RECLAMATION

Managing Water in the West

ENGINEERING GEOLOGIC EVALUATION OF THE NEWMAN WASTEWAY AND STRUCTURES

DELTA MENDOTA CANAL RECIRCULATION FEASIBILITY STUDY

JANUARY 2009

U.S. DEPARTMENT OF INTERIOR
BUREAU OF RECLAMATION
MID PACIFIC REGION GEOLOGY BRANCH
SACRAMENTO, CA

ENGINEERING GEOLOGIC EVALUATION OF THE NEWMAN WASTEWAY AND STRUCTURES

DELTA MENDOTA CANAL
RECIRCULATION FEASIBILITY STUDY

JANUARY 2009

U.S Department of Interior
Bureau of Reclamation
Mid Pacific Region Geology Branch
Sacramento, CA

Cover Photos: Views looking upstream from Draper Road Bridge.
Background: Test Flow Conditions – September 4, 2008
Left: Pre-Test Flow (Baseline) Conditions – July 25, 2008
Right: Post-Test Flow Conditions – September 29, 2008

Prepared By: Joel Sturm, Geologist

Reviewed By: Michael McCulla, Geologist

Regional Geologist: Greg Mongano

CONTENTS

APPENDIX A. REFERENCES

MILEPOST AT STRUCTURE SITES
DELTA-MENDOTA CANAL, NEWMAN WASTEWAY
SEPTEMBER 1992

SPECIFICATIONS DATA, DC-2951-1

LOCATION MAP	214-D-16592
PROFILE AND SECTIONS	214-D-15379, -15380
LINED SECTION	214-D-15041
CONCRETE DROPS, PLAN AND SECTIONS	214-D-15616
LOCATION OF EXPLORATION	214-D-16715
LOGS OF GEOLOGIC EXPLORATION	214-D-16716, -16717, 16718
SUMMARY OF DRAINAGE INLETS	214-D-16645

APPENDIX B. PHOTOGRAPHS

I. PRE-TEST FLOW (BASELINE) CONDTIONS – JULY 25, 2008
II. TEST FLOW CONDITIONS – SEPTEMBER 4, 2008
III. POST-TEST FLOW CONDITIONS – SEPTEMBER 29, 2008

**ENGINEERING GEOLOGIC EVALUATION
OF THE NEWMAN WASTEWAY AND STRUCTURES**

DELTA MENDOTA CANAL RECIRCULATION FEASIBILITY STUDY

JANUARY 2009

I. INTRODUCTION AND BACKGROUND

The Newman Wasteway was inspected by U.S. Bureau of Reclamation (Reclamation) Mid Pacific Region Geology Branch (MP-230) geologist Joel Sturm on June 25, 2008 and September 29, 2008, along with a larger inspection team that included Reclamation's Project Coordinator Gene Lee (MP-700), Mark Walsh, San Luis & Delta Mendota Water Authority (SLDMWA) Operations and Maintenance Department, and an engineer and two biologists from the California Department of Water Resources (DWR) Fresno Office. The purposes of the two inspections were as follows:

- **Pre-Test Flow Inspection June 25, 2008**
  Establish baseline or pre-test flow conditions for the wasteway prior to passing a test recirculation flow of approximately 250 to 300 cfs

- **Post-Test Flow Inspection September 29, 2008**
  Document conditions following the high flow event

The high test flows began on or about July 30, 2008 and continued through September 15, 2008, a duration of about 6 weeks.

The two inspections and elevated test flow event are part of the Delta Mendota Canal Recirculation Feasibility Study also referred to as the Newman Wasteway Study. The study is investigating the feasibility of routing relatively high quality water from the Delta-Mendota Canal (DMC) via the Newman Wasteway to the San Joaquin River near its confluence with the Merced River.

The specific objectives of the engineering geologic evaluation of the wasteway were:

1. Document the pre-test flow (baseline) and post-test flow conditions of the concrete lined and unlined sections, drop structures and bridges.
2. Document the pre-test flow (baseline) and post-test flow conditions of the wasteway side slopes and invert and note any existing unstable areas, evidence of erosion or scour and animal burrows.
3. Evaluate the movement of water through the wasteway with a particular emphasis on causes and sources of turbidity.

II. DESCRIPTION OF WASTEWAY

The 8.2-mile-long Newman Wasteway is located in California's San Joaquin Valley, south and east of the town of Newman (Figure 1, Location Map). The wasteway begins at milepost (MP) MP 54.38 of the Delta-Mendota Canal (DMC) and terminates at the San Joaquin River about 1 mile upstream (south) of the San Joaquin/Merced River confluence. Flow from the DMC into the wasteway is controlled by two radial gates with a combined capacity of 4300 cfs located in a concrete turnout structure where the wasteway branches off the DMC. From the DMC, the wasteway runs east for 4.6 miles and then turns northeast for 3.6 miles giving it a dogleg shape. The initial 1.4 miles of the wasteway is a 13-foot-deep, concrete lined section. The remaining 6.8 miles of wasteway is an unlined, 21.25-foot-deep section that is entirely in cut except for the last 1.3-mile-long section where, for much of the section, the lower part of the wasteway prism is in cut and the upper part is embankment. The embankment attains a maximum height of approximately 10 feet along the right side of the wasteway.

Historically, the wasteway has never had to be operated close to its rated capacity or in an emergency situation. A maximum flow of approximately 1000 cfs is reported to have been passed in the 1960's. Typical flows, consisting mainly of irrigation runoff discharged by numerous drains and a minor amount of leakage from the DMC, range from a few to 10 cfs and occasionally are as high as 20 to 30 cfs. Flows as high as 250 to 300 cfs were passed in 2004, and lower flows were passed in 2007 (50 cfs average flow with a 150 cfs peak flow for 12 hours) as part of the recirculation study.

The wasteway runs through five reinforced concrete drop structures (MP 1.44/Main Canal, MP 2.48, MP 4.21/Hwy. 33, MP 5.49/Braza Road, and MP 6.86) and is crossed by four concrete county road bridges (Eastin, Draper, Upper and Canal School), one timber farm bridge and two pipelines. The wasteway is crossed by the Central California Irrigation District (CCID) Main Canal at the MP 1.44 drop structure, by Highway 33 at the MP 4.21 drop and by Braza Road at the MP 5.49 drop. A total of 26 drains discharge irrigation runoff from the surrounding fields into the wasteway. All structures are listed in the Newman Wasteway section of *Milepost at Structure Sites, Delta-Mendota Canal, September 1992*, included in
Appendix A. References.

The complete engineering design and construction specifications are contained in:

U.S. Bureau of Reclamation Specifications No. DC-2951-1
Earthwork, Concrete Lining and Structures
Station 1+79.50 to Station 432+70 Newman Wasteway
March 1949
Delta-Mendota Canal
Central Valley Project, California

Selected specifications drawings showing locations of structures and exploratory boreholes, plan and section views of typical structures and borehole logs are included in **Appendix A. References**.

III. GEOLOGY

The near-surface sediment of the central San Joaquin Valley is mostly fine-grained basin fill consisting of sandy clay and clayey sand dissected by widely spaced, narrow drainages and stream channels filled with sand and gravel. The fine-grained sediment is typically erodible and is often classified as erosive/dispersive soil. Geologic investigations for Newman Wasteway included over 100 soil borings along and near the wasteway alignment. Borehole logs describe the majority of the soils sampled as clay with variable amounts of sand (Specifications Drawing Nos. 214-D-16715, -16716, 16717 and -16718).

IV. INSPECTION PROCEDURE

The entire wasteway was inspected on July 25, 2008, before the approximately 6-week-long period of high flow (test flow) to establish pre-test flow or baseline conditions. Post-test flow conditions were observed and documented on September 29, 2008.

Inspection stops were made at all drop structures, at three county road bridges (Eastin, Draper and Upper Roads), at the "Big Bend" (MP 4.65), and at the wasteway's confluence with the San Joaquin River at MP 8.21. Each stop was documented by a series of photographs that are included in **Appendix B. Photographs**. Major structures, their mileposts and representative photographs are listed in Table 1 (Pg. 13). All observations were made from the right and left wasteway crest operation and maintenance (O&M) roads or from the bridge decks or tops of drop structures. The interiors of the drop structures, the undersides of bridges and the two pipeline crossings were not inspected. The inlet and outlet aprons of all five drop structures and the bottom few feet of all bridge piers were mostly obscured by vegetation and/or sediment deposits.

The author did not personally observe the high test flows. Test flow conditions on September 4, 2008 are documented by a series of photographs taken by Richard Patras, Mid Pacific Region Division of Planning (MP-700) and included in **Appendix B. Photographs**.

Photographic Documentation

Photographs included in **Appendix B. Photographs** are organized as follows:

I. Pre-Test Flow (Baseline) Conditions	July 25, 2008
II. Test Flow Conditions	September 4, 2008
III. Post-Test Flow Conditions	September 29, 2008

Where appropriate, the captions of photographs showing post-test flow conditions reference pre-test and test flow photographs taken from approximately the same vantage point. A comparison of equivalent pre-test flow, test flow and post-test flow photographs provides an excellent appreciation of the impact (or lack of impact) of the high test flows on the wasteway and ancillary structures.

V. LINED SECTION AND CONCRETE STRUCTURES

BASELINE CONDITIONS -- July 25, 2008

Lined Section

The reinforced lining is in excellent condition (Pre-, Test and Post-Test Flow Photos 1, 2 and 3). No cracking, offset or separated construction joints, spalling or erosion was observed. Minor plant growth and slight concrete deterioration is evident at numerous construction joints where the sloping lining intersects the invert (the cove section).

Drop Structures

The nearly 60-year-old reinforced concrete structures are in excellent condition. Inlet and outlet wing walls show no significant cracking, spalling or evidence of erosion (Pre-Test Flow Photos 4, 5, 12, 15, 23, 26 and 27). Construction joints are tight and show no offset. Wing walls are thoroughly embedded in the canal slopes except as noted below.

County Road Bridges

Concrete piers are in excellent condition and show no cracking, evidence of scour or spalling (Pre-Test Flow Photo 9). Bridge decks and superstructure appear to be in generally good condition but were not carefully inspected.

POST-TEST FLOW CONDITIONS -- September 29, 2008

Lined Section, Drop Structures and County Road Bridges

All concrete structures are in excellent condition and appear unaffected by the test flows (Post-Test Flow Photos 4, 5, 6, 13, 17 and 24).

VI. UNLINED SECTION

BASELINE CONDITIONS -- July 25, 2008

Cutslopes

With only a few exceptions as described below, wasteway cutslopes appear stable and show no evidence of erosion or instability (Pre-Test Flow Photos 6, 8, 10, 11, 14,16-20, 24, 28, 30 and 31). Cutslopes are covered by grasses which provide excellent erosion protection.

Erosion

Four localized areas of erosion were observed:

- Three- to four-foot high vertical cutbanks along the wasteway cutslope toes downstream of the MP 1.44/Main Canal Drop Structure.
- Erosional voids behind the right inlet wing wall of the MP 2.48 Drop Structure.
- Several broad, erosional swales and at least one collapsed animal burrow on the outside cutslope of the “Big Bend” at MP 4.65.

- Erosion at the downstream edges of the outlet wing walls at the MP 6.86 Drop Structure

Cutbanks. Three- to four-foot-high, vertical cutbanks were observed downstream of the MP 1.44/Main Canal Drop Structure where the main channel or waterway runs along the toe of the right and left cutslopes and the slopes are not protected by a dense growth of reeds, as is typical elsewhere along the wasteway (Pre-Test Flow Photos 6 and 8). The cutbanks at the cutslope toes probably developed during periods of elevated flow. Existing cutbanks are likely to experience further erosion during future recirculation flows. New cutbank erosion is likely to occur during periods of elevated flow wherever the main channel runs along the cutslope toe and the toe is not protected by a dense growth of reeds or grasses.

