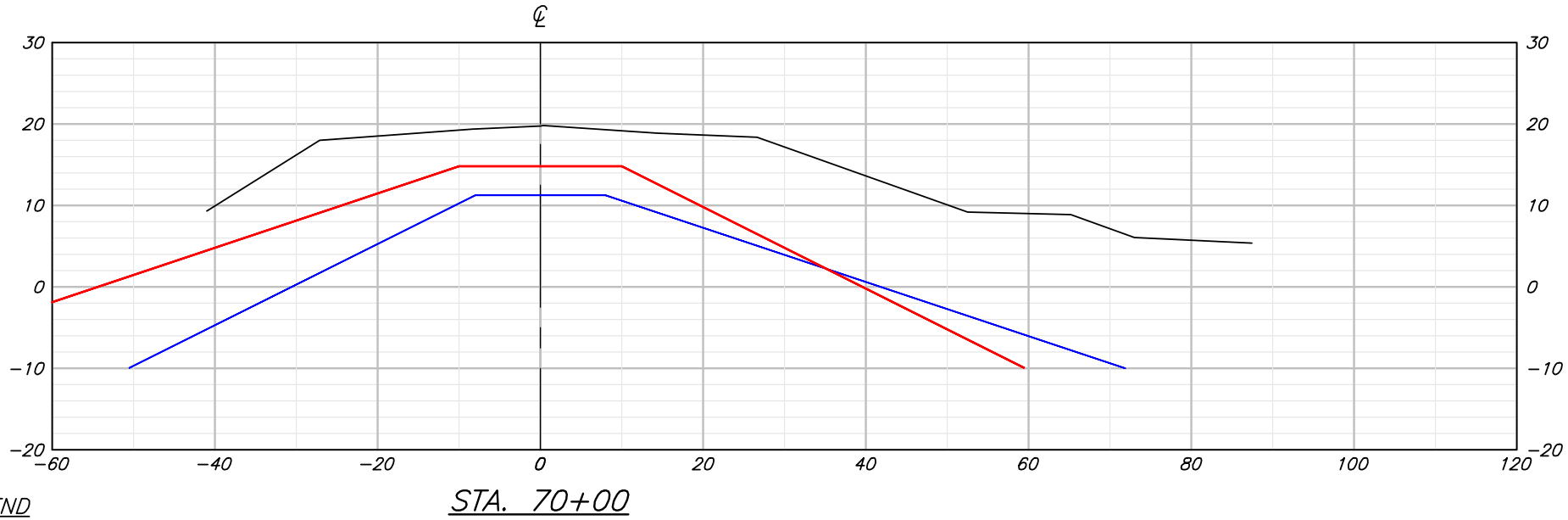

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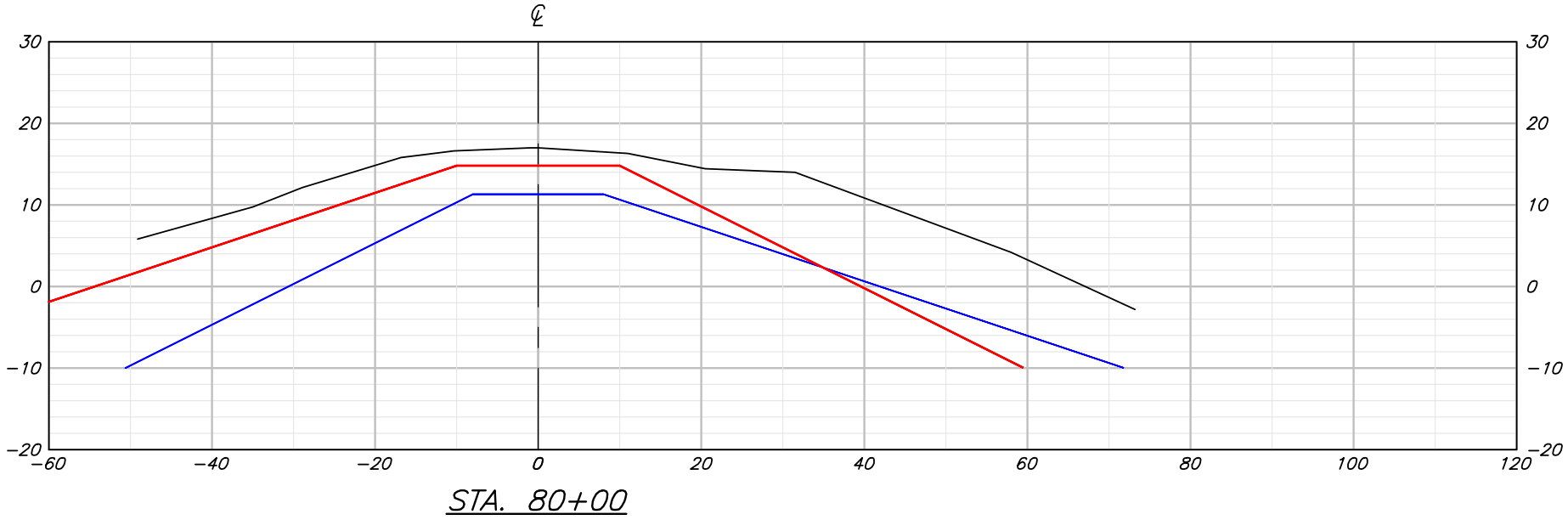

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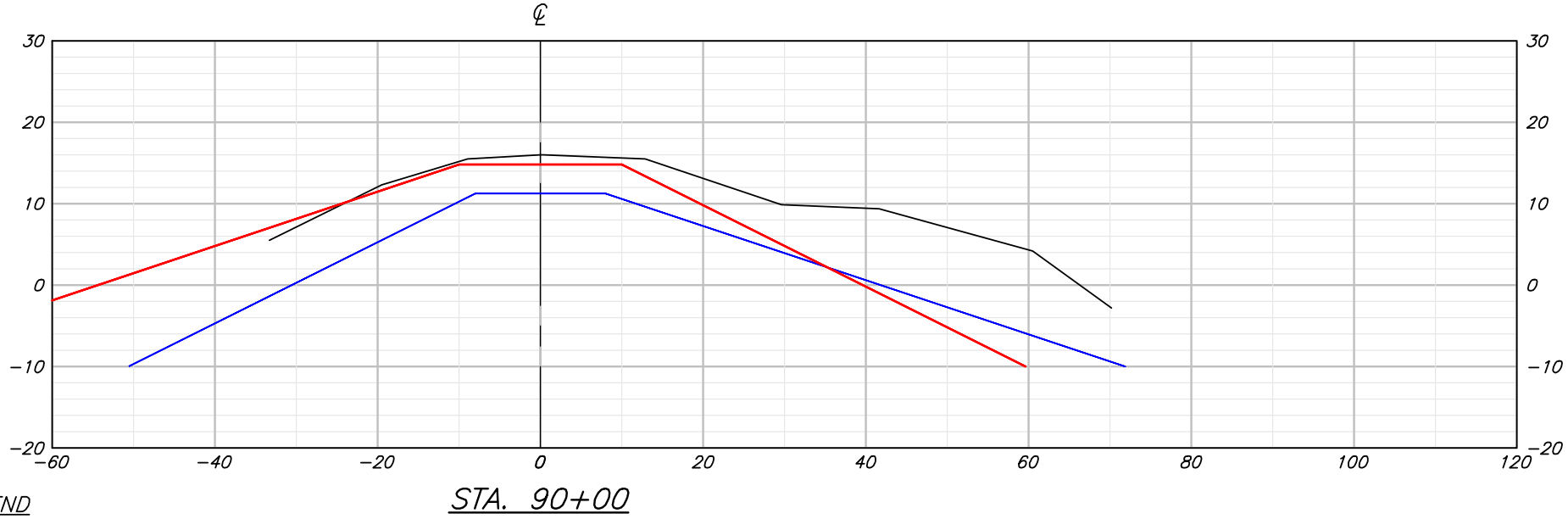

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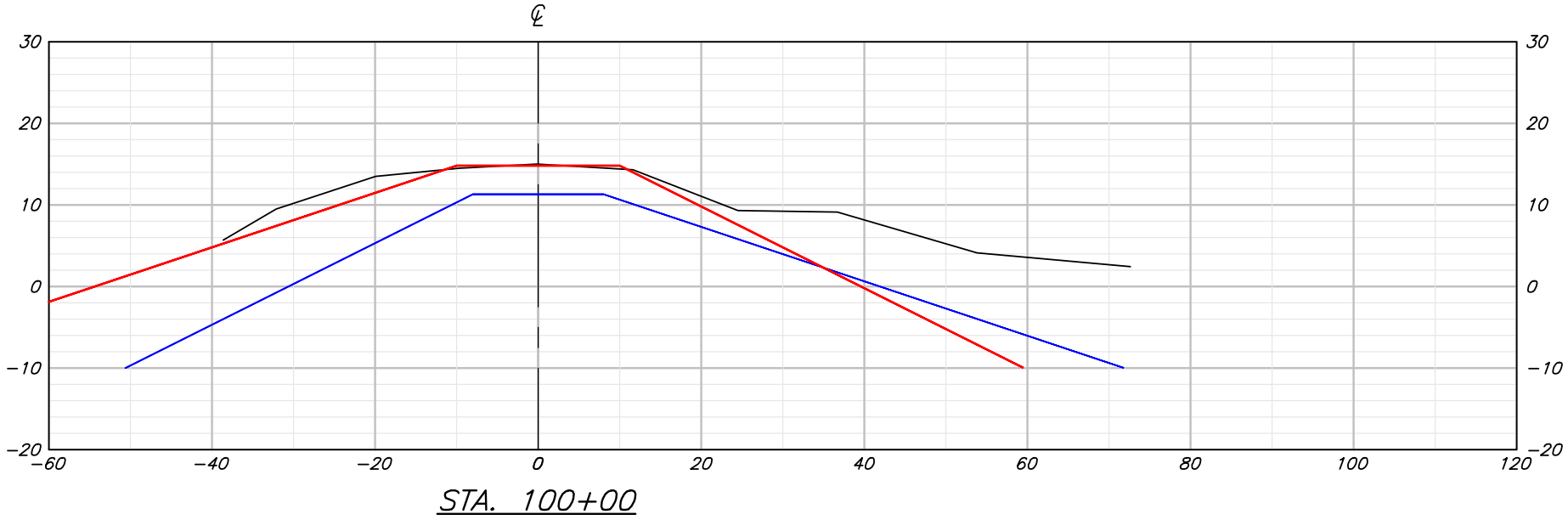

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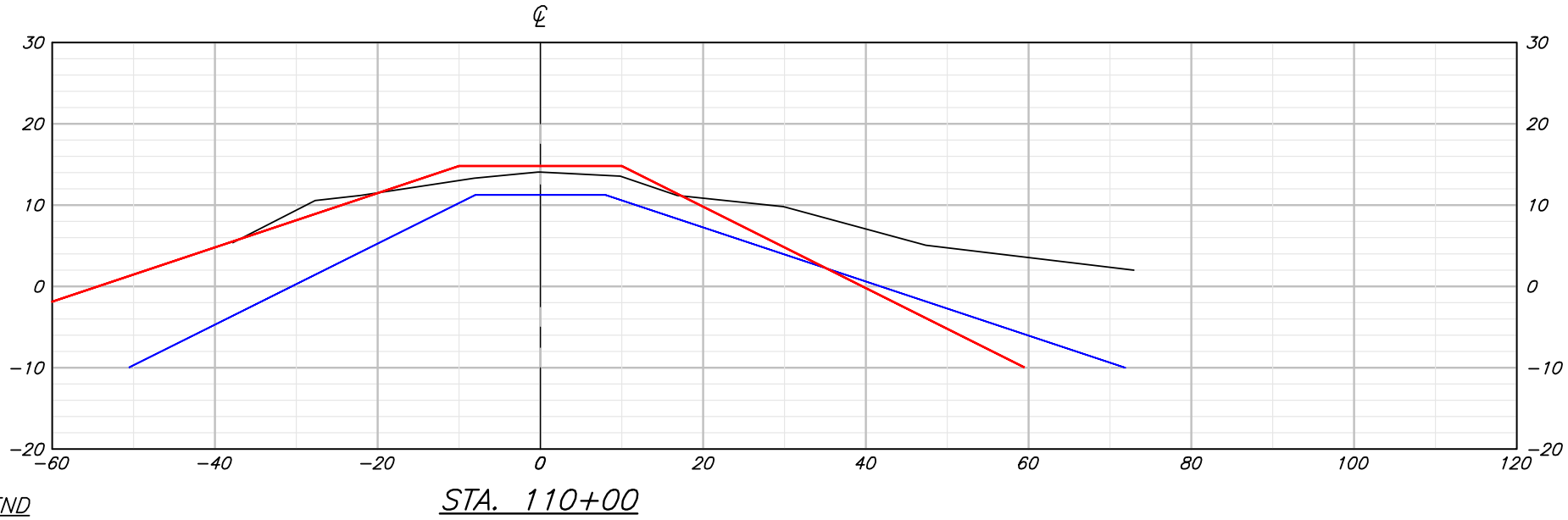

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STATION 100+00 AND STATION 110+00

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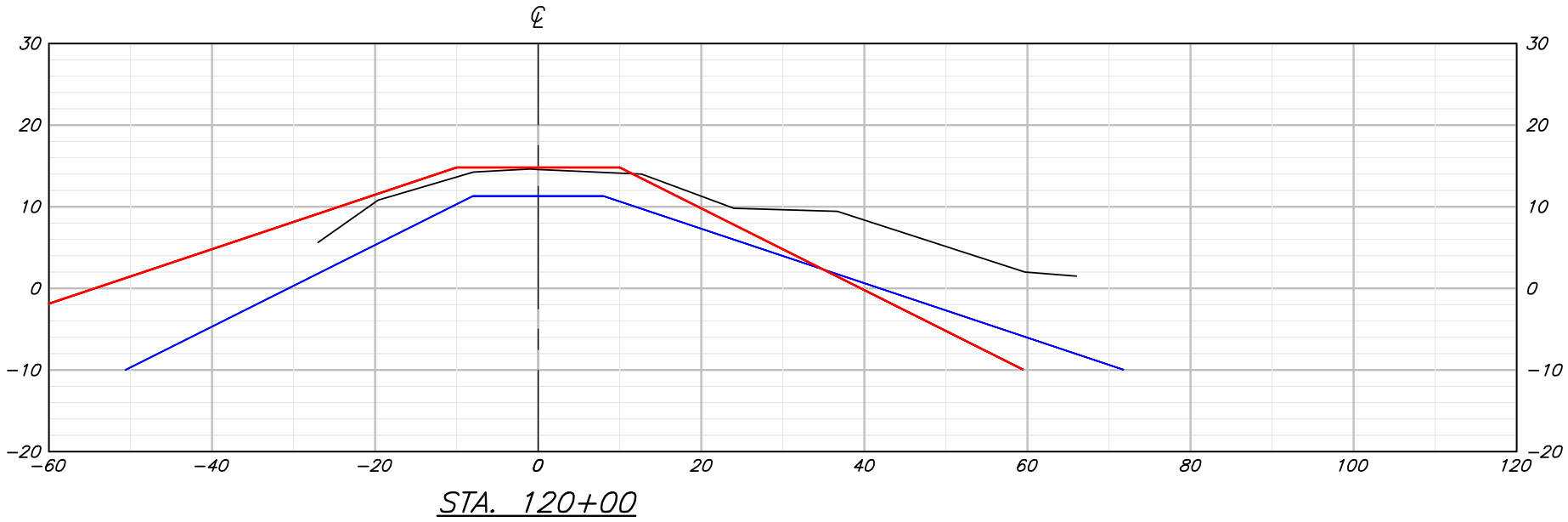

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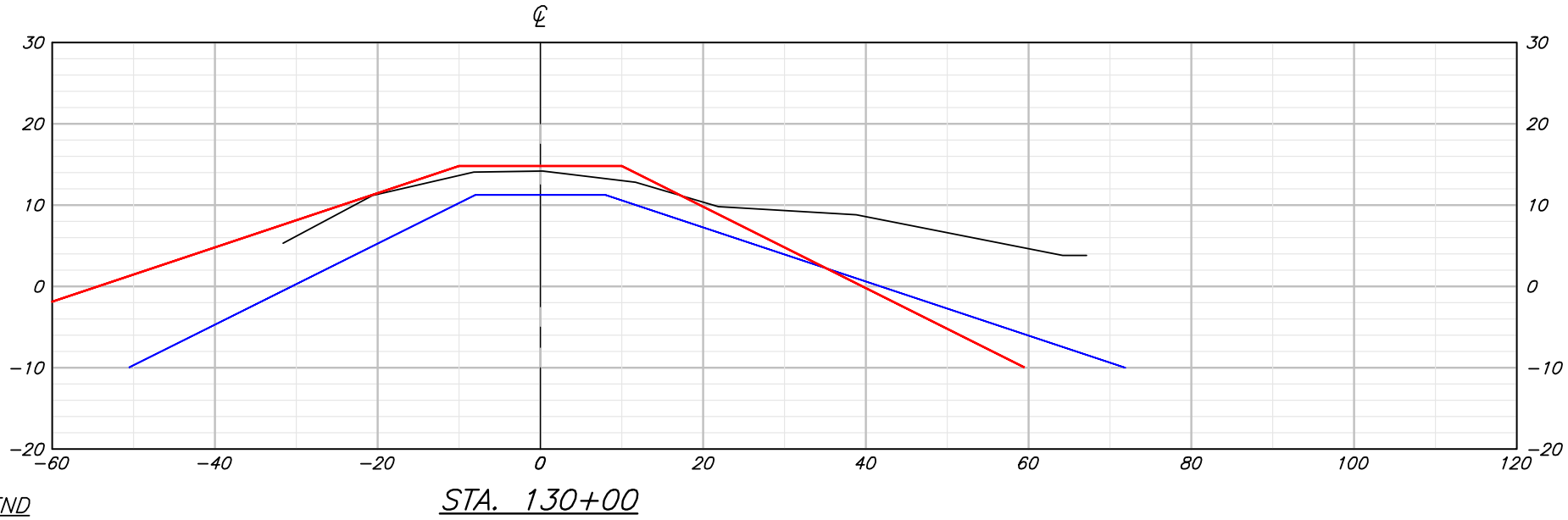

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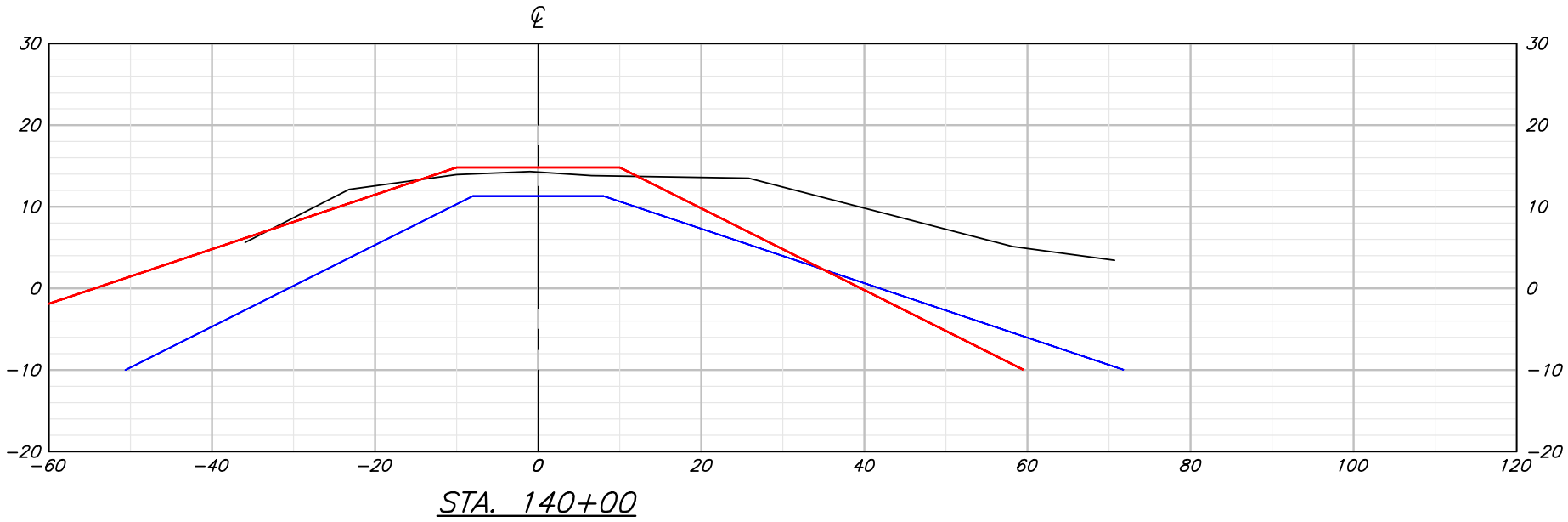

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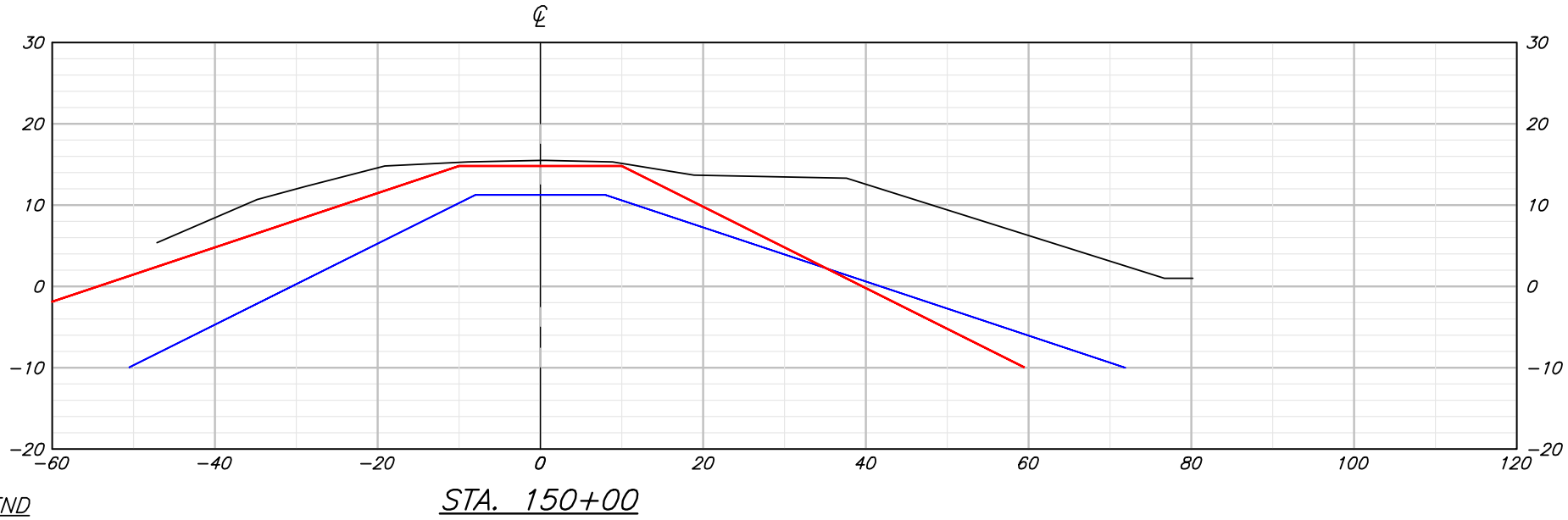

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LEGEND

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RECLAMATION DISTRICT NO. 341

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CROSS SECTIONS
STATION 140+00 AND STATION 150+00

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STATE OF CALIFORNIA

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Date	AUGUST 2020

SHEET 8 OF 53 SHEETS

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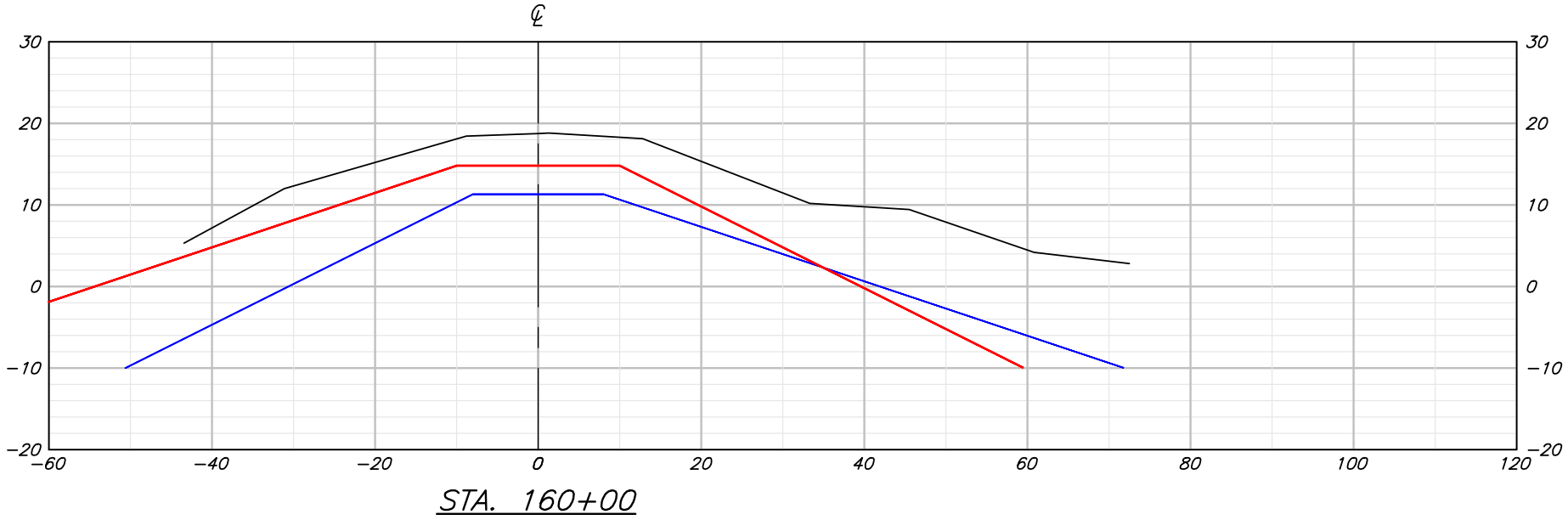

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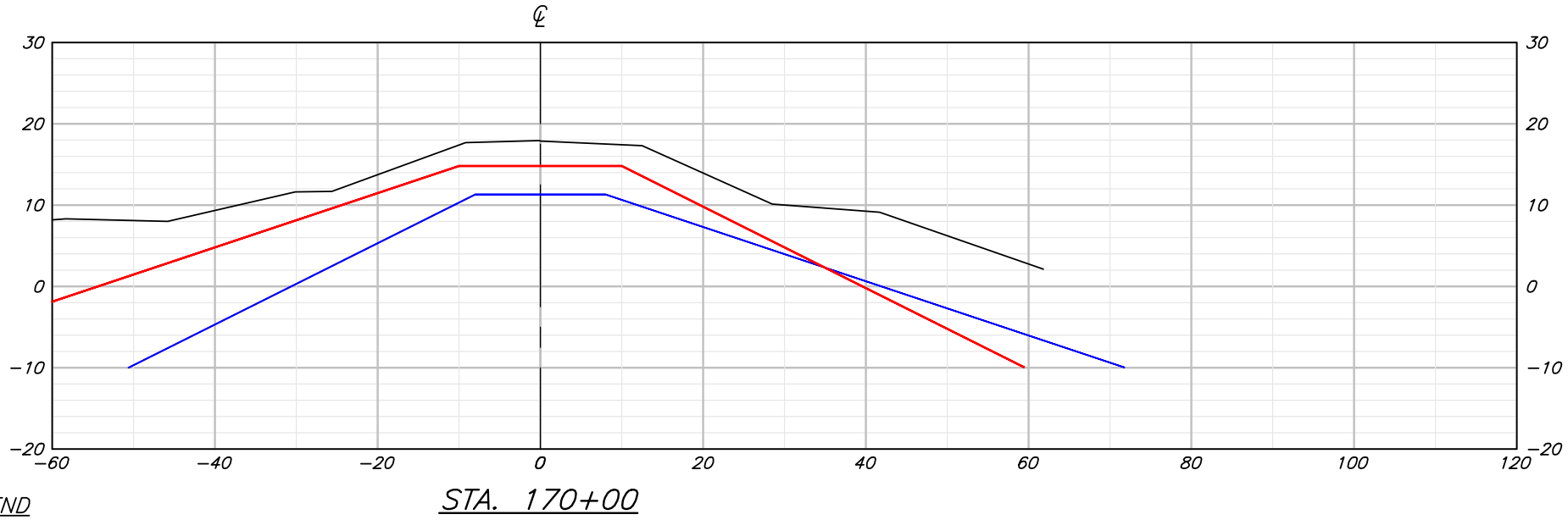

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LEGEND

EXISTING GRADE
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PL 84−99
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 160+00 AND STATION 170+00

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

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SHEET 9 OF 53 SHEETS

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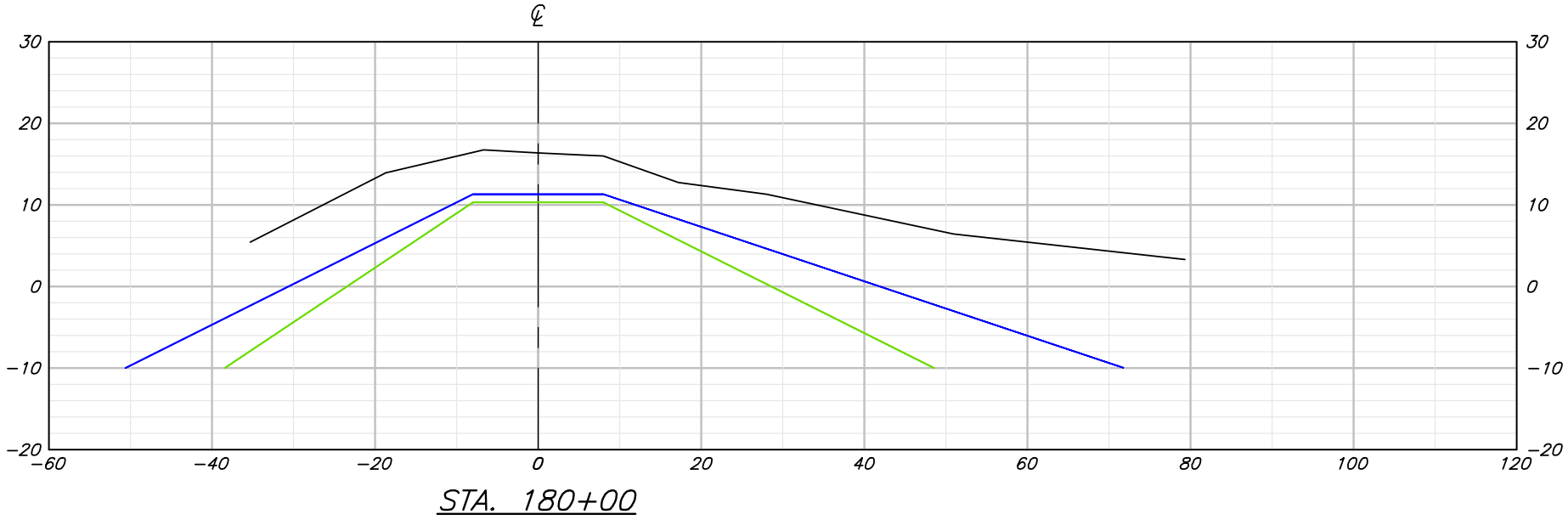

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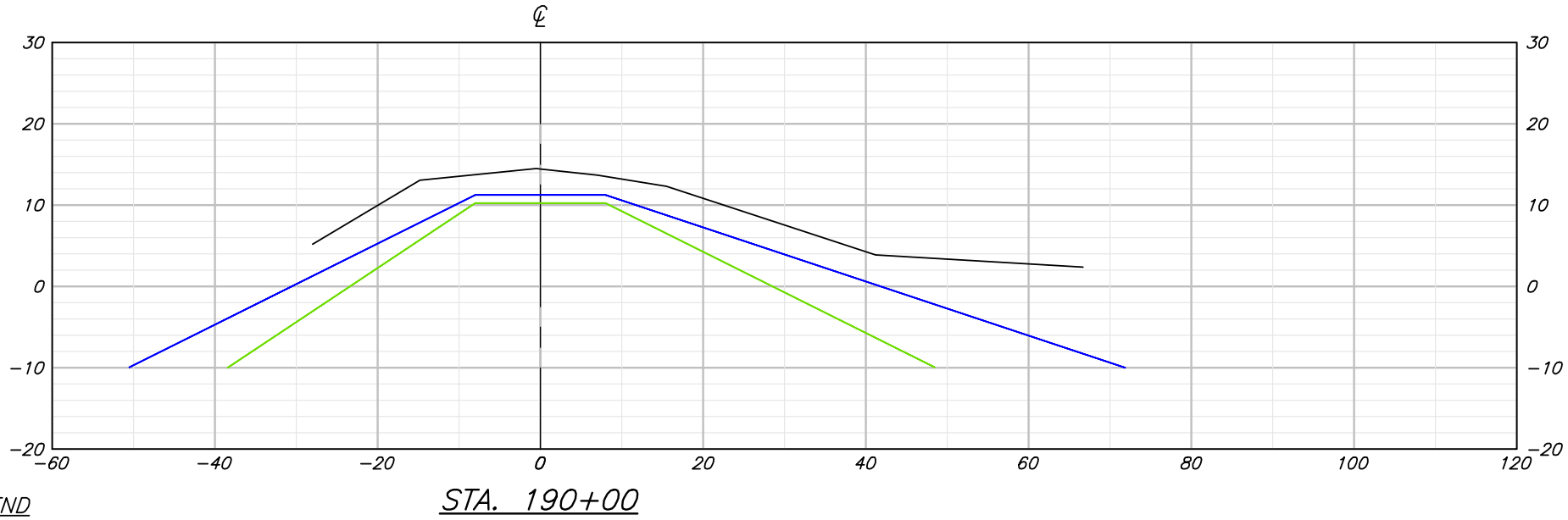

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LEGEND

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RECLAMATION DISTRICT NO. 341

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SHEET 10 OF 53 SHEETS

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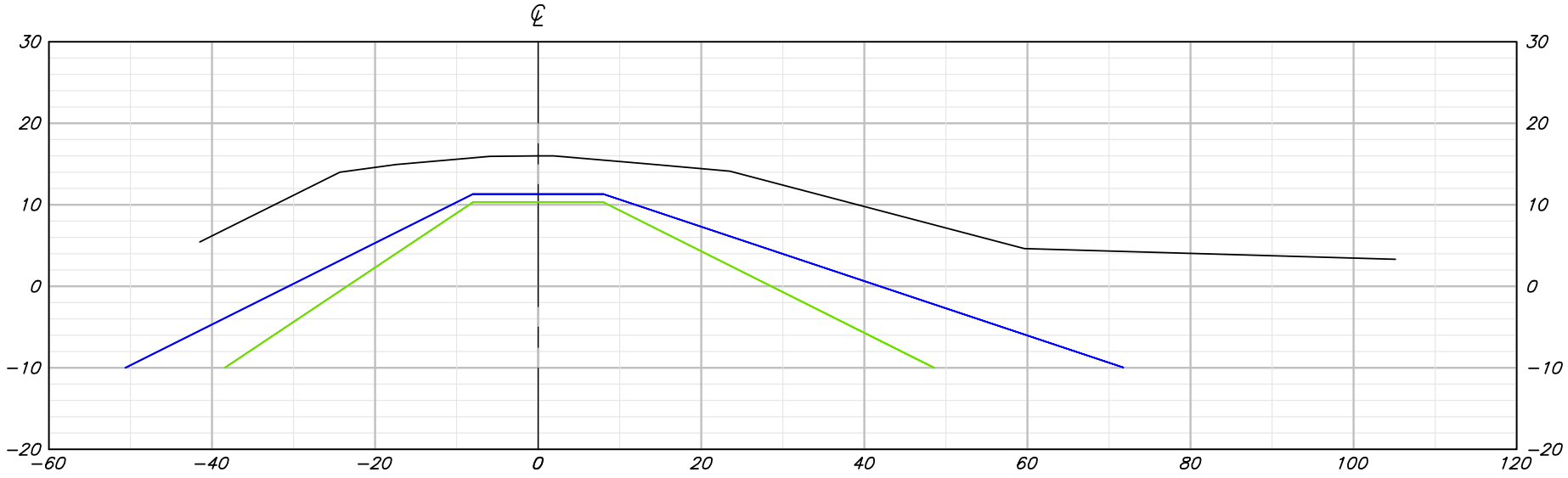
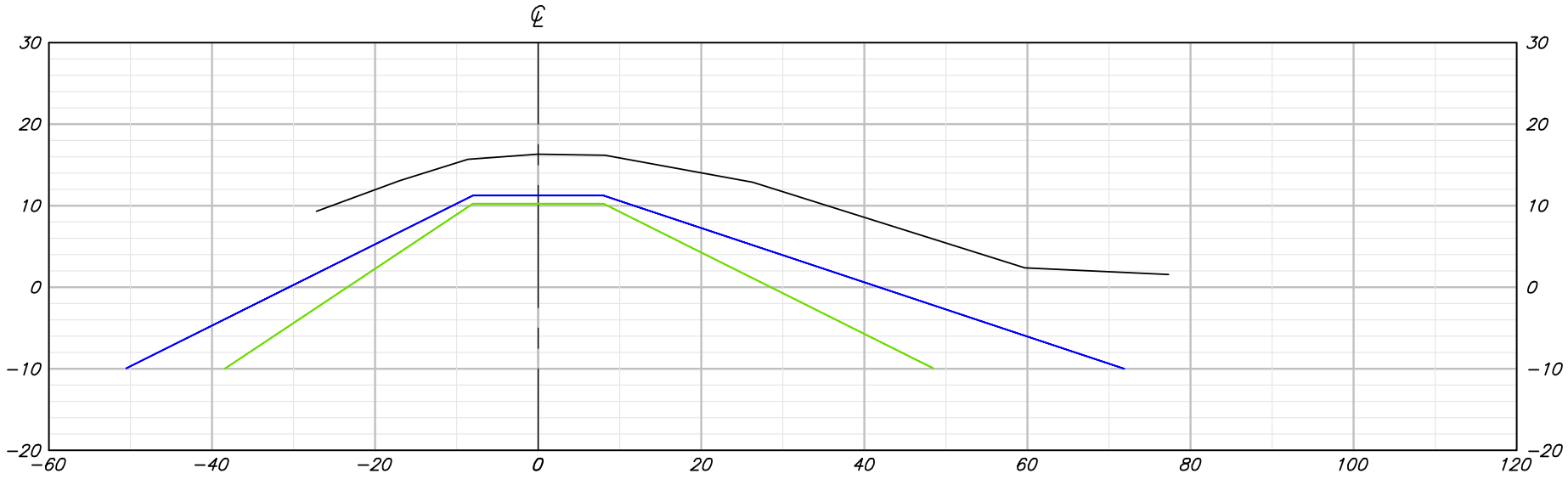


STA. 200+00



STA. 210+00

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

8/6/2020 11:58 AM
Plot Date

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation
2151 River Plaza Drive
Suite 100
Sacramento, California 95833
Ph: 916-441-6850
Fx: 916-779-3120

RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

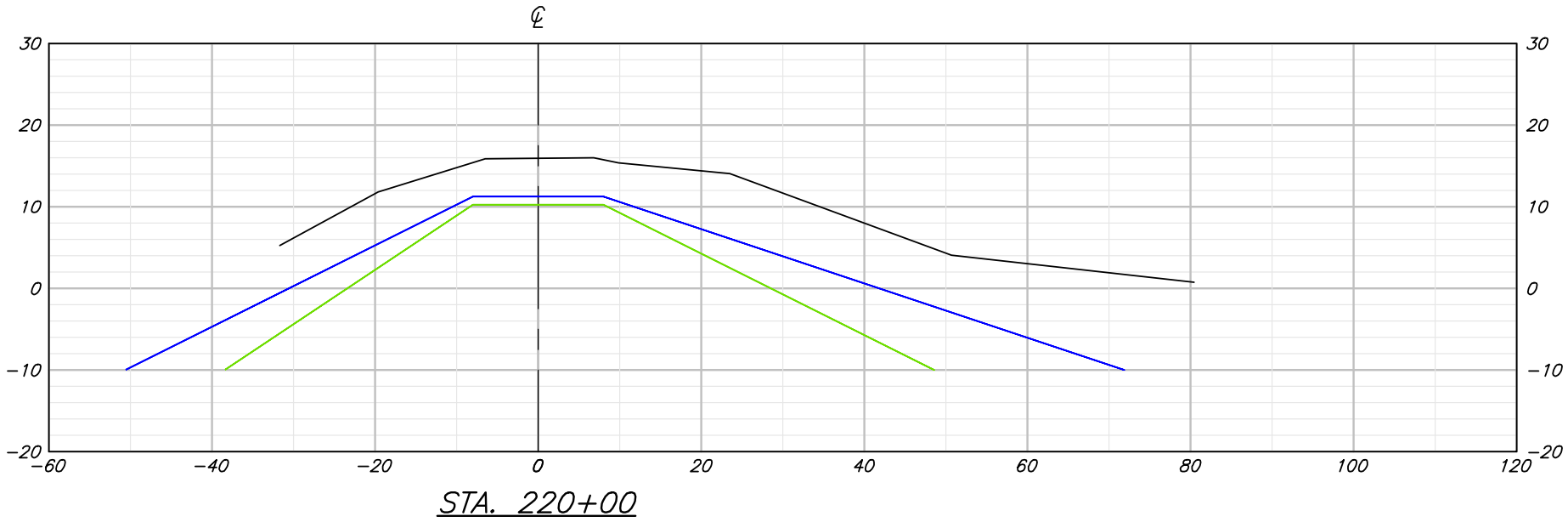
CROSS SECTIONS
STATION 200+00 AND STATION 210+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

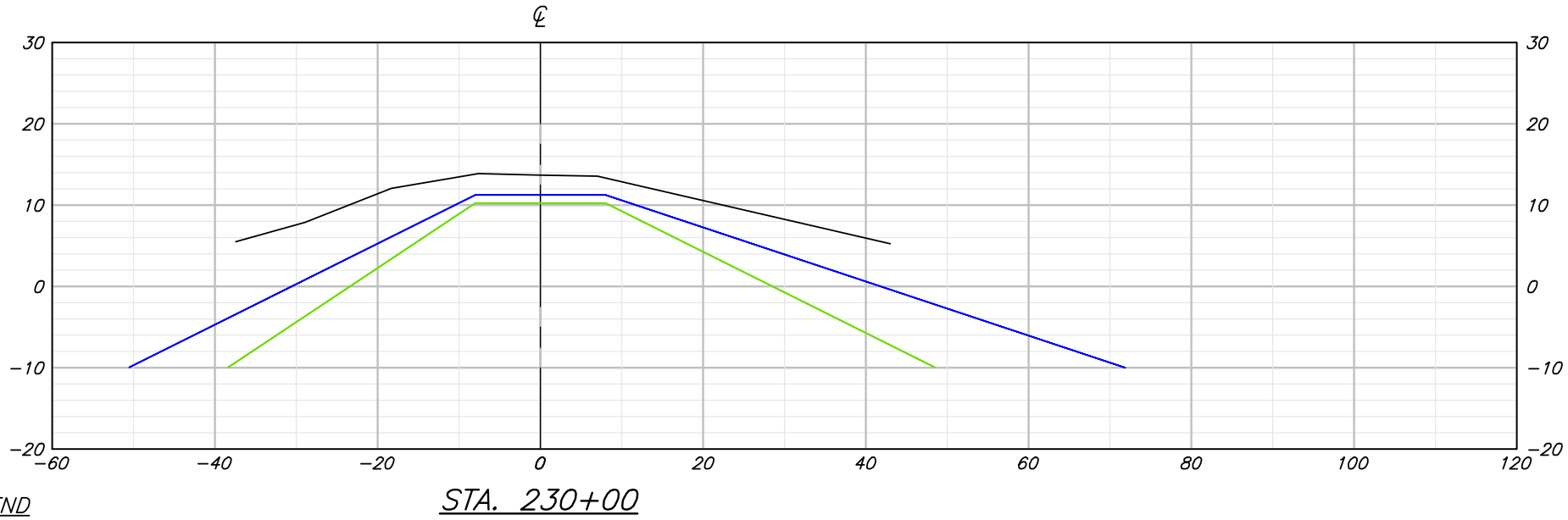
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 11 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 220+00



STA. 230+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 220+00 AND STATION 230+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 12 OF 53 SHEETS

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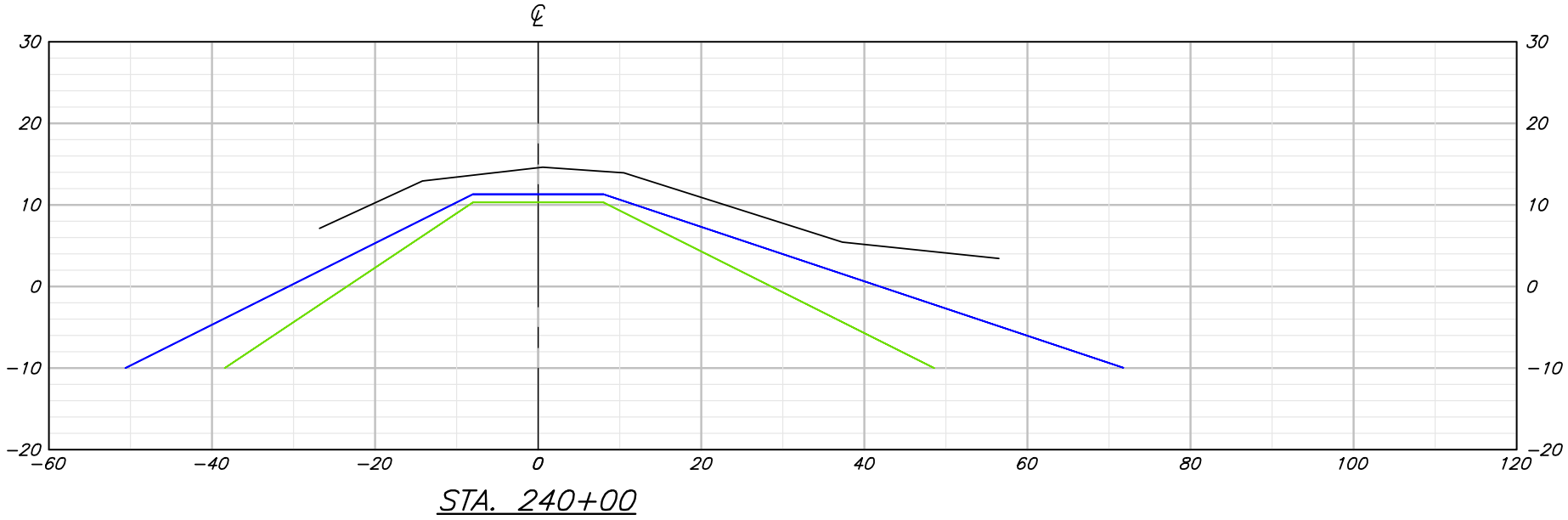
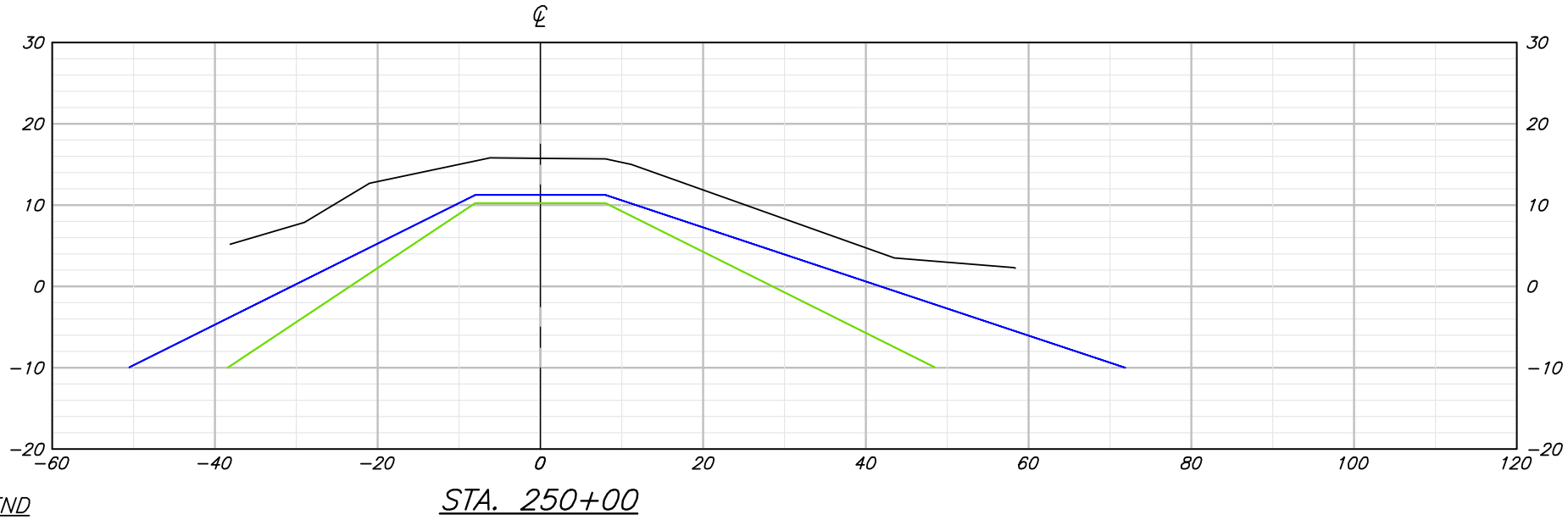


STA. 240+00



STA. 250+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 240+00 AND STATION 250+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 13 OF 53 SHEETS

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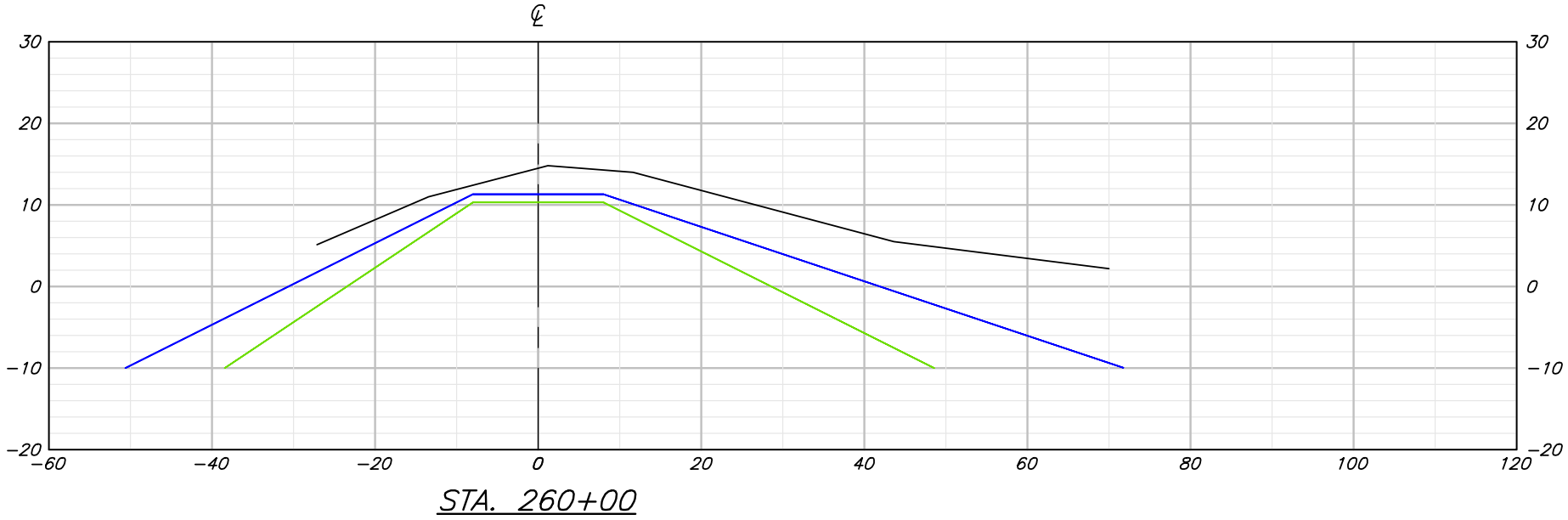
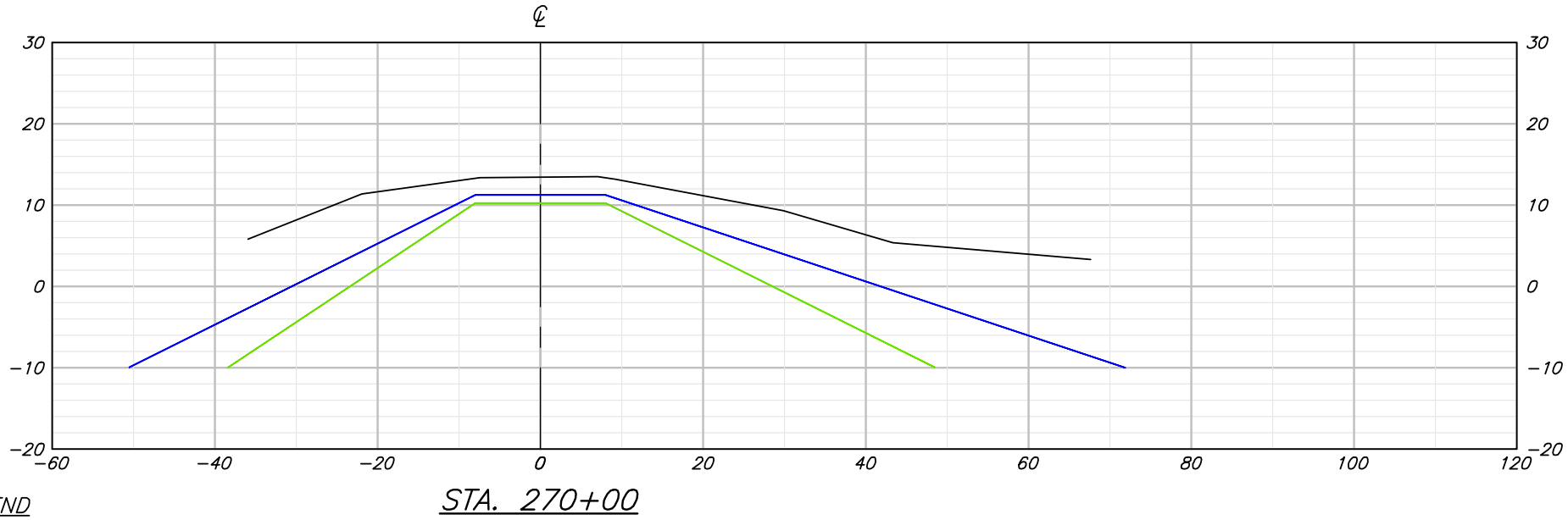


STA. 260+00



STA. 270+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

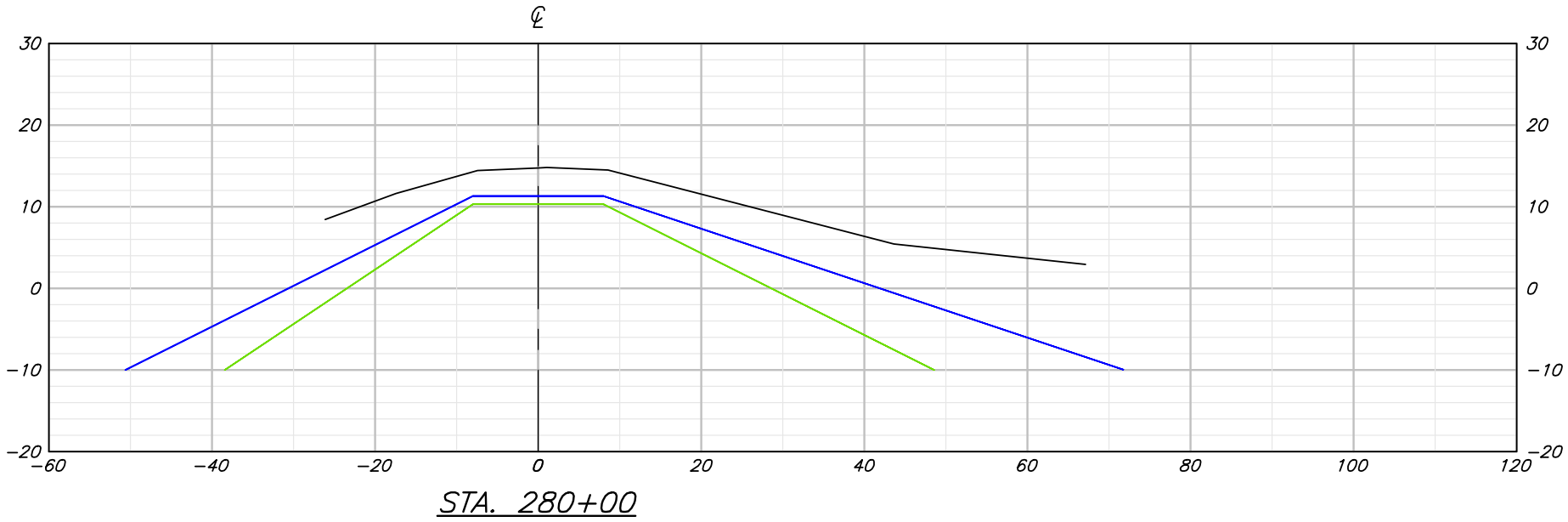
CROSS SECTIONS
STATION 260+00 AND STATION 270+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

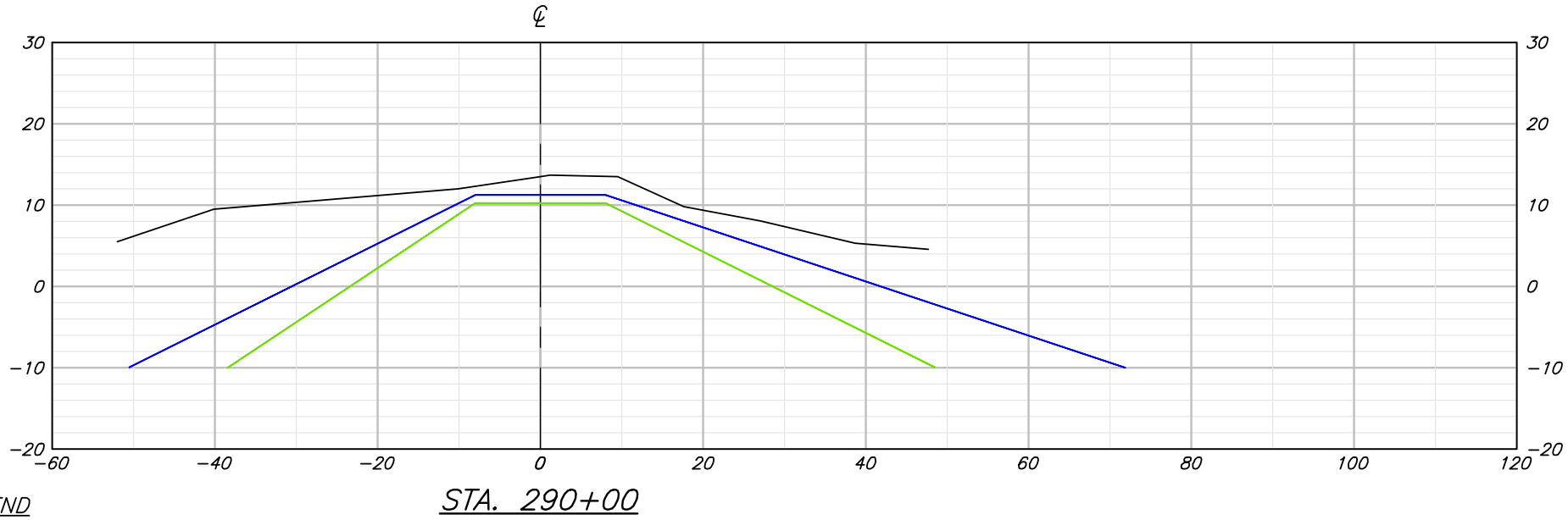
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 14 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 280+00



STA. 290+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

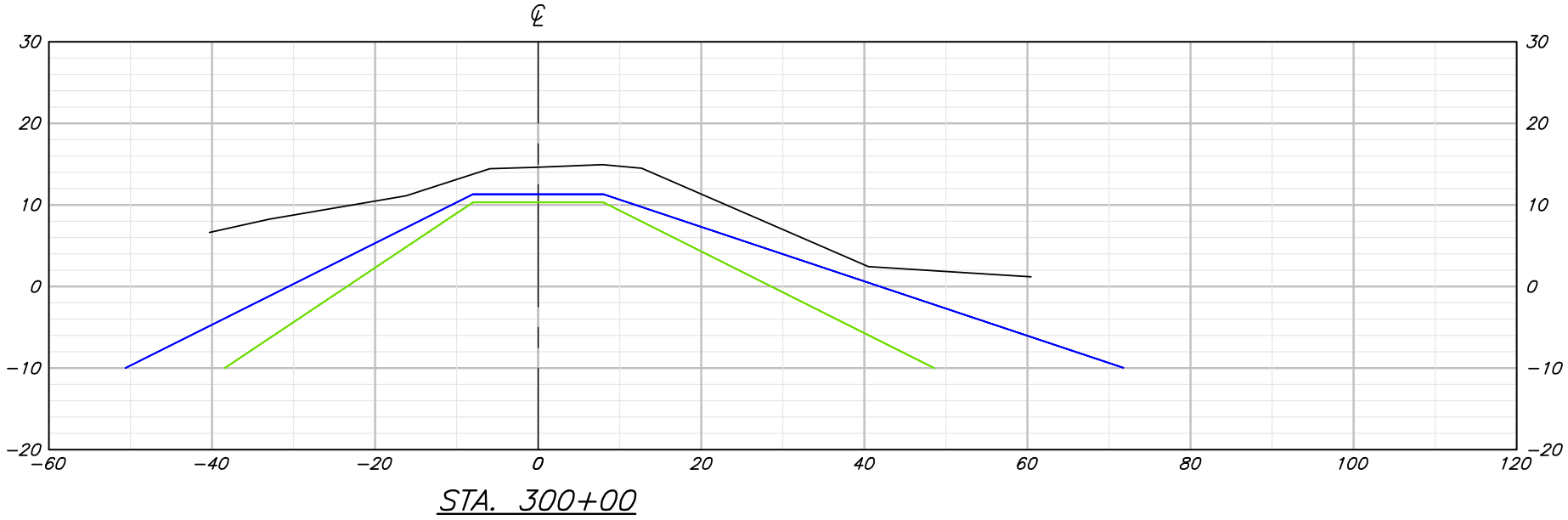
CROSS SECTIONS
STATION 280+00 AND STATION 290+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

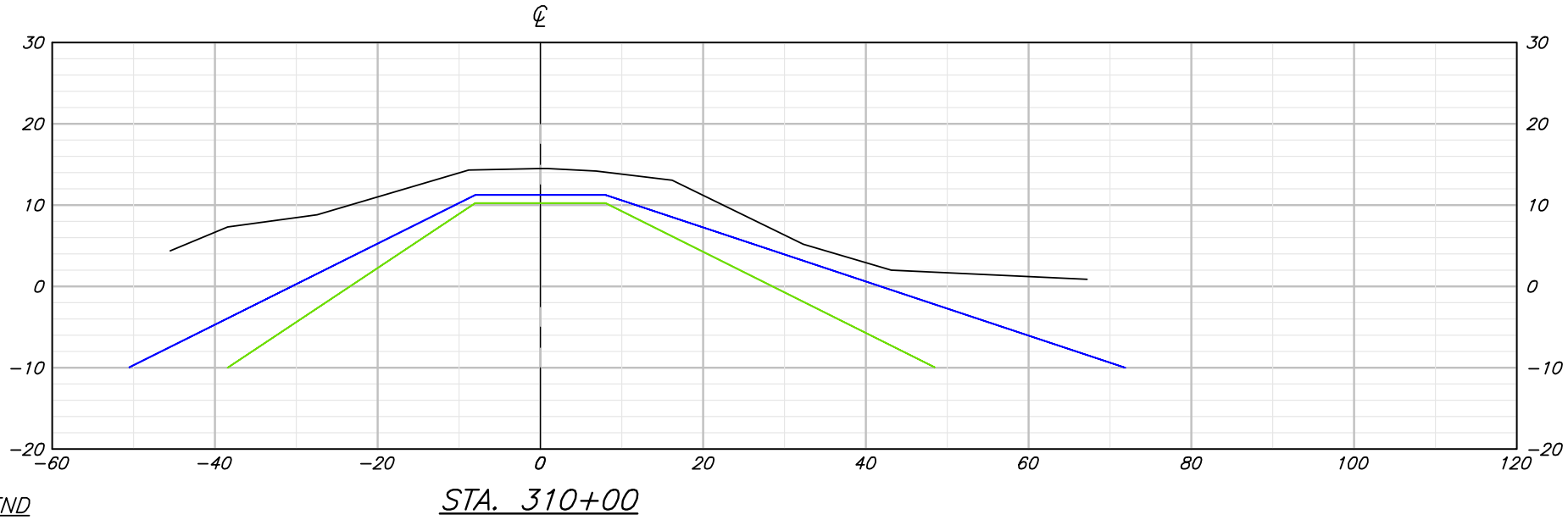
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 15 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 300+00



STA. 310+00

LEGEND

EXISTING GRADE
HMP
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

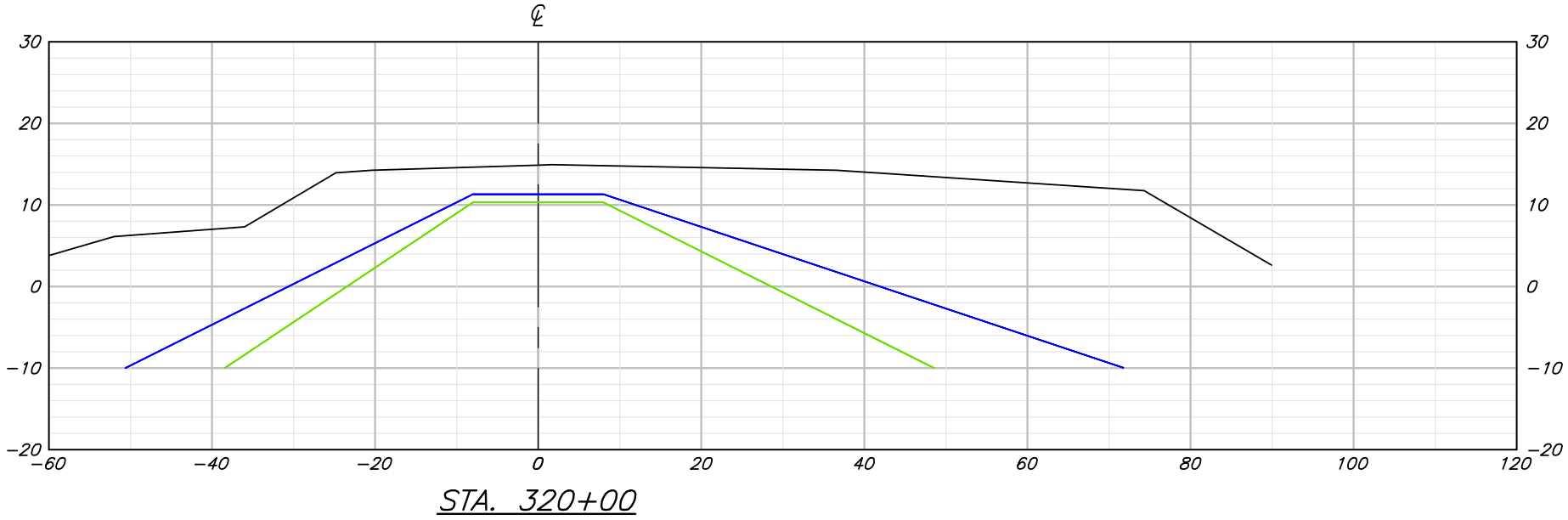
CROSS SECTIONS
STATION 300+00 AND STATION 310+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

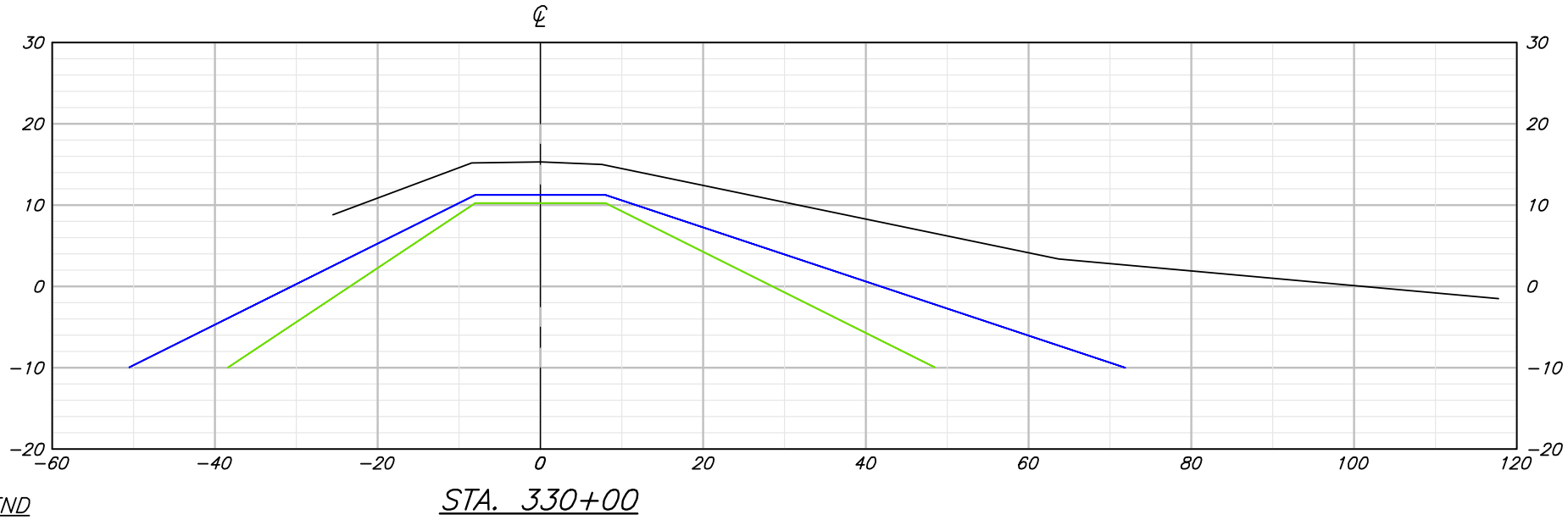
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 16 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 320+00



STA. 330+00

LEGEND

EXISTING GRADE
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

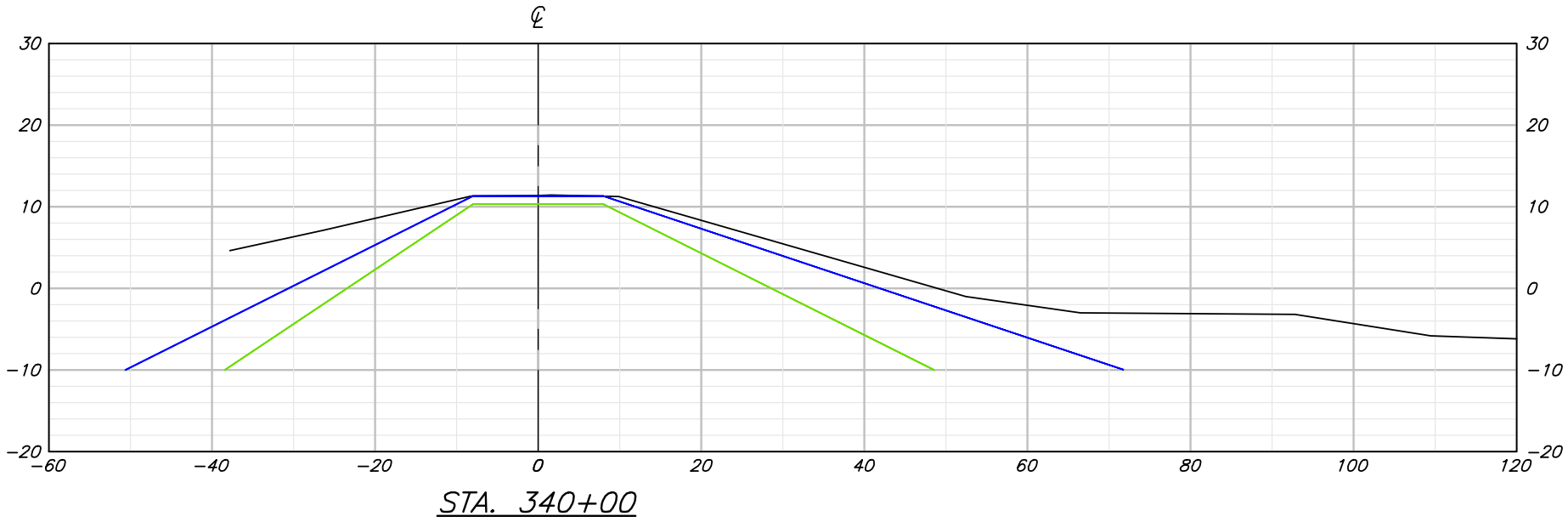
CROSS SECTIONS
STATION 320+00 AND STATION 330+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

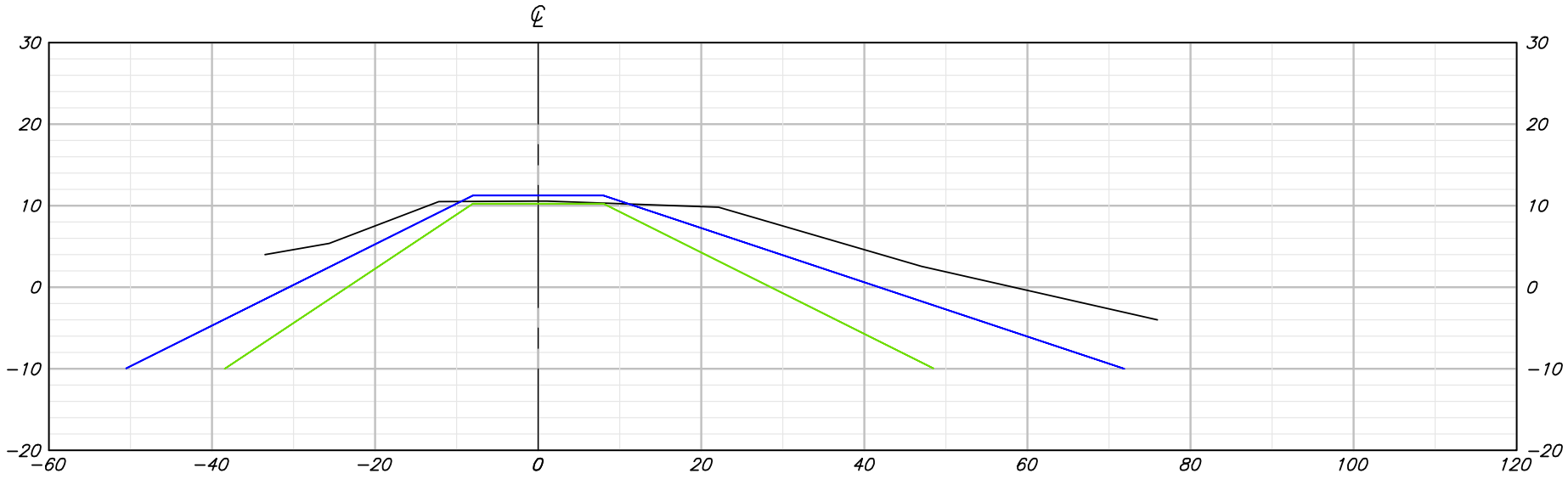
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 17 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 340+00



STA. 350+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 340+00 AND STATION 350+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 18 OF 53 SHEETS