Erosional Voids. A few 1- to 8-inch diameter erosional voids, several feet deep, were observed in sandy clay backfill behind the left inlet wall of the MP 2.48 drop structure (Pre-Test Flow Photo 13). The voids are believed to be rodent holes that were enlarged by surface runoff eroding the erosive/dispersive soils common to the San Joaquin Valley. Similar voids were not observed at the other five drop structures. This type of erosion is unrelated to wasteway flow.

Erosional Swales and Animal Burrows. A number of broad, shallow erosional swales, characteristic of erosion of erosive/dispersive soils by surface runoff and a few slumps near the water's edge, probably caused by collapsed animal burrows, are present on the right, outside wasteway cutslope of the "Big Bend" at MP 4.65 (Pre-Test Flow Photos 21 and 22). These features are little changed since they were observed by the author in 1999 and are unrelated to normal or elevated wasteway flows.

Wing Wall Erosion. Immediately downstream of the outlet wing walls of the MP 6.86 drop structure, the right cutslope and embankment and, to a lesser extent, the left cutslope and embankment, experienced noticeable erosion (Pre-Test Flow Photo 29). The erosion is reported to have occurred in the late 1990's when San Joaquin River flood flows breached the right wasteway embankment, flooding the entire wasteway between the MP 6.86 drop and the San Joaquin River for a period of months. Riprap scour protection was placed on both slopes, downstream of the outlet wing walls. Further erosion in this area due to test recirculation flows is unlikely.

Channel Characteristics and Vegetation

The unlined wasteway can be divided into two distinct reaches based on channel characteristics and vegetation:

- MP 1.44 to MP 6.86 — Start of unlined section to last drop structure
- MP 6.86 to MP 8.21 — Last drop structure to San Joaquin River

The character of the wasteway and the distribution, type and density of vegetation are very consistent within each of these reaches, but the same characteristics differ significantly between the two reaches.

MP 1.44 to MP 6.86
For much of the 5.4 mile length of this reach, the wasteway invert is characterized by a well-defined, generally sinuous, central channel or waterway that is flanked by a dense growth of reeds or, less commonly grasses, that covers most of the wasteway invert (Pre-Test Flow Photos 5 to 12 and 14 to 28). The central channel carries the majority of the wasteway flow and is open and free of vegetation from the MP 1.44 Drop to the MP 2.48 Drop (Pre-Test Flow Photos 5 to 8, 21, 22 and 24) and is mostly filled with a dense growth of water plants (mainly primrose) from the MP 2.48 Drop to the MP 6.86 Drop (Pre-Test Flow Photos 16 to 19 and 25).

Significant deposits of fine-grained sediment that have been stabilized by dense vegetation are present immediately downstream of either the left or right “barrel” of each drop structure (Pre-Test Flow Photos 5, 16, 20 and 25). These erosion resistant, vegetated deposits impede flow from the drop structures and create stilling basins that promote the settling out of suspended sediment at the drop structure outlets.

A number of beaver dams are reported to exist within the wasteway between MP 1.44 and MP 6.86. The only dam observed on July 25 is located at MP 1.66, about 1,000 feet downstream of the MP 1.44/Main Canal Drop Structure (Pre-Test Flow Photos 7 and 8). The beaver dam at MP 1.66, considered to be representative of all beaver dams, extends diagonally across the entire wasteway invert and is constructed of reeds and mud. As shown in Pre-Test Flow Photos 7 and 8, the beaver dam is difficult to differentiate from the surrounding vegetation and vegetated sedimentary “islands”.

The effect of beaver dams on flow and turbidity is believed to be comparable to the effect of the vegetated sediment deposits that occur downstream of all drop structures: beaver dams impede flow and create stilling basins that promote the settling out of suspended sediment.

MP 6.86 to MP 8.21
The last 1.35 miles of the wasteway (the terminal reach) are characterized by a broad, open, linear channel that nearly spans the entire 64-foot width of the invert and sparse vegetation (mainly reeds and scattered patches of primrose) that is established mainly along the edges of the channel (Pre-Test Flow Photos 29 to 33). The channel is completely filled with barely flowing, relatively turbid water, 1 to 2 feet deep that most likely includes some backwater from the San Joaquin River.

The character of the terminal reach is or has been influenced by three main factors:

- The level of the San Joaquin River.
- The absence of a downstream drop structure.
- Major flood events in the late 1990's and 2005 that flooded the terminal reach for a period of months.

Water Movement and Turbidity
Wasteway flow is primarily irrigation runoff discharged by over 20 drains and a far lesser amount of leakage from the DMC past the radial gates at the Newman Canal headworks (Pre-Test Flow Photo 9). Flows steadily increase in the downstream direction in response to an increase in the number of drains discharging into the wasteway. A flow of 6 cfs was estimated just upstream of the MP 4.21/Hwy 33 Drop Structure on July 25 (Photo 19).

Observations on July 25 showed a consistent pattern of flow velocity and turbidity that is controlled largely by the drop structures and vegetation. Vegetation appears to filter and clarify the flowing water upstream of each drop structure. Flow into each drop structure is fast moving and relatively clear (Pre-Test Flow Photos 19 and 28). Flow at the outlet of each drop is very slow moving or nearly stagnant and relatively turbid (Pre-Test Flow Photos 19 and 29). Suspended sediment tends to settle out and accumulate in the relatively stagnant pools at the outlet of each drop.

The primary source of the suspended sediment is believed to be the water entering the wasteway as irrigation runoff and canal leakage. The stability of the cutslopes and absence of active erosion suggests that only a very small fraction of the sediment load is derived from erosion within the wasteway prism.

POST-TEST FLOW CONDITIONS -- September 29, 2008
Cutslopes
Cutslopes are stable and appear unaffected by high test flows (Post-Test Flow Photos 7 and 8). A compacted fill located just upstream of Draper Road Bridge (MP 2.17) shows no evidence of instability or erosion (Test Flow Photo 9 and Post-Test Flow Photo 14).

Erosion
<u>Cutbanks.</u>
Cutbank (lateral) erosion is uncommon and localized. Where observed, cutbanks are restricted to the bottom, 2 to 4 vertical feet of a cutslope. Removal of vegetation (erosion protection) observed at the right cutslope toe near the MP 1.66 beaver dam (Post-Test Flow Photos 11 and 12); downstream of the MP 4.21 Drop; and on the outside slope of the Big Bend (MP 4.65; Post-Test Flow Photos 28 to 31)) may (or may not) exacerbate cutbank erosion in these areas in the future. No obvious cutbank erosion was observed downstream of the Big Bend.

Erosional Voids, Erosional Swales and Animal Burrows, and Wing Wall Erosion.
The specific examples of these erosional features observed and documented on July 25 are unchanged following the high test flows.

Invert Erosion
Only the localized deepening of the narrow, sinuous central channel by a few inches and no widening of the channel was observed (Post-Test Flow Photos 5, 18, 21, 26, 33 and 35).

Channel Characteristics and Vegetation

MP 1.44 to MP 6.86
The most noticeable and significant impact of the high test flows was on established vegetation. Flattening and/or removal of vegetation (mainly reeds and grasses) is most evident:

- Downstream of the MP 1.44 Drop Structure (Post-Test Flow Photos 5 and 6).
- In the vicinity of the beaver dam at MP 1.66 (Post-Test Flow Photos 9 and 11).
- From 300 feet upstream of Draper Road Bridge (MP 2.17) to the MP 2.48 Drop Structure (Post-Test Flow Photos 15 to 21).
- Immediately up- and downstream of all drop structures and bridges (Post-Test Flow Photos 6, 13, 15, 16 to 18, 21, 24 to 26, 32, 33 and 34).
- In the Big Bend (MP 4.65) at the toe of the right (outside) cutslope ((Post-Test Flow Photos 29 and 30).

The impact on vegetation was greatest where flow velocities were highest. The extensive zone of vegetation disturbance downstream of the MP 1.44 Drop (Post-Test Flow Photo 6) is attributed to relatively high flows exiting the drop which separates the upstream lined section of wasteway from the downstream unlined section.

Removal of water plants (mainly primrose) from the sinuous central channel is evident from about the MP 2.48 Drop Structure, the approximate upstream limit of primrose growth) to Drop Structure MP 6.86 (Post-Test Flow Photos 21, 22, 23, 25, 26, 32 and 32 to 35) with the single exception of the Big Bend area (MP 4.65) where primrose growth appears to have expanded or, at least, remained unchanged following the high test flows (Post-Test Flow Photos 28 to 31).

Beaver dams were observed at MP 1.66, MP 4.21 and MP 6.86. The most substantial dam is at MP 1.66, the same location observed on July 25. The pattern of flattened and removed vegetation indicates that the MP 1.66 dam diverted high test flows out of the central channel, impacting vegetation that might otherwise have not been subjected to the direct force of the high flows (Post-Test Flow Photos 9 and11). A similar impact on vegetation is evident immediately downstream of the beaver dams at MP 4.21 and MP 6.86 (Post-Test Flow Photos 25 and 34). The beaver dams at MP 1.66 and MP 6.86 were either removed or submerged by high flows (Test Flow Photos 8 and 22, and rebuilt within two weeks following the reduction of flow (Post-Test Flow Photos 8 and 34).

The deposits of vegetation-stabilized, fine-grained sediment, observed on July 25, immediately downstream of each drop structure, are still present and appear to have experienced little or no erosion or reduction in volume.

<u>MP 6.86 to MP 8.21</u>
Primrose growth along the channel margins has expanded into 1) previously unvegetated beaches and 2) areas where high test flows had removed reeds (Post-Test Flow Photos 37 and 38). Reed growth along both channel margins appears more lush and extensive as compared to the baseline conditions observed on July 25 (Pre-Test Flow Photo 31).

Water Movement and Turbidity
As was also observed on July 25, during low flow, baseline conditions, wasteway flow is primarily irrigation runoff and a far lesser amount of leakage from the DMC (Pre-Test Flow Photo 9 and Post-Test Flow Photo 4).

All flow is within the sinuous, central channel (Post-Test Flow Photos 7, 15, 16, 18, 21 to 23 25 to 27 and 32 to 34), identical to pre-test flow conditions. Flow from Drop MP 1.44 to the Big Bend (MP 4.65) appears uniformly turbid, probably due to a loss of sediment filtering by vegetation as a result of flattening and removal of reeds and the removal of water plants within this reach by high test flows. Downstream of the Big Bend (MP 4.65), flow seems less turbid than upstream, probably due to sediment filtering by the persistent dense growth of reeds and primrose in the Big Bend area.

The same pattern of flow velocity (faster upstream and slower downstream of drops) observed on July 25 was also evident on September 29 (Post-Test Flow Photos 32 and 33).

During the high test flows, flow typically spilled out of the central channel and covered a larger area of the wasteway invert (Test Flow Photos 6, 8, 10 to 13, 15, 16). The high flow seemed to stay mainly in the central channel in areas where reed growth flanking the channel was particularly dense (Test Flow Photos 17, 18 and 22). Flow conditions appear relatively unchanged downstream of Drop MP 6.86 where flow occupies the same broad, linear channel at both low and high flows. Flow velocity and turbidity appear fairly uniform for the entire length of the unlined wasteway (Test Flow Photos 6, 11, 22 and 23).

Note: The preceding paragraph is based entirely on a review of photographs taken by R. Patras (Appendix. B, Photographs, II. Test Flow Conditions -- September 4, 2008).

VII. CONCLUSIONS AND RECOMMENDATIONS

Lined Section and Concrete Structures

All concrete lining and reinforced drop structures and bridges are in excellent condition. No degradation or damage to concrete lining or structures was observed during or following the high test flows.

Erosion

Only relatively minor, localized cutbank (lateral) erosion was caused by elevated wasteway flows of approximately 250 to 300 cfs. Cutbank erosion occurs at the toes of cutslopes in a few widely spaced areas. The volume of material eroded in a single high flow event is relatively insignificant and probably contributes only slightly to the total suspended sediment load. In the future, should yearly high flows become a regular event, repeated episodes of cutbank erosion may require the placement of riprap slope protection in areas where erosion is most severe.

Beaver Dams

During low, baseline flow conditions, beaver dams appear to have an effect on water movement and turbidity comparable to that of stable, densely-vegetated sediment deposits that are present downstream of all drop structures: beaver dams impede flow and create stilling basins that promote the settling out of suspended sediment. Beaver dams are either removed or submerged during high flows and rebuilt within a few weeks after the high flows end. Removal of the beaver dams is not recommended.

Channel Characteristics and Vegetation

From MP 1.44, the start of the unlined section, to MP 6.86, the last drop structure, the wasteway is characterized by a well-defined, generally sinuous central channel or waterway that is flanked by a dense growth of reeds. From MP 6.86 to the San Joaquin River, the wasteway is characterized by a broad, open, linear channel that spans the nearly the entire 64-foot width of the invert and sparse vegetation that is established mainly along the edges of the channel.

The most noticeable and significant impacts of the high test flows was to established vegetation as follows:

<u>MP 1.44 to MP 6.86</u>

- Flattening and/or removal of vegetation (mainly reeds and grasses.
- Removal of water plants (mainly primrose) from the sinuous central channel (MP 2.48 to MP 4.21)

<u>MP 6.86 to MP 8.21</u>

- Primrose growth along the channel margins expanded into 1) previously unvegetated beaches and 2) areas where high test flows had removed reeds.
- Reed growth along both channel margins appears more lush and extensive following the high flow event as compared to the baseline conditions observed on July 25

Water Movement and Turbidity

The primary source of the suspended sediment and turbidity during low flow periods is believed to be the water entering the wasteway as irrigation runoff and canal leakage.

The stability of the cutslopes and absence of active erosion suggests that only a very small fraction of the sediment load is derived from erosion within the wasteway prism.

Flow velocity and turbidity are strongly influenced by the drop structures, beaver dams and vegetation. Vegetation appears to filter and clarify the flowing water upstream of each drop structure.

During low flow periods, flow into each drop structure is fast moving and relatively clear, and flow at the outlet of each drop is very slow moving or nearly stagnant and relatively turbid. Suspended sediment tends to settle out and accumulate in the relatively stagnant pools at the outlet of each drop and the pools upstream of beaver dams.

During high flow events, high velocity flows flatten and/or remove reeds from localized sections of the wasteway invert and water plants (primrose) from the sinuous central channel, both of which reduce the filtering out of suspended sediment by vegetation. As a result, turbidity in the wasteway is fairly uniform and largely controlled by the turbidity of the water discharged from the DMC.

As currently “operated” some amount of suspended sediment remains within the wasteway during normal periods of low flow (5 to 10 cfs) due to filtering by vegetation and settling out downstream of drop structures and upstream of beaver dams. The volume of this relatively erodible, fine-grained sediment is proportional to the length of time between high flow events. Whenever flows are increased, as is the case when test recirculation flows of 250 to 300 cfs are made, this sediment is flushed from the wasteway producing a pulse of turbid flow. The degree of turbidity and the duration of the turbid pulse are directly proportional to the volume of erodible fine sediment.

Creation of a more open, unrestricted flow condition by removing vegetation, beaver dams and the densely-vegetated sediment “dams” downstream of the drop structure outlets is likely to reduce the settling out and filtering of suspended sediment. As a result, the normal sediment load (turbidity) would be transported directly into the San Joaquin River more or less continuously with the amount of suspended sediment reaching the San Joaquin proportional to the wasteway flow at any given time.

In either its current condition or in a more open flow condition, the total amount of suspended sediment reaching the San Joaquin River via the Newman Wasteway is about the same. The difference between the two conditions is mainly one of timing.

The current condition traps and stores sediment during low (normal) flows and releases it during high, flushing flows (elevated recirculation releases) resulting in long periods of relatively low turbidity during normal, low flow conditions and short periods of relatively high turbidity (turbid pulses) during high flow events.

A more open, unrestricted flow condition would transport suspended sediment at a more or less continuous rate yielding a fairly constant level of turbidity with less noticeable highs and lows. The creation and long-term maintenance of an open, unrestricted channel will most likely require regularly scheduled dredging and channel clearing and the removal of beaver dams and erosion-resistant deposits of sediment. Sustained, higher flows may help to maintain an open channel condition, but higher flows alone are not likely to keep the channel open and to prevent the rebuilding of beaver dams or the deposition of sediment below each drop without regular maintenance such as described above.

TABLE 1. MILEPOST AT STRUCTURE SITES AND KEY TO PHOTOGRAPHS -- NEWMAN WASTEWAY

STRUCTURE	MILEPOST	PHOTOS		
		PRE-TEST FLOW	TEST FLOW	POST-TEST FLOW
Concrete Lined Section	**0.0 to 1.48**			
Wasteway Headworks	0.0	1	1	1
Eastin Road Bridge	1.14	2, 3	2, 3	2, 3
Drop Structure / Main Canal	1.44	4, 5, 6	4, 5, 6, 7	4, 5, 6
Beaver Dam Area	1.55 to 1.66	7, 8	8	7, 8, 9, 10,11, 12
Unlined (Earth) Section	**1.48 to 8.21**			
Draper Road Bridge	2.17	9, 10, 11	9, 10, 11, 12, 13, 14	13, 14, 15, 16
Drop Structure	2.48	12, 13, 14, 15, 16	15, 16	17, 18, 19, 20, 21
Upper Road Bridge	3.17	17, 18	17, 18	22, 23
Drop Structure / Hwy 33	4.21	19, 20	--	24, 25, 26, 27
Big Bend	4.65	21, 22	--	28, 29, 30, 31
Drop Structure / Braza Road	5.49	23, 24, 25, 26	19, 20, 21	32, 33
Drop Structure	6.86	27, 28, 29	22, 23	34, 35
Terminal Reach	7.11 to 8.21	30, 31	24	36, 37, 38
Confluence San Joaquin River	8.21	32, 33	25, 26, 27	39, 40

Figure 1.
Location Map
Newman Wasteway

APPENDIX A. REFERENCES

MILEPOST AT STRUCTURE SITES

DELTA-MENDOTA CANAL

SEPTEMBER 1992

STATION	MILEPOST	STRUCTURE	SIZE	TYPE
2147+00	54.38	Centerline - Delta-Mendota Canal		Sta. 0.00 NWW = Sta. 2147+00 DMC
0+24	0.00	Begin Transition Newman Wasteway Turnout		Concrete Structure
0+67	0.01	Wasteway Turnout (2)	20'0"x18'6" Q=4300	Radial Gates
1+10	0.02	PT&T Conduit (Remote Control)	2-3/8"	Steel Pipe
1+43	0.03	Shoulder Drain Inlet (Lt)	8"	CMP
1+79.50	0.04	End Transition Newman Wasteway Turnout		Concrete Structure
1+79.50	0.04	Begin Lined Section No. 1	Q=4300	Contract Lined
	0.06	Power Line	36'	12 KV
		Power Line		12 KV
27+50	0.50	Irrigation Crossing	6"	Steel Pipe
54+00	1.02	Drain Inlet (Lt)	24"	Concrete Pipe
60+14.65 Bk. = 60+00.00 Ah. (Equation)				
60+18	1.14	Bridge, County (Eastin Road)	24'	Concrete

STATION		MILEPOST	STRUCTURE	SIZE	TYPE
		1.15	Power Line Crossing		
74+90	3	1.42	Drain Inlet (Lt) (Orestimba Soil Cons. District)	30"	Concrete Pipe w/Flap Gate
75+15	4	1.43	Drain Inlet (Rt)	24"	Concrete Pipe
75+50		1.44	Drop Structure Inlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
75+90		1.44	Canal Crossing (San Joaquin, Kings River Canal)		Concrete
76+00	X	1.44	Bridge, Operating (San Joaquin, Kings River Canal)	16'	Timber (NO LONGER EXIS
76+87		1.46	Drop Structure Outlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
78+02		1.48	Begin Earth Section No. 2	Q=4300	Earth
93+78.89 Bk. = 93+00.00 Ah. (Equation)					
97+06	5	1.86	Drain Inlet (Rt)	18"	Concrete Pipe w/Concrete Chute
113+07	6	2.16	Drain Inlet (Lt)	18"	Concrete Pipe Concrete Chute
113+07	7	2.16	Drain Inlet (Rt)		
113+17		2.16	Powerline (PG&E)	46'	12 KV+60 KV
113+38	2	2.17	Bridge, County (Draper Rd.)	24'	Concrete
			Conduit Crossing on d/s Side of Bridge	1-1/2'	Steel Pipe

STATION		MILEPOST	STRUCTURE	SIZE	TYPE
130+85		2.48	Drop Structure Inlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
132+01		2.52	Drop Structure Outlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
148+50	8	2.83	Drain Inlet (Rt)	18"	Concrete Pipe w/Concrete Chute
152+80	9	2.91	Drain Inlet (Lt) w/Flap Gate and Concrete Chute	18"	Concrete Pipe
166+38	(3)	3.17	Bridge, County (Whitworth Road/ UPPER ROAD)	24'	Concrete
			Pipe Under Roadway	18"	Concrete Pipe
			Telephone Conduit on d/s Side of Bridge	3"	Steel Pipe
179+54	10	3.42	Drain Inlet (Rt)	18"	Concrete Pipe w/Flap Gate and Concrete Chute
190+00	11	3.62	Drain Inlet (Rt)	18"	Concrete Pipe w/Flap Gate and Concrete Chute
220+90		4.21	Drop Structure Inlet Headwall CVP Signs u/s (Lt) (Rt)	(2) 11'6"x22'0" Bbls.	Concrete
221+10	12	4.21	Drain Inlet (Lt) End Newman Service Lateral (Lat. Sta. 150+24)	24"	Concrete Pipe
221+16		4.21	Power and Telephone	6 wire	
			Line (PG&E)	2 wire	

STATION		MILEPOST	STRUCTURE	SIZE	TYPE
221+46		4.21	Highway Crossing (Highway No. 33)		Asphalt
221+87		4.22	Oil Line Crossing (Getty Oil Co.) Buried Over Barrel	8"	Steel Pipe
221+89		4.22	Telegraph Line	15 wire	
221+93		4.22	Oil Line Crossing (Getty Oil Co.) Buried Over Barrel	8"	Steel Pipe
222+29		4.23	R.R. Crossing (S.P.R.R.)	Single Track	
222+72		4.24	Signal Line	9 wire	
222+73.83		4.24	Drop Structure Outlet Headwall	(2) 11'x22'0" Bbls.	Concrete
223+38	13	4.25	Drain Inlet (Rt)	18"	CMP
232+28	14	4.42	Drain Inlet (Lt)	18"	CMP
232.32	15	4.42	Drain Inlet (Rt)	18"	Concrete Pipe w/Concrete Chute
232+32		4.42	Telephone Line	29'0"	
232+52	(9)	4.42	Bridge, County (Canal School Road)	24'	Concrete
			Gasline Crossing (PG&E) on d/s Side of Bridge	4"	Steel Pipe
239+74		4.56	Powerline (PG&E)	40' 3 wire	12 KV