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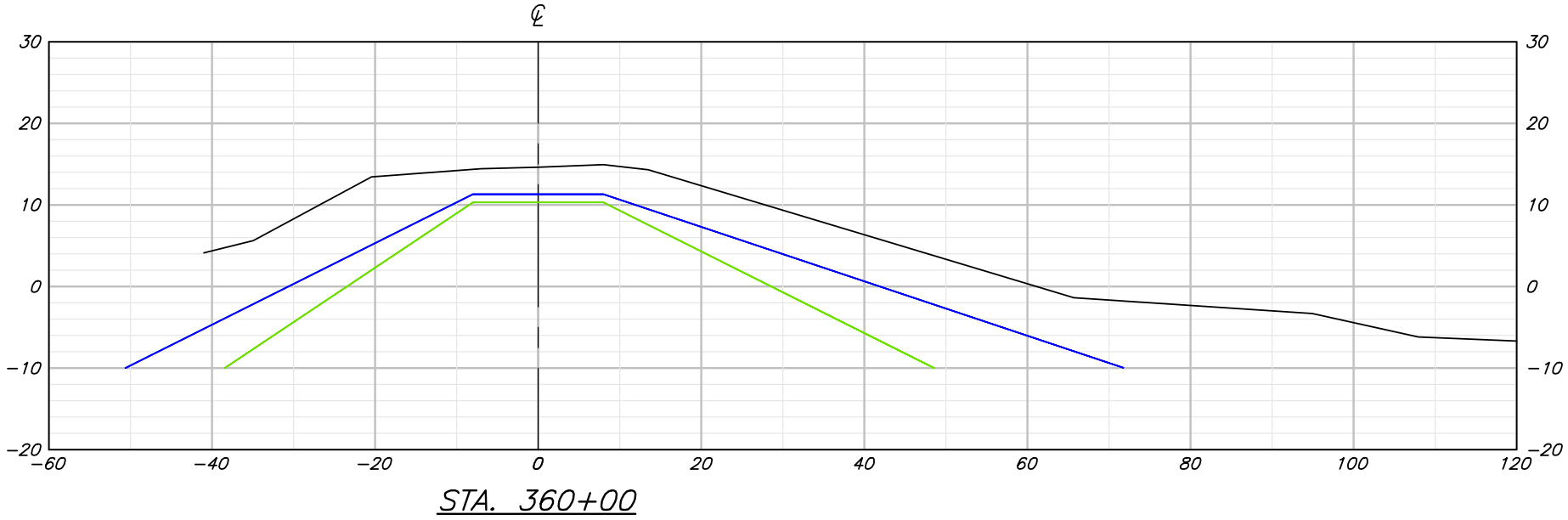
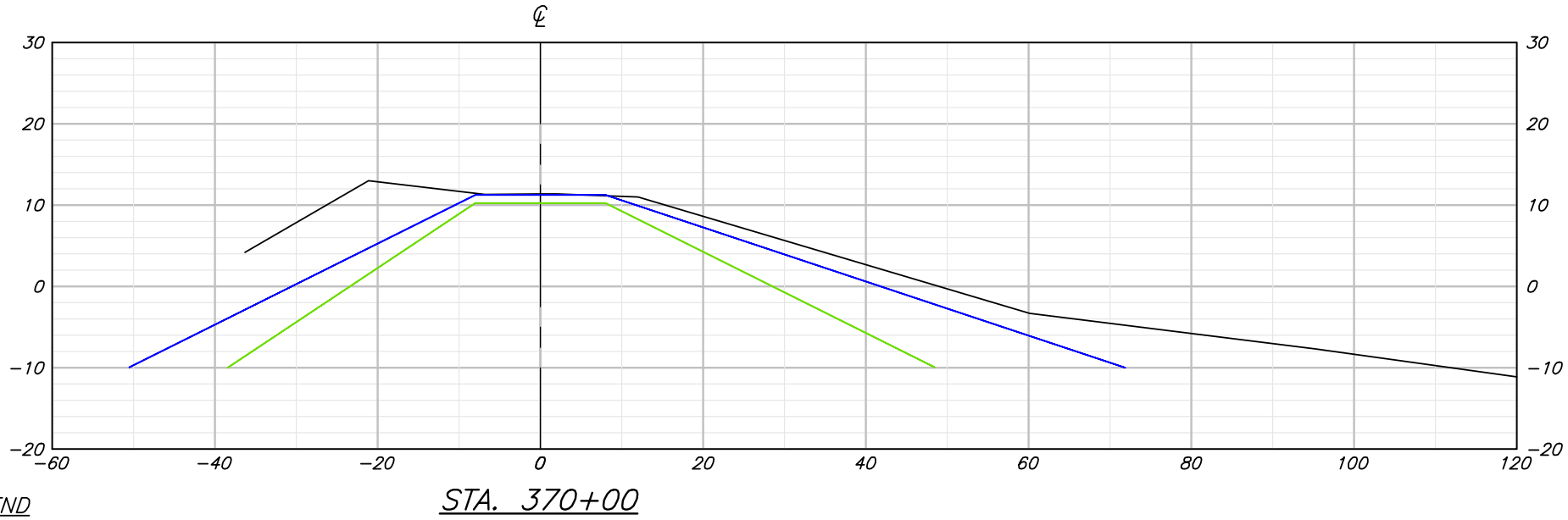


STA. 360+00



STA. 370+00

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

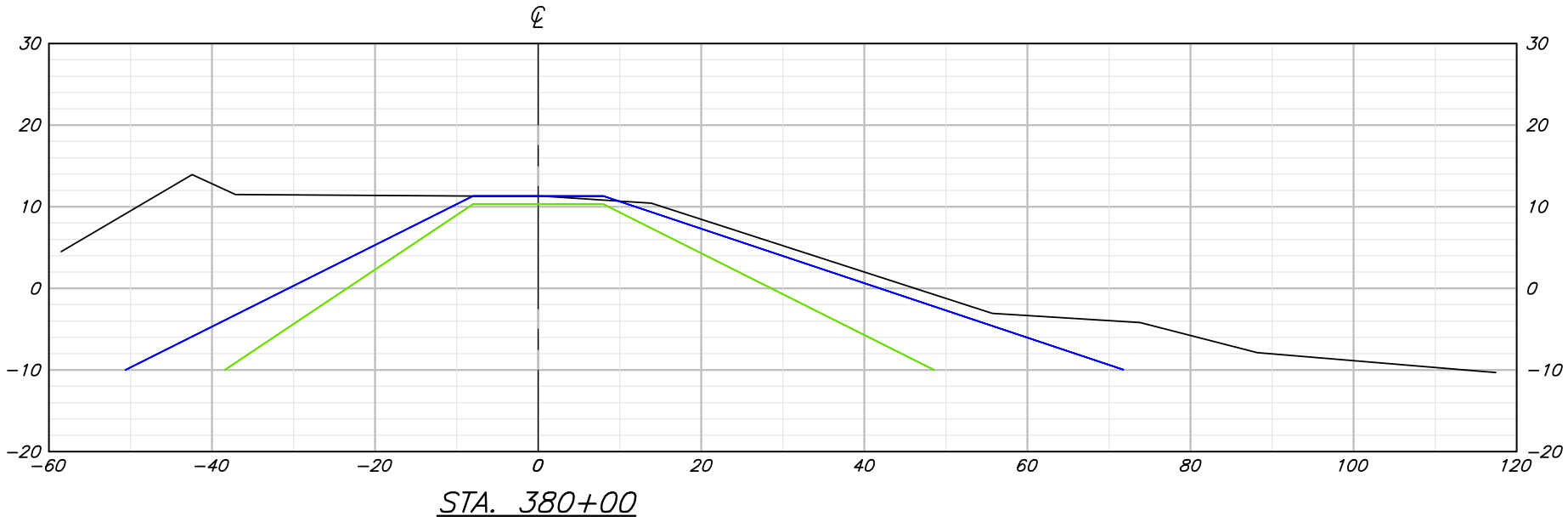
CROSS SECTIONS
STATION 360+00 AND STATION 370+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

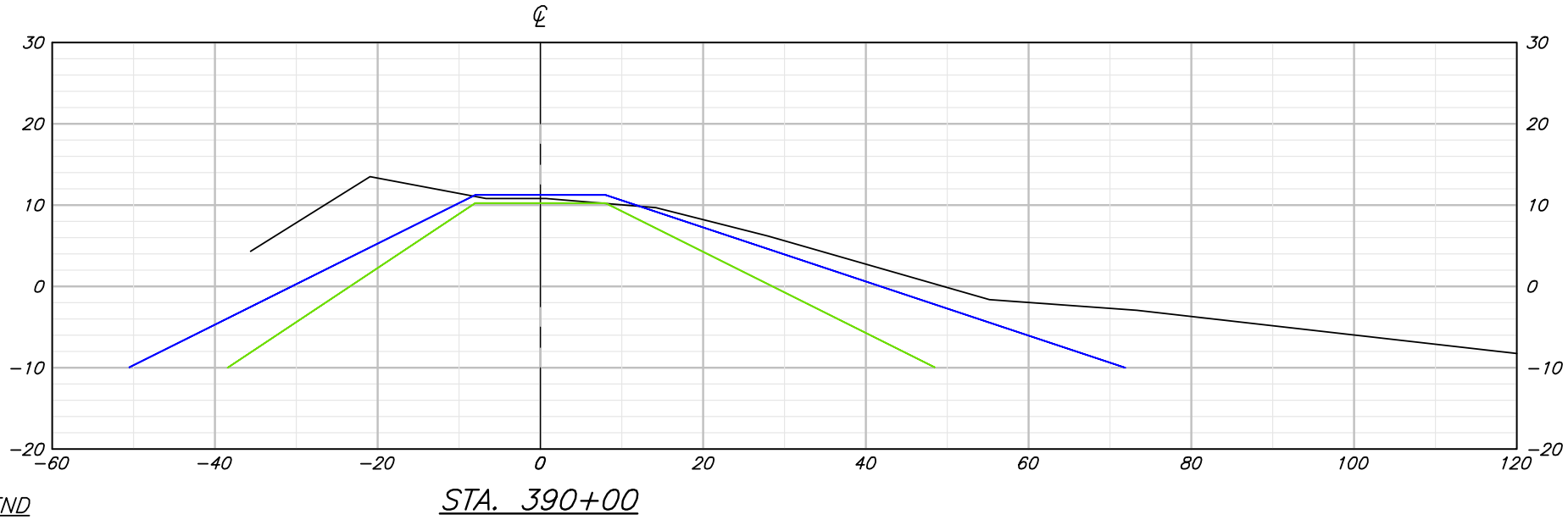
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 19 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 380+00



STA. 390+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

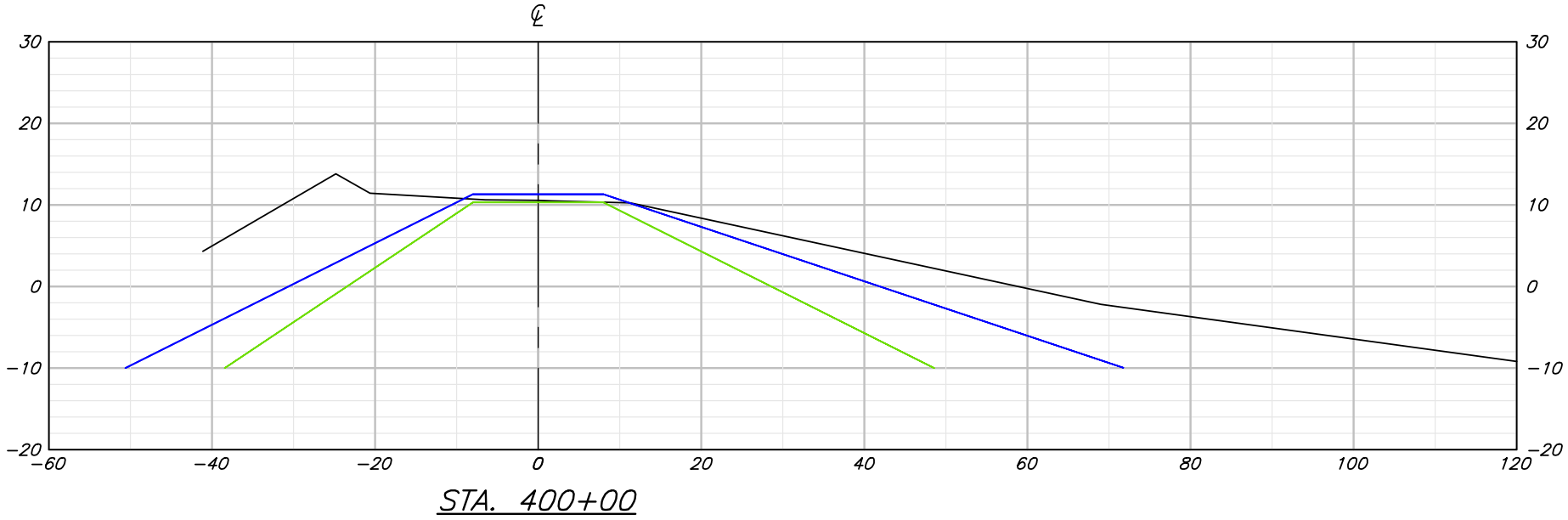
CROSS SECTIONS
STATION 380+00 AND STATION 390+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

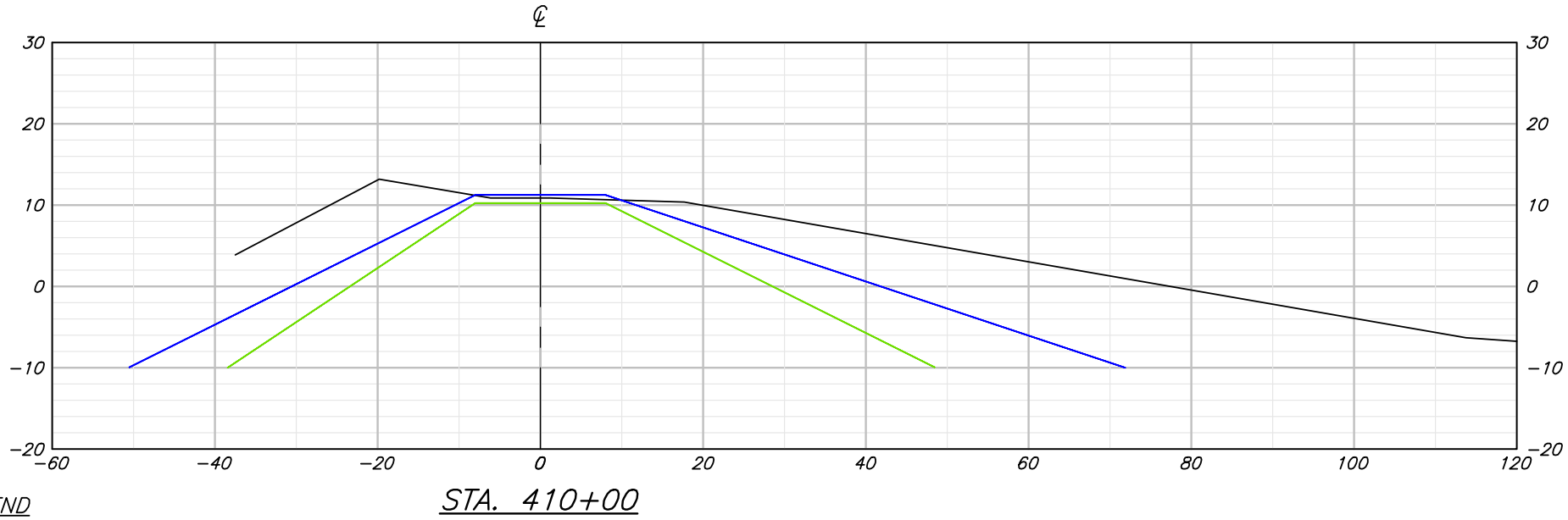
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 20 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 400+00



STA. 410+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 400+00 AND STATION 410+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 21 OF 53 SHEETS

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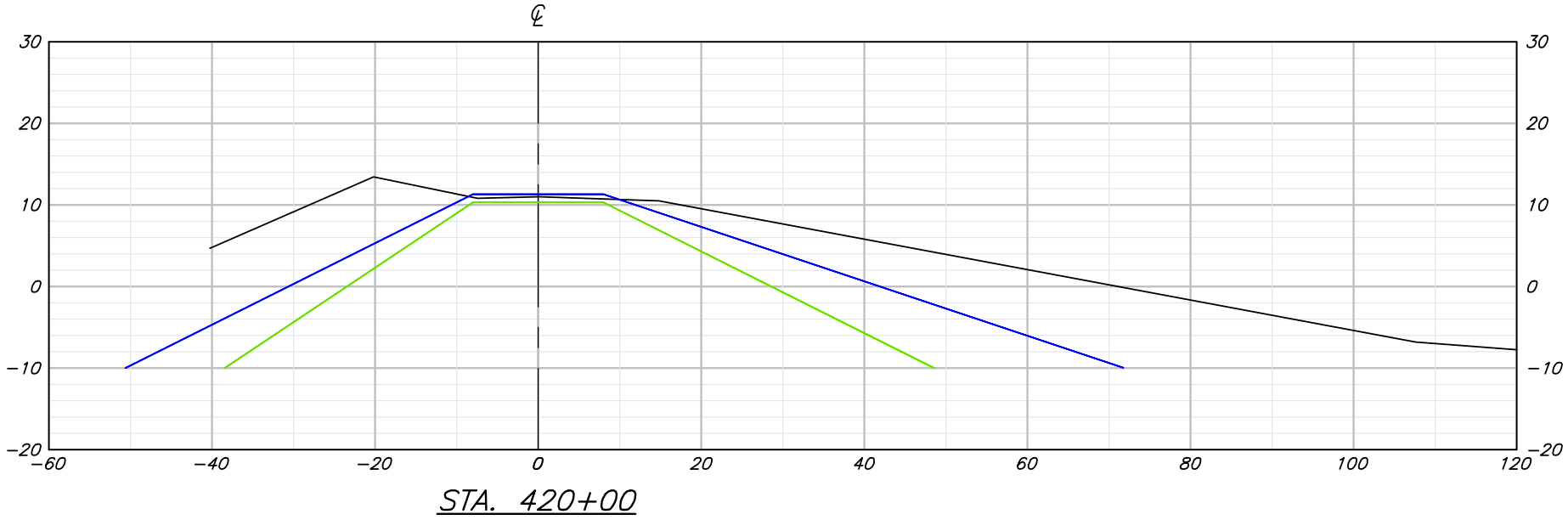
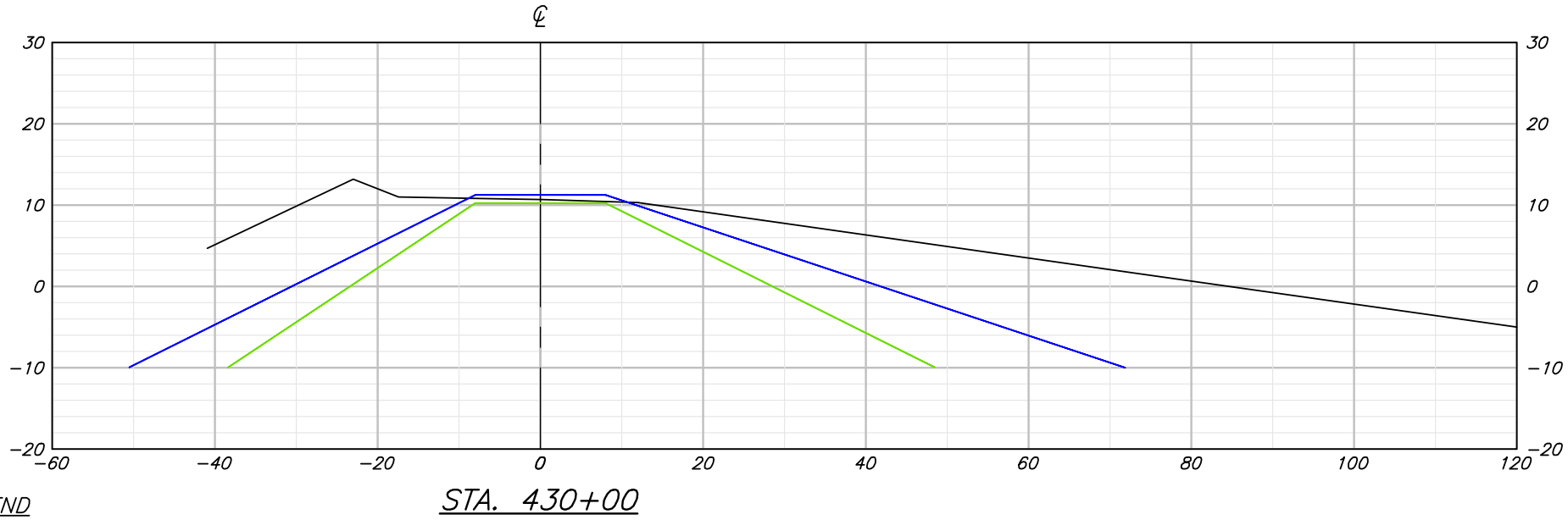


STA. 420+00



STA. 430+00

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

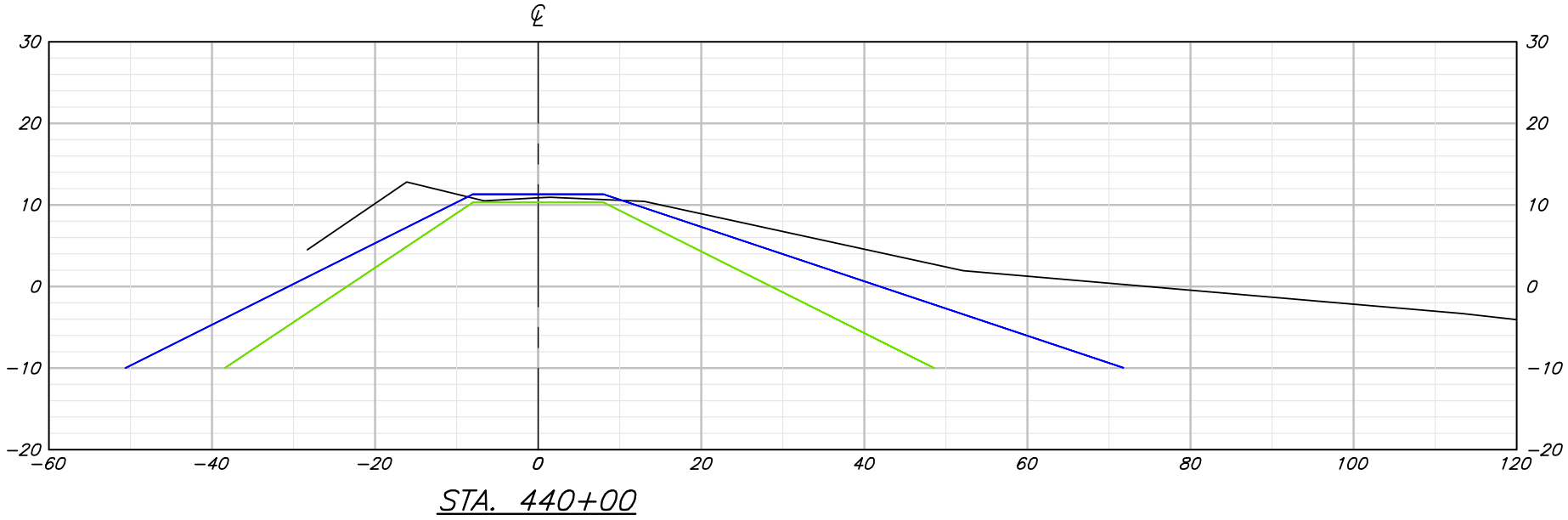
CROSS SECTIONS
STATION 420+00 AND STATION 430+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

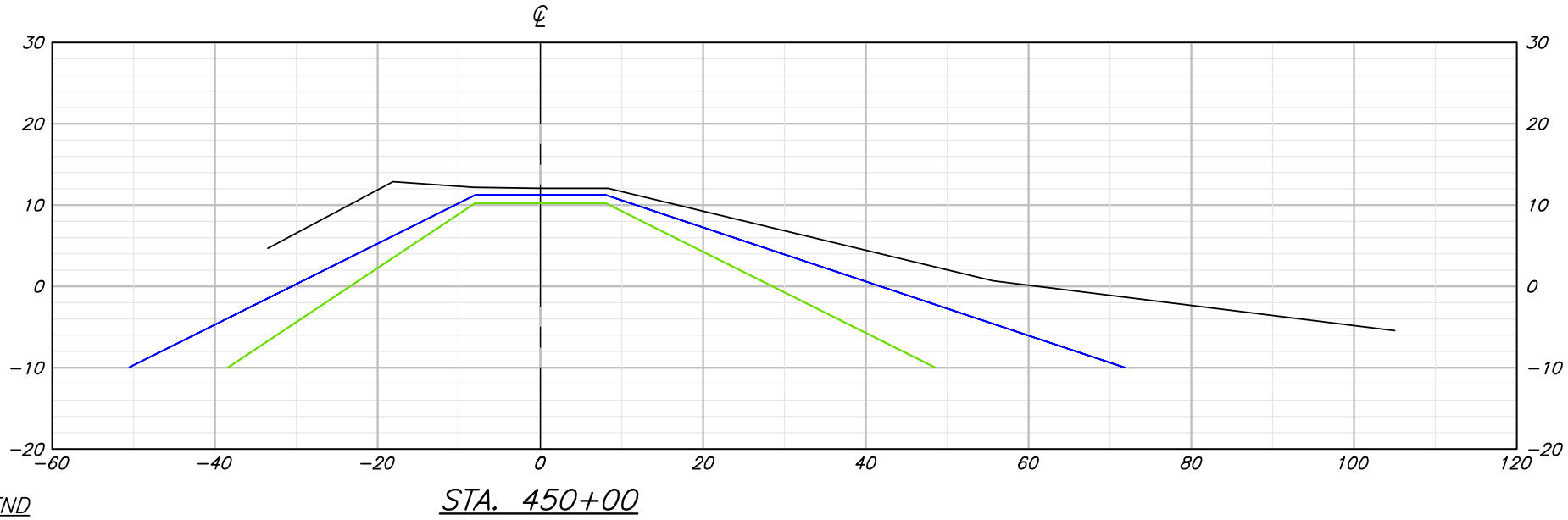
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 22 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 440+00



STA. 450+00

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

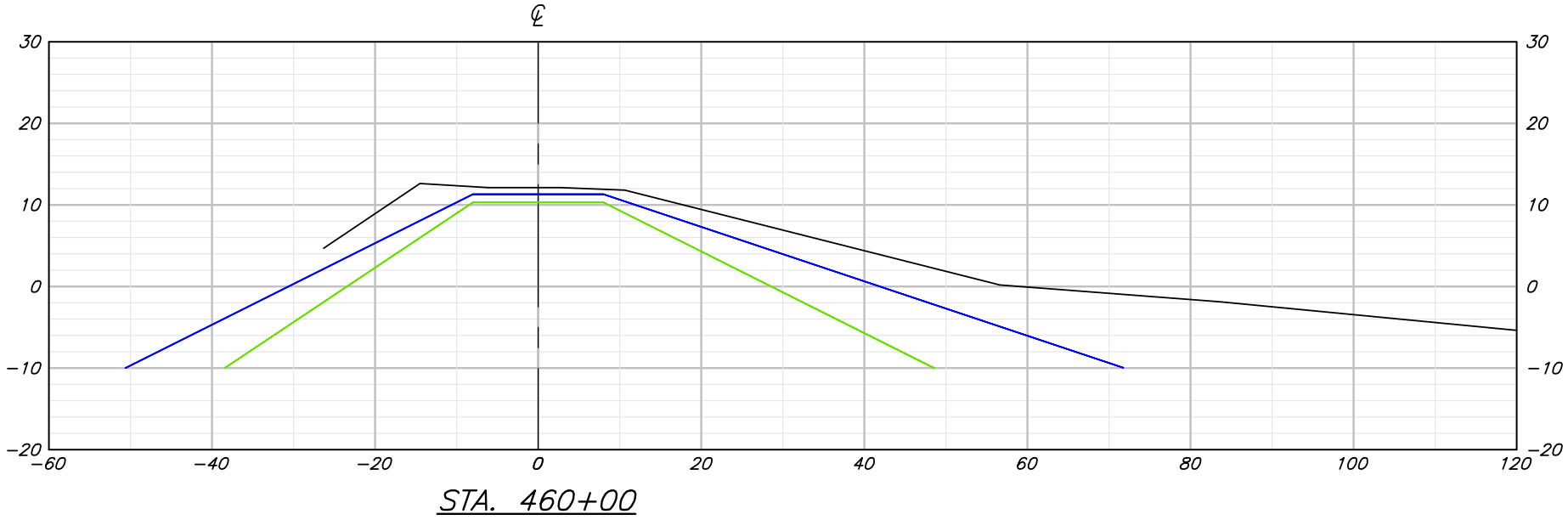
CROSS SECTIONS
STATION 440+00 AND STATION 450+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

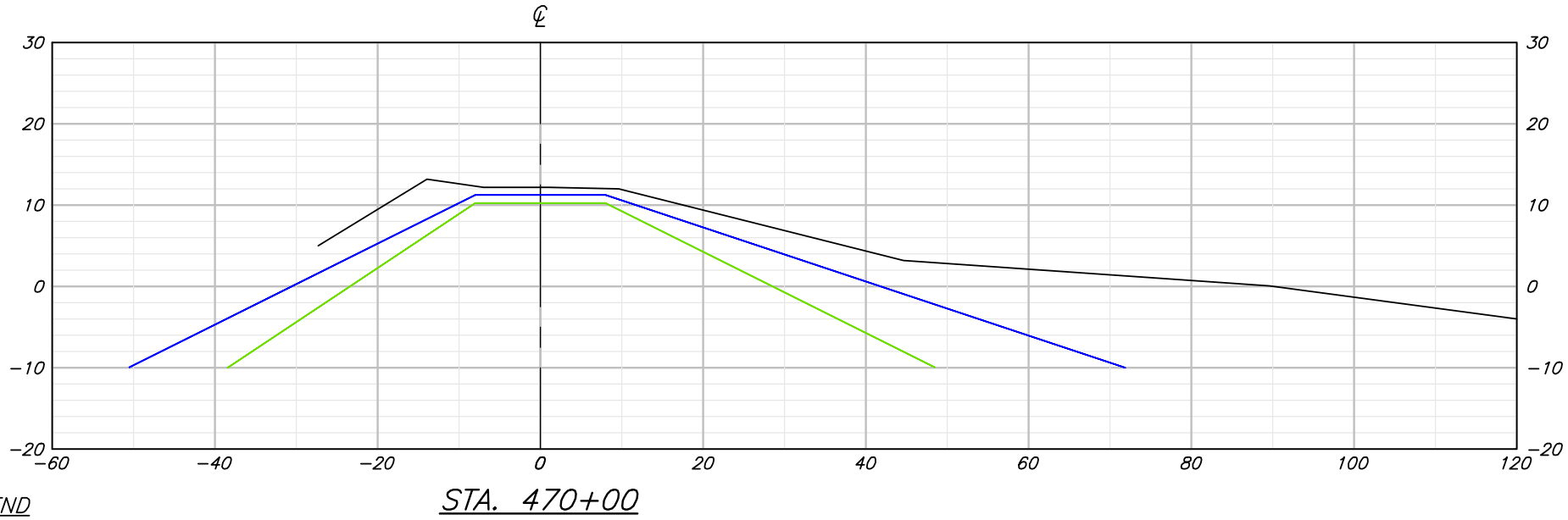
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 23 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 460+00



STA. 470+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Consulting Civil Engineers, A Corporation

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

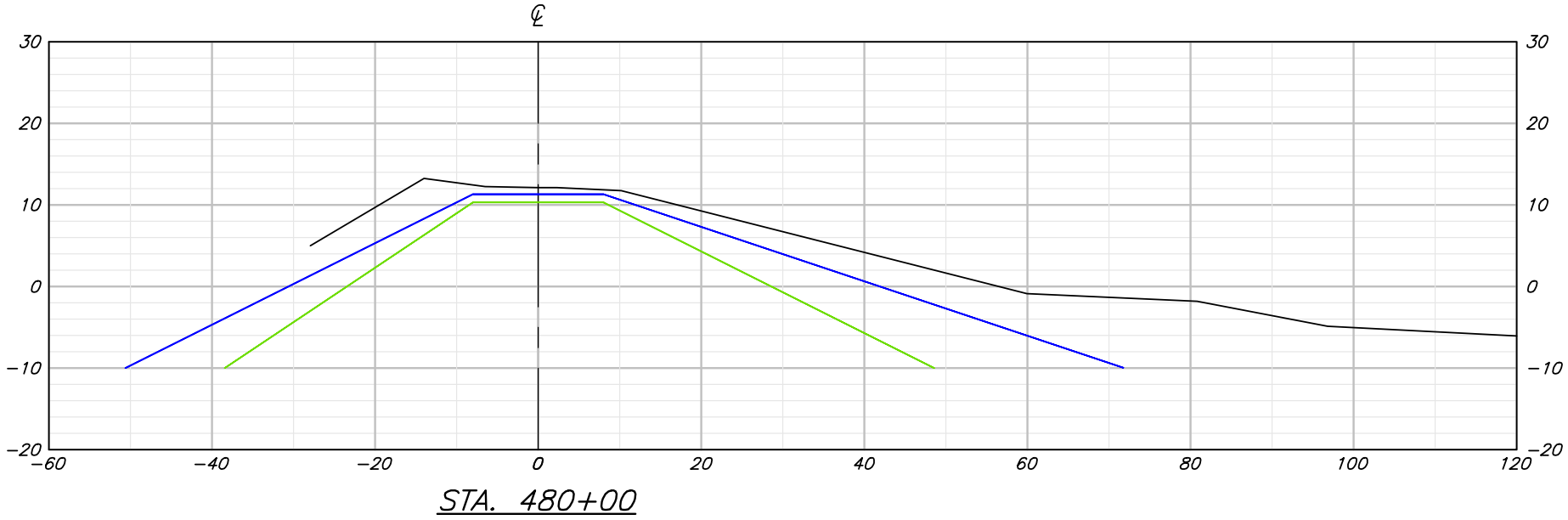
CROSS SECTIONS
STATION 460+00 AND STATION 470+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

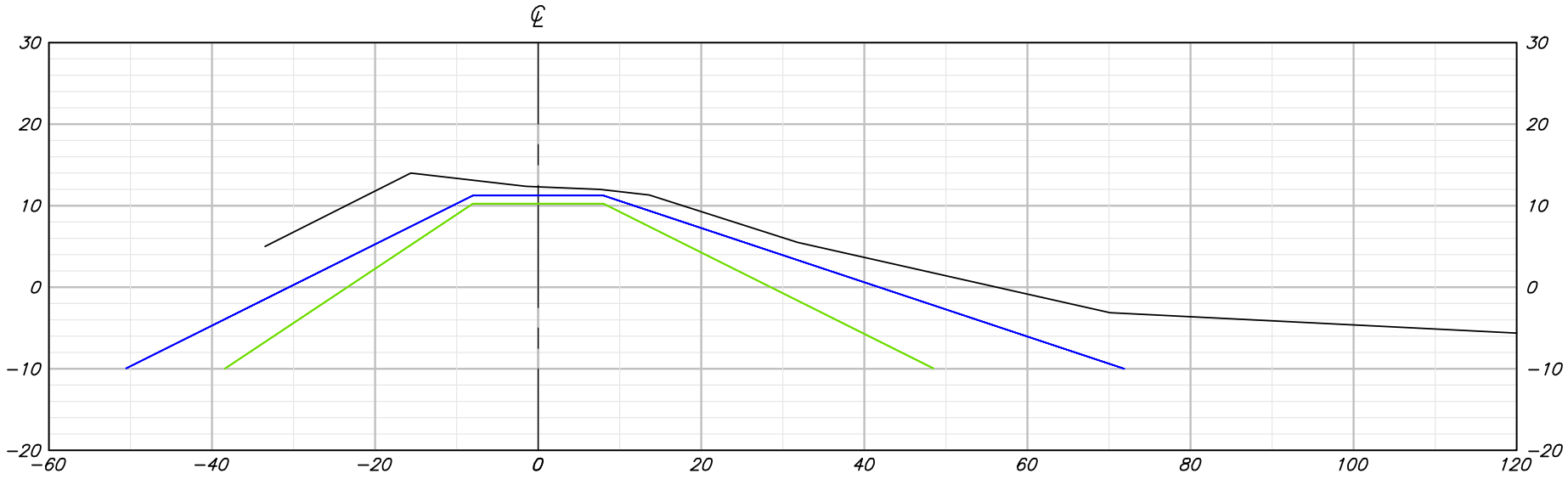
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 24 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 480+00



STA. 490+00

LEGEND

EXISTING GRADE
HMP
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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 480+00 AND STATION 490+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 25 OF 53 SHEETS