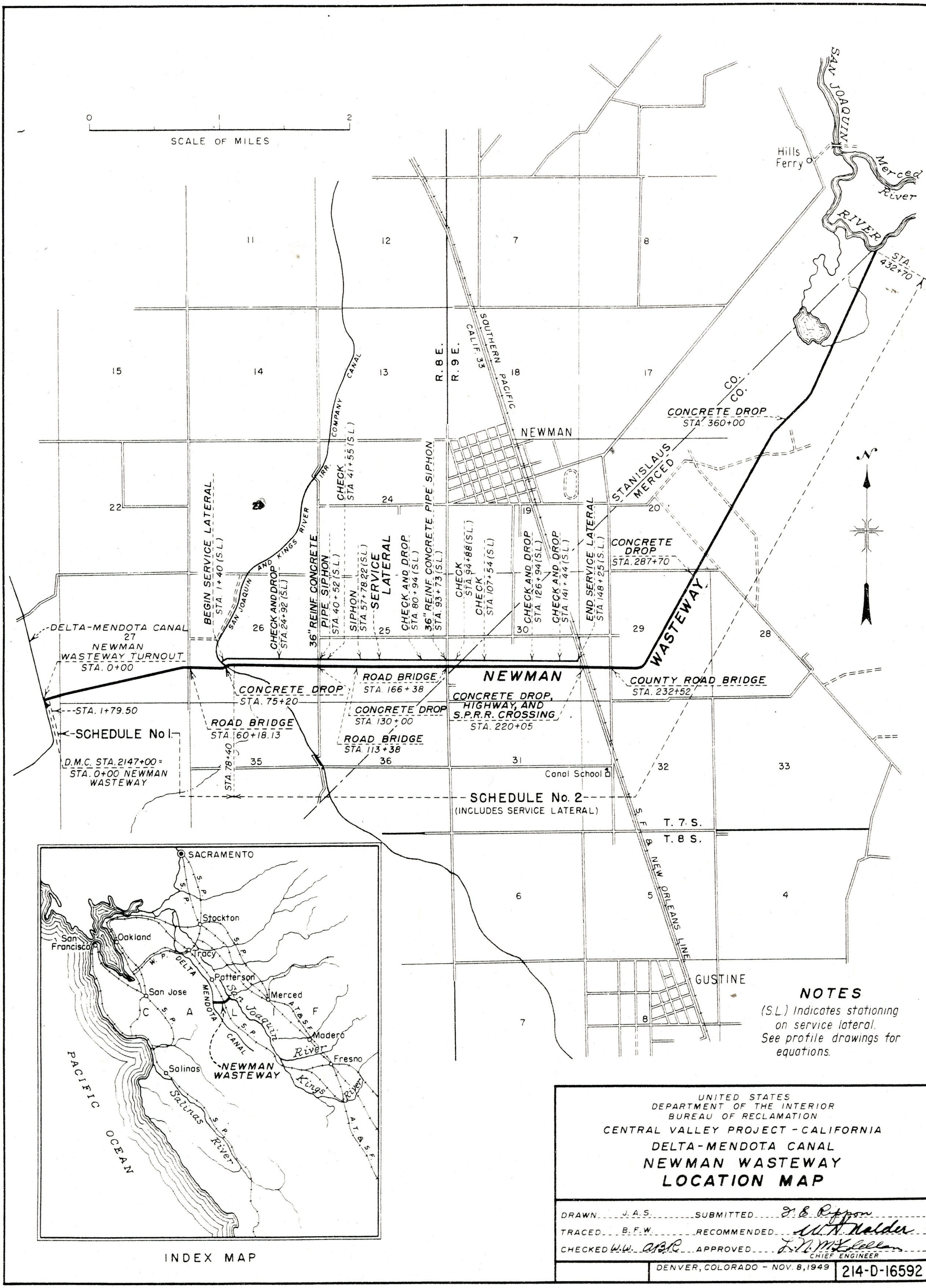
STATION		MILEPOST	STRUCTURE	SIZE	TYPE
259+15	1	4.93	Bridge, Farm	20'	Timber
265+00	16	5.04	Drain Inlet (Lt)	(2) 18"	Concrete Pipe w/Concrete Chute
267+00	17	5.08	Drain Inlet (Rt)	18"	Concrete Pipe w/Concrete Chute
267+88		5.09	Irrigation Pipe Crossing on Timber Pile Bents (T. & R. Cotta)	24"	Steel Pipe
279+25	18	5.31	Drain Inlet (Lt)	18"	Concrete Pipe w/Flap Gate and Concrete Chute
288+55		5.49	Drop Structure Inlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
288+71	19	5.49	Drain Inlet (Lt)	18"	Concrete Pipe
289+21		5.50	Road Crossing (Brazo Road)		
289+71		5.51	Drop Structure Outlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
297+50	20	5.65	Drain Inlet (Rt)	18"	Concrete Pipe w/Concrete Chute
	21	5.95	Drain Inlet	14"	CMP
316+40		6.01	Pipe Crossing on Concrete Piers	36"	Steel Pipe
317+40	22	6.03	Drain Inlet (Lt) (Simon Newman Co.)	12"	Steel Pipe
317+40	X	6.03	Bridge, Farm, Rehabilitated on u/s Side of Bridge Maintained by USBR	16'	Timber & Concrete Piles

(NO LONGER EXISTS)

STATION		MILEPOST	STRUCTURE	SIZE	TYPE
340+50	23	6.47	Drain Inlet (Lt)	12"	Steel Pipe
360+85		6.86	Drop Structure Inlet Headwall	(2) 11'6"x22'0" Bbls.	Concrete
362+01		6.88	Drop Structure Outlet Headwall - Life Ring Shelter	(2) 11'6"x22'0" Bbls.	Concrete
		6.96	Powerline	37'	12 KV
367+25	24	6.97	Drain Inlet (Rt)	24"	Concrete Pipe w/Flap Gate and Concrete Chute
386+00	25	7.33	Drain Inlet (Rt)	24"	Concrete Pipe w/Flap Gate Outlet w/Screw-Lift Metal Inlet Gate
428+75	26	8.14	Drain Inlet (Rt)	24"	Concrete Pipe w/Flap Gate Outlet w/Screw-Lift Metal Inlet Gate
432+70		8.21	End Schedule		

SPECIFICATIONS DATA

DC-2951-1



NOTES

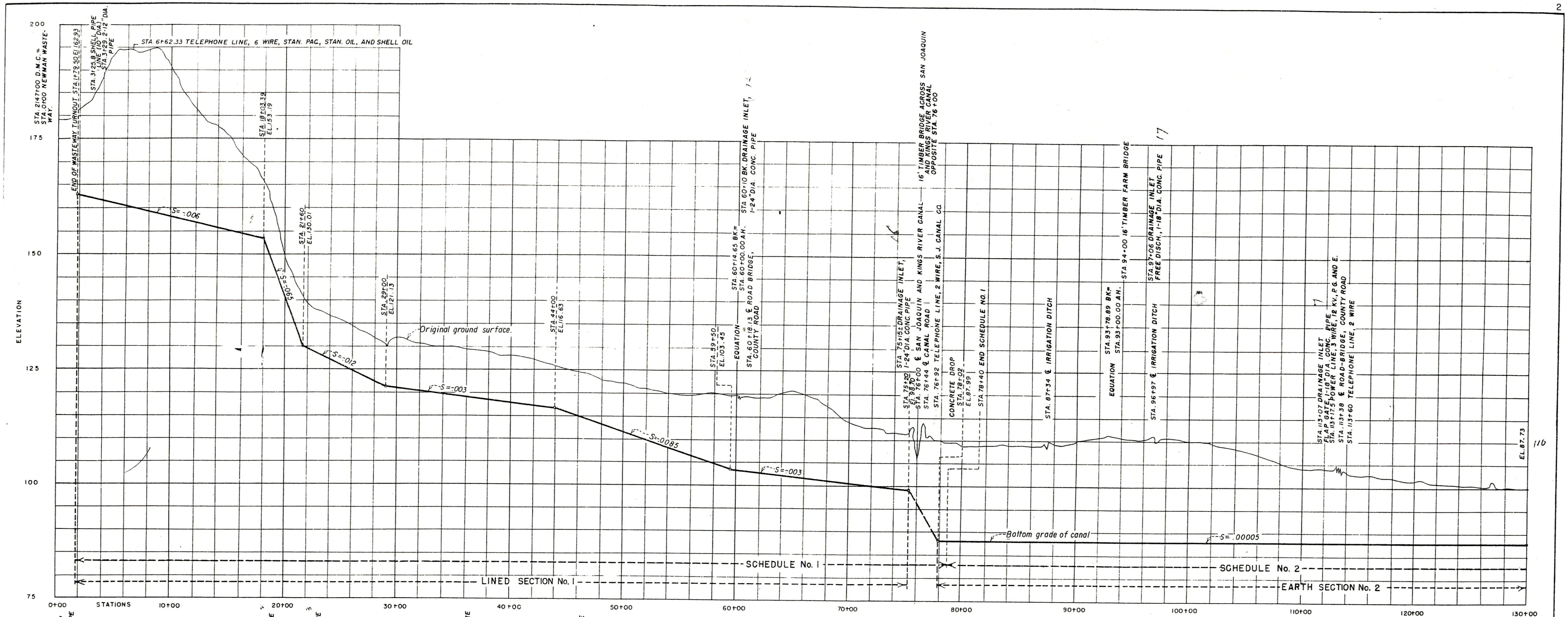
(S.L.) Indicates stationing on service lateral.
See profile drawings for equations.

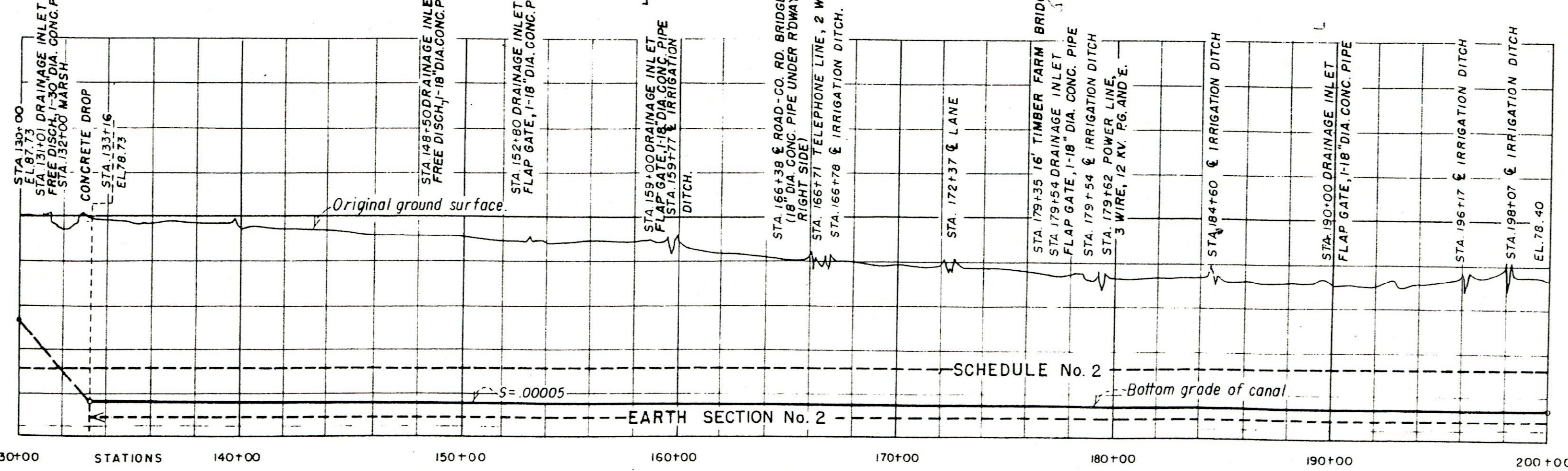
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT - CALIFORNIA
DELTA-MENDOTA CANAL