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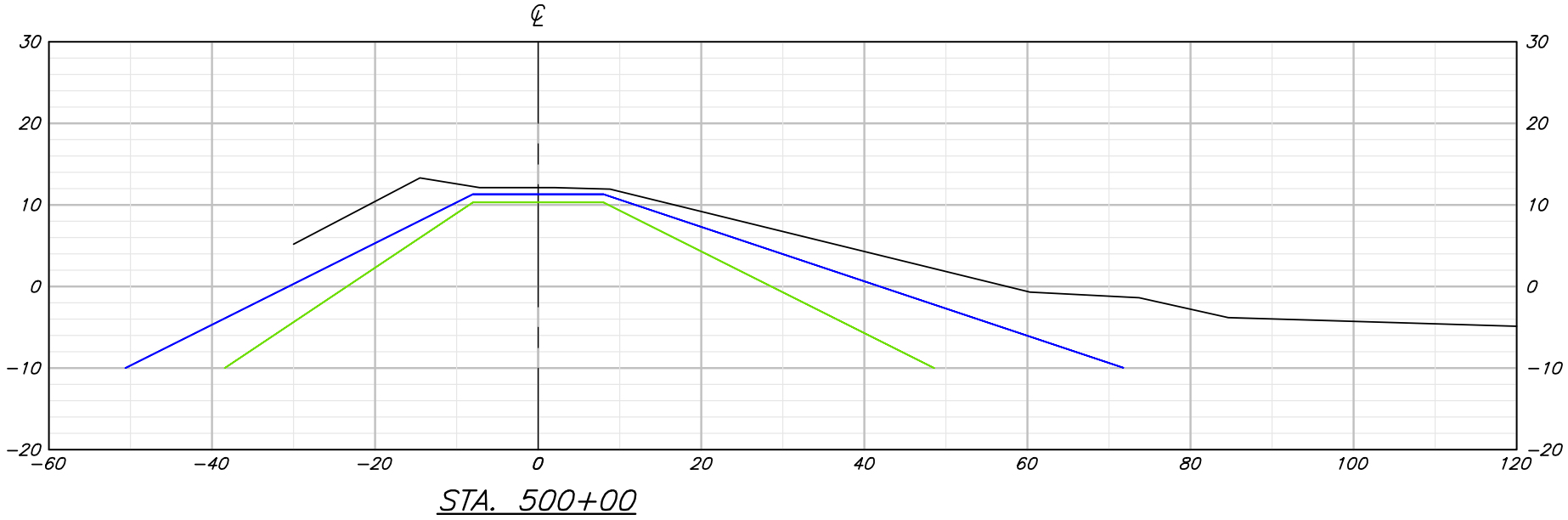
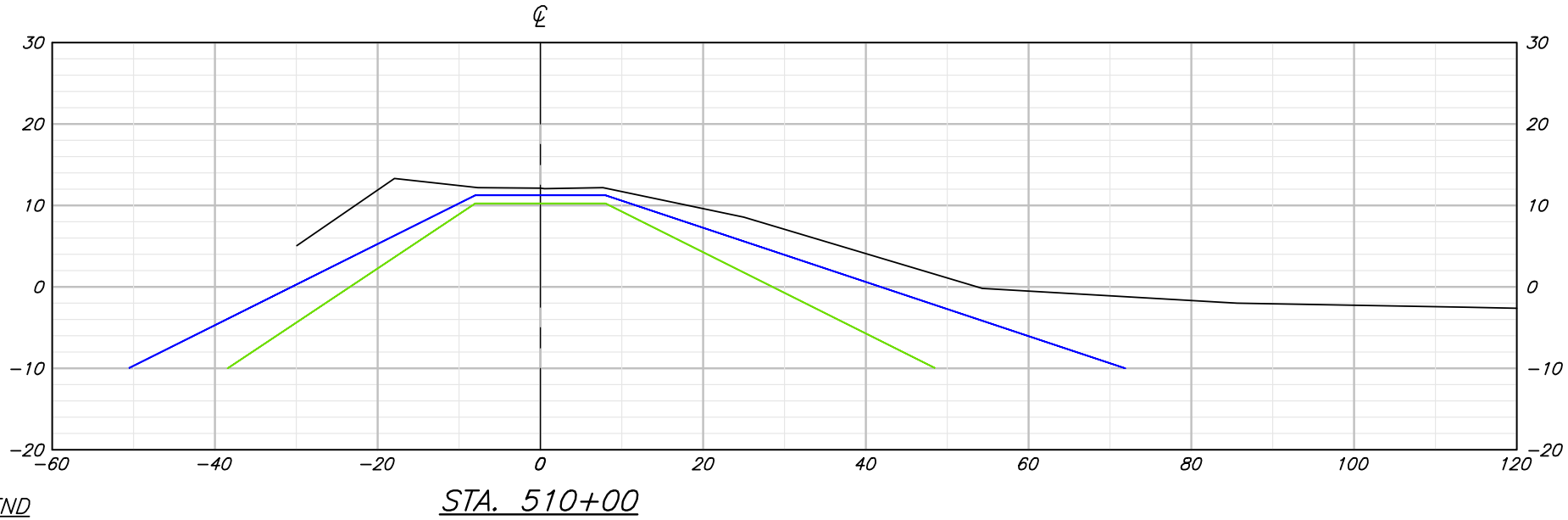


STA. 500+00



STA. 510+00

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

8/6/2020 11:59 AM
Plot Date

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Consulting Civil Engineers, A Corporation
2151 River Plaza Drive
Suite 100
Sacramento, California 95833
Ph: 916-441-6850
Fx: 916-779-3120

RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 500+00 AND STATION 510+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 26 OF 53 SHEETS

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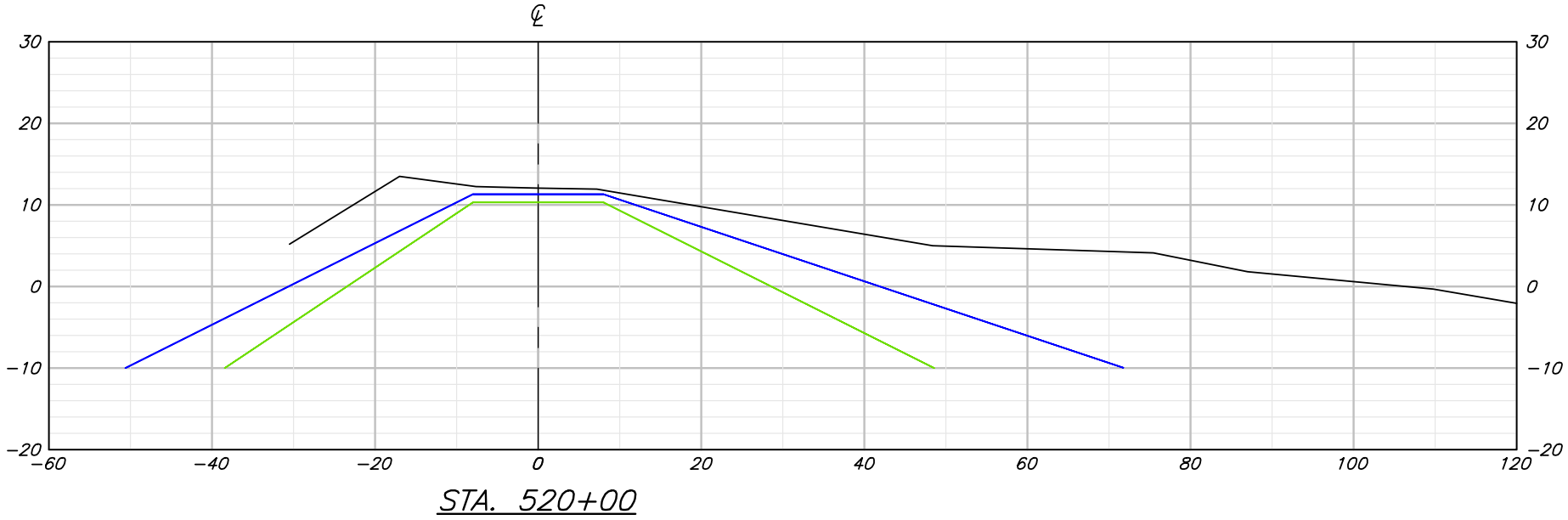
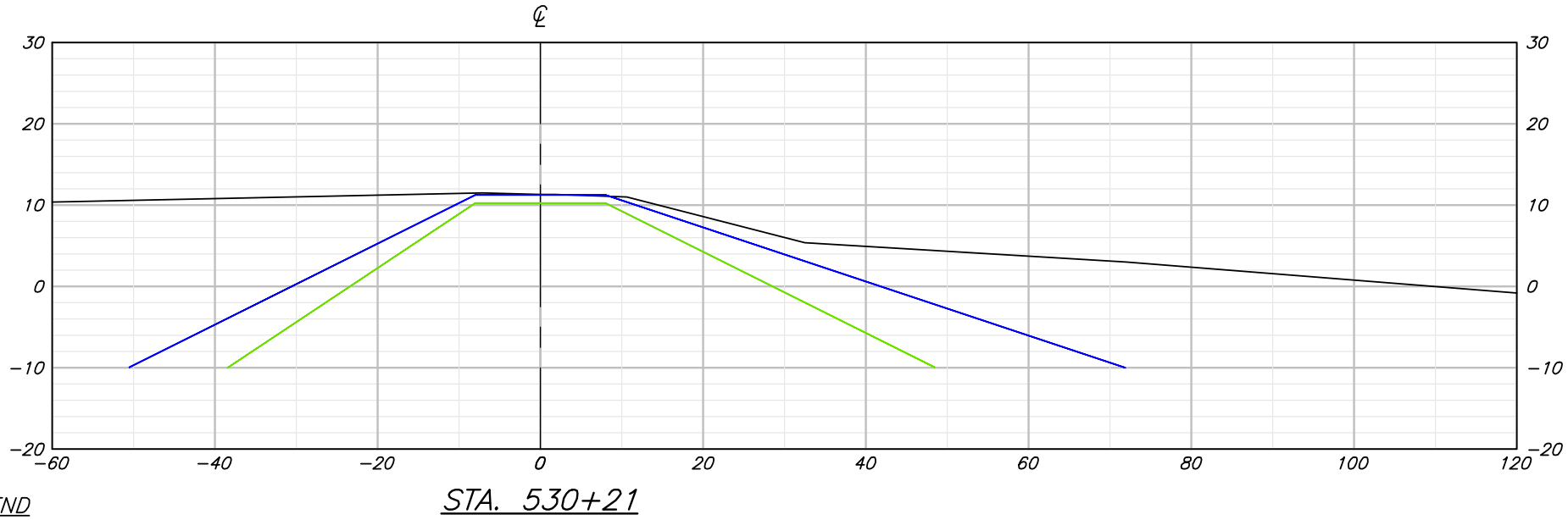


STA. 520+00



STA. 530+21

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 520+00 AND STATION 530+21

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 27 OF 53 SHEETS

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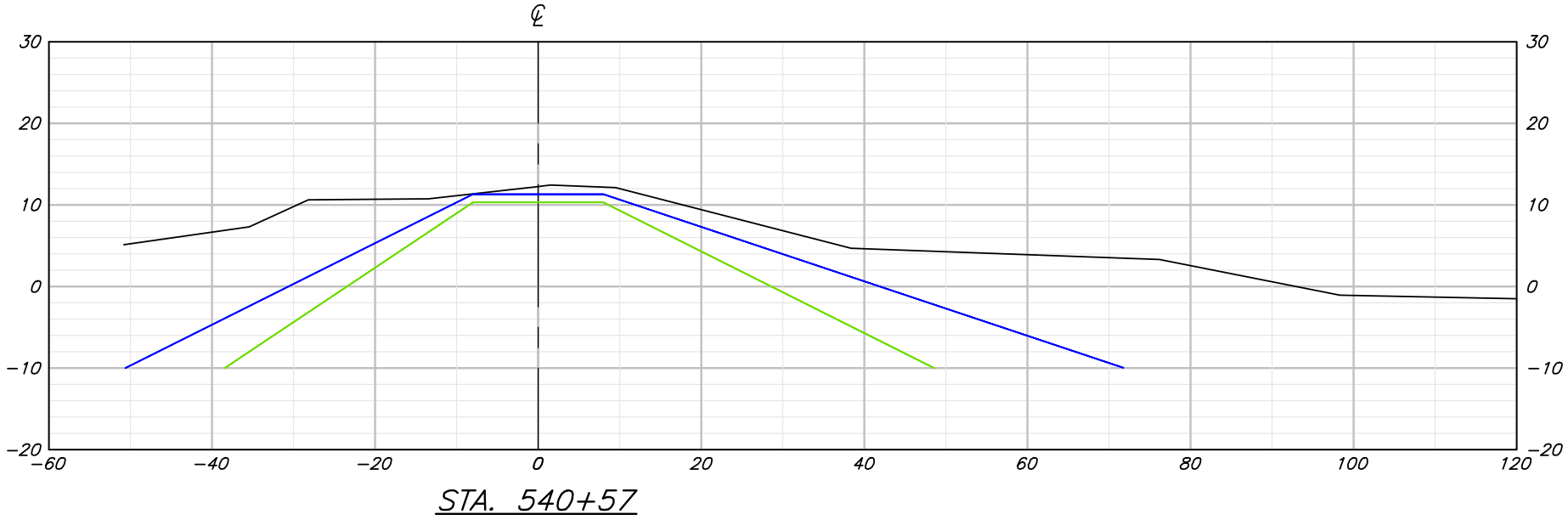
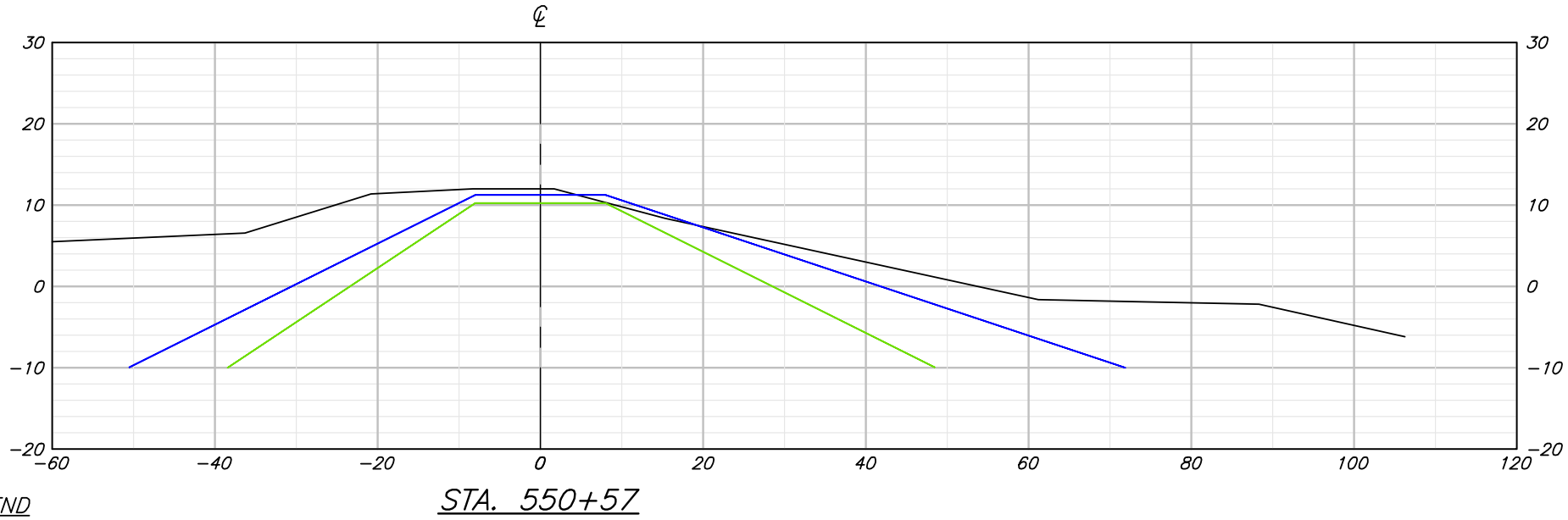


STA. 540+57



STA. 550+57

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 540+57 AND STATION 550+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 28 OF 53 SHEETS

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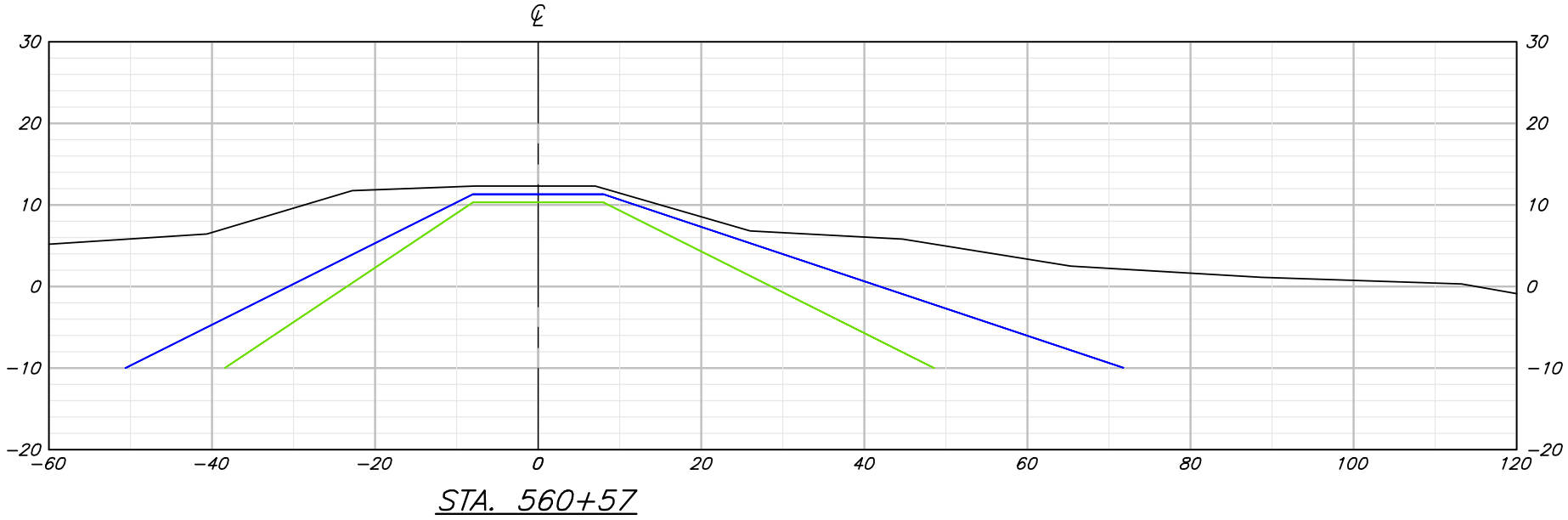
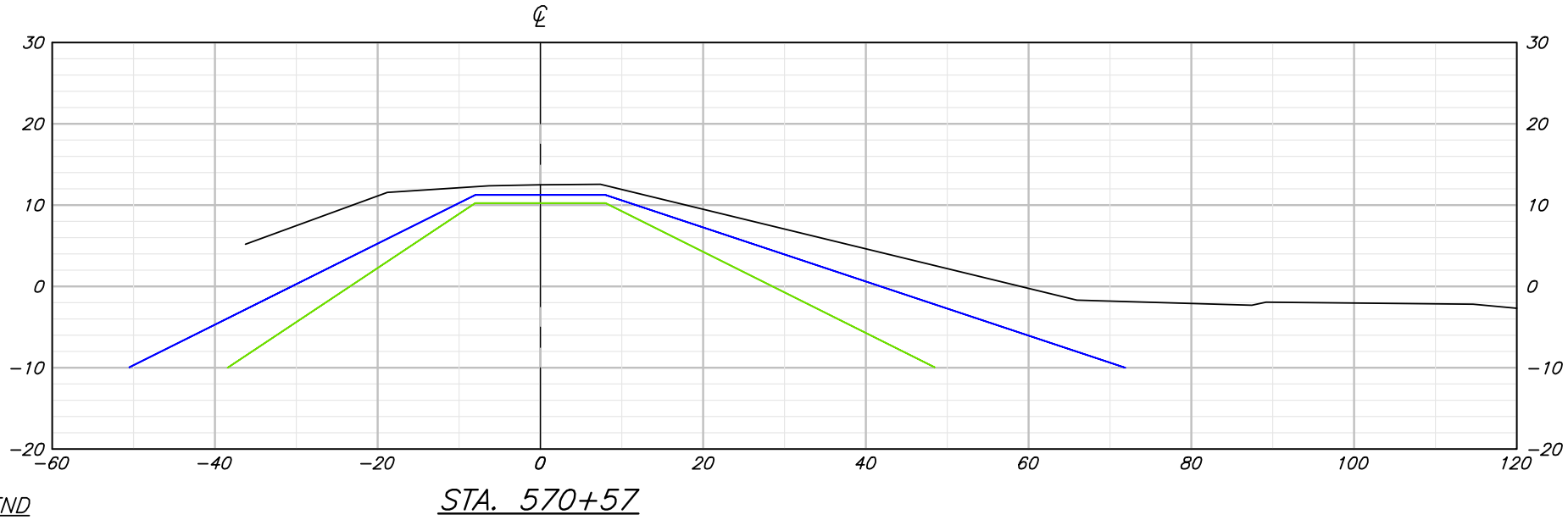


STA. 560+57



STA. 570+57

LEGEND

EXISTING GRADE
PL 84−99
HMP
USACE

8/6/2020 11:59 AM
Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 560+57 AND STATION 570+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 29 OF 53 SHEETS

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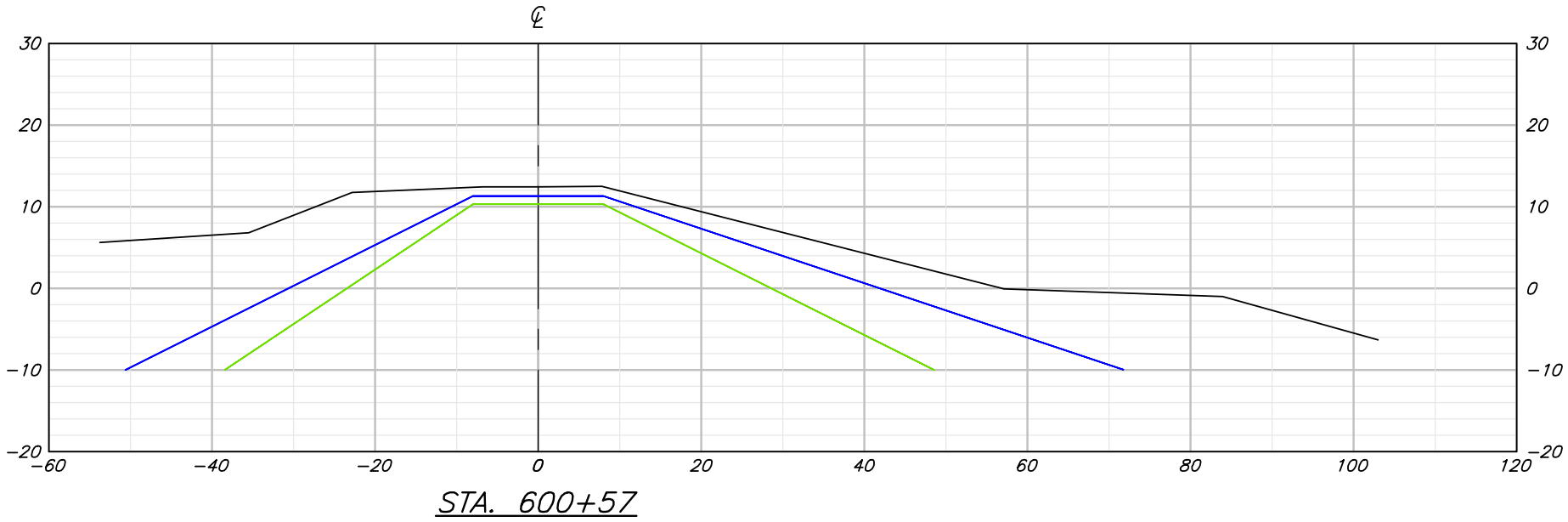
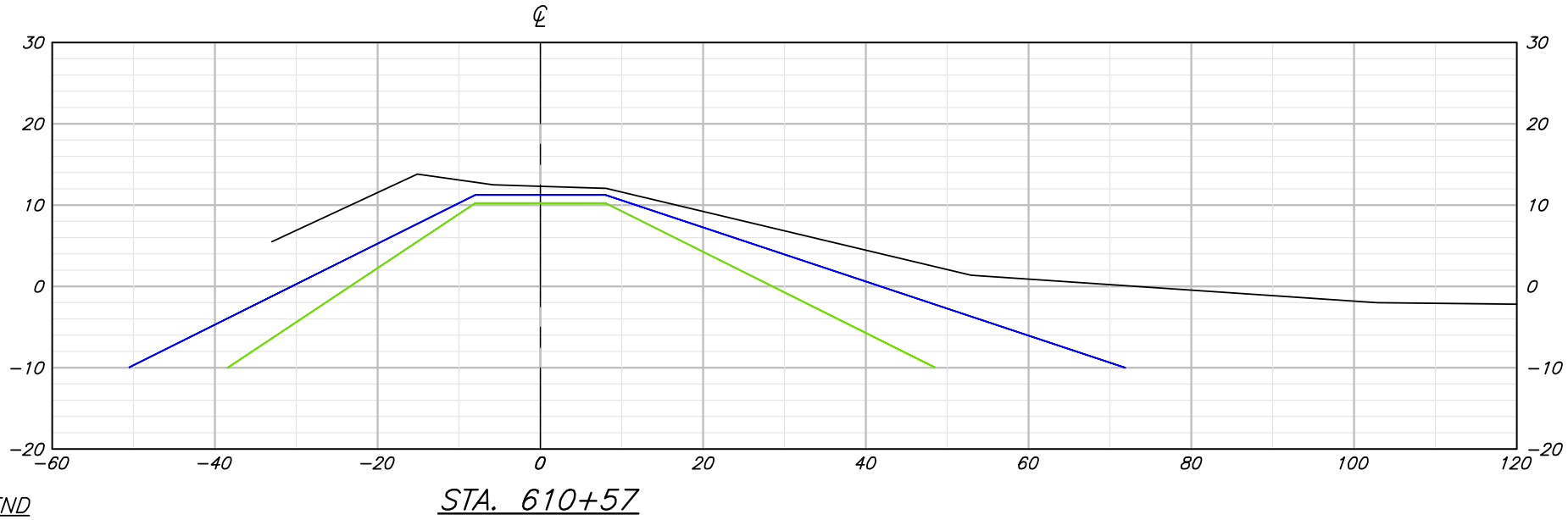


STA. 600+57



STA. 610+57

LEGEND

EXISTING GRADE
PL 84−99
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USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 600+57 AND STATION 610+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 30 OF 53 SHEETS

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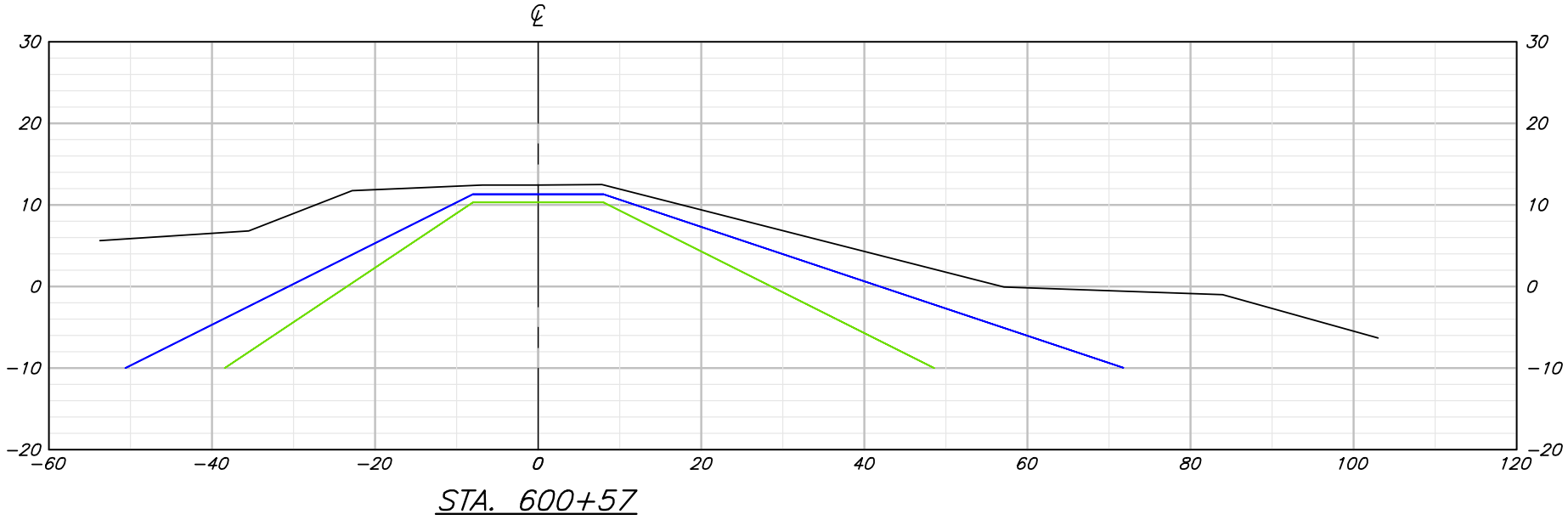
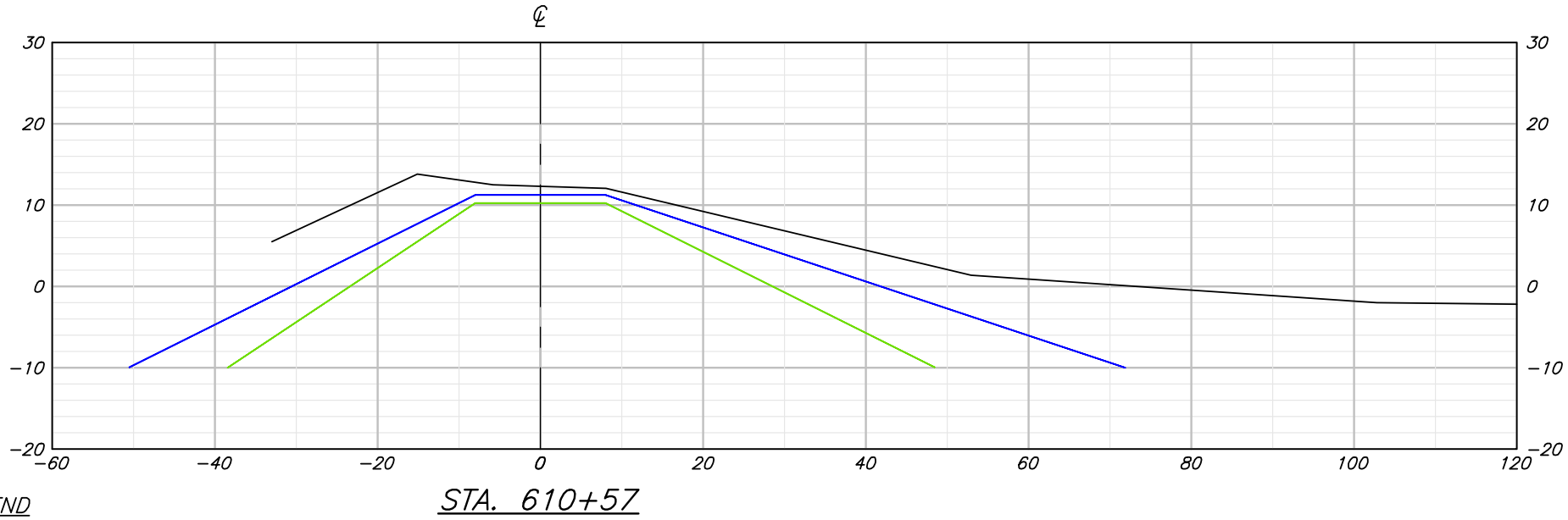


STA. 600+57



STA. 610+57

LEGEND

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 600+57 AND STATION 610+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 31 OF 53 SHEETS

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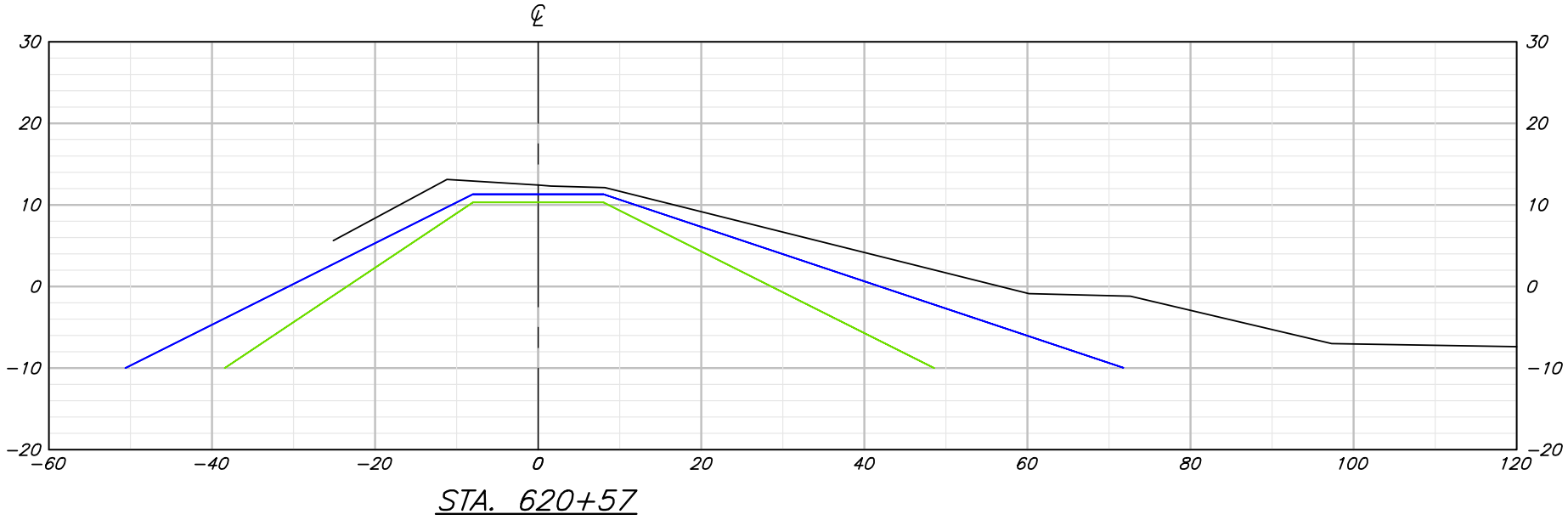
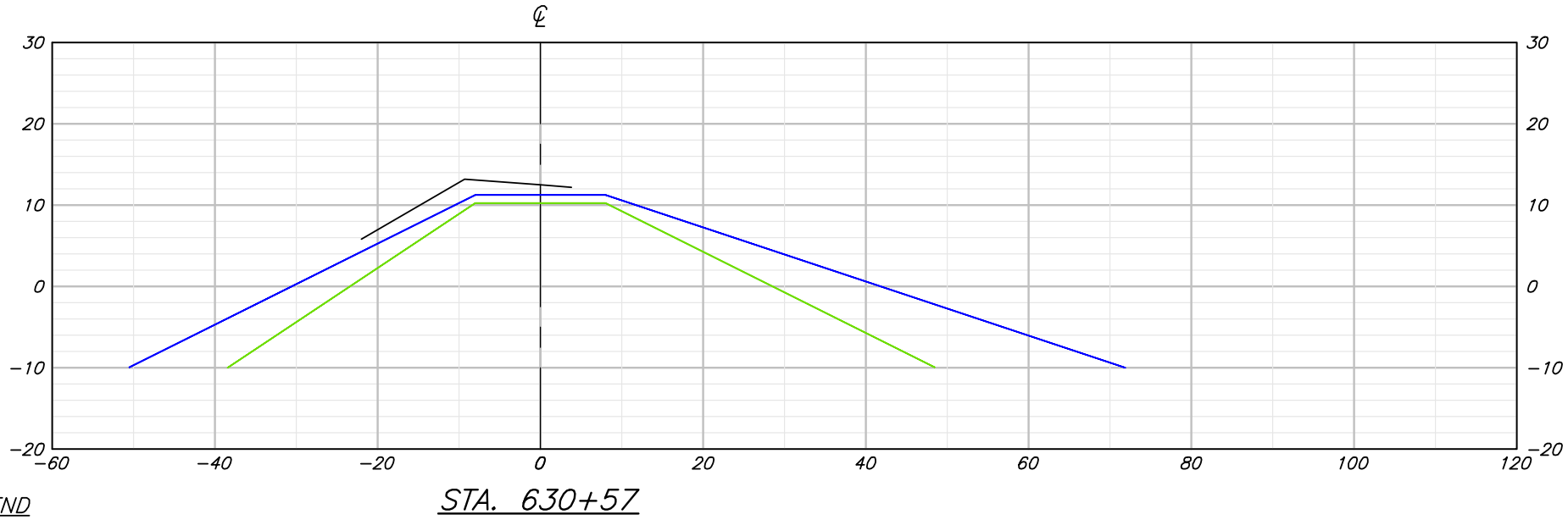


STA. 620+57



STA. 630+57

LEGEND

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 620+57 AND STATION 630+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 32 OF 53 SHEETS