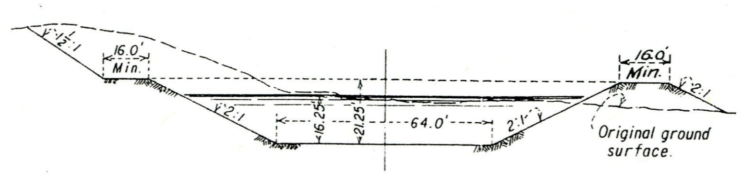
NEWMAN WASTEWAY
LOCATION MAP

DRAWN	J. A. S.	SUBMITTED	D. E. Rippon
TRACED	B. F. W.	RECOMMENDED	W. H. Nalder
CHECKED	W. W. ABR	APPROVED	L. N. McClellan, CHIEF ENGINEER

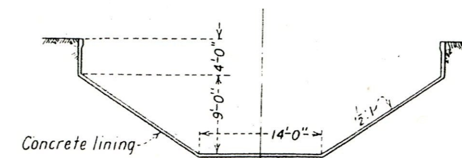
DENVER, COLORADO - NOV. 8, 1949 | 214-D-16592







EARTH SECTION No. 2



LINED SECTION No. I
(For details, see Dwg. 214-D-15041)

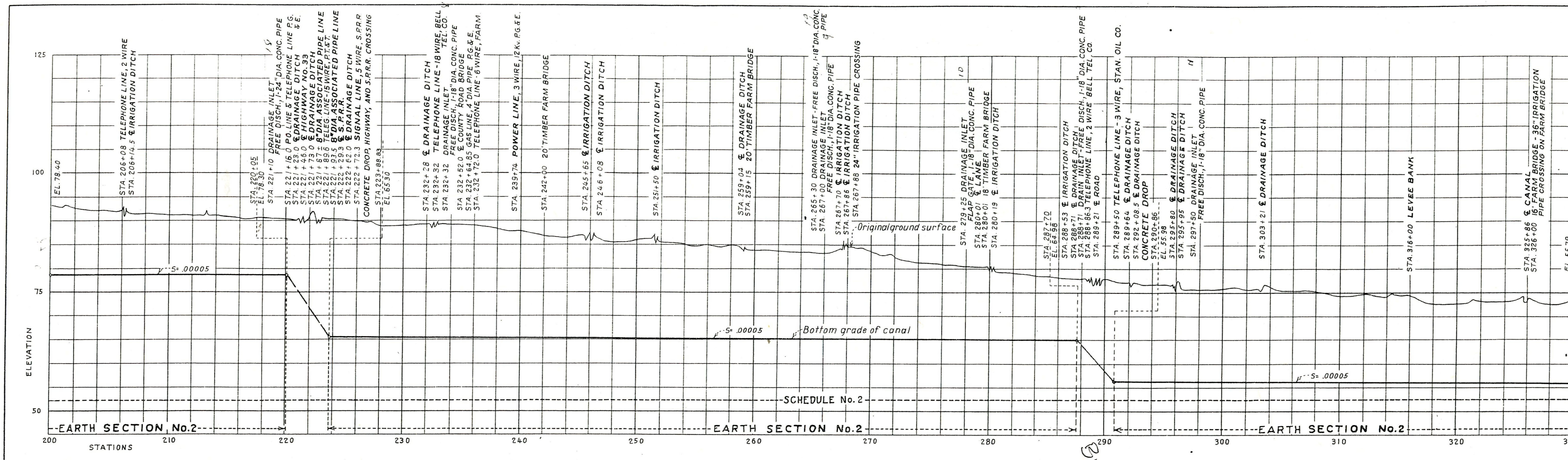
HYDRAULIC PROPERTIES

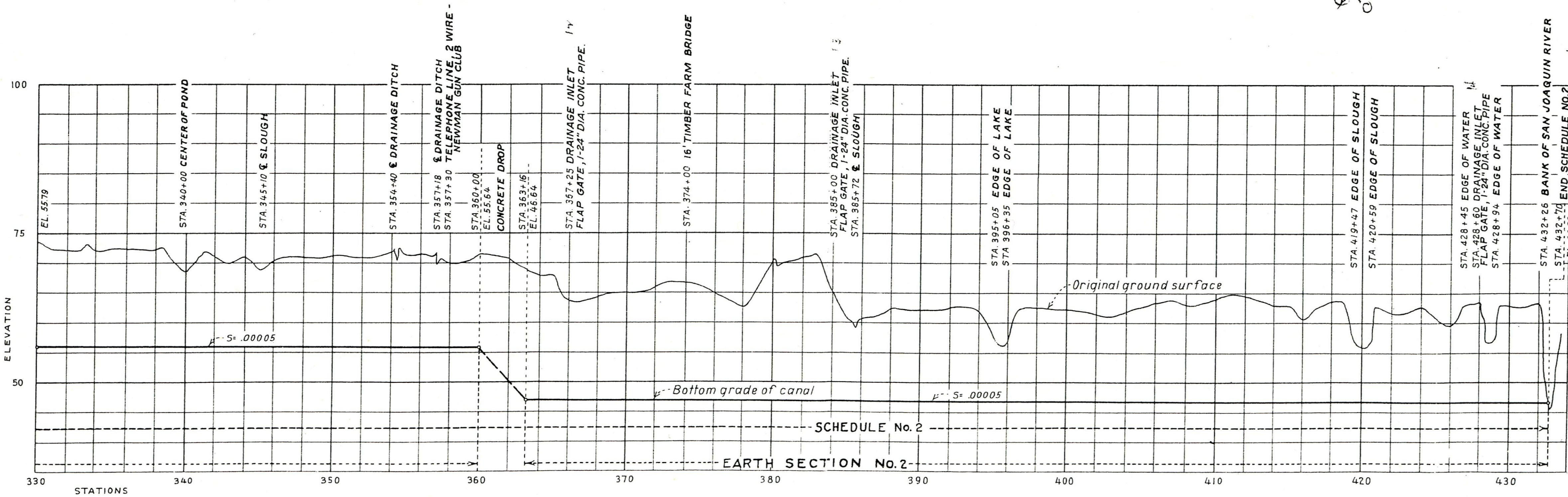
SECTION	A	V	Q	r	n	s
Earth No. 2	1568.1	2.74	4300	11.47	.021	.00005
Lined No. 1			4300			

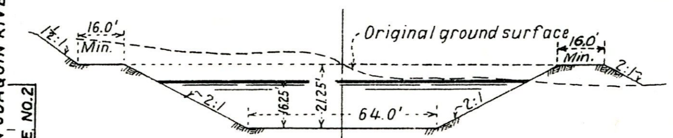
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT—CALIFORNIA
DELTA—MENDOTA CANAL
NEWMAN WASTEWAY—STA. 1+79.50 TO STA. 200+00

PROFILE AND SECTIONS

DRAWN W.W. SUBMITTED A.B. Reeve
TRACED F.B.C. RECOMMENDED [illegible]
CHECKED ABR APPROVED W. H. Nalder, Asst. CHIEF ENGINEER
DENVER, COLORADO MAY 24, 1948 SHEET 1 OF 2 214-D-15379







EARTH SECTION No.2

HYDRAULIC PROPERTIES

SECTION	A	V	Q	r	n	s
Earth No. 2	1568.1	2.74	4300	11.47	.021	.00005

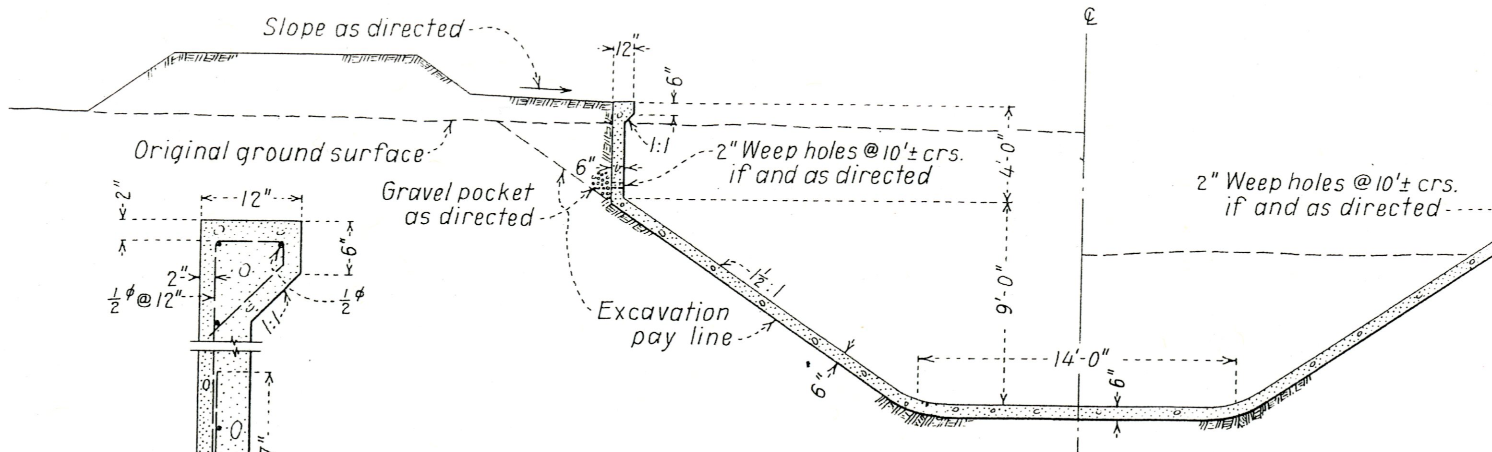
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CENTRAL VALLEY PROJECT—CALIFORNIA
DELTA—MENDOTA CANAL
NEWMAN WASTEWAY—STA. 200+00 TO STA. 432+70

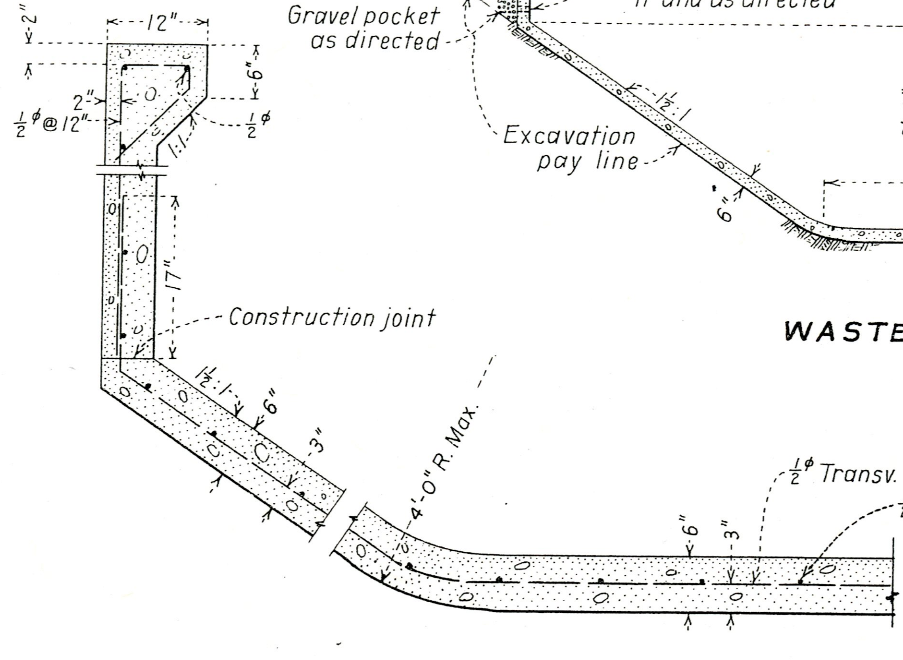
PROFILE AND SECTION

DRAWN W.W. SUBMITTED A.B. Reeve
TRACED H.W.F. RECOMMENDED H.E. Rippon
CHECKED Jum. ABR. APPROVED W.H. Nalder, Act. CHIEF ENGINEER

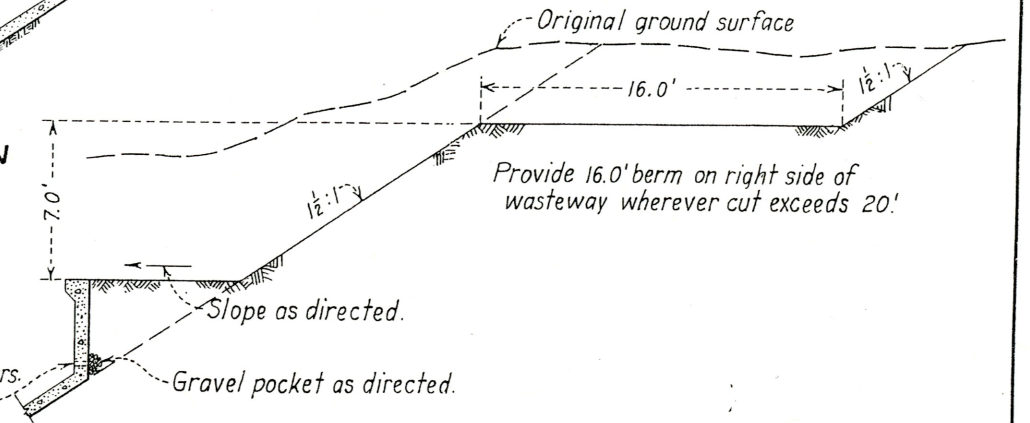
DENVER, COLORADO, MAY 24, 1948 SHEET 2 OF 2 | 214-D-15380



WASTEWAY SECTION



LINING DETAIL

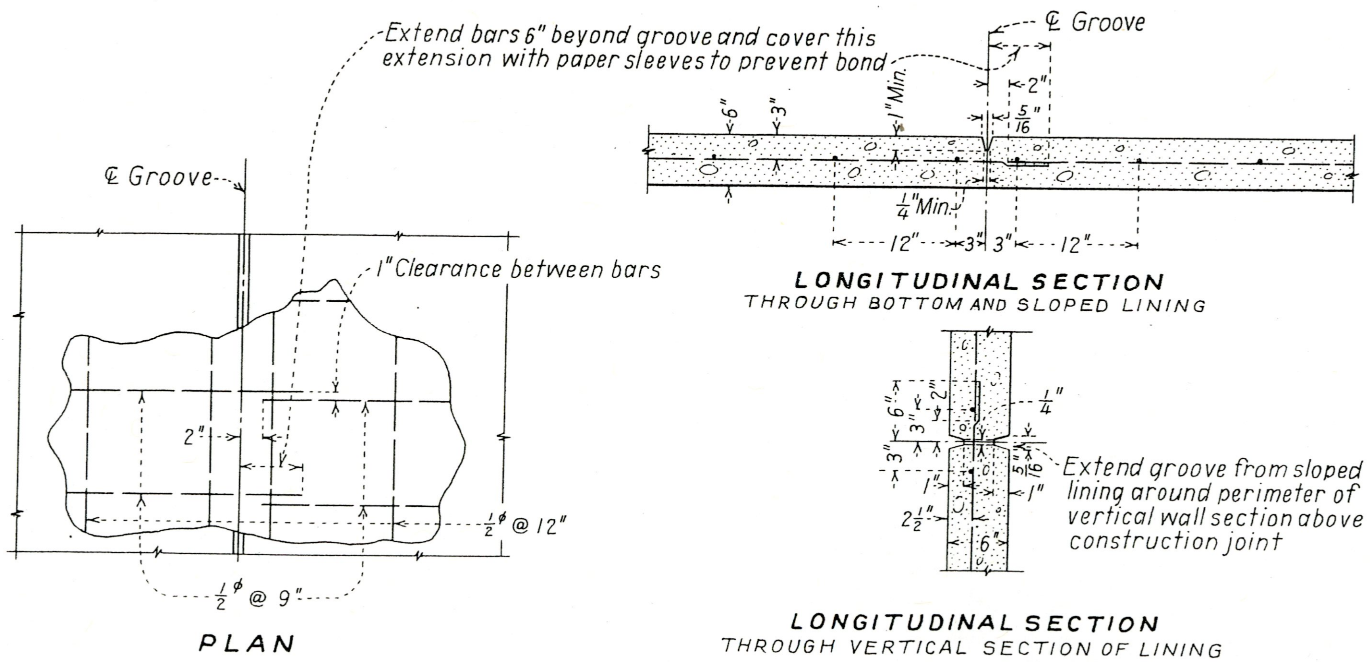


WASTEWAY SECTION IN THOROUGH CUT

NOTES

Single strands of 10 gage wire at 12" centers (or equivalent) to be used as ties across groove to prevent movement of reinforcement while lining is being placed.

Provide transverse grooves at 15'-6" maximum centers.



GROOVE DETAIL

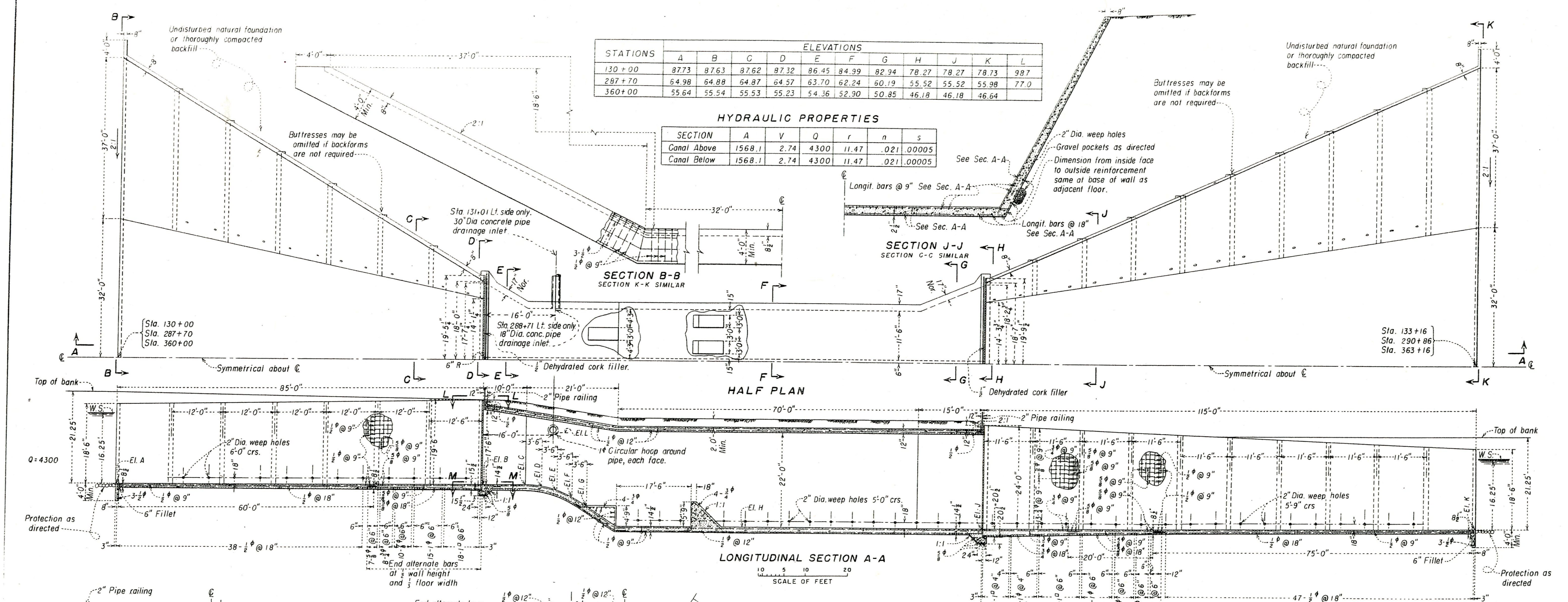
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT – CALIFORNIA

DELTA-MENDOTA CANAL – NEWMAN WASTEWAY

LINED SECTION

DRAWN B.H.	SUBMITTED A.B. Reeves
TRACED H.W.F.	RECOMMENDED D.E. Rippon
CHECKED Jum ABR	APPROVED W.H. Nalder, act. CHIEF ENGINEER

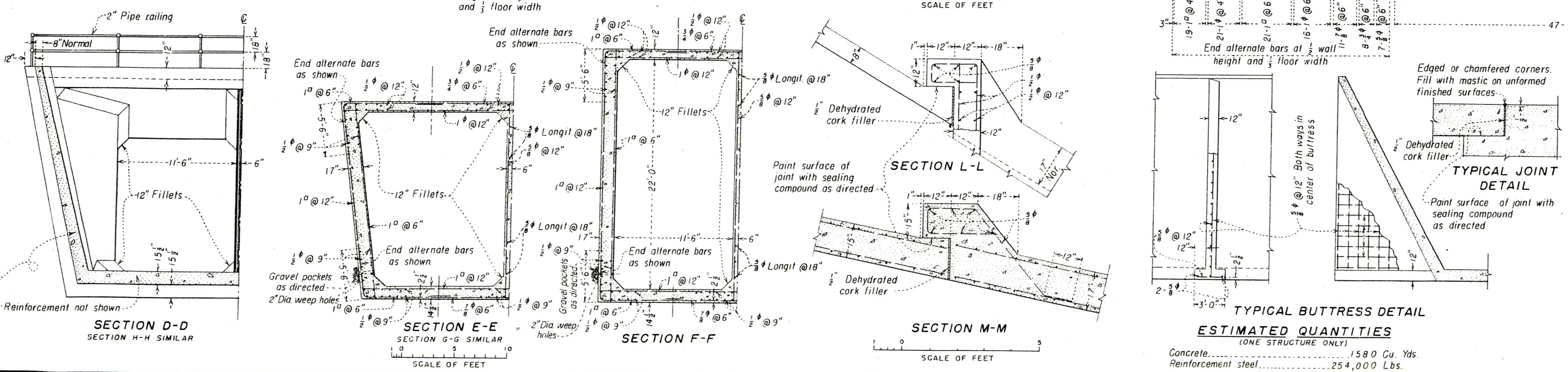
DENVER, COLORADO, FEB. 11, 1948 — 214-D-15041



STATIONS	ELEVATIONS										
	A	B	C	D	E	F	G	H	J	K	L
130+00	87.73	87.63	87.62	87.32	86.45	84.99	82.94	78.27	78.27	78.73	98.7
287+70	64.98	64.88	64.87	64.57	63.70	62.24	60.19	55.52	55.52	55.98	77.0
360+00	55.64	55.54	55.53	55.23	54.36	52.90	50.85	46.18	46.18	46.64	

HYDRAULIC PROPERTIES

SECTION	A	V	Q	r	n	s
Canal Above	1568.1	2.74	4300	11.47	.021	.00005
Canal Below	1568.1	2.74	4300	11.47	.021	.00005



ESTIMATED QUANTITIES
(ONE STRUCTURE ONLY)

Concrete .... 1580 Cu. Yds.
Reinforcement steel .... 254,000 Lbs.