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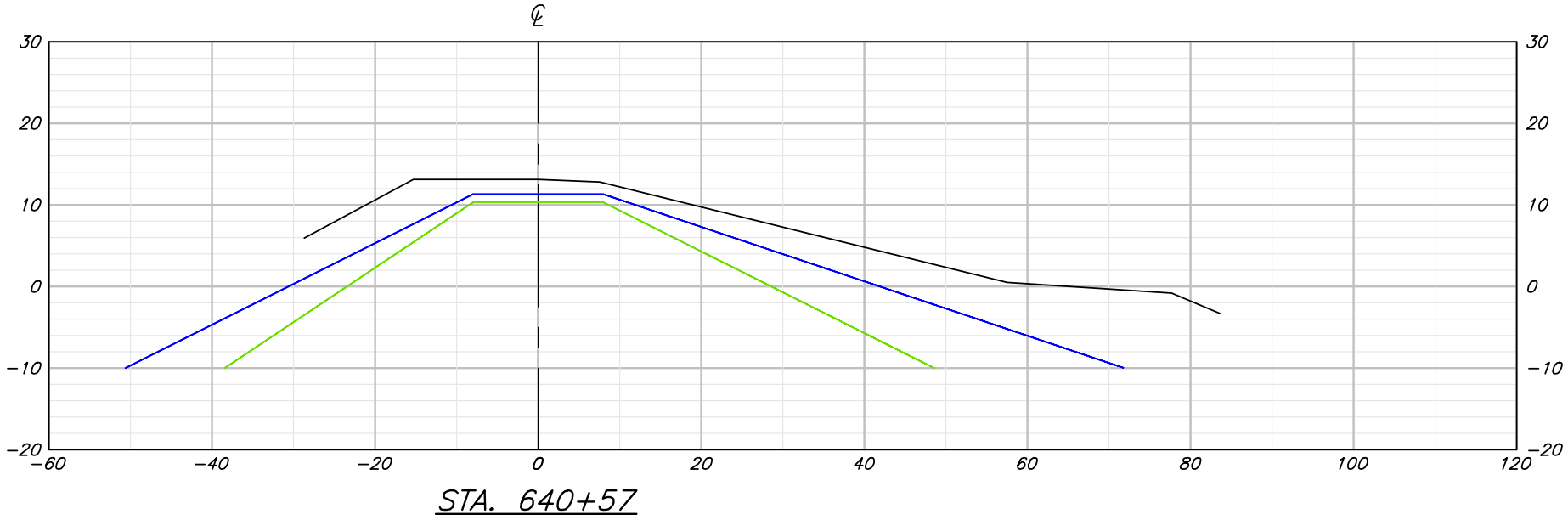
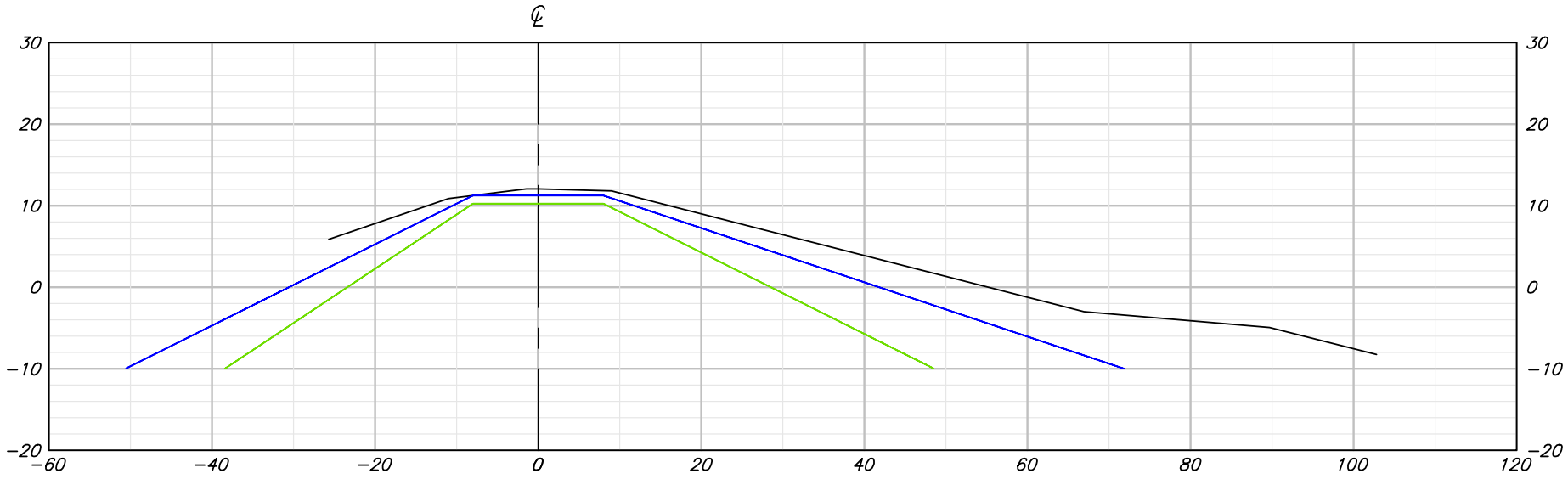


STA. 640+57



STA. 650+57

LEGEND

EXISTING GRADE
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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 640+57 AND STATION 650+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 33 OF 53 SHEETS

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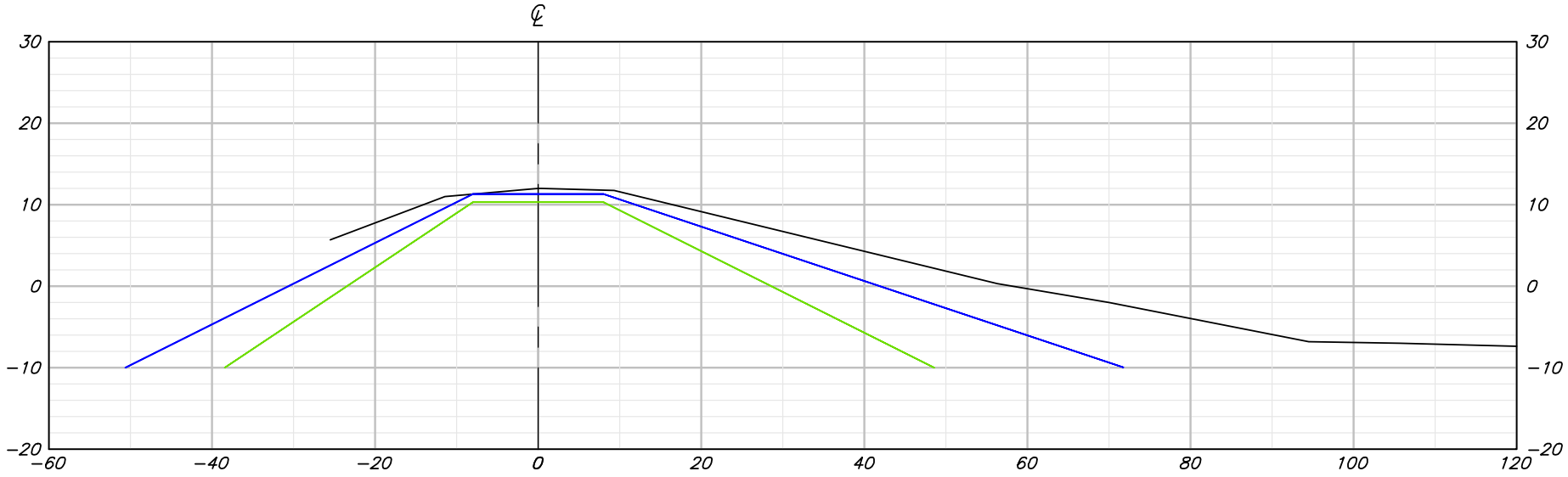
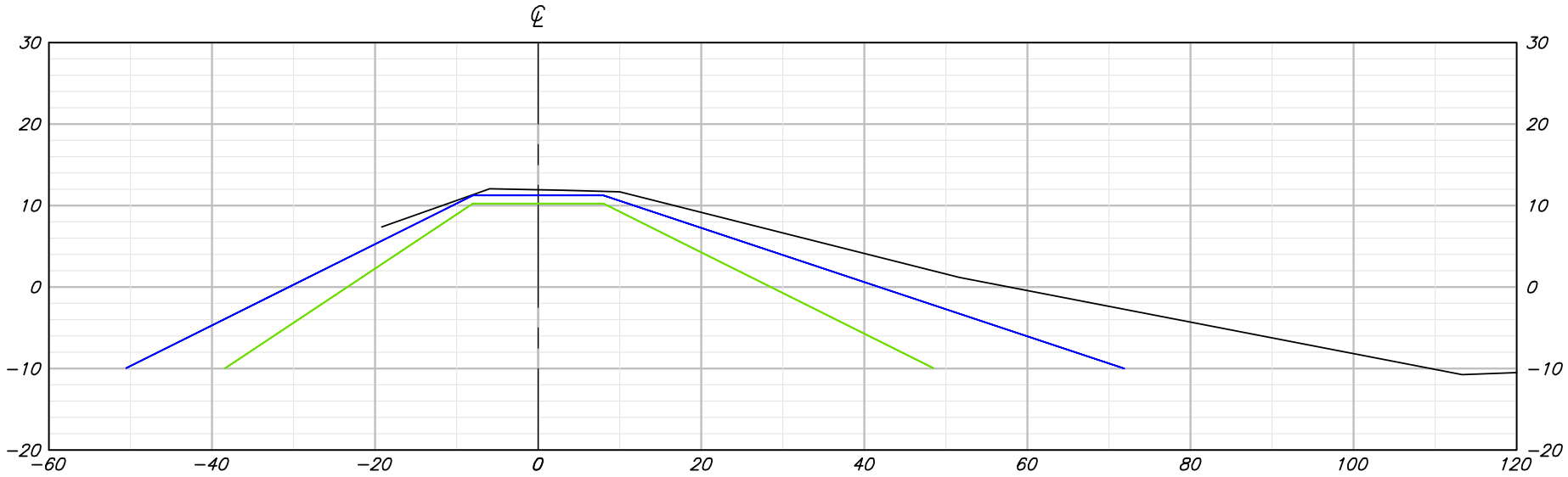


STA. 662+70



STA. 672+77

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 662+70 AND STATION 672+77

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 34 OF 53 SHEETS

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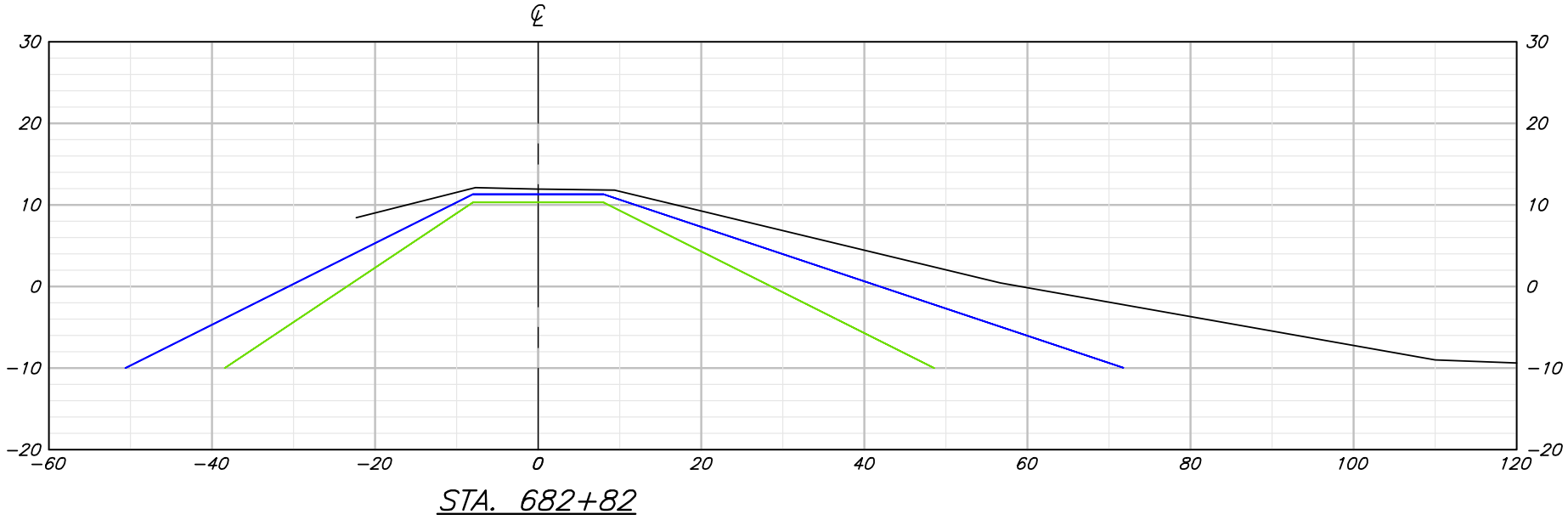
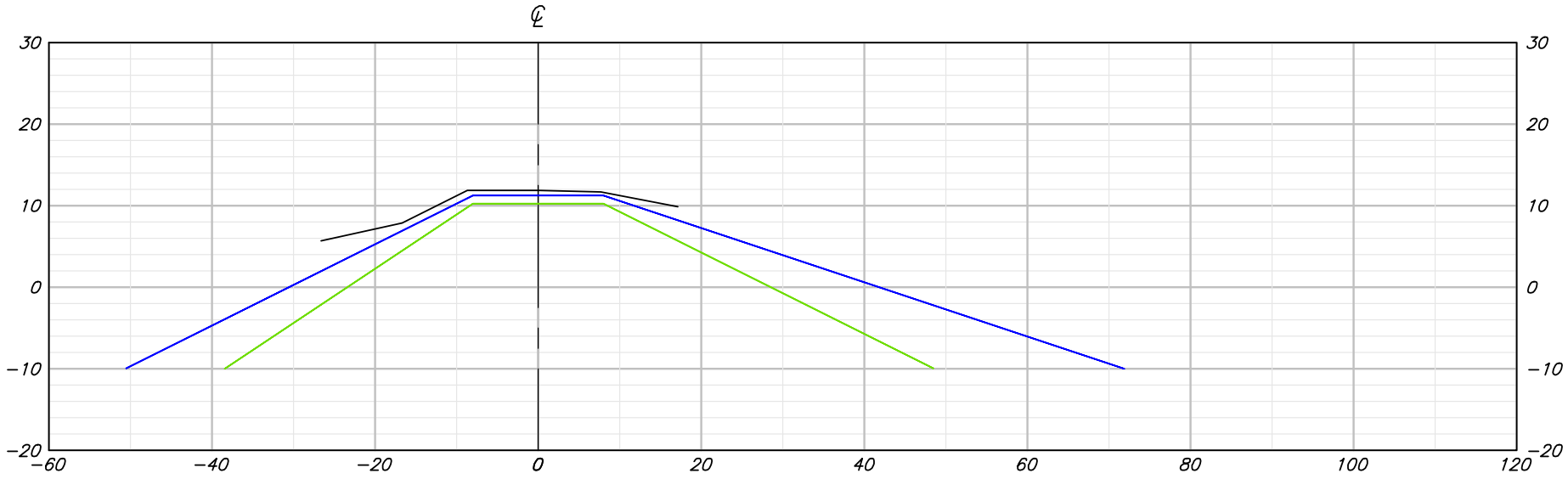


STA. 682+82



STA. 690+39

LEGEND

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

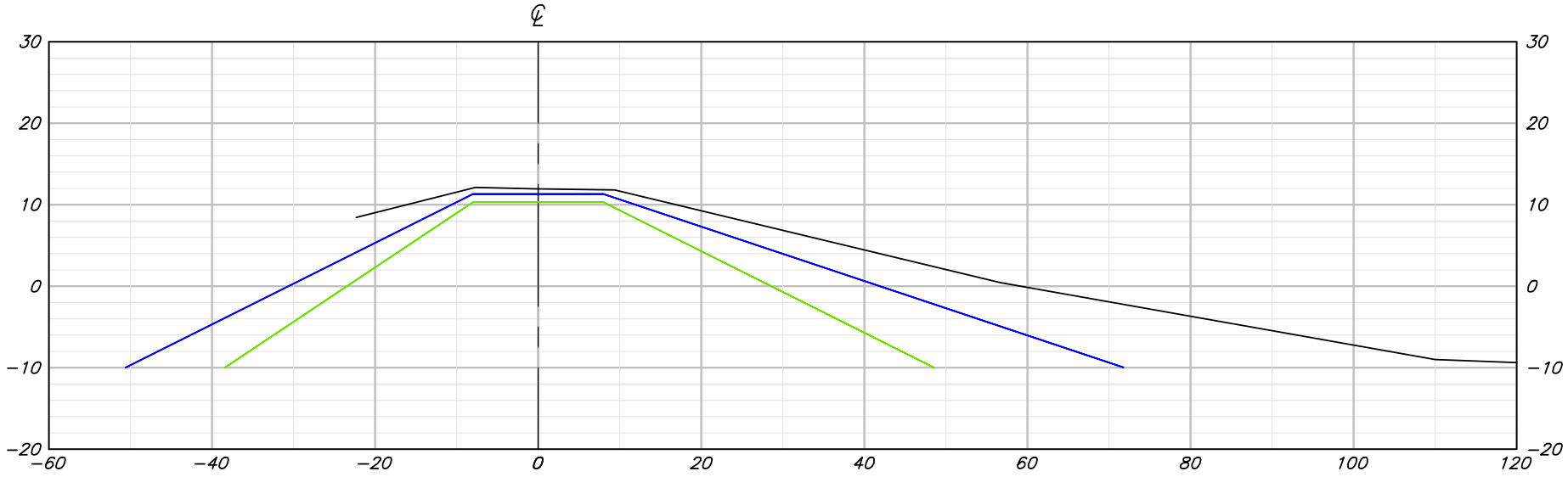
CROSS SECTIONS
STATION 682+82 AND STATION 690+39

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

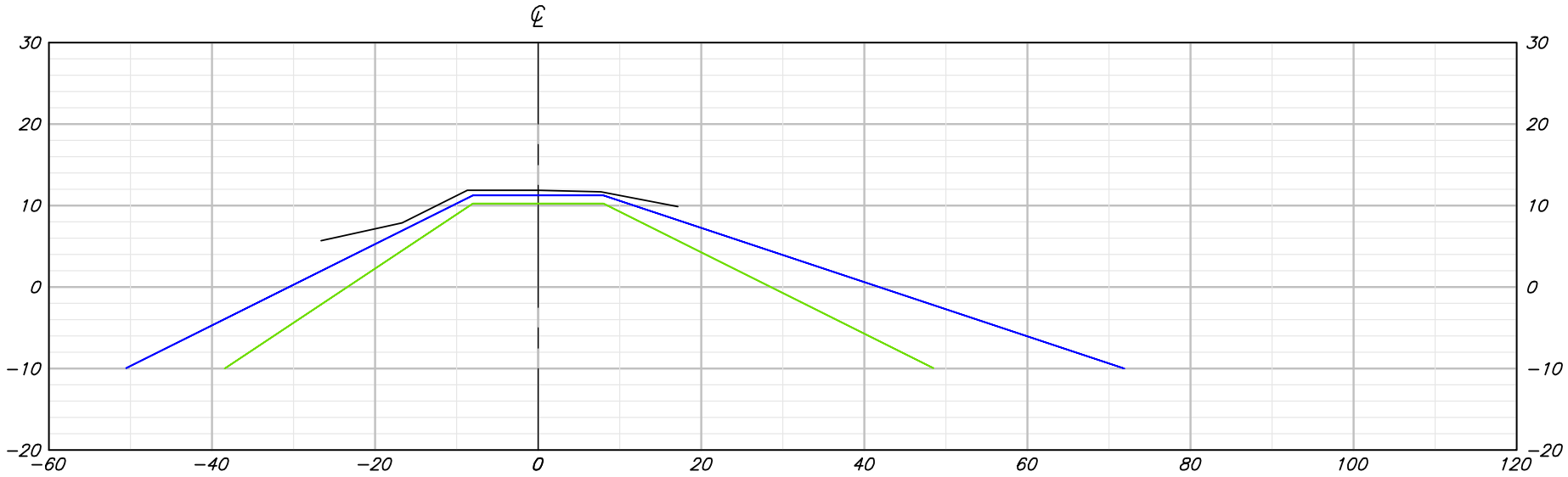
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 35 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 682+82



STA. 690+39

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 682+82 AND STATION 690+39

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 36 OF 53 SHEETS

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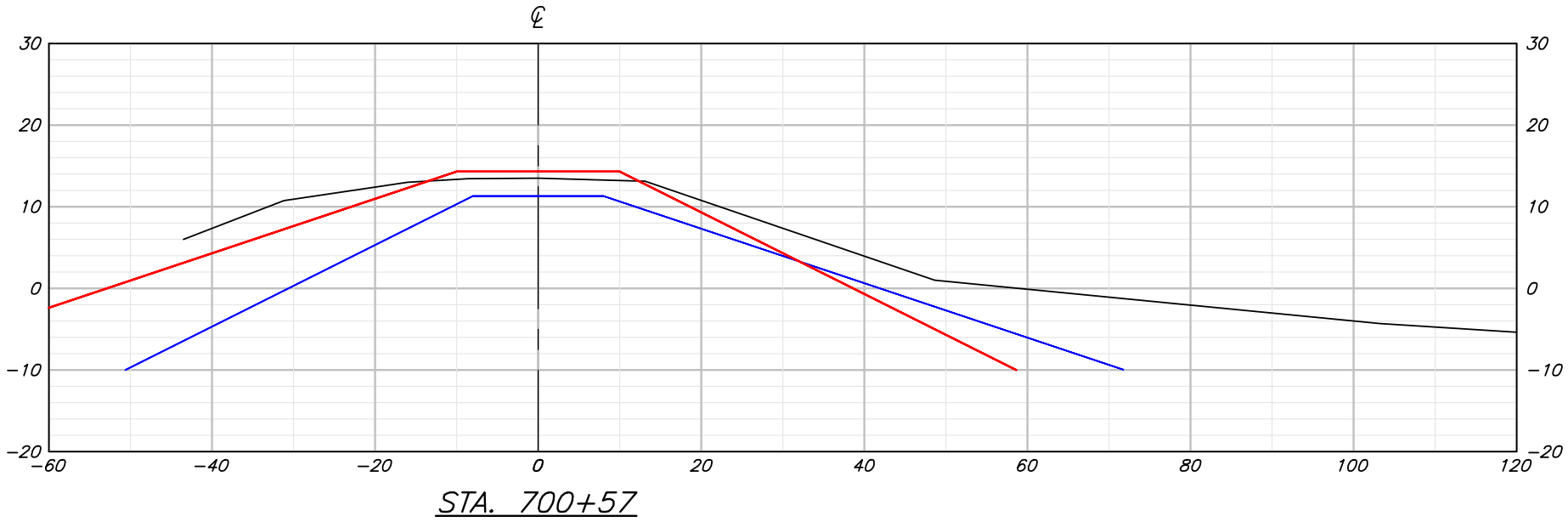
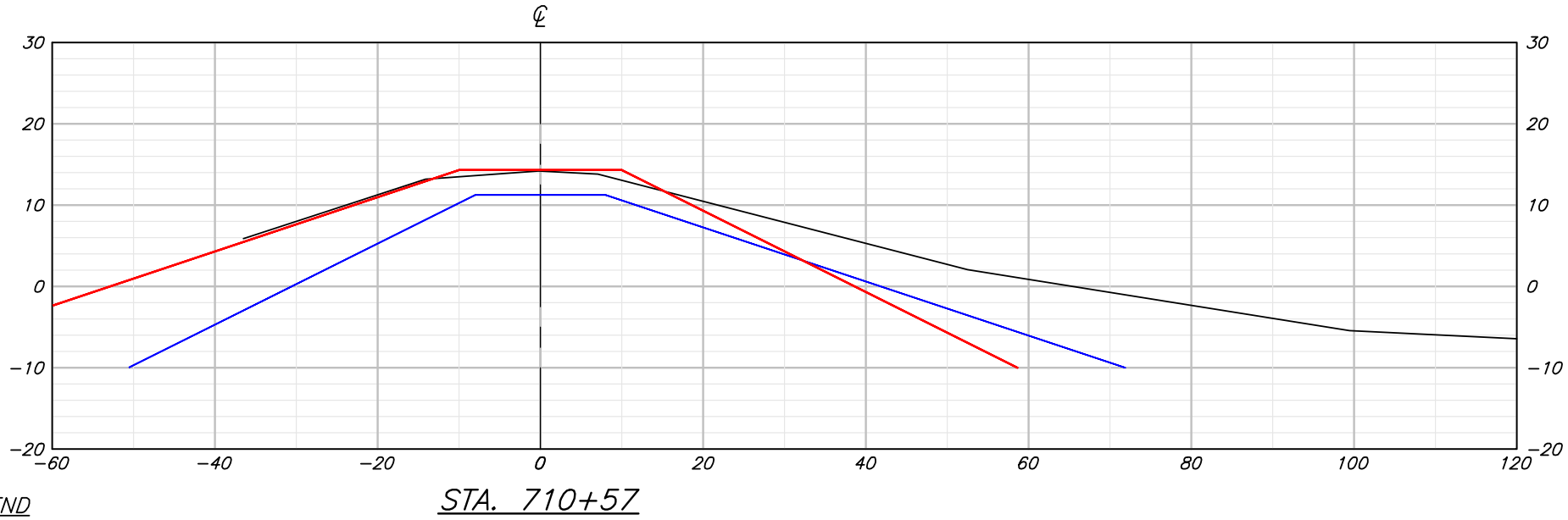


STA. 700+57



STA. 710+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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Fx: 916-779-3120

RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 700+57 AND STATION 710+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 37 OF 53 SHEETS

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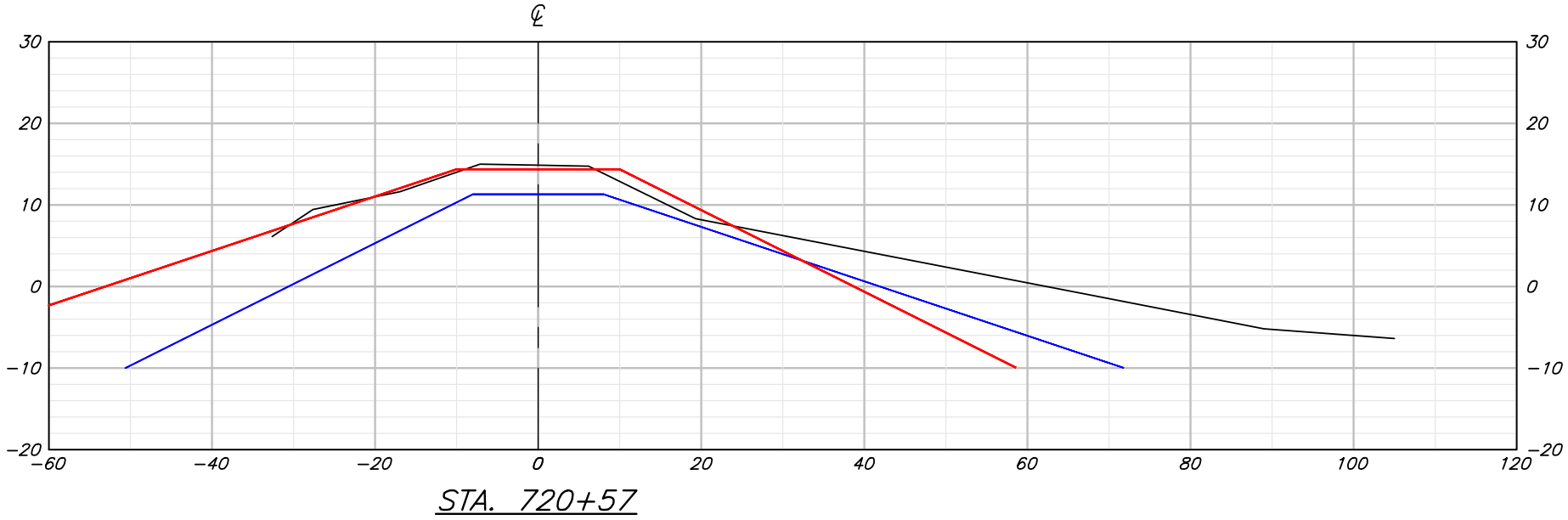
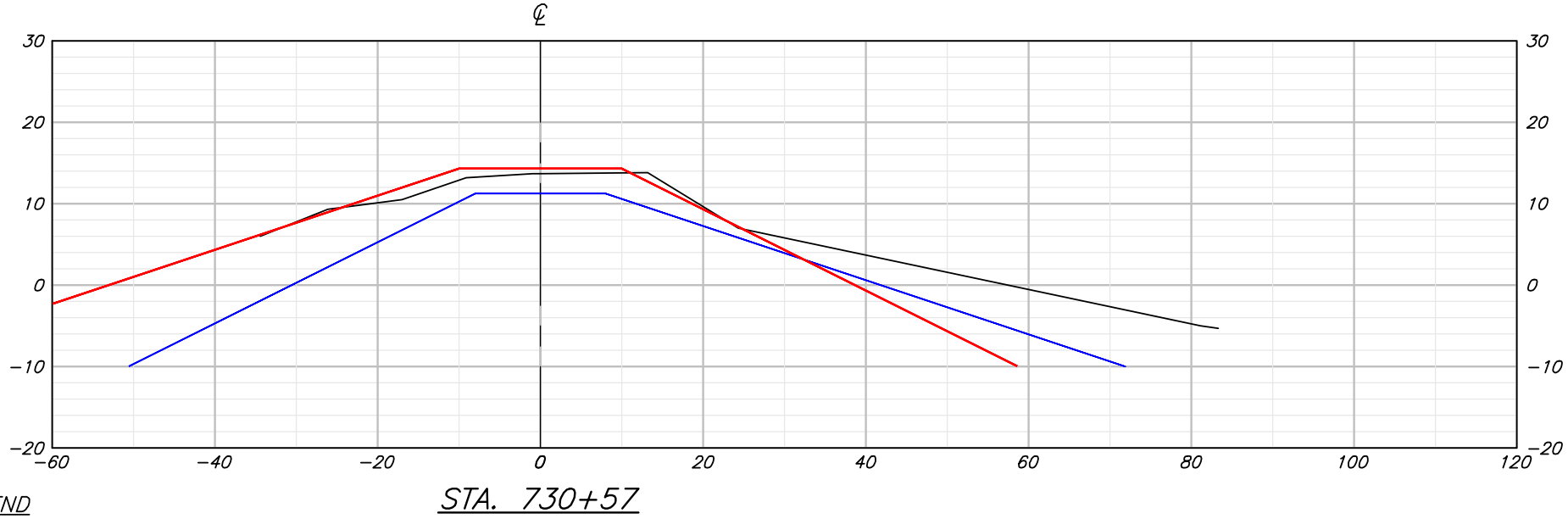


STA. 720+57



STA. 730+57

LEGEND

EXISTING GRADE
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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 720+57 AND STATION 730+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 38 OF 53 SHEETS

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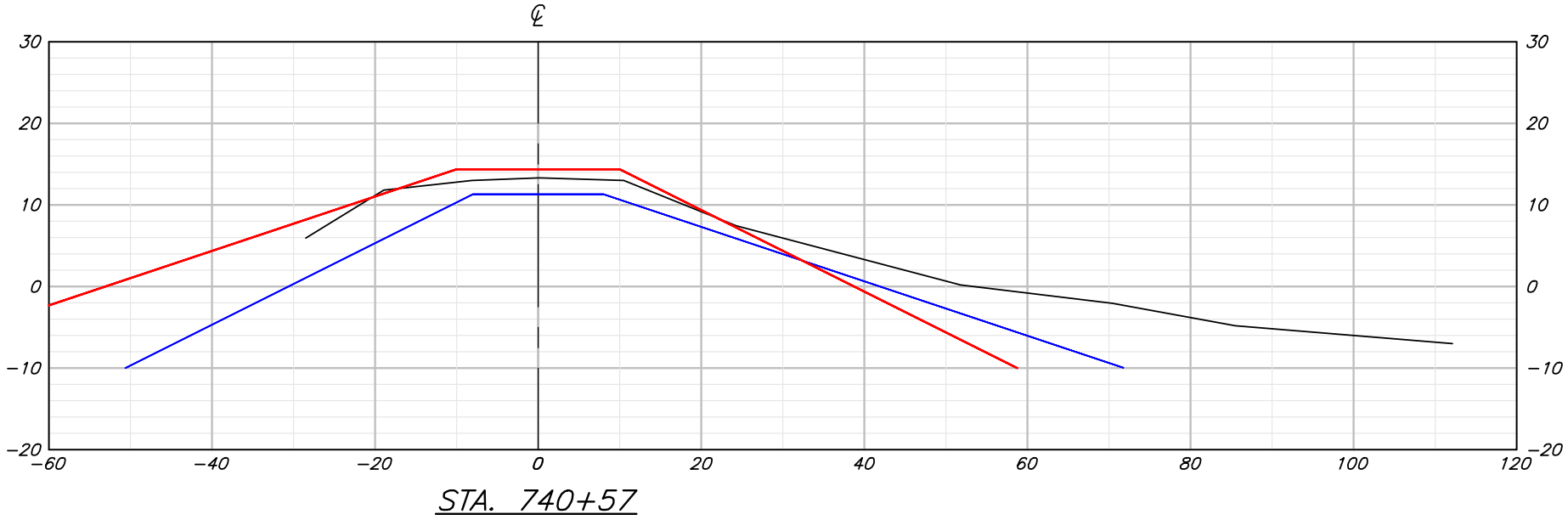
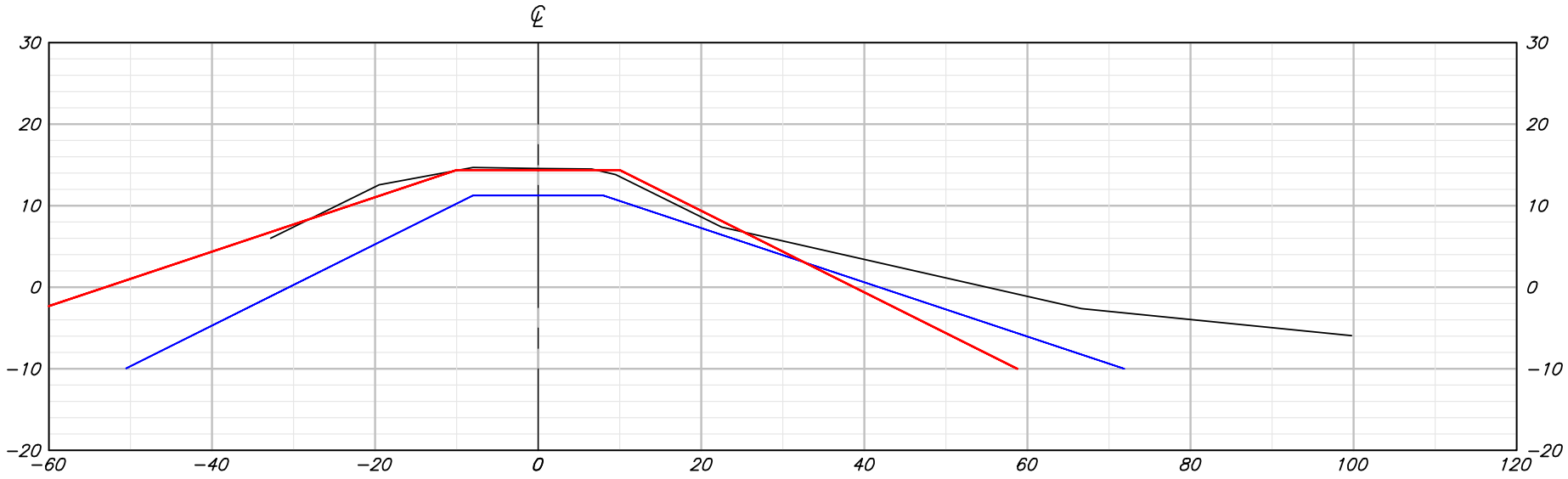


STA. 740+57



STA. 750+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 740+57 AND STATION 750+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 39 OF 53 SHEETS

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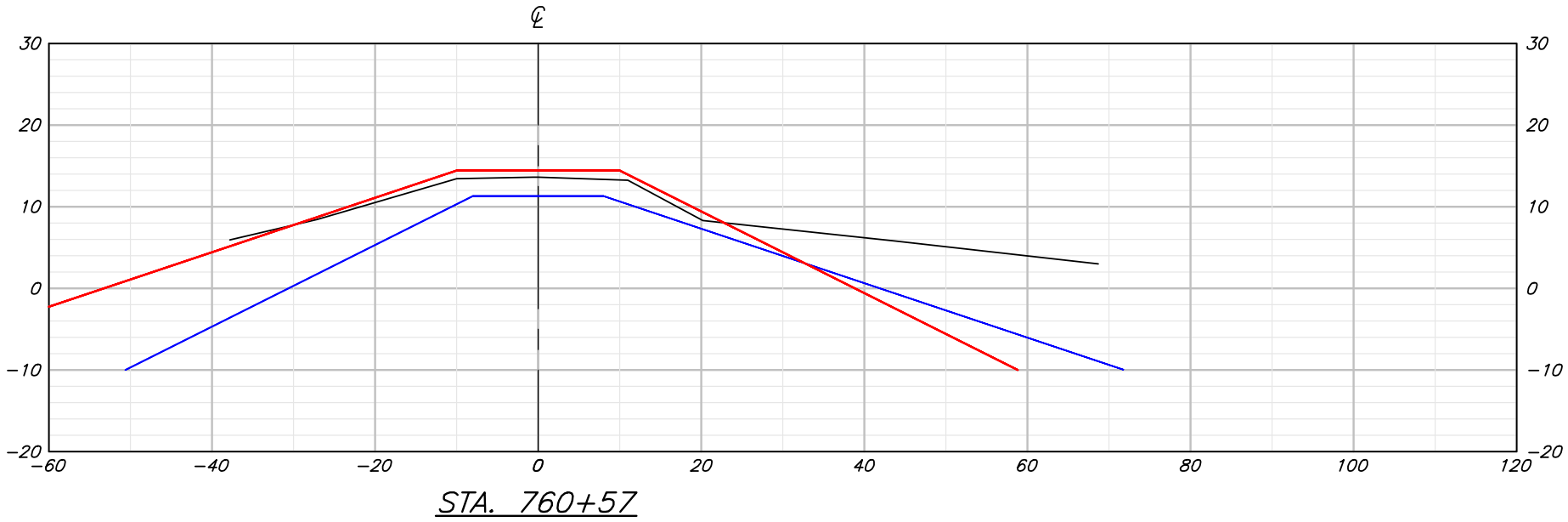
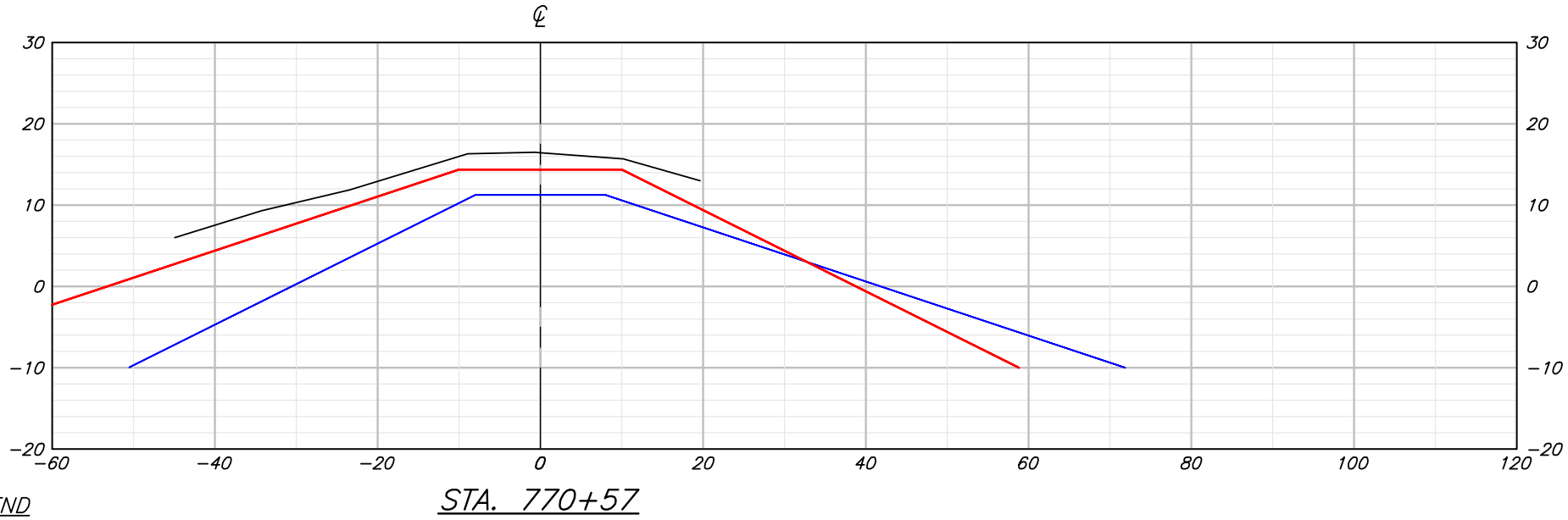