NOTES

Place all reinforcement so that the centers of bars in the outer layers will be 2" from face of concrete, unless otherwise shown.
Lap all bars 34 diameters at splices.
Concrete design based on a compressive strength of 3000 pounds per square inch.
Provide 24" thickness of selected gravel as directed under stilling pool of drop structure at Sta. 130+00.
Provide 18" thickness of selected gravel as directed under sloping portion and stilling pool of drop structure at Sta. 287+70.
Sta. 131+01 and Sta. 289+71 Drainage inlets - Extend pipe to inlet as directed. Inlet similar to that shown on Dwg. 214-D-16644 if directed.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT - CALIFORNIA
DELTA-MENDOTA CANAL
NEWMAN WASTEWAY STA. 130+00, STA. 287+70 AND STA. 360+00

CONCRETE DROPS
PLAN AND SECTIONS

DRAWN D.C. SUBMITTED A.B. Reeves
TRACED H.R.E. RECOMMENDED F. E. Rippon
CHECKED W.W. ABR APPROVED W. H. Nalder act. CHIEF ENGINEER

DENVER, COLORADO, OCT. 1, 1948 214-D-15616

FLAP GATE DRAINAGE INLETS
EARTH SECTION

STATION	SIZE	INVERT EL.	H	TYPE	DISCHARGING FROM
113+07	1-18"	102.07	2.00	II	Right
152+80	1-18"	92.88	2.00	I	Left
159+00	1-18"	91.85	3.00	I	Left
179+54	1-18"	92.75	2.00	II	Right
190+00	1-18"	91.70	3.00	II	Right
279+25	1-18"	78.27	3.00	II	Left
367+25	1-24"	61.87	1.00	II	Right
385+00	1-24"	58.78	4.00	II	Right
428+60	1-24"	58.56	4.00	II	Right

FREE FLOW DRAINAGE INLETS
EARTH SECTION

STATION	SIZE	INVERT EL.	DISCHARGING FROM
97+06	1-18"	104.65	Right
148+50	1-18"	95.40	Right
232+32	1-18"	82.01	Right
265+30	1-18"	81.84	Left
267+00	1-18"	81.83	Right
297+50	1-18"	72.70	Right

DRAINAGE INLETS
DROP STRUCTURES

STATION	SIZE	DISCHARGING FROM
131+01	1-30"	Left
221+10	1-24"	Left
288+71	1-18"	Left

DRAINAGE INLETS
LINED SECTION

STATION	SIZE	EL. TOP OF LINING	INVERT LOCATION	DISCHARGING FROM
60+10 BK	1-24"	126.27	Pipe on top of lining	Left
75+15 ±	1-24"	111.66	Invert below top of lining	Right

NOTES

"H" is distance from wasteway water surface down to invert of flap gate drainage inlet.

REFERENCE DRAWINGS

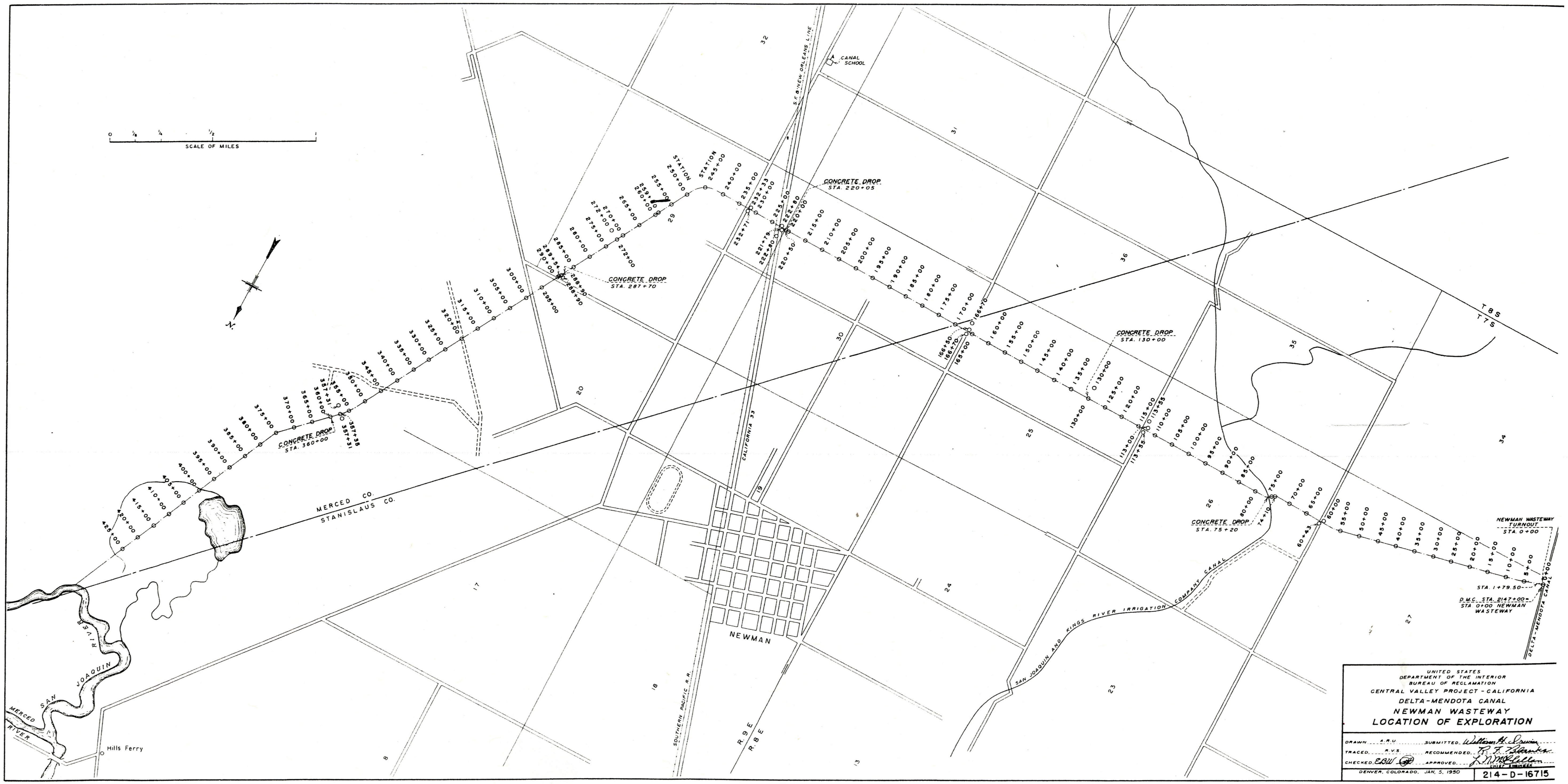
CONCRETE PIPE DRAINAGE INLETS - LINED SECTION ______ 214-D-16636
FREE FLOW DRAINAGE INLETS - EARTH SECTION ______ 214-D-16646
FLAP GATE DRAINAGE INLETS - EARTH SECTION ______ 214-D-16644
FREE FLOW DRAINAGE INLETS - DROP STRUCTURES ______ 214-D-15616
214-D-15646

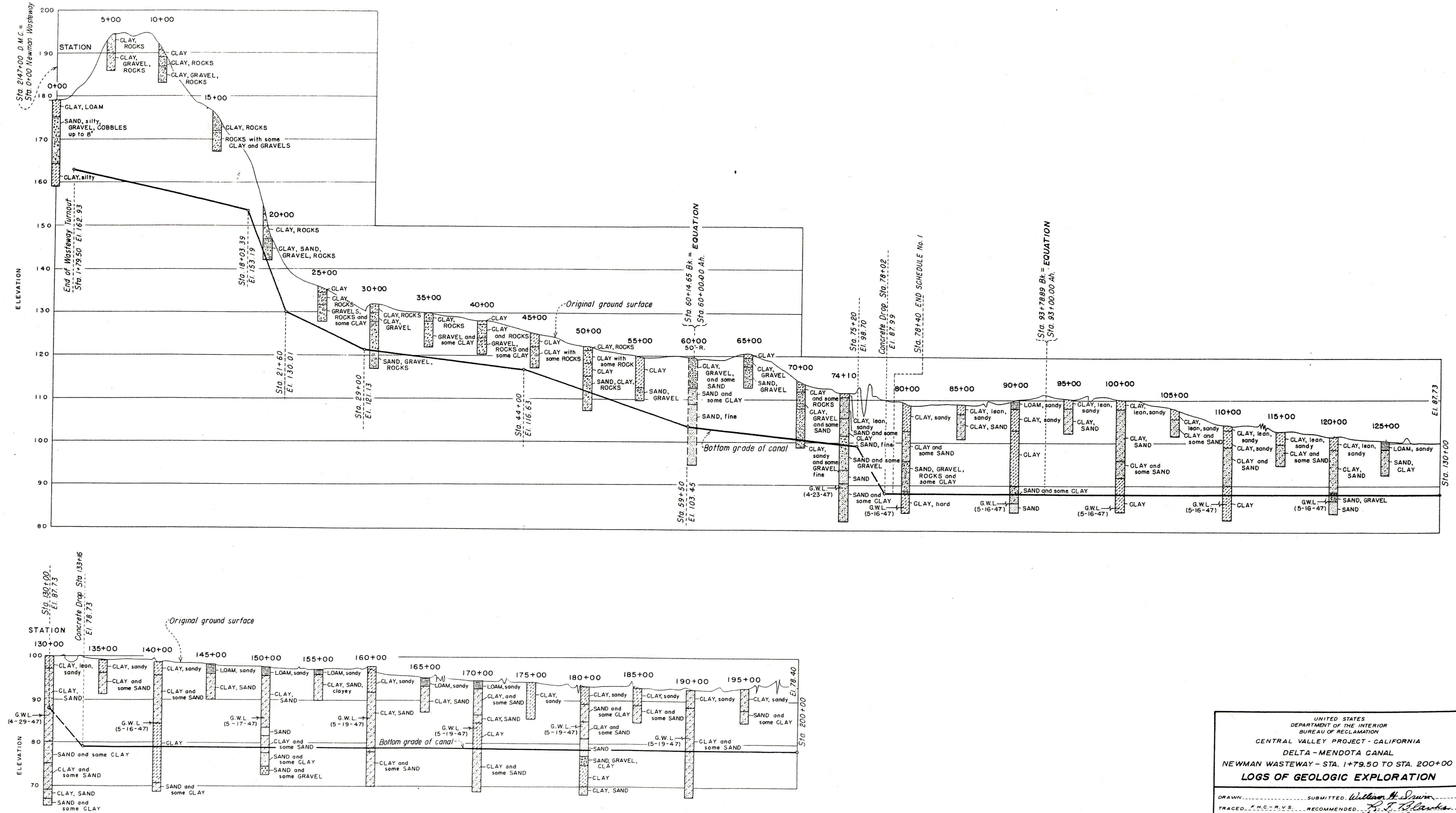
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT - CALIFORNIA
DELTA-MENDOTA CANAL
NEWMAN WASTEWAY
SUMMARY OF DRAINAGE INLETS

REV. 12-8-49 C.C.P.

DRAWN G.E.R. SUBMITTED Allan T. Raymond
TRACED R.F.N. RECOMMENDED O.G.B. W.R. Nalder
CHECKED C.W.G. APPROVED L.V. McClellan
CHIEF ENGINEER

P4033C | ANTIOCH, CALIF. NOV. 25, 1949 | 214-D-16645


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT - CALIFORNIA
DELTA-MENDOTA CANAL
NEWMAN WASTEWAY
LOCATION OF EXPLORATION
DENVER, COLORADO, JAN. 5, 1950
214-D-16715
SCALE OF MILES
CONCRETE DROP STA. 220+05
CONCRETE DROP STA. 287+70
CONCRETE DROP STA. 360+00
CONCRETE DROP STA. 130+00
CONCRETE DROP STA. 75+20
NEWMAN WASTEWAY TURNOUT STA. 0+00
STA. 1+79.50
D.M.C. STA. 2147+00= STA 0+00 NEWMAN WASTEWAY
DELTA-MENDOTA CANAL
CANAL SCHOOL
S.P. & NEW ORLEANS LINE
CALIFORNIA 33
SOUTHERN PACIFIC R.R.
SAN JOAQUIN AND KINGS RIVER IRRIGATION COMPANY CANAL
MERCED CO.
STANISLAUS CO.
SAN JOAQUIN RIVER
MERCED RIVER
Hills Ferry
NEWMAN
R.9 E
R.8 E
T 8 S
T 7 S
N.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

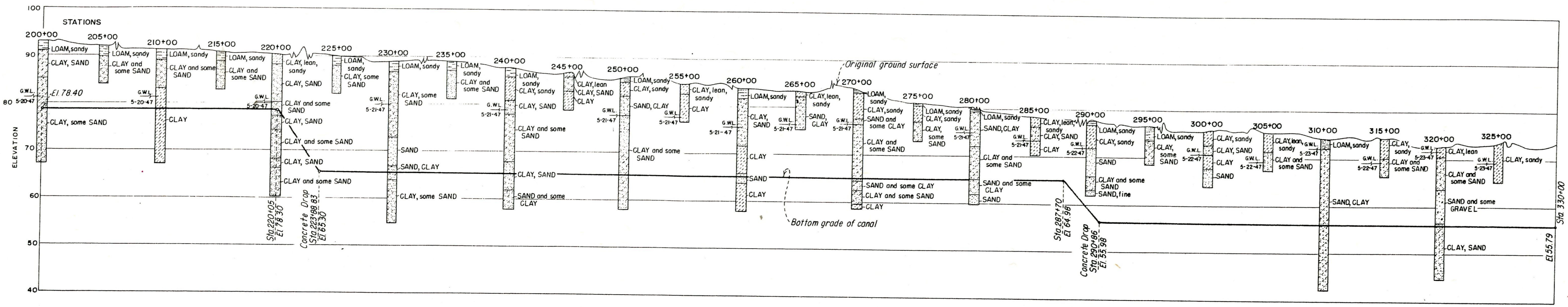
CENTRAL VALLEY PROJECT - CALIFORNIA

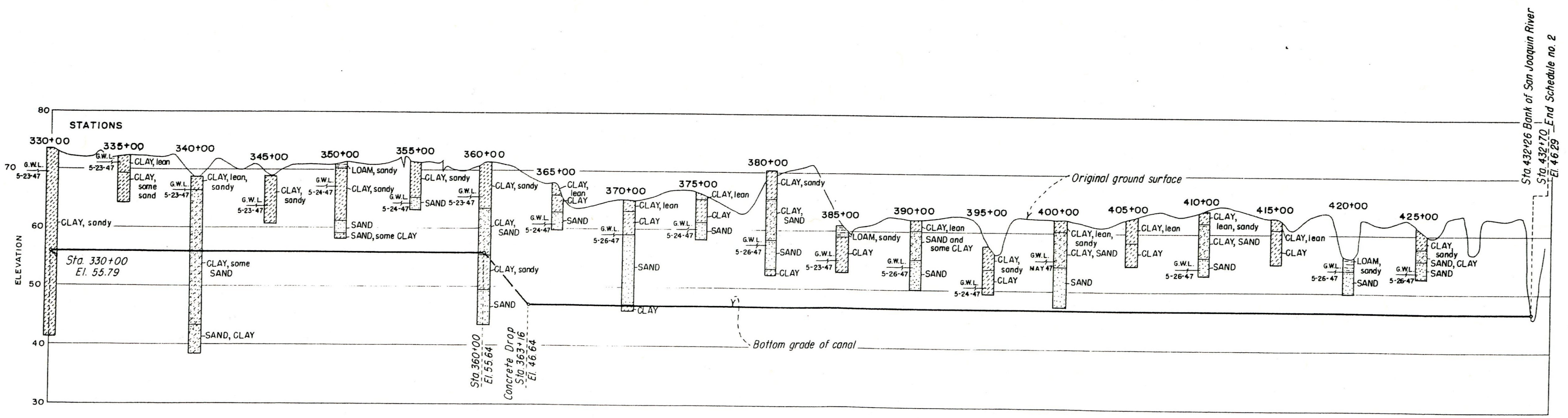
DELTA - MENDOTA CANAL

NEWMAN WASTEWAY - STA. 1+79.50 TO STA. 200+00

LOGS OF GEOLOGIC EXPLORATION

DRAWN........	SUBMITTED William H. Irwin
TRACED F.H.C.-R.V.S.	RECOMMENDED R. F. Blanks
CHECKED E.W.	APPROVED L. N. McClellan, CHIEF ENGINEER
DENVER, COLORADO, JAN 5, 1950 SHEET 1 OF 3	214-D-16716





UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

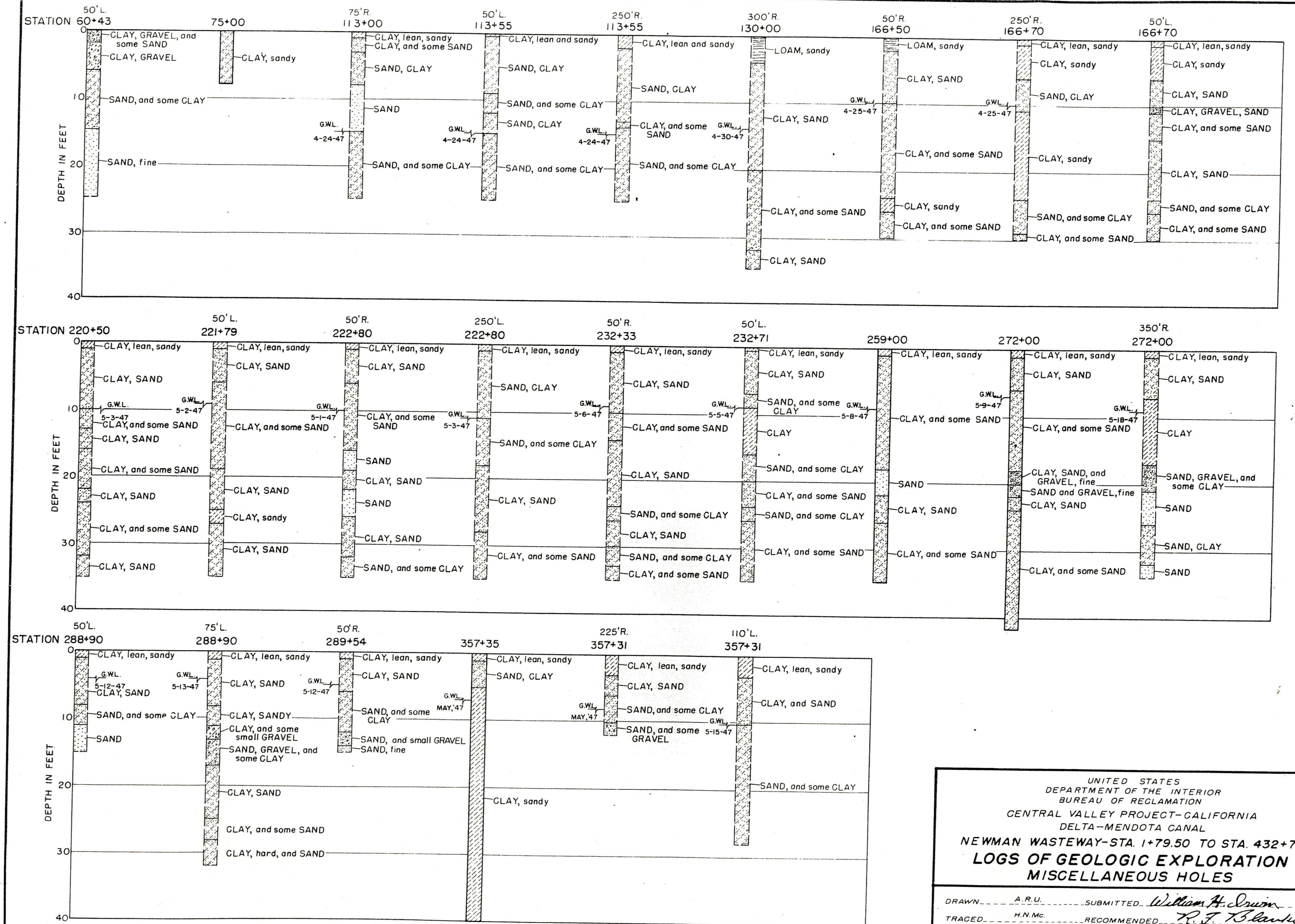
CENTRAL VALLEY PROJECT - CALIFORNIA

DELTA-MENDOTA CANAL

NEWMAN WASTEWAY - STA. 200+00 TO STA. 432+70

LOGS OF GEOLOGIC EXPLORATION

DRAWN........	SUBMITTED William H. Irwin
TRACED W.J.O.	RECOMMENDED R. F. Blanks
CHECKED	APPROVED L. N. McClellan, CHIEF ENGINEER
DENVER, COLORADO, JAN. 5, 1950 SHEET 2 OF 3	214-D-16717



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT–CALIFORNIA
DELTA–MENDOTA CANAL

NEWMAN WASTEWAY–STA. 1+79.50 TO STA. 432+70

LOGS OF GEOLOGIC EXPLORATION
MISCELLANEOUS HOLES

DRAWN A.R.U.	SUBMITTED William H. Irwin
TRACED H.N.Mc.	RECOMMENDED R. F. Blanks
CHECKED E.B.W.	APPROVED L. N. McClellan, CHIEF ENGINEER

DENVER, COLORADO JAN. 5, 1950
SHEET 3 OF 3

214-D-16718

APPENDIX B. PHOTOGRAPHS

I. PRE-TEST FLOW (BASELINE) CONDITIONS

JULY 25, 2008

Photo 1

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION

View looking east (downstream) from the wasteway headworks at the concrete lined section. The reinforced concrete lining, parapet walls and construction joints are all in excellent condition.

J. Sturm

July 25, 2008

Photo 2

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION

View looking west (upstream) from Eastin Road at the concrete lined section.

J. Sturm

July 25, 2008

Photo 3

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION

View looking east (downstream) from Eastin Road at the concrete lined section.

J. Sturm

July 25, 2008

Photo 4

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / MAIN CANAL -- MP 1.44

View looking northeast (downstream) at the drop structure inlet.

J. Sturm

July 25, 2008

Photo 5

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / MAIN CANAL -- MP 1.44

View looking southwest (upstream) at the drop structure outlet. A stable, well-vegetated deposit of fine-grained sediment is present downstream of the left barrel (looking downstream). The reinforced concrete drop structure