STA. 760+57



STA. 770+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
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Fx: 916-779-3120

RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 760+57 AND STATION 770+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 40 OF 53 SHEETS

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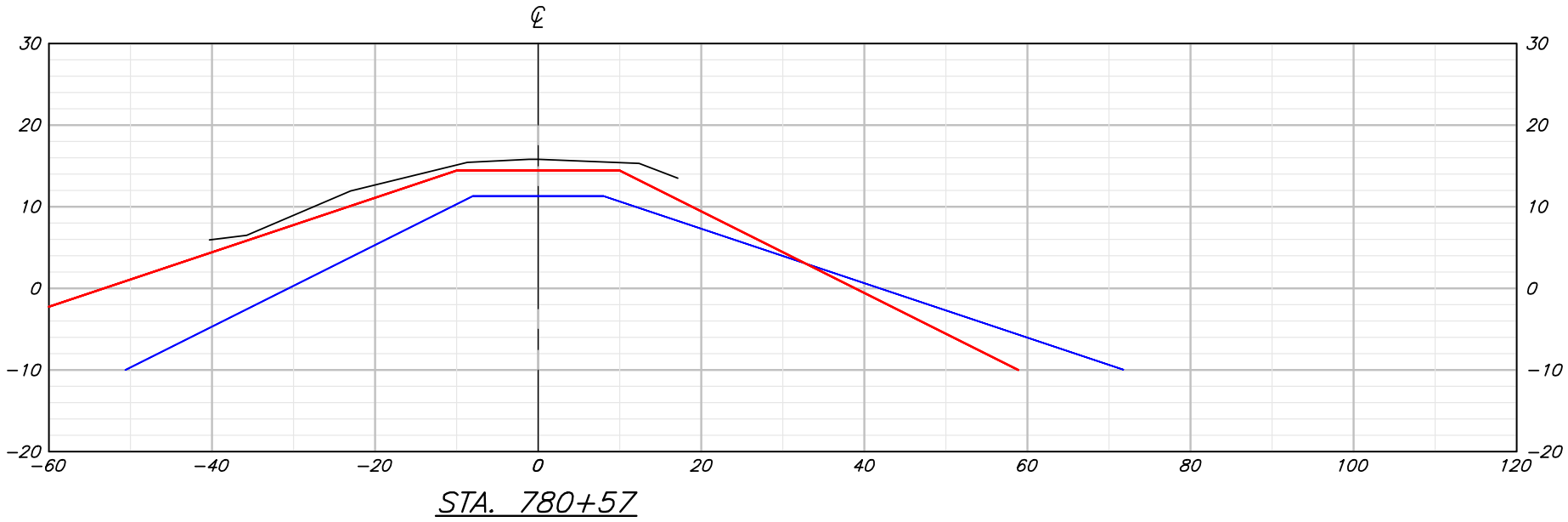
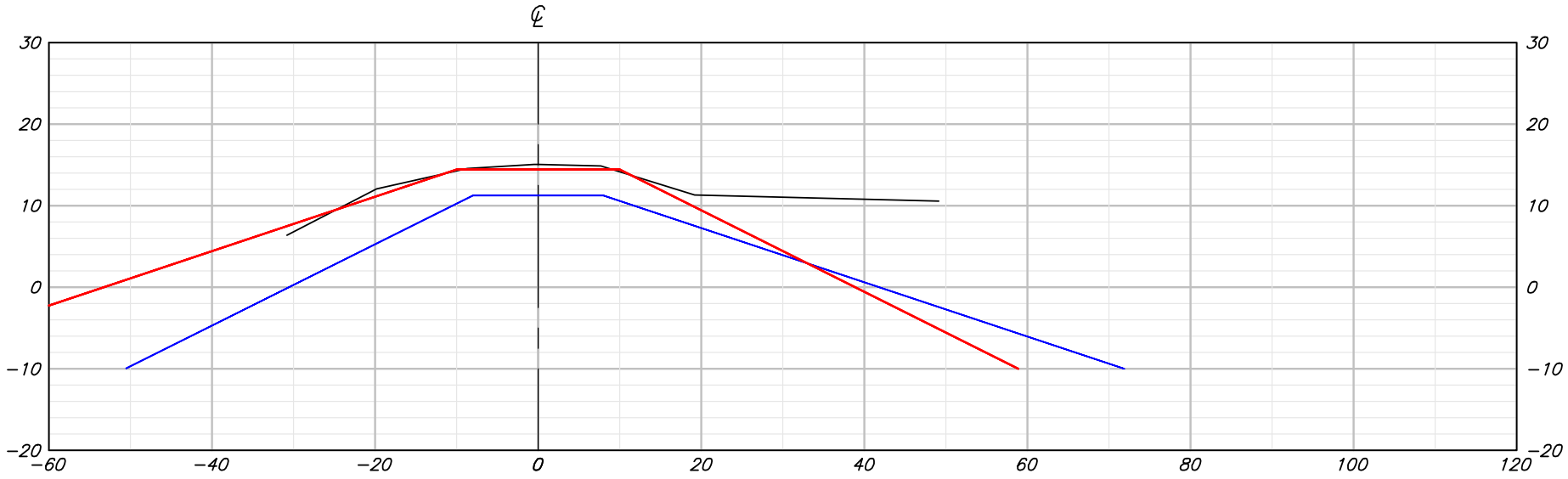


STA. 780+57



STA. 790+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

Plot Date 8/6/2020 12:00 PM

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 780+57 AND STATION 790+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 41 OF 53 SHEETS

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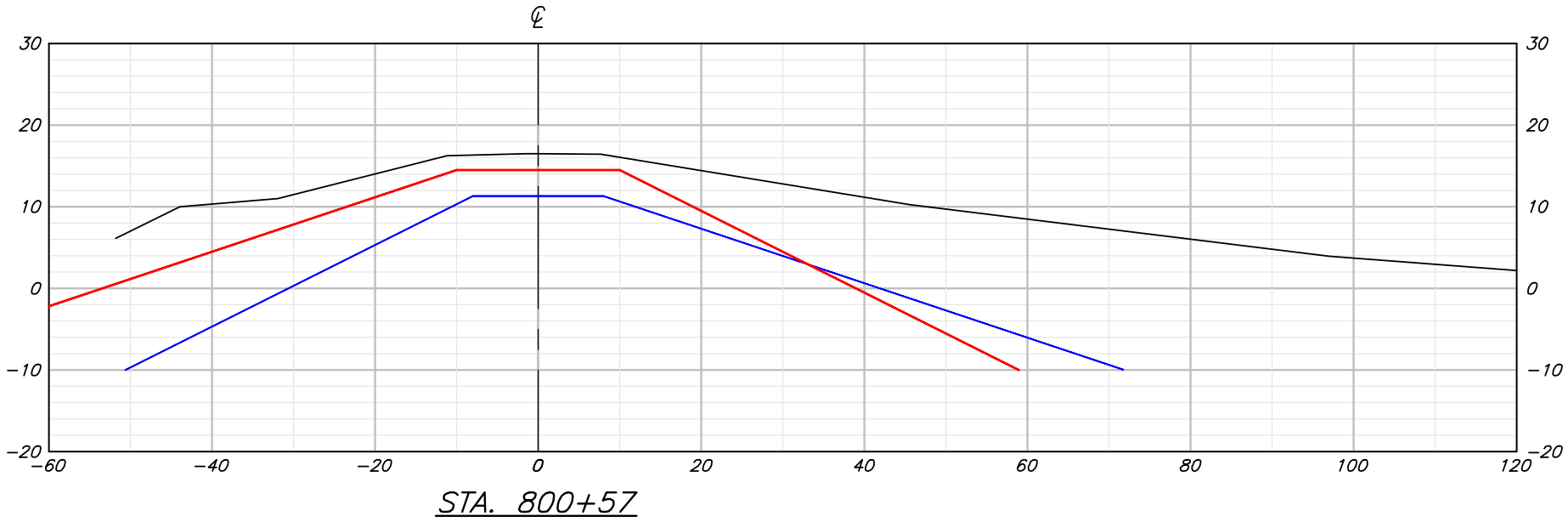
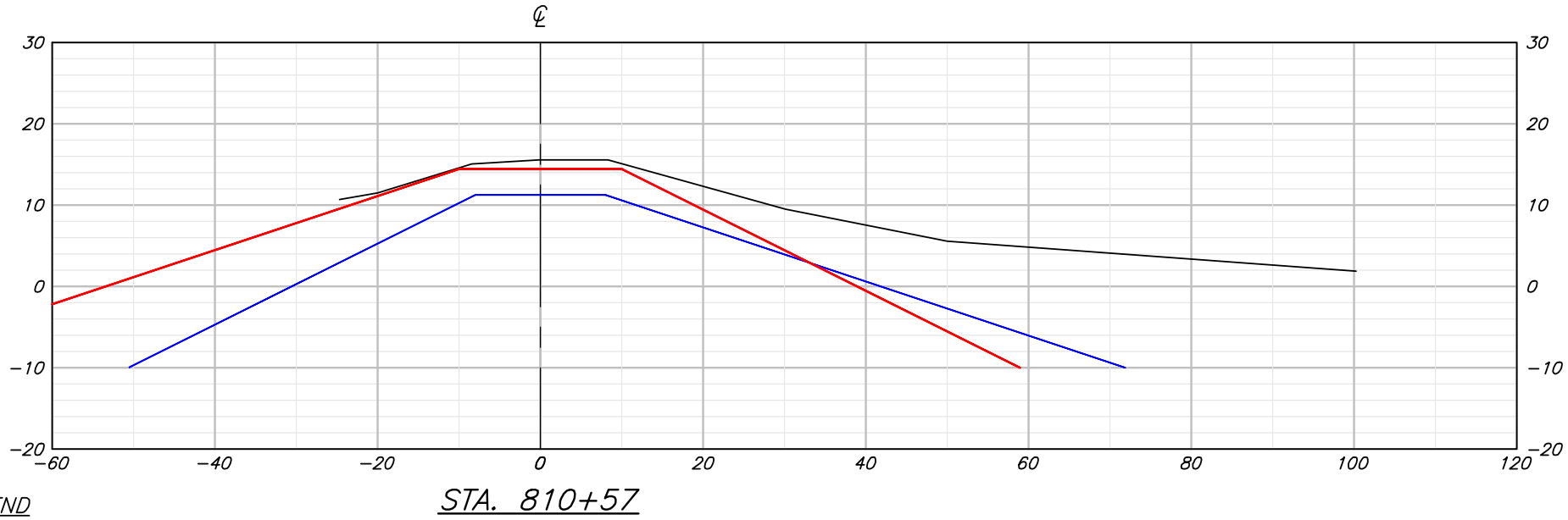


STA. 800+57



STA. 810+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
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Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 42 OF 53 SHEETS

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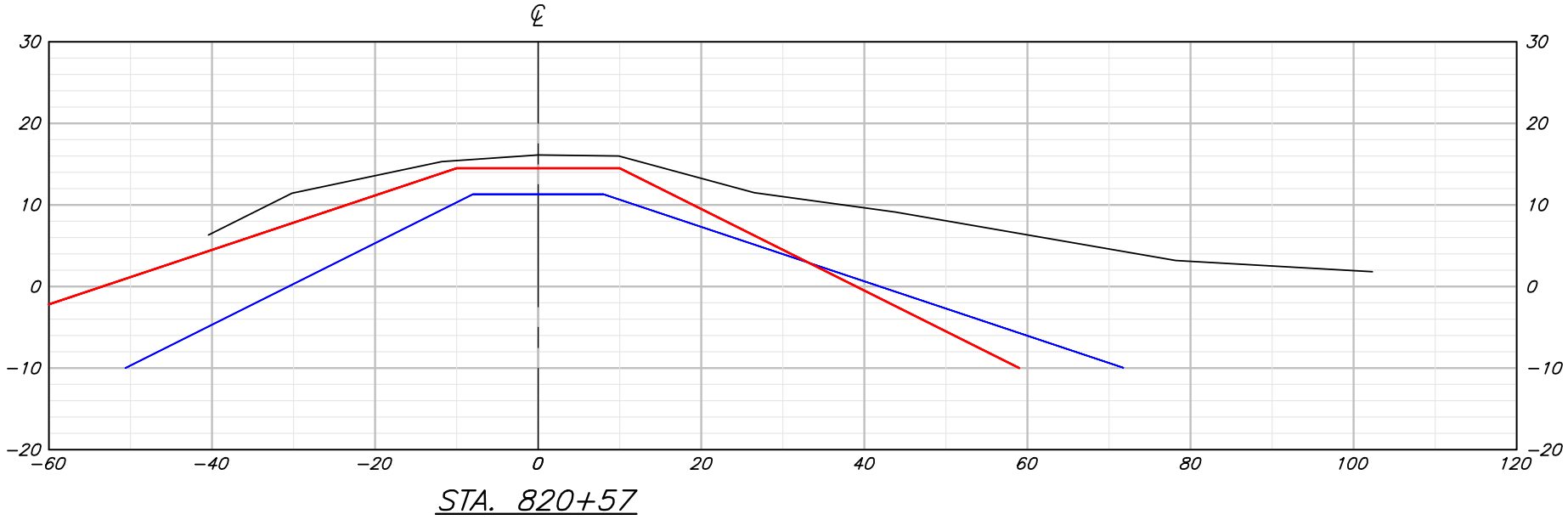
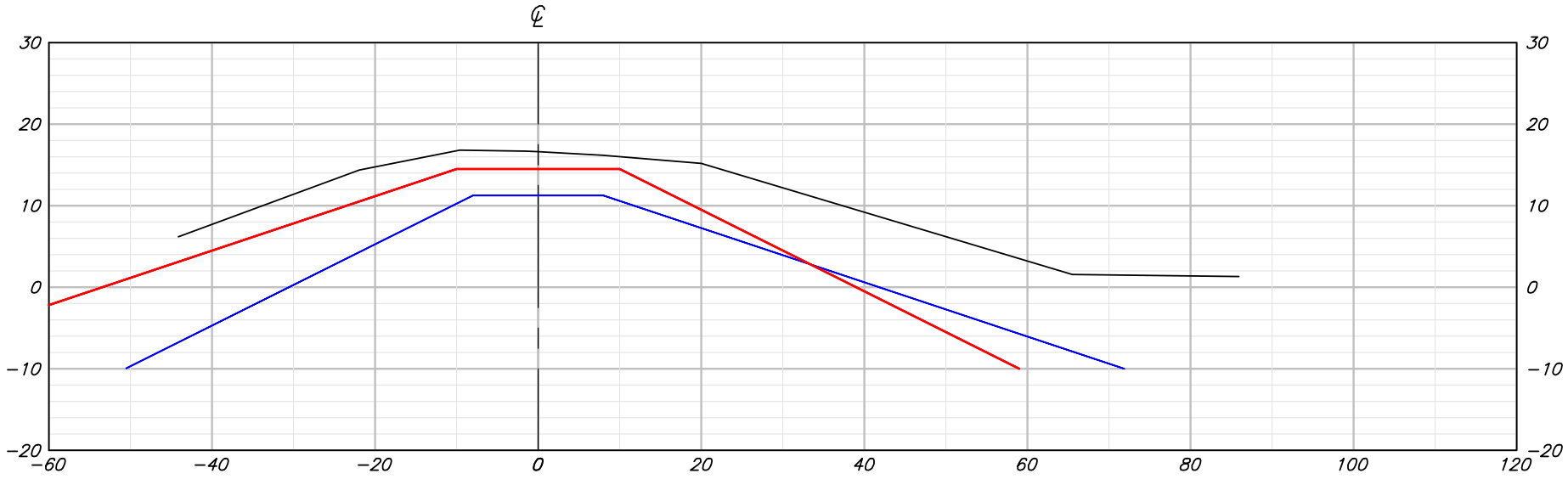


STA. 820+57



STA. 830+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

Plot Date 8/6/2020 12:00 PM

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 820+57 AND STATION 830+57

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No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 43 OF 53 SHEETS

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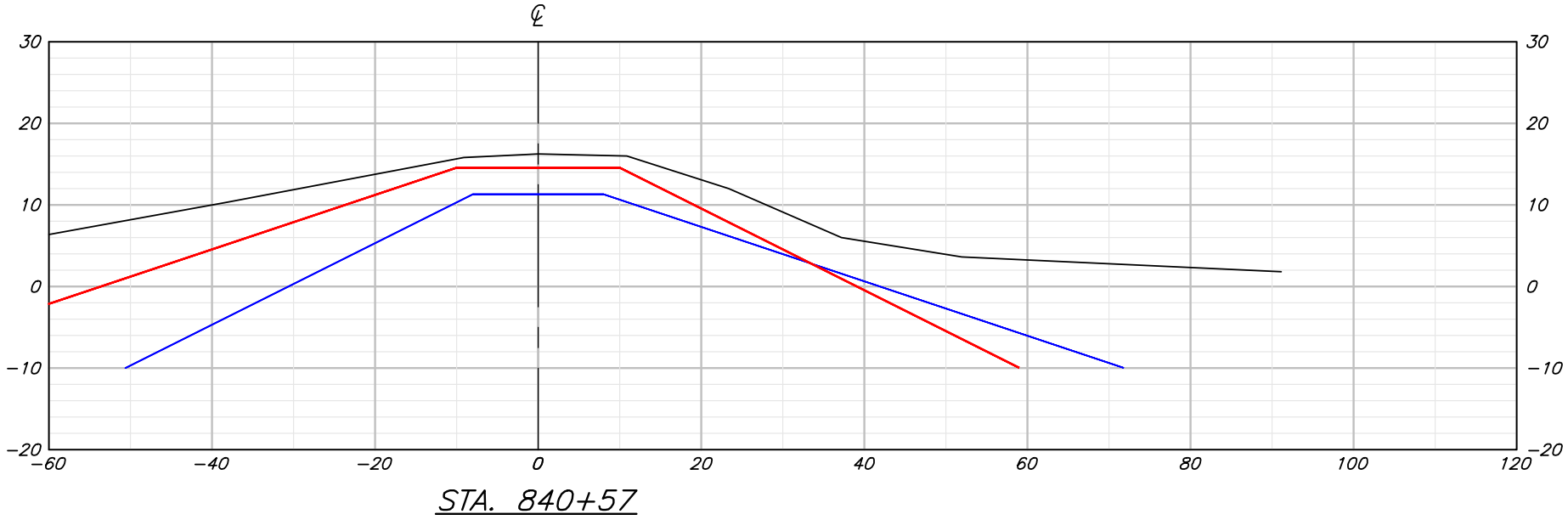
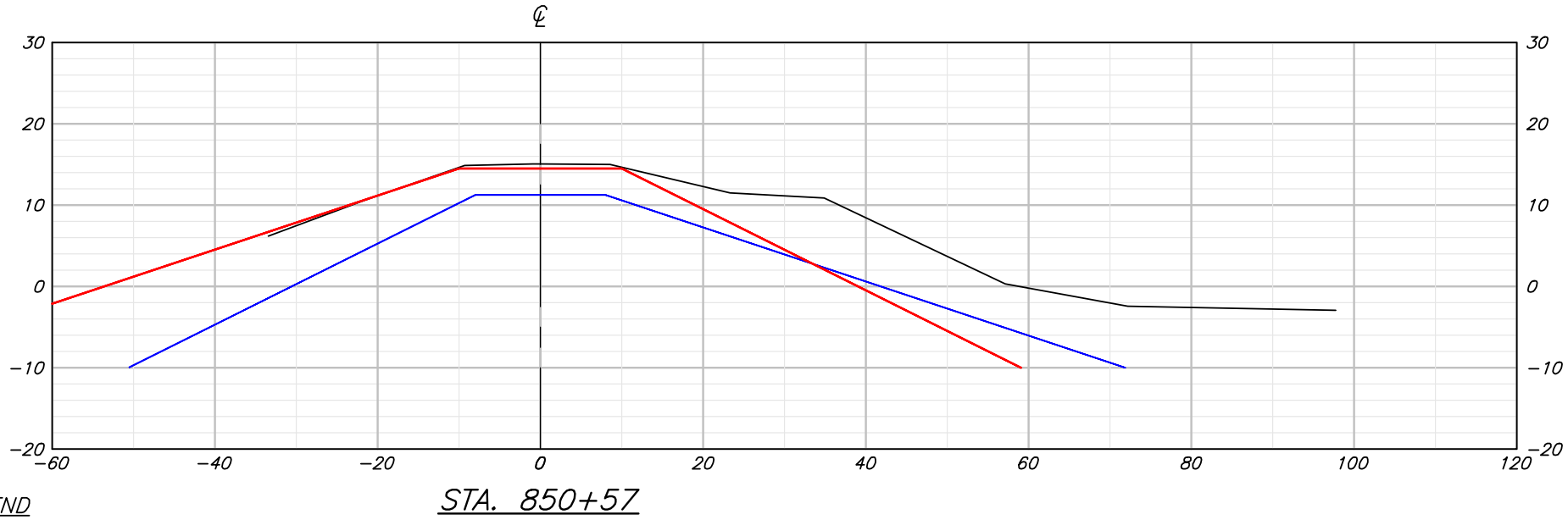


STA. 840+57



STA. 850+57

LEGEND

EXISTING GRADE
HMP
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 840+57 AND STATION 850+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 44 OF 53 SHEETS

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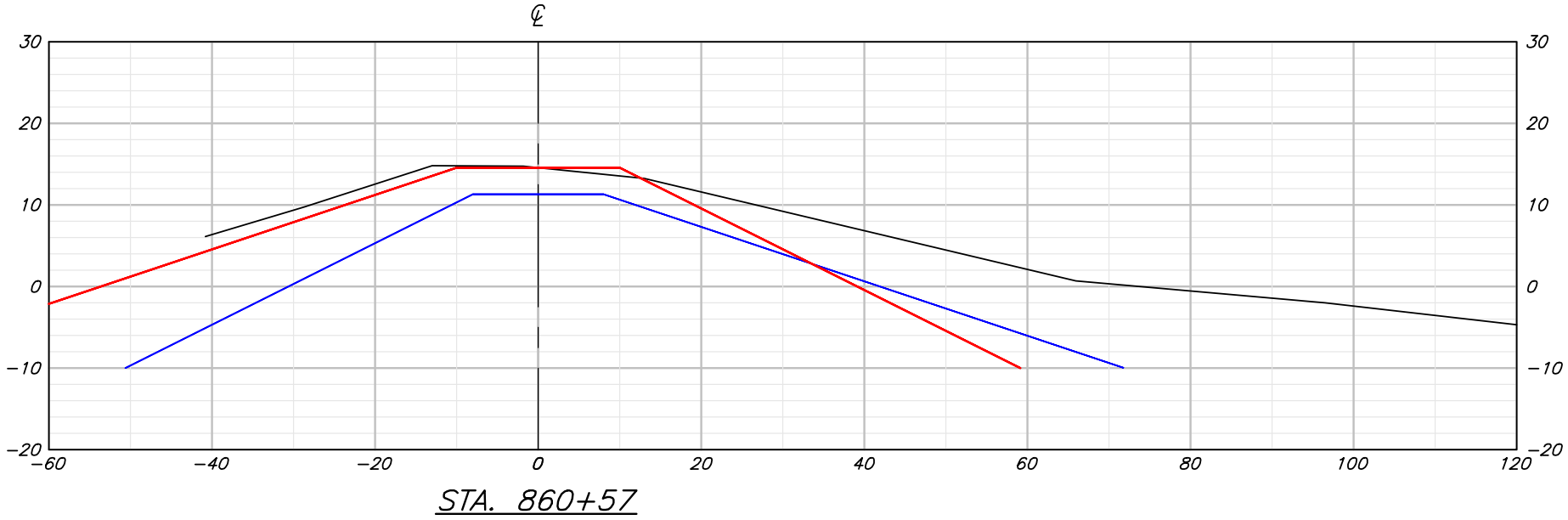
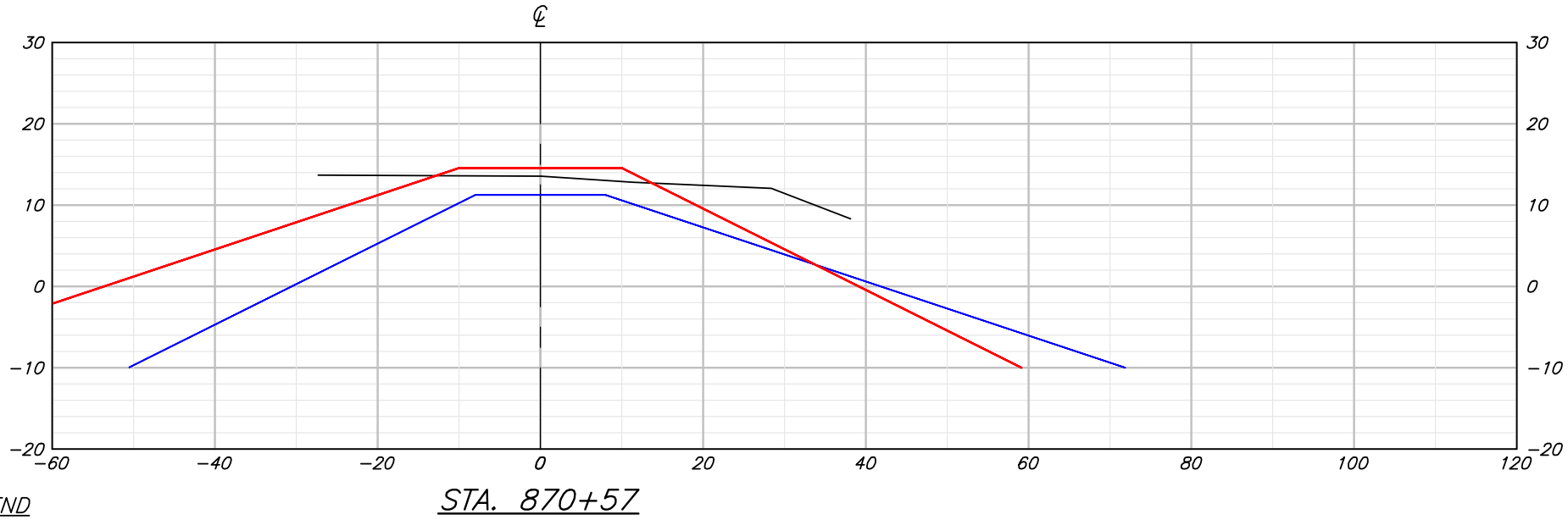


STA. 860+57



STA. 870+57

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 860+57 AND STATION 870+57

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 45 OF 53 SHEETS

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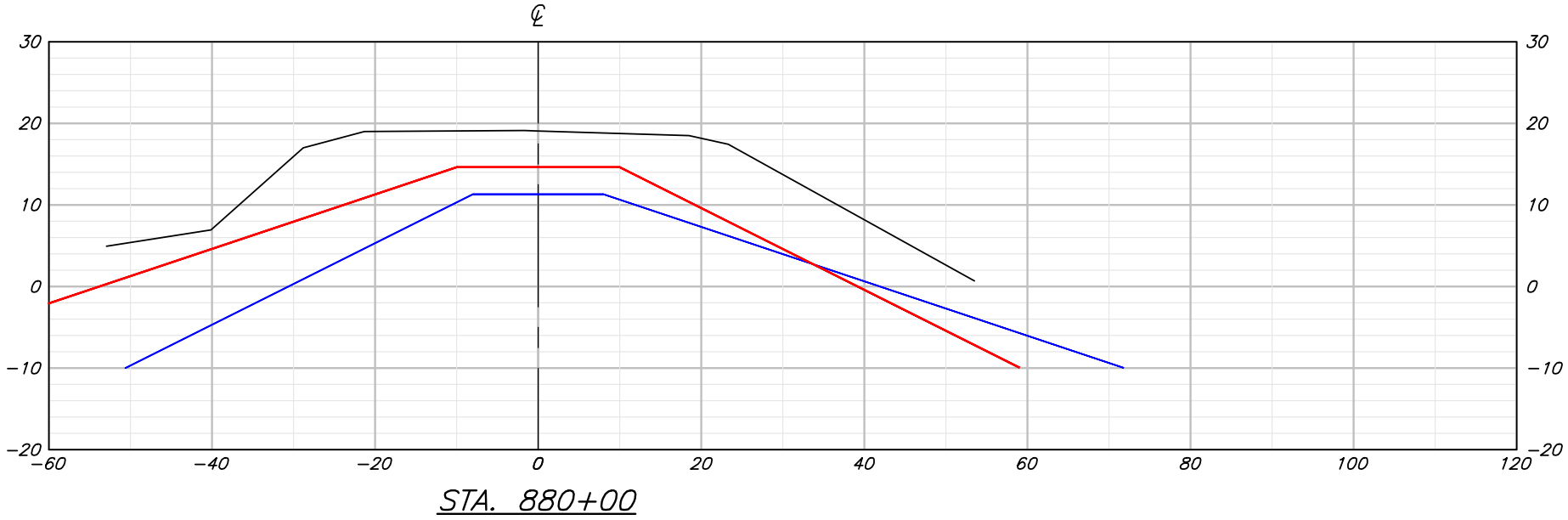
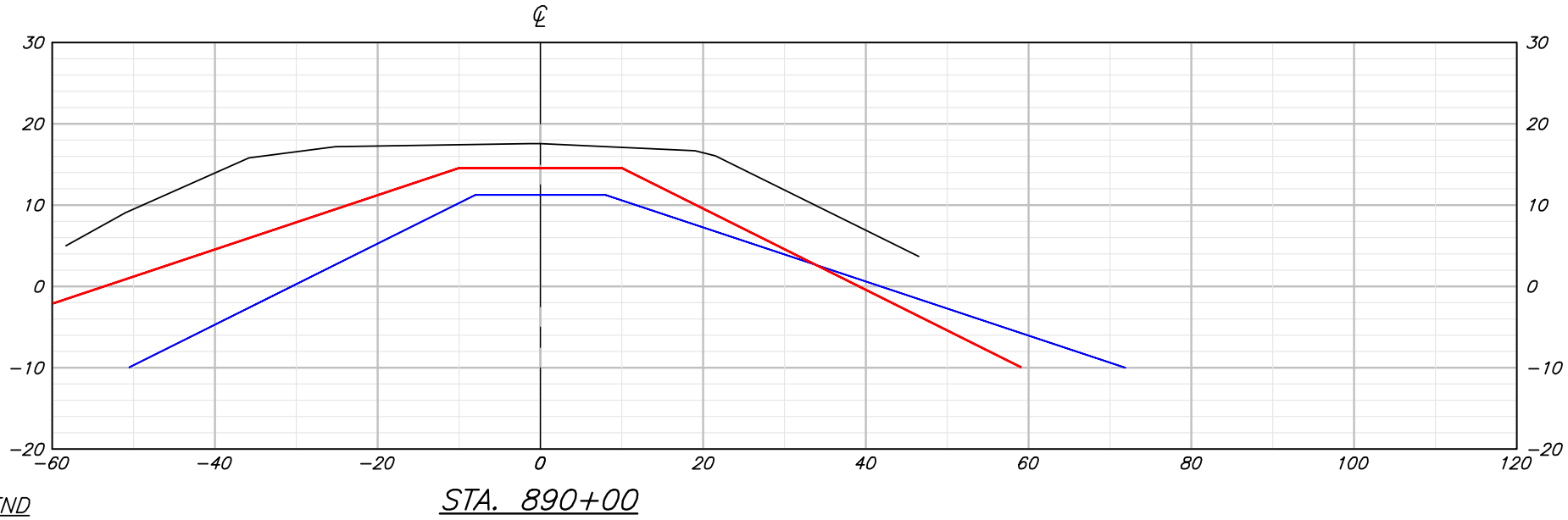


STA. 880+00



STA. 890+00

LEGEND

EXISTING GRADE
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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

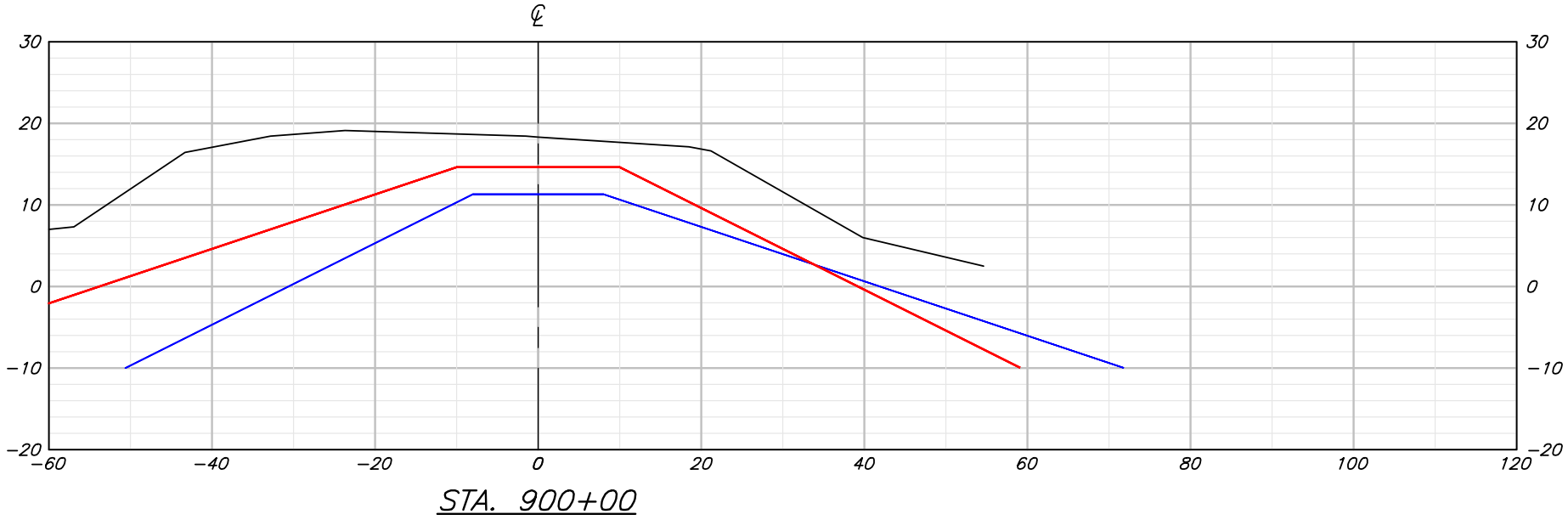
CROSS SECTIONS
STATION 880+00 AND STATION 890+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

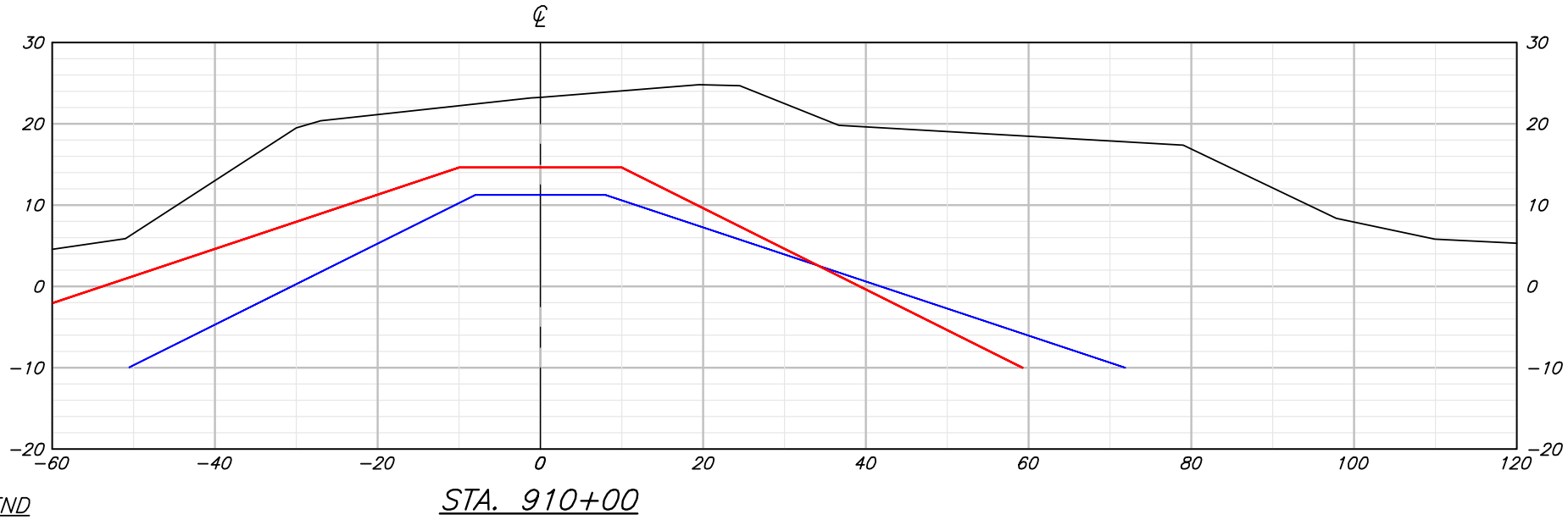
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 46 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 900+00



STA. 910+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

Plot Date 8/6/2020 12:00 PM

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

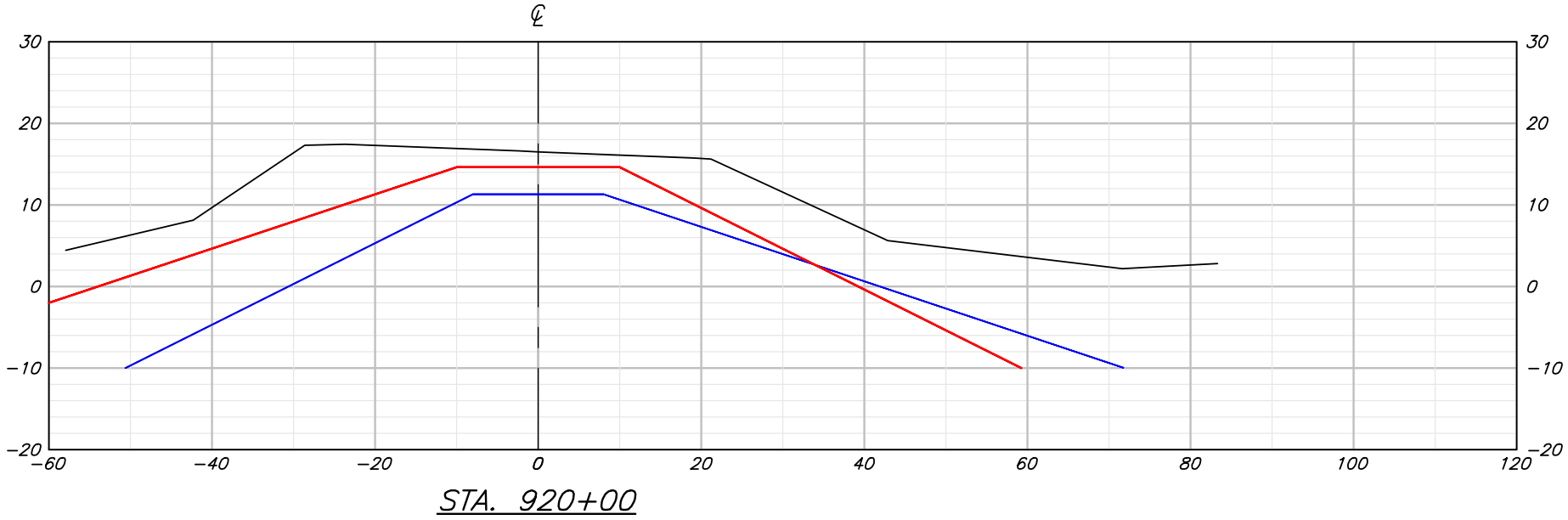
CROSS SECTIONS
STATION 900+00 AND STATION 910+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

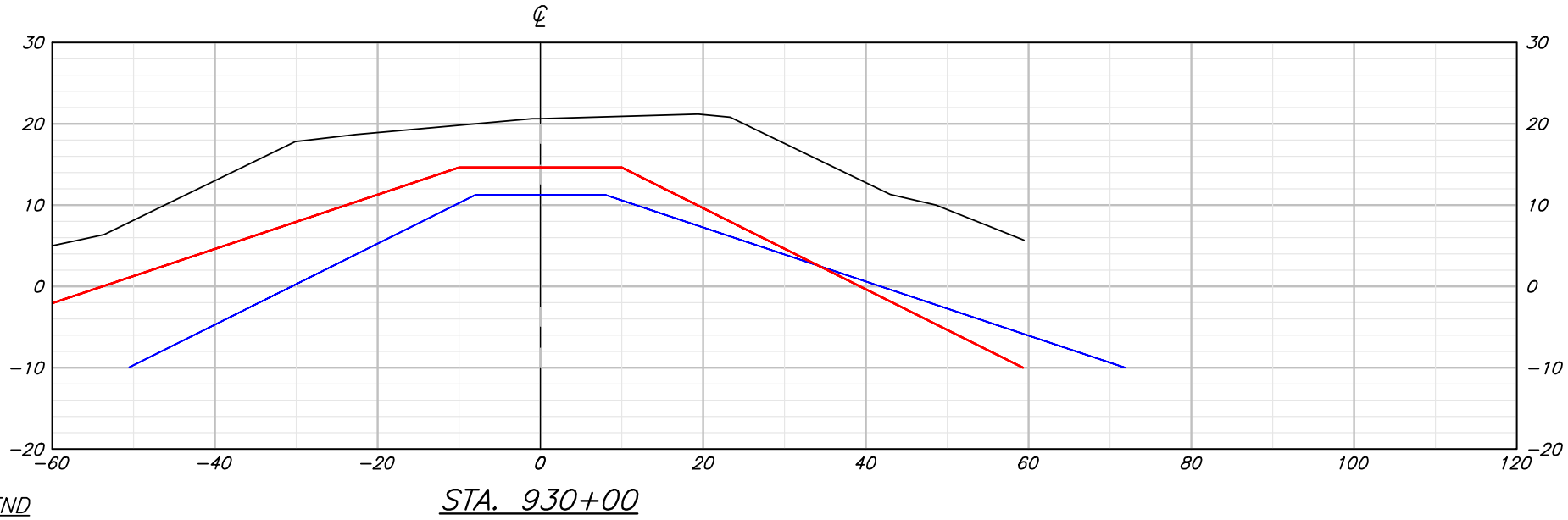
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 47 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 920+00



STA. 930+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

8/6/2020 12:00 PM
Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

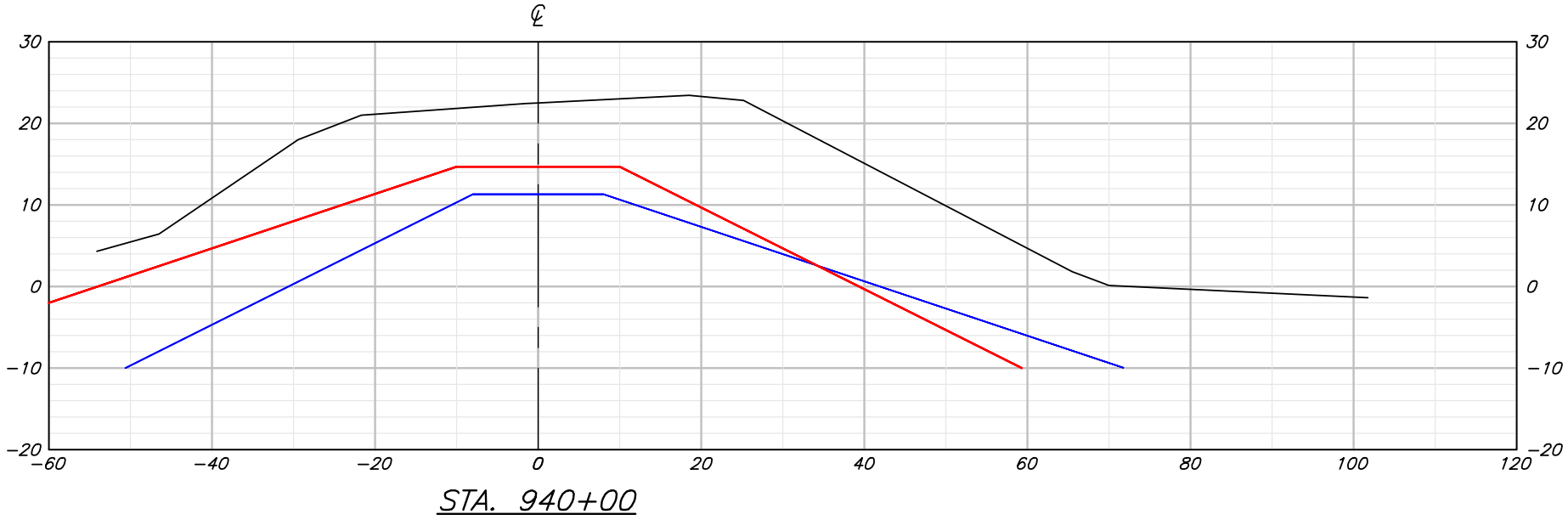
CROSS SECTIONS
STATION 920+00 AND STATION 930+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

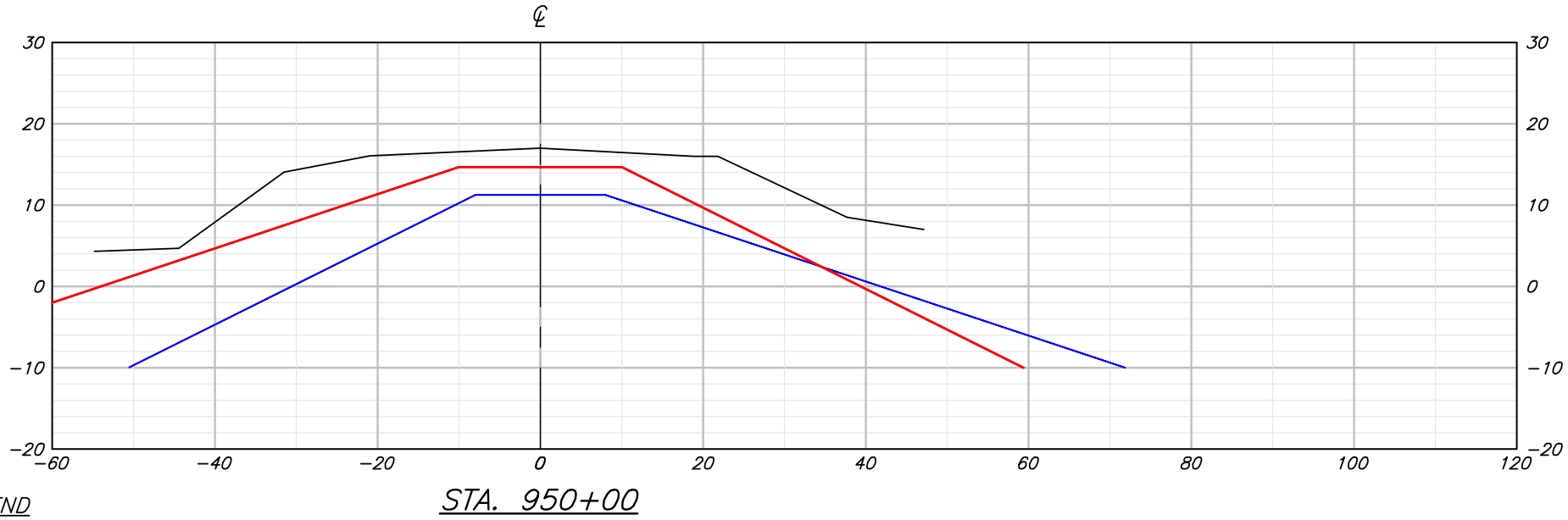
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 48 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 940+00



STA. 950+00

LEGEND

EXISTING GRADE
HMP
PL 84−99
USACE

Plot Date 8/6/2020 12:00 PM

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

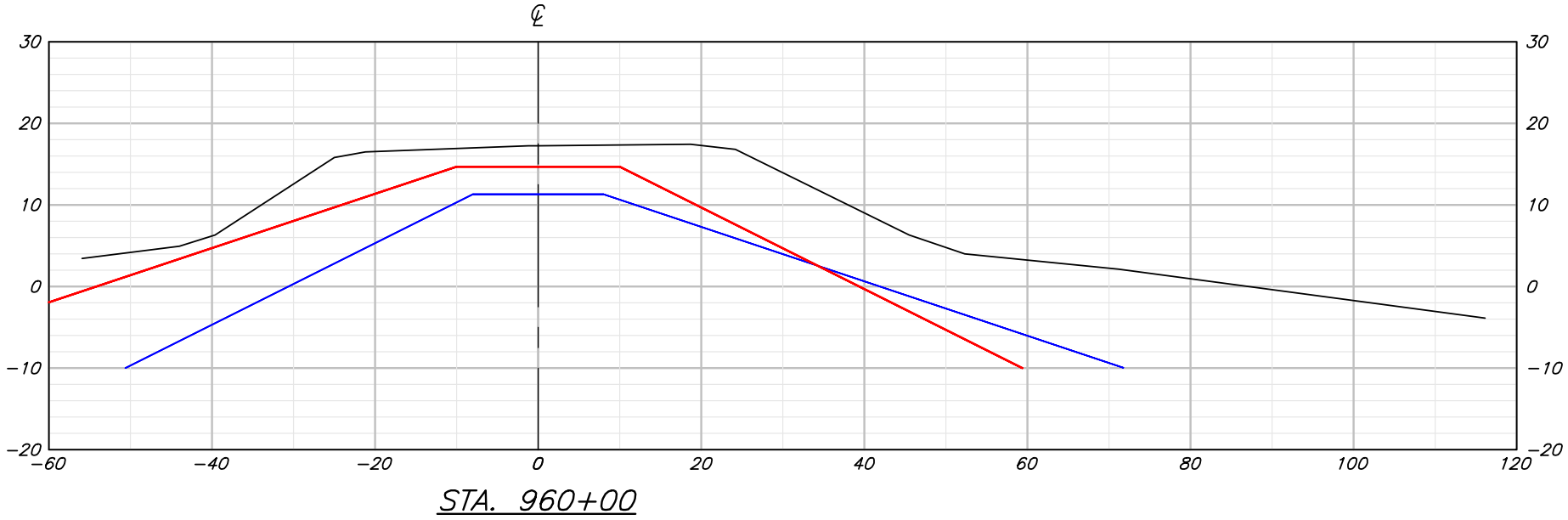
CROSS SECTIONS
STATION 940+00 AND STATION 950+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

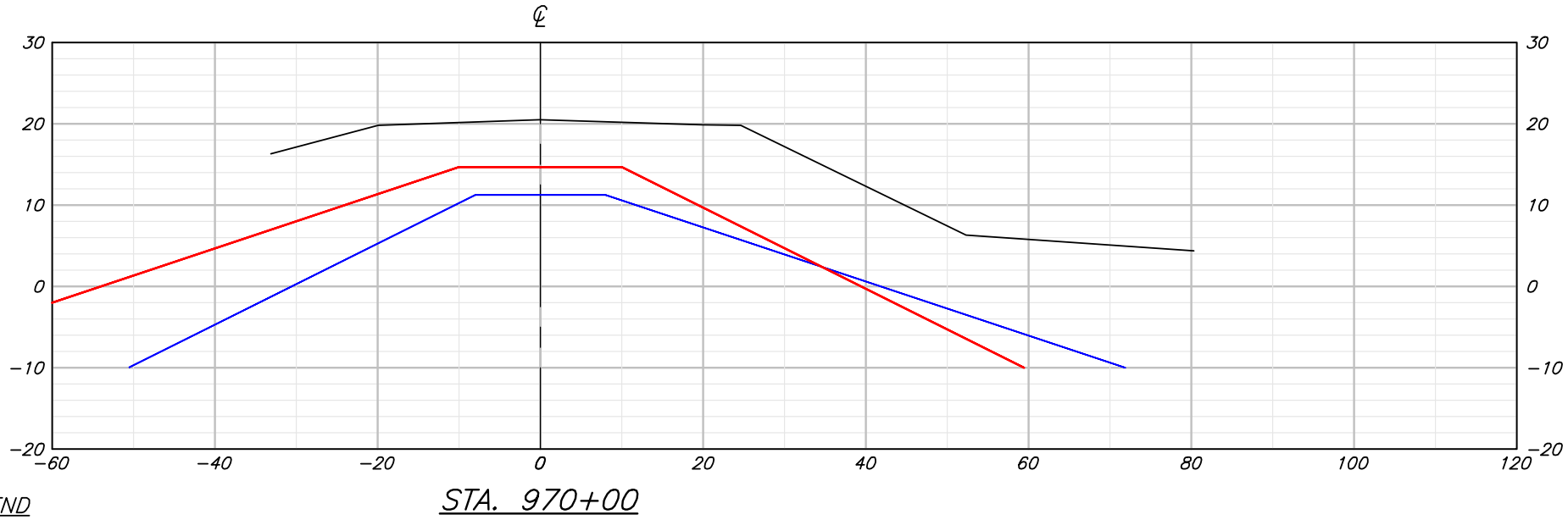
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 49 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 960+00



STA. 970+00

LEGEND

EXISTING GRADE
HMP
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USACE

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Plot Date

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

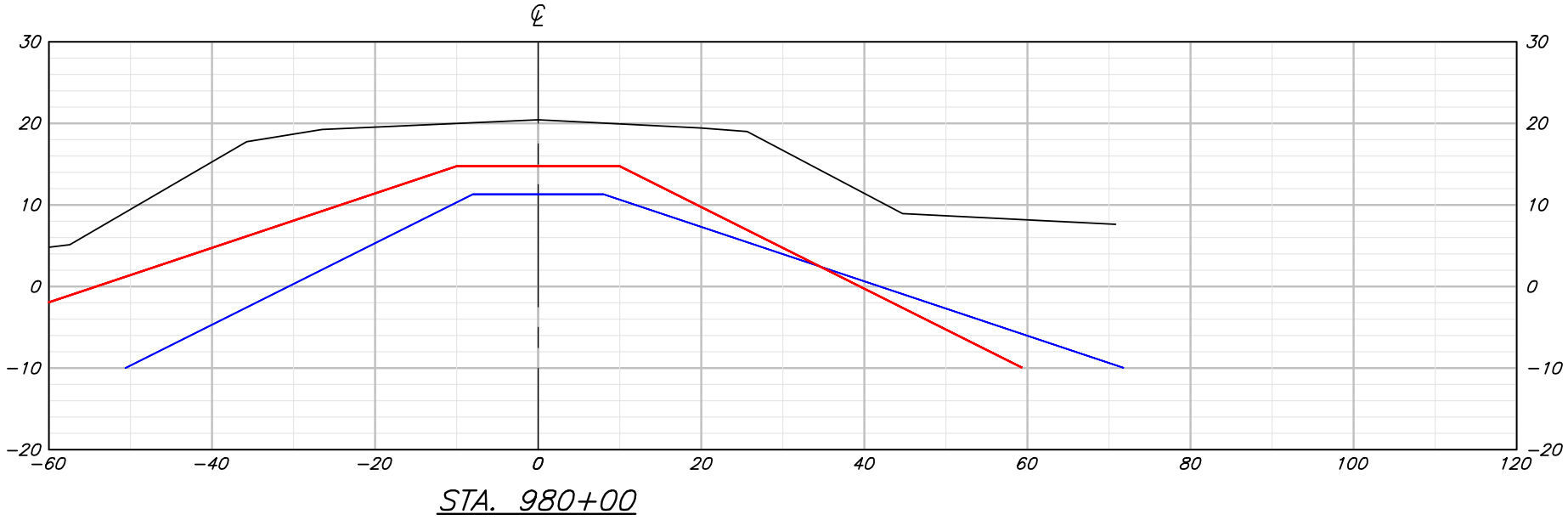
CROSS SECTIONS
STATION 960+00 AND STATION 970+00

REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

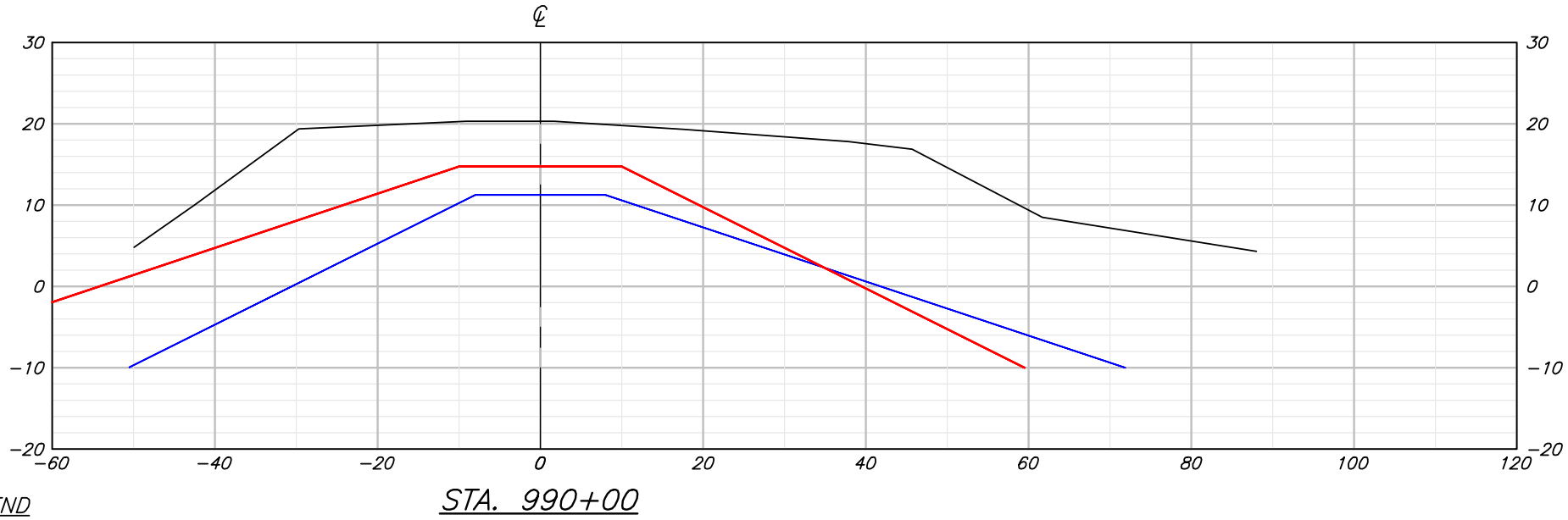
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 50 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 980+00



STA. 990+00

LEGEND

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HMP
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USACE

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

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STATION 980+00 AND STATION 990+00

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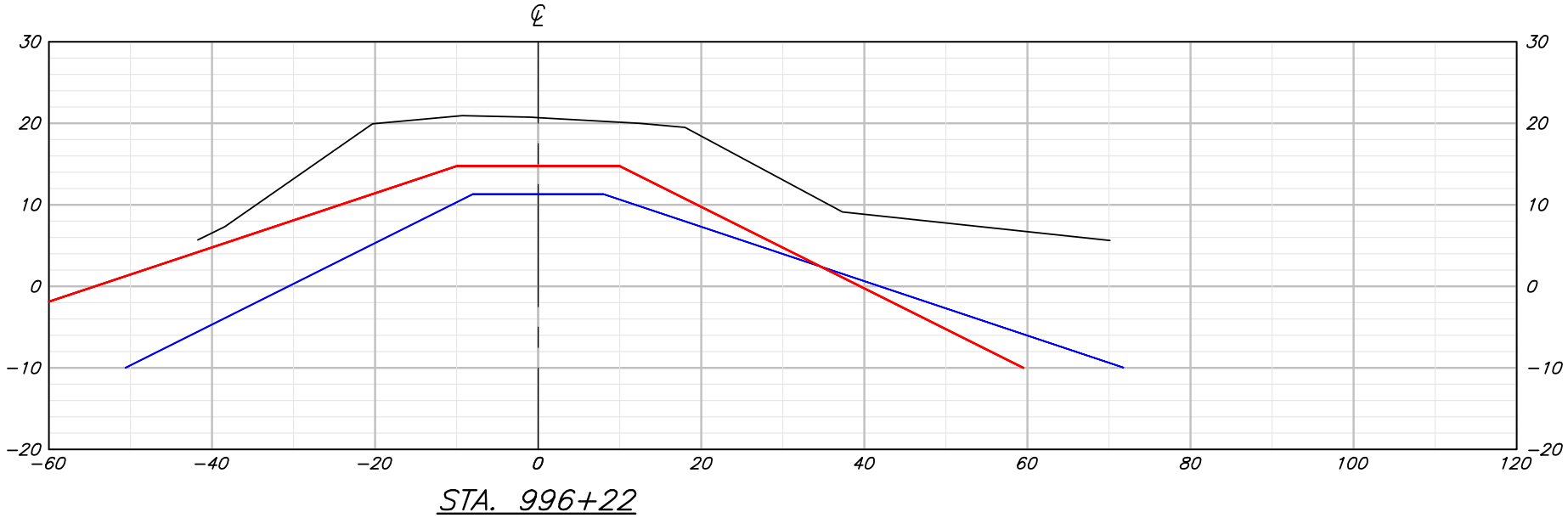
CIVIL
STATE OF CALIFORNIA

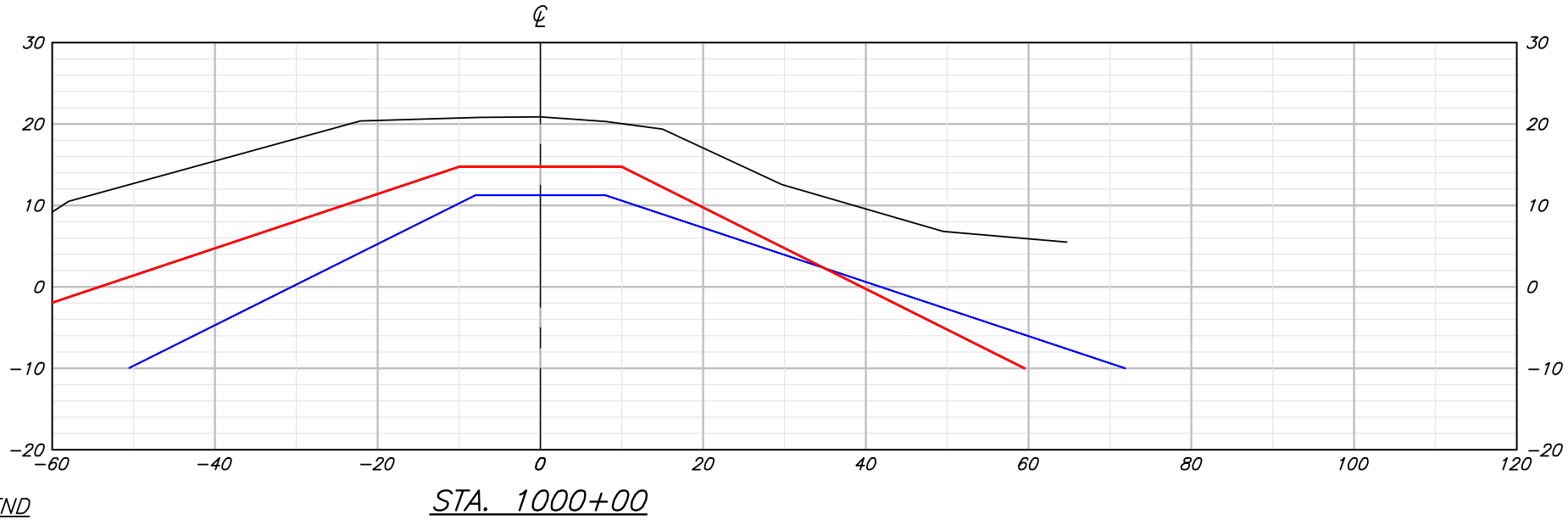
Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 51 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg



STA. 996+22



STA. 1000+00

LEGEND

EXISTING GRADE
HMP
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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 996+22 AND STATION 1000+00

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CIVIL
STATE OF CALIFORNIA

Scale	1" = 20'
Drawn By	V. VANG/M. BERBER
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 52 OF 53 SHEETS

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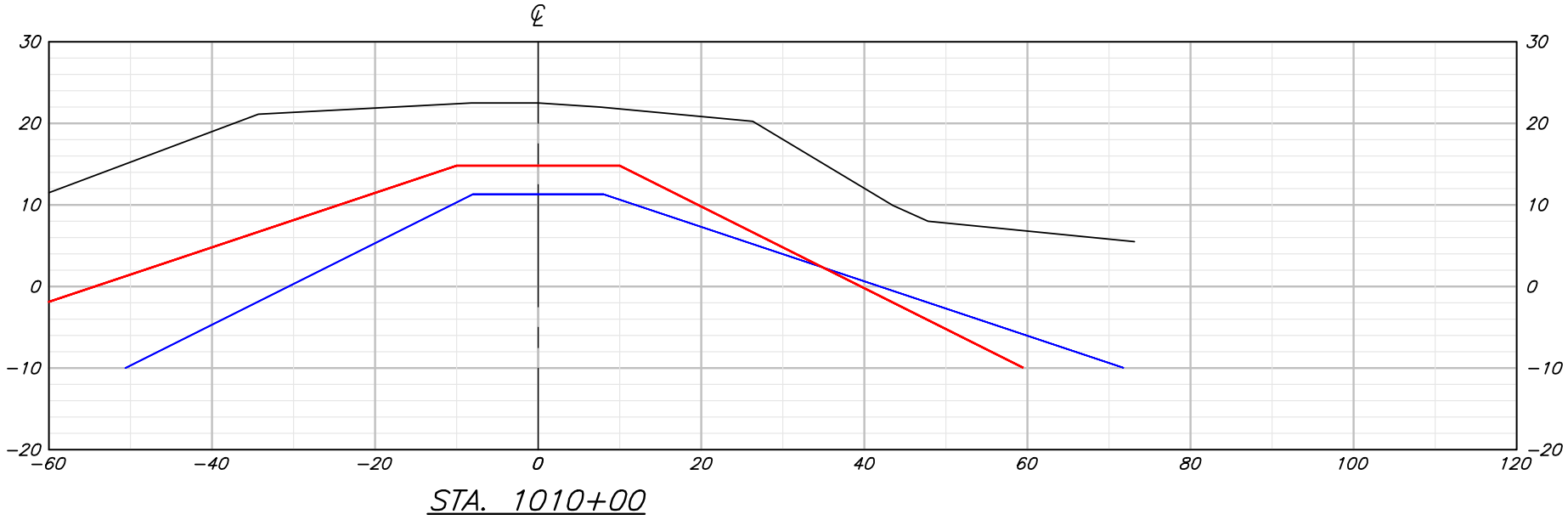
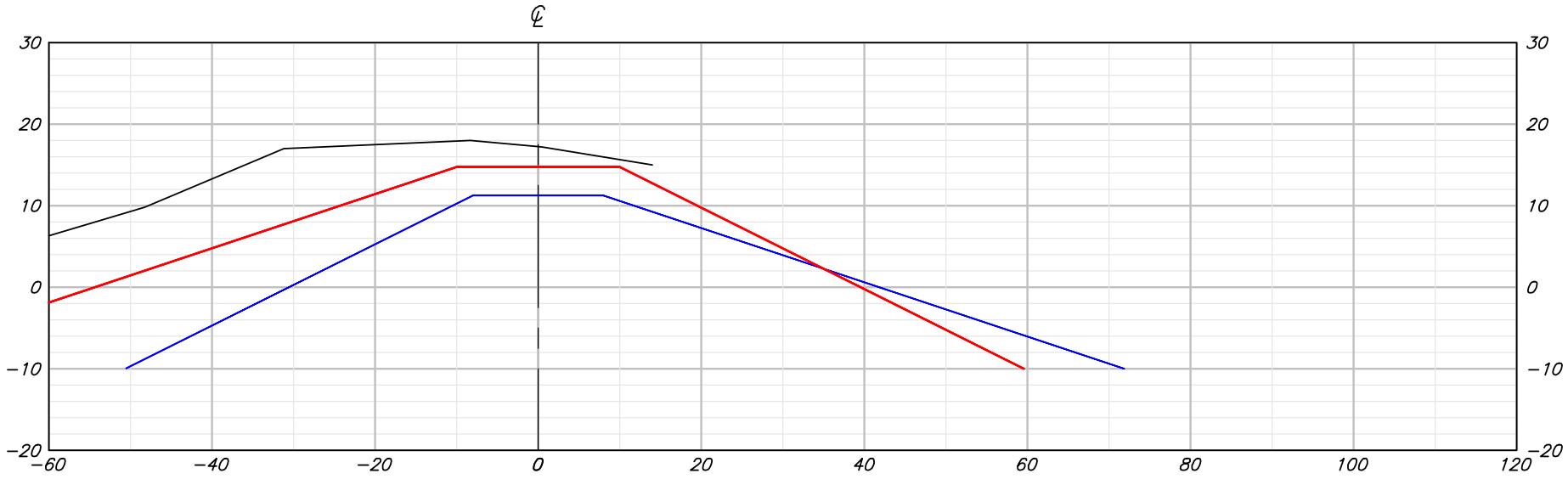


STA. 1010+00



STA. 1020+00

LEGEND

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RECLAMATION DISTRICT NO. 341

2015 LEVEE SYSTEM SURVEY

CROSS SECTIONS
STATION 1010+00 AND STATION 1020+00

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Exp. 12/31/20
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STATE OF CALIFORNIA

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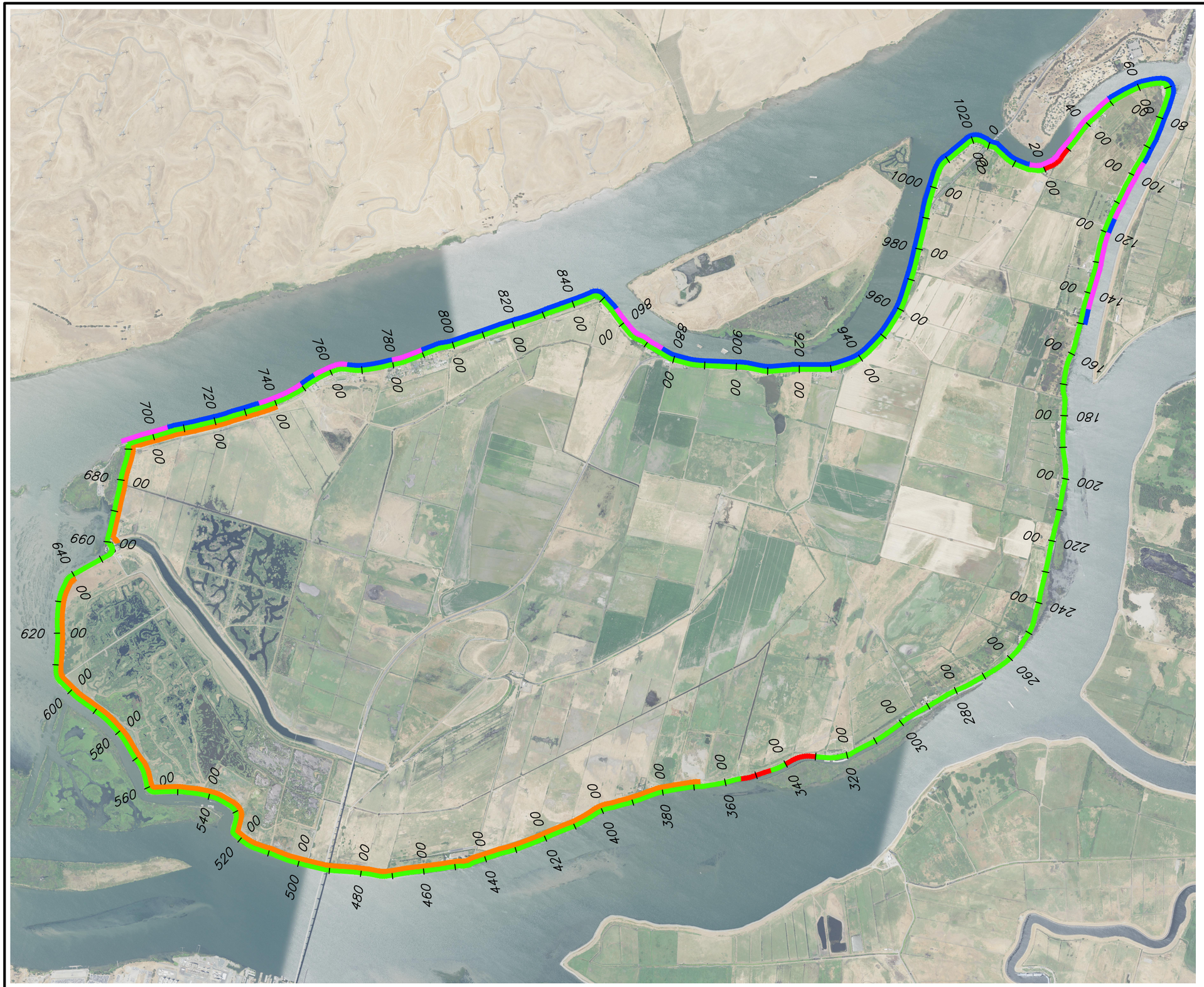
Approved By	R.C. WAGNER
Date	AUGUST 2020

SHEET 53 OF 53 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Cross Sections.dwg

EXHIBIT 2. MAP OF EXISTING LEVEL OF PROTECTION



N

0’ 1,500’ 3,000’ 6,000’

Legend

- Below PL 84-99 Geometry
- At or Above PL 84-99 Geometry
- Below USACE Standard
- At or Above USACE Standard
- Counterbalance Berm

Reclamation District No. 341
Sherman Island

Level of Protection

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Consulting Civil Engineers, A Corporation

Aerial Imagery per U.S. Department of Agriculture (USDA) - Aerial Photography Field Office, National Agricultural Inventory Project, flown July 15, 2018.

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Level of Protection.dwg

EXHIBIT 3. MAP OF PROPOSED PROJECTS

Aerial Imagery per U.S. Department of Agriculture (USDA) - Aerial Photography Field Office, National Agricultural Inventory Project, flown July 15, 2018.

Reclamation District No. 341
Sherman Island

Five-Year Plan
Proposed Projects

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Consulting Civil Engineers, A Corporation

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Map of Proposed Projects.dwg

EXHIBIT 4. MAP OF SHERMAN ISLAND ASSETS

N

0’ 1,500’ 3,000’ 6,000’

Legend

- State Highway
- County Road
- Natural Gas Line
- High Voltage Power Line
- Parcel 11
- Mayberry Farms
- Whale's Mouth
- Whale's Belly
- Waterside Habitat
- Fish Release Facility
- Marina
- RV Park
- Sherman Island County Park

Reclamation District No. 341
Sherman Island

Map of Assets Protected by the
Sherman Island Levee System

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Consulting Civil Engineers, A Corporation

Aerial Imagery per U.S. Department of Agriculture (USDA) - Aerial Photography Field Office, National Agricultural Inventory Project, flown July 15, 2018.

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EXHIBIT 5. MAP OF LEVEE SYSTEM DEFICIENCIES

Reclamation District No. 341
Sherman Island

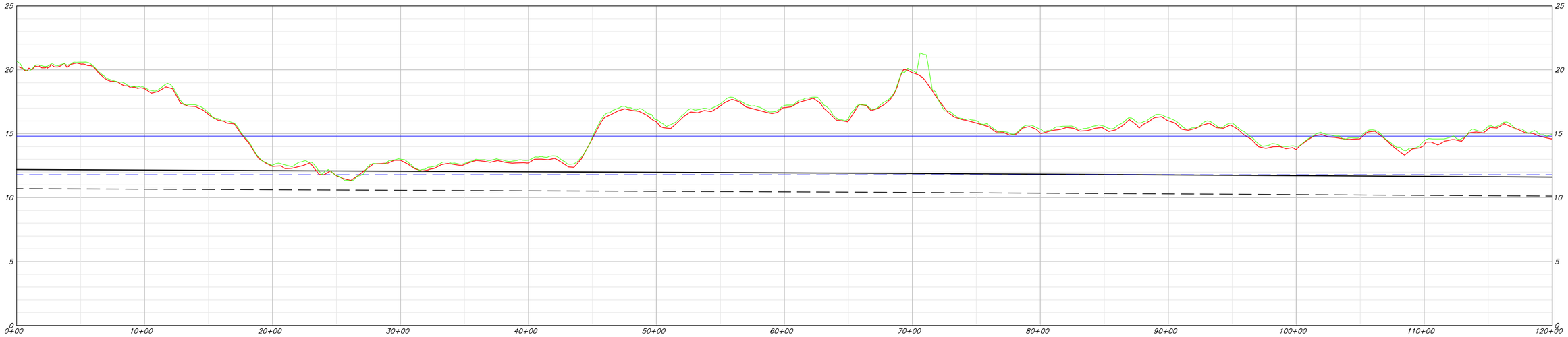
Existing Deficiencies in the
Sherman Island Levee System

Wagner Bonsignore
Consulting Civil Engineers, A Corporation

Aerial Imagery per U.S. Department of Agriculture (USDA) - Aerial Photography Field Office, National Agricultural Inventory Project, flown July 15, 2018.

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Map of Existing Deficiencies.dwg

EXHIBIT 6. LEVEE CENTERLINE PROFILE



LEGEND

- EXISTING GRADE (2015)
- EXISTING GRADE (2019)
- PL 84-99 BFE
- PL 84-99 ENGINEERED ELEVATION
- USACE BFE
- USACE ENGINEERED ELEVATION

PROFILE

VERT. SCALE: 0' 2' 4' 8'

HORIZ. SCALE: 0' 200' 400' 800'

NOTES

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REVISIONS

REF.	DESCRIPTION	APVD.	DATE

Designed By	M. BERBER
Drawn By	M. BERBER
Checked By	R.C. WAGNER
Approved By	R.C. WAGNER
Date	AUGUST 2020

Wagner&Bonsignore
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REGISTERED PROFESSIONAL ENGINEER
ROBERT C. WAGNER
No. 52903
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

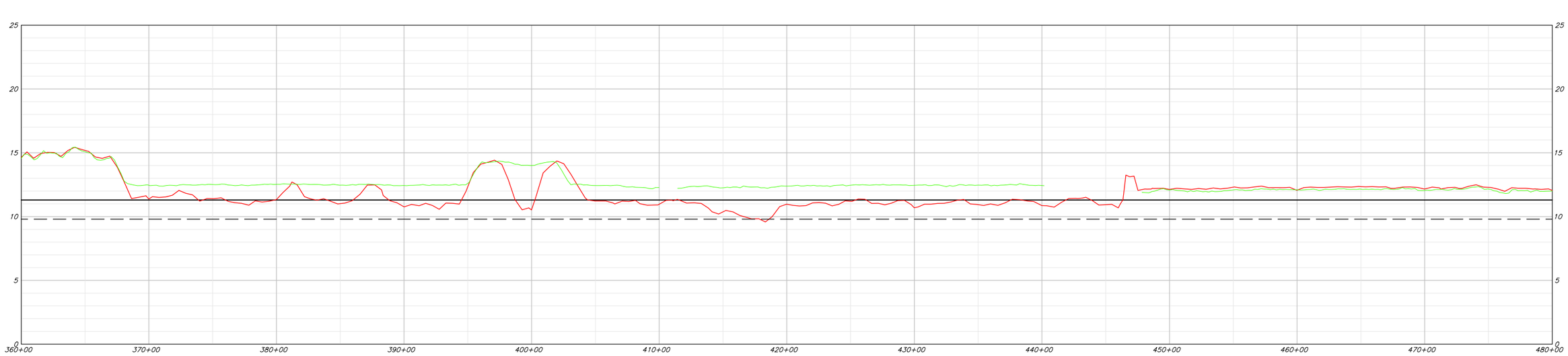
RECLAMATION DISTRICT NO. 341

LEVEE CENTERLINE PROFILE

STA. 0+00 TO STA. 240+00

SHEET 1 OF 5 SHEETS

File: Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Profile.dwg
Date: 8/6/2020



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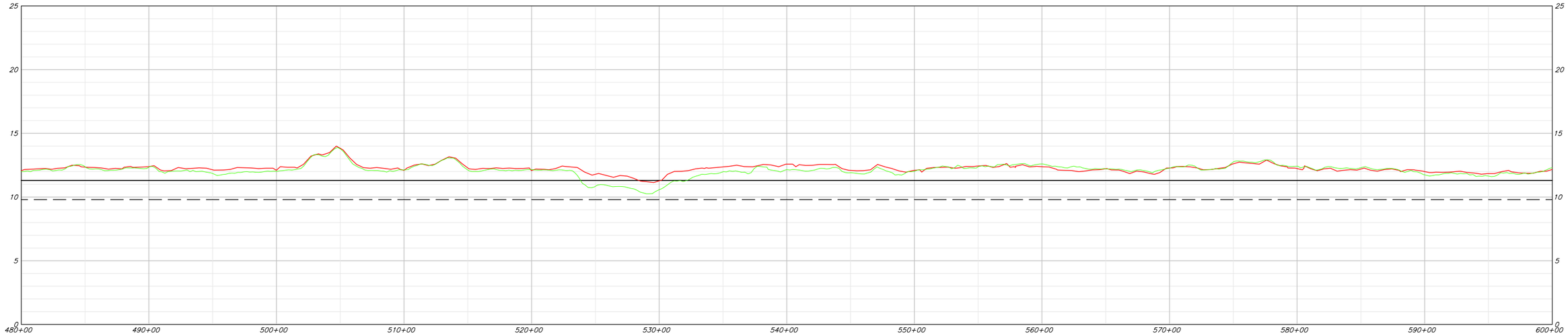
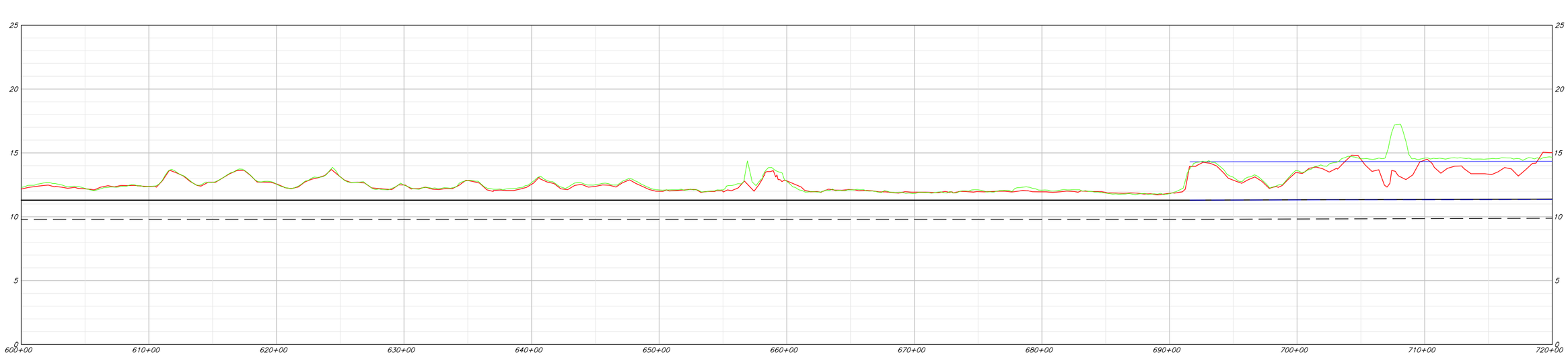
LEVEE CENTERLINE PROFILE

STA. 240+00 TO STA. 480+00

SHEET 2 OF 5 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Profile.dwg
Plot Date: 8/6/2020





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LEVEE CENTERLINE PROFILE

STA. 480+00 TO STA. 720+00

SHEET 3 OF 5 SHEETS

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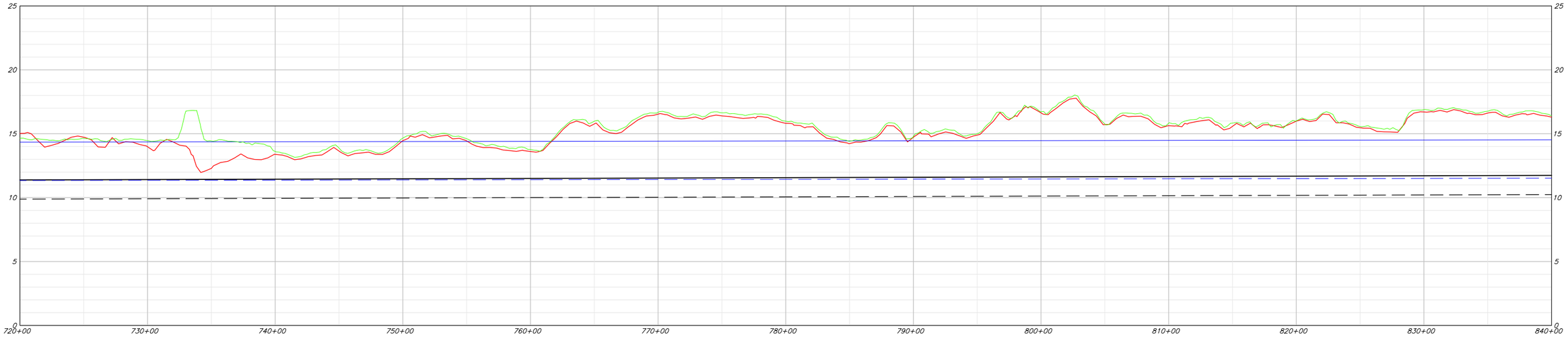

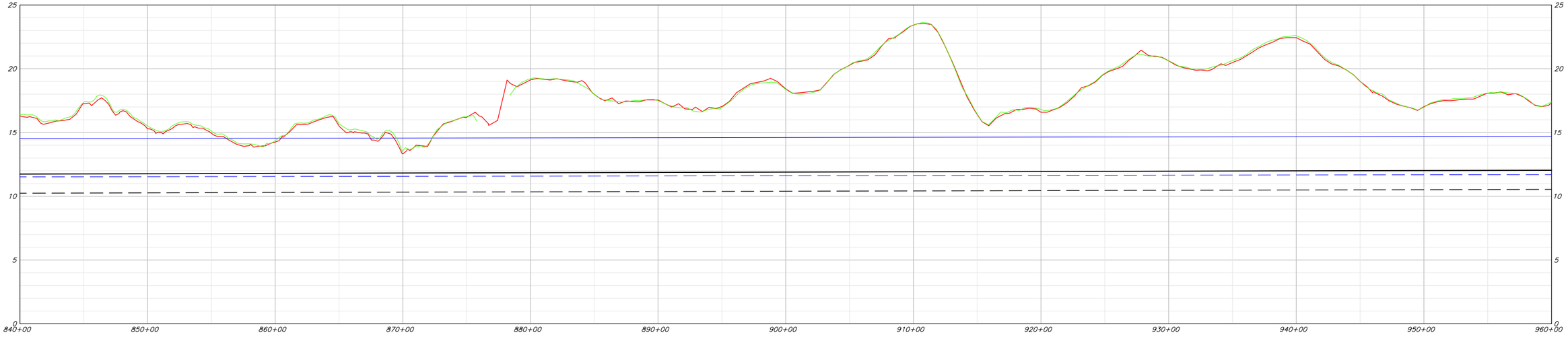

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LEVEE CENTERLINE PROFILE

STA. 720+00 TO STA. 960+00

SHEET 4 OF 5 SHEETS

Plot Date: 8/6/2020

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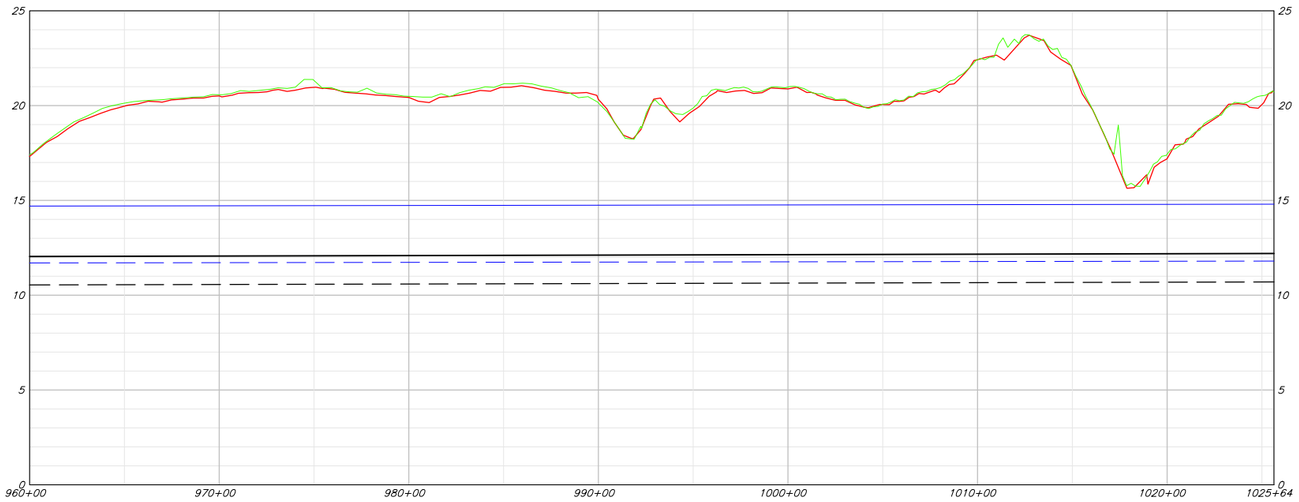

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LEVEE CENTERLINE PROFILE

STA. 960+00 TO STA. 1025+64

SHEET 5 OF 5 SHEETS

Q:\Drawings\Reclamation District No 341\SH-18-1.0-SP\Production\Profile.dwg
Plot Date: 8/6/2020

EXHIBIT 7. SHERMAN ISLAND LEVEE LOG

Levee Log for Sherman Island 5/1/00

Key to Levee Log: Side: Water (W) or Land (L) side of levee. Station Begin/End: DMI readings (feet from panel station zero). Height: Height of individual tree or average height of a linear strip of habitat. Width: Average width of a linear strip of habitat. Habitat Type: See *Table 1* for definitions. Species: Dominant species present for a said habitat type. Length: Length of habitat type (canopy edge to canopy edge). Notes: Other observations, habitat cover percentage, photo log, DMI discrepancies.

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio (1:1=11)	Location on Levee	Notes
W	140		single tree	70		RF	EUC	32		
W	185		single tree	60		RF	EUC	32		Pic. 1&2 of EUCs near 160 Bridge (Disk 2)
L	233		single tree	20		RF	POFR	32		
W	322	375	53	55		RF	POFR			SRA; 2 Trees
W	385		single tree	25		RF	POFR	32		Restraunt end @ Landside
W	453		single tree	25		RF	EUC	32	M	
L	482		single tree	60		RF	POFR	32	L	
L	559		single tree	35		RF	POFR	23		
L	609	1058	449		5	FM	SCR			
L	609	858	249	10	25	SS	SAEX/ACNE			
L	928		single tree	10		SS	SALA	12		
L	1033		single tree	30		RF	POFR	31		Flagged; near power lines
W	1058		single tree	30		RF	QUWI/FR	11		2 TREES
W	1151	1584	433	10	10	SS	QUWI/SAEX			
L	1425	1475	50	10	30	SS	SAEX			Need to re-measure stand length
W	2014	2222	208	10	10	SS	QUWI/SAME/FRLA/JURE			
L	2090	2368	278	60	40	RF	QUWI/EUC/POFR			URBAN-like
W	2317		single tree	15		SS	JUCA	11		SRA
L	2368	2819	451	10	20	SS	SAEX/QUWI		M	
W	2454		single tree	40		RF	QUWI	32	L	SRA
L	2485		single tree	35		RF	QUWI	32		
L	2819	3045	226		5	FM	SCR			
L	2819		single tree	30		RF	QUWI	32	H	
L	3500	3800	300	10	15	SS	SAEX			
L	3812		single tree	40		RF	EUC	31		
L	3847	3965	118	20	20	RF	JUCA/JURE/EUC			
L	4066	4359	293	20	30	RF	JUCA/FICA		H	With URBAN features; 85%
W	4183		single tree	20		RF	JUCA	32	H	
L	4673	5113	440	15	30	SS	SALA/SAEX/SAME			5036 @ 50+00
L	5113	5211	98	5	30	SS	RUDI/SAME		L	
L	5211	5650	439		10	FM	SCR			
L	5655	5820	165	10	10	SS	ROPS		M	80%
L	5835	6100	265			FM	SCR			
W	5890		single tree	20		RF	ROPS	32		
W	5935	5975	40	20	20	RF	ROPS			
W	5983		single tree	15		SS	JUCA	11		
W	6046		single tree	20	15	RF	ALRH	11		
L	6106		single tree	20		RF	SAGO	11		SRA

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	6106		single tree	30		RF	ALRH	21		
W	6172		single tree	15		RF	QUWI	32		
W	6224		single tree	30		RF	ALRH	32		
L	6250	6644	394		20	FM	SCR			
W	6492	6860	368	20	20	RF	SAL/ALRH/QUWI			SRA
L	6546		single tree	20		RF		23		
L	6644	6730	86	20	30	RF	SAL/SAME			
L	6732	7393	661			URBAN	QUWI/PALM			Marina Zone
W	6860	6920	60	35	30	RF	QUWI			2 Trees
W	6921	7212	291			URBAN	EUC			14 Tree; Marina Zone
W	7212	7393	181	20	15	RF	ALRH/QUWI		H	
L	7393	7599	206	20	25	RF	SAEX/QUWI		H	
W	7473		single tree	20		RF	QUWI	32		SRA
W	7532	8119	587	15	10	SS	SAEX/QUWI/SAME/ALRH			SRA; 80%
L	7599	8177	578		10	FM	SCR			
L	8177	8254	77	15	25	SS	SAEX			
W	8352		single tree	10		SS	ALRH	11		
W	8520	8615	95	10	10	SS	ALRH/SAEX			
L	8562	8615	53	15	20	SS	SAEX			
L	8765	8828	63	10	15	SS	SAEX			
L	9711	10292	581	10	30	SS	SAEX/RUDI			9023 @ 90+00; SAEX < 10'
W	11075	11111	36	15	10	SS	ALRH/FRLA/SAEX			
L	11415	11514	99	20	20	RF	SAL/ROPS			
L	11514	11631	117	35	30	RF	SAGO			
W	11786	11845	59	15	15	SS	SAEX			
W	12264		single tree	15		SS	ALRH	11		12013 @ 120+00 Marker
W	12804		single tree	15		SS	ALRH	23		
L	12840	15028	2188			URBAN	POFR/EUC/ORNAM			SAEX < 10' on Waterside
W	14138		single tree	15		SS	ALRH	11		
W	15741		single tree	15		SS	ROPS	32		Just North of Pumphouse
W	15913	16056	143	10	10	SS	ROPS/SAEX/JUCA			
W	16197		single tree	10		SS	ALRH	11		
W	16320	16406	86	10	10	SS	ALRH/SAEX			SRA; ARDO here
W	16480	16673	193	15	15	SS	ALRH/JUCA/POFR			5 Trees; 60%
W	16760	16860	100	40		RF	POFR/FRLA			2 Trees
W	17028		single tree	10		SS	FRLA/AL	23		2 Trees; 17004 @ 170+00
W	17129		single tree	10		SS	ALRH	11		
W	17279		single tree	10		SS	ALRH	11		
W	17683		single tree	10		SS	ALRH	11		17495 @ Siphon; ARDO HERE X 60 ft. long
W	17760		single tree	10		SS	SALA	11		
W	17801	17838	37	10	10	SS	ALRH/SAL			
W	17950	17986	36	30	20	RF	SALA/POFR			SRA
L	18130	18361	231			URBAN	POFR/FICA/EUC			~7 Trees

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	18155		single tree	15		RF	FICA	11		SRA; 180+00 @ 17994
W	18251	18482	231	40	30	RF	POFR/FRLA/JURE			8 Trees; 35%
W	18512	18634	122	40		RF	POFR			6 Trees
L	18590	19928	1338	65	40	RF	POFR/EUC			Pic. 1 Disk 2?
W	18778	18976	198	10	10	SS	SAEX			SRA; 19029 @ 190+00
W	19146		single tree	60		RF	POFR	32		**KEY: RESET DMI to 190+97 @ 1020+00
W	19238		single tree	50		RF	EUC	31		
W	19375		single tree	15		SS	ALRH	23		SRA X 15 FEET
W	19392		single tree	45		RF	EUC	31		
W	19452		single tree	40		RF	EUC	31		
W	19465		single tree	10		SS	ORNA	11		
W	19636		single tree	40		RF	POFR	31		
W	19674	19712	38	20	15	RF	POFR			2 Tree
W	19841	19884	43	35	30	RF	POFR			
L	19988	20618	630			URBAN	EUC/ORNA			
W	20000		single tree	15		SS	JUCA	32		Reset DMI to 200+00 @ Stop Sign East of 160 & Windsurf shop
W	20054	20618	564		20	FM	SCR			
W	20295		single tree	15	15	SS	SALA	12		ARDO @ 19915
W	20488		single tree	25		RF	JUCA	31		20030@200+00 Marker
W	20738	21480	742		35	FM	SCR			
W	20896	21233	337	10	15	SS	SALA/ALRH			20840-20875 ARDO
W	21325	21380	55	10	10	SS	SALA/ALRH			
W	21430		single tree	20		RF	FRLA	11		2 Trees
W	21480	22322	842		10	FM	SCR			
W	21972	22182	210	10	10	SS	SALA/RUDI/ROCA			75%
L	22128	22172	44	20	20	RF	FICA/ACACIA			2 Trees; 22023 @ 220+00
W	22212		single tree	45		RF	POFR	31		Pheasants
W	22322		single tree	30		RF	JUCA	32		
W	22350	22677	327	10	10	SS	SAEX/RUDI			Turkey
W	22360	22891	531		35	FM	SCR			
W	22891	23013	122		10	FM	SCR			
W	23013	24902	1889		60	FM	SCR			
W	23013	23068	55	10	15	SS	SAEX			23013 @ 230+00 Marker
W	23168	24639	1471	15	35	SS	SALA/ALRH/ACNE/RUDI			90%
W	24715		single tree	10		SS	ALRH/SA	11		
W	24902	25504	602		20	FM	SCR			
W	24902		single tree	20		RF	SAGO	12		
W	25030	25164	134	15	15	SS	OLIVE/SAL			
L	25070	25430	360			URBAN	ORNAMENTAL			
W	25138	25367	229	10	15	SS	SALA			

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	25164	25237	73	30	30	RF	JUCA/OLIVE			SRA
W	25437	25466	29	10	15	SS	SAL/JUCA			
W	25466		single tree	35		RF	JUCA	11		
L	25585		single tree	20		RF	FICA	11		
W	25585	26389	804		20	FM	SCR			
W	25898		single tree	10		SS	SALA	11		
W	26389	28853	2464		10	FM	SCR			
W	26696		single tree	10		SS	SALA	23		
W	26767		single tree	10		SS	ALRH/SA	11		
W	26830		single tree	10		SS	CEOC	11		
W	26938	28853	1915	15	15	SS	SAL			70%
L	28850	29133	283			URBAN	EUC/ORNA			
W	28850	29592	742		30	FM	SCR			
W	28900	29014	114	55	40	RF	EUC			10 Trees
W	29133		single tree	60		RF	POFR	32		
W	29335	29765	430		5	FM	SCR			
W	29335	29690	355	10	15	SS	RUDI/SAL/ROCA/ALRH			
W	29779	29861	82	20	20	RF	SALA			Sparatic FM
W	29928		single tree	15		SS	SALA	12		
W	30135		single tree	15		SS	SALA	12		30082 @ 300+00 Marker (Reset DMI)
W	30242	30492	250	20	35	RF	SAL			
W	30717	31160	443	15	25	SS	SAL/RUDI			310+00 @ 310+80 DMI
W	31272	31319	47	20	20	RF	SAL			Pict.#15
W	31319	31597	278		10	FM	SCR			
W	31660	31877	217	10	15	SS	RUDI/SAL			Sparatic FM
W	31999		single tree	20	20	RF	SALA/AI	11		
L	32014	32719	705			URBAN	ORNA/EUC			
W	32014	32687	673	55	30	RF	POFR/SAL			Within Marina Area ~ 18 Trees
W	32719	33002	283	15	20	SS	ALRH/SAEX/RUDI			
W	33252	33341	89	15	15	SS	SAME			>2'; Pict# 14 Norther harrier pair
W	33417	33813	396	15	25	SS	SALA			70%; Sparatic FM
W	33960		single tree		15	SS	SALA	12		SRA
W	34060	34692	632		10	FM	SCR			
W	34060	34157	97	10	15	SS	SALA/RUDI			SRA
W	34275		single tree	10		SS	SALA	23		SRA
W	34447	34503	56	15	15	SS	SALA			RUDI Understory
W	34623		single tree	10		SS	SAEX/RU	12		SRA
W	34692	35306	614		30	FM	SCR			35066 @ 350+00 Marker
W	34692		single tree	10		SS	SAEX/RU	12		SRA
W	35446	36877	1431		20	FM	SCR			
L	35604	35820	216	15	80	SS	SAEX/RUDI			35587 @ Green Siphon
W	36925	38051	1126		15	FM	SCR			Some PHAU

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	38188	40251	2063		20	FM	SCR			95%; Typical FM @ 40251; Pic #13
W	40507	40977	470		15	FM	SCR			90%
L	40977	41101	124	50	30	RF	ORNA/EUC			
W	40977	41181	204			URBAN				
W	41010		single tree	50		RF	POFR	32		
W	41244	41643	399		25	FM	SCR			
W	41780	43414	1634		20	FM	SCR			90%
W	43500	44257	757		15	FM	SCR			85%
L	44126		single tree	35		RF	SAGO	23		
L	44212		single tree	35		RF	SAGO	23		
W	44321	44408	87		30	FM	SCR			
W	44363		single tree	20		RF	JUCA	31		44321 @ Gate; Pics# 10,11
W	44408	44494	86	50	45	RF	SAGO/POFR			SRA; 3 Trees
L	44599	44689	90	65	25	RF	EUC			
L	44705	45298	593			URBAN	EUC/ORNA			45062 @ 450+00 Marker
L	44708		single tree	35		RF	POFR	11		
W	44780		single tree	35		RF	JUCA	32		
W	44857	46132	1275		30	FM	SCR/PHAU			46074 @ 460+00 Marker
W	46241	47043	802		30	FM	SCR/PHAU			
W	47043	47719	676		20	FM	SCR/PHAU			
W	47798	47881	83		10	FM	SCR			
W	48015	48282	267		10	FM	SCR/PHAU			
W	48457	48714	257		10	FM	SCR			90%
W	51822	52035	213		20	FM	SCR			49126 @ West edge on Antioch Bridge
W	51845		single tree	35		RF	SAGO	11	L	SAEX Understory
W	52308	53533	1225		5	FM	SCR			80%
W	52441	52667	226		15	FM	SCR			
W	52735	53208	473		20	FM	SCR			Landside Pond
W	52889	53178	289	15	20	SS	SAL			
W	53461		single tree	15		SS	SAL	12		
W	53533	54228	695	20	20	RF	SAL/RUDI			54628 @ Siphon; FM understor
W	54228	55306	1078	15	25	SS	RUDI/SAL/ROCA			Some FM intertwined; 85%
W	55306	56075	769	10	10	SS	RUDI/SALA			
W	56075	56750	675	15	15	SS	SALA/RUDI			
W	56750	56933	183	5	5	SS	ROCA/SAL			
W	56933	56975	42	10	10	SS	SAL			
W	57042	57491	449	10	10	SS	SAL			SRA
W	57627	57738	111	10	10	SS	SAL			SRA
W	58876		single tree	10		SS	SAL	12		
W	59072	59340	268		10	FM	SCR			
W	65489		single tree	30		RF	SAL	23		
W	65961	67031	1070		10	FM	PHAU/SCR			85%; Coverage
L	66129		single tree			URBAN	EUC/ORNA			Pict.#9; needs beginning

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	66129		single tree			URBAN	EUC/JUCA			need beginning for Urban
W	66584		single tree	25		RF	JUCA	12		
W	67041	67239	198	10	10	SS	RUDI/JUCA			Pict.# 6,7,8 of PHAU
W	67274		single tree	20		RF	JUCA	32		
W	67354		single tree	20		RF	SAL	12		ARDO here
W	67423		single tree	40		RF	SAGO	11		
W	67502	67590	88	20	20	RF	SAGO			2 Trees; 80%
W	67590	67850	260	15	15	SS	SAL/RUDI			
W	67859		single tree	45		RF	SAGO	32		
W	67893	68013	120	15	15	SS	RUDI/SAEX			
W	68013	69072	1059		30	FM	SCR			
W	68013	68258	245	20	20	RF	SAEX/RUDI			
W	68258	68336	78	15	15	SS	SAEX			
W	69072	69125	53	15	15	SS	RUDI/SALA			Near County Park
W	69455						At Center of Last Power Tower on Sac River			
L	71836		single tree	20		RF	JUCA	32	L	74023 @ 740+00 Marker
W	74353		single tree	10		SS	SALA	11		
W	74516		single tree	10		SS	SALA	11		Pict.#5 Landside Typical
L	75199	75304	105	35	30	RF	PORF		L	6 Trees total
W	75255		single tree	20		RF	JUCA	11		75100 ARDO; 75013 @ 75000 Marker
L	75351		single tree	35		RF	POFR	32	L	Sparatic FM Landside
W	76753		single tree	15		SS	JUCA	32		76404-76753; 3 Clumps of ARDO X 15W
W	77203		single tree	15		SS	JUCA	32		
W	77501		single tree	20		RF	JUCA	11		ARDO Here @ 77380
W	77624	77916	292	15	15	SS	JUCA/SAL			85%; Some Dead Shrubs
L	77732	79835	2103			URBAN	SAEX/ORN/POFR			
W	78133	78213	80	15	15	SS	FRLA			78085 @ 780+00 Marker (Reset to 780+00)
W	78294	79652	1358		10	FM	SCR			
W	78452	78515	63	10	10	SS	SAL			
W	78938	78999	61	15	15	SS	SAL			
W	79101		single tree	15		SS	SAL	12		ARDO 78999-79071; 79071 @ 790+00 Marker
W	79183	81815	2632		10	FM	SCR/PHAU			81257 @ Center of 2nd (SW) Tower
W	79183	79340	157	20	20	RF	JUCA/ALRH			
W	79495	79805	310	15	20	SS	SALA/ALRH/JUCA			ARDO @ 79475 (15x30W)
W	79783		single tree	10		SS	SAL	12		
W	79835		single tree	20		RF	FRLA	32		
W	79935	79984	49	15	20	SS	RUDI/JUCA/ACNE/BACE			
W	80000	80087	87	10	15	SS	RUDI/JUCA			80058 @ 800+00 Marker

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	80002		single tree	20		RF	JUCA	23		
W	80223	80402	179	10	15	SS	RUDI/SAEX			
W	80402	80444	42	25	20	RF	JUCA			
W	80449	81149	700	15	15	SS	SALA/JUCA			81160 @ Siphon
W	81330	81833	503	15	15	SS	JUCA/SAL			ARDO Mixed in w/SS here; 85%
W	81833	82128	295		20	FM	SCR			ARDO 82128 - 81200
W	81965	82007	42	20	15	RF	ACNE/JUCA			
W	82128		single tree	10		SS	SAL	12		
W	82179	84599	2420		30	FM	SCR			
W	82438	82689	251	15	20	SS	SAEX			
W	83225		single tree	10		SS	SALA	11		
L	83235	84673	1438		5	FM	SCR		SD	
W	83410		single tree	20		RF	JUCA	32		
W	83640		single tree	10		SS	SALA	11		
W	83881		single tree	10		SS	JUCA	23	L	
W	83951	84442	491	15	20	SS	SALA/JUCA/ALRH			A few trees to 20 feet here
L	84442		single tree	20		RF	SALA	23	SD	
W	84479		single tree	20		RF	JUCA	32	L	
W	84507	84776	269	15	20	SS	RUDI/SAEX/SAL			Picts. # 1-4
W	84776		single tree	35		RF	SAGO	32		
W	84915		single tree	10		SS	SALA	32		84798 @ Tital Guage/Siphon
W	84950		single tree	20		RF	ALRH	11		
L	85022	85523	501			URBAN				
W	85022	85109	87	15	15	SS	JUCA			85%; ASLE Here not in bloom
W	85325		single tree			SS	SALA	11		
W	85388		single tree	10		SS	ALRH	11		
W	85523	86000	477		15	FM	SCR			At Barge on Sherman Isand Rd.
W	86734		single tree	10		SS	SAL	12		Stopped @ 86077 = 860+00
L	86771	86912	141	20	30	RF	FICA/EUC			Urban Landside of RF
W	86799		single tree	10		SS	JUCA	11		
W	87014	87294	280	35	30	RF	ACACIA/POFR			Behind Fence
W	87294	89736	2442		20	FM	SCR			ARDO 89736-90025
W	87331	87580	249	20	20	RF	ALRH			40%
L	87410	87596	186	50	40	RF	POFR/EUC			URBAN-like
W	87934	88223	289	15	15	SS	ALRH			30%; ARDO landside 87714
W	88369		single tree	30		SS	JUCA	32		
L	88569	89907	1338	15	30	SS	SAEX			
W	88622	88721	99	15		SS	ALRH	11		
W	89090	89440	350	15	30	SS	SAEX/ROPS/SAME			ROPS to 20'; 89043 @ 890+00
L	89907	90600	693	20	35	RF	SAEX/ROPS			75%; 90025 @ 900+00 Marker
W	90055	90600	545	35	30	RF	ROPS/JUCA			

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
W	90665	90944	279	40	40	RF	ROPS			3 Silos on Landside
W	90968		single tree	65		RF	POFR	32		91144 @ 910+00 Resetting to 910+00
L	91225		single tree	40		RF	EUC	32	M	
W	91300	91493	193	20	20	RF	ROPS			Pond Landside
L	91325		single tree	60		RF	EUC	32	L	
W	91325	91543	218		15	FM	SCR			
L	91408	91665	257	20	30	RF	SAL			Siphon @ 91632
W	91543		single tree	15		SS	ROPS	11		
W	91578	91632	54	15	20	SS	ROPS			
W	91699	91867	168	15	20	SS	JUCA/SAL/ROPS			
L	91808	91867	59	65	40	RF	EUC		L	
W	91900	92116	216	20	25	RF	SAL/POFR/ROPS			920+00 Marker @ 92116
L	91999	92231	232	25	35	RF	SAL/ROPS			
W	92171		single tree	20		RF	ALRH	11		
W	92422	92820	398	20	20	RF	SAL/ALRH/JUCA			75%; ARDO @ 92400; 40ft Sago in Stand
	92960		single tree						Ardo X 55 feet Long	
W	93389	93563	174	15	15	SS	POFR/SALA			93093 @930+00 Marker; Reset DMI to 930+00
W	93570	93865	295	50	40	RF	POFR			SRA;70%
L	93742	94080	338	45	40	RF	POFR/SAEX			SRA; 80%
W	93933		single tree	45		RF	POFR	32		SRA
W	94660	94853	193	55	40	RF	POFR			SRA
W	95195		single tree	25		RF	JUCA	32		95055 @ 950+00 Marker
W	95200	98400	3200		15	FM	SCR			80%
W	95450		single tree	15		SS	JUCA	11		ARDO @ 95561 to 95300; 2 Trees
W	95561	95899	338	50	30	RF	POFR			~10 Trees; 45%
L	96000	96075	75			URBAN	JUCA			96040 @ 690+00 Marker
W	96290		single tree	10		SS	JUCA	11		ARDO @ 96160
W	96418		single tree	15		SS	JUCA	11		
W	96479		single tree	15		SS	FRLA	11		ARDO 96725-96794
W	96794	97434	640	15	15	SS	JUCA/ACNE/SAEX			Some ARDO Here
W	97548	97619	71	30	20	RF	ROPS			
W	97660	97878	218	75	40	RF	EUC			ROPS understory
L	97806		single tree	75		RF	EUC	32		
W	97878	98000	122	20	20	RF	ROPS/EUC			
W	98184	98303	119	45	30	RF	EUC			ROPS under; Reset DMI here: 98160 @ 98000
L	98303	98450	147	20	15	RF	EUC		H	ARDO 98300-98476
W	98352	98476	124	45	30	RF	EUC			
W	98476	99378	902	15	15	SS	SAEX/ALRH/JUCA			Some ARDO mixed in
W	98746	99429	683		20	FM	SCR			Pict# 5; Assesed on 160 Shoulder

LEVEE LOG

SIDE	Station Begin	Station End	Length	Height	Width	Habitat Type	Species	Ratio	Location on Levee	Notes
L	99368		single tree	20		RF	CEOC	11	L	
W	99429		single tree	15		SS	SALA	11		
W	99650	100130	480		10	FM	SCR			Picts. 3 & 4
W	99658		single tree	50		RF	POFR	31		99634 @ Gate to 160 South along Sac River
L	99718	99930	212	70	50	RF	EUC			
W	99718	100130	412	40	35	RF	EUC			100029 @ 100000 Marker
W	100140		single tree	45	40	RF	POFR	11		
W	100271	100341	70	60	30	RF	POFR			3 Trees
W	100356	100533	177	10	10	SS	SAEX			
W	100533		single tree	35		RF	EUC	32		
W	100551		single tree	10		SS	ALRH	11		
W	100704	100745	41	15	10	SS	JUCA			
W	100824	100882	58	40	40	RF	EUC			3 Trees
W	100953		single tree	10		SS	JUCA	11		
W	101063	101102	39	15	10	SS	JUCA			
W	101128		single tree	20		RF	JUCA	12		SRA
W	101286		single tree	10		SS	ALRH	23		
L	101441		single tree	25		RF	SAGO	23		
W	101872		single tree	30		RF	QUWI	32		Gate
W	101935	102025	90	45	30	RF	POFR			2 Trees

Table 2.

Sherman Island Habitat Summary

Hab. Type	Length	Square Feet	Acres
FM	44953.00	855390.00	19.64
RF	13071.00	425050.00	9.16
SS	23264.00	455541.70	9.80
SRA	2855.50	*	*
Total	84143.50	1735981.70	38.60

*SRA is inventoried in linear feet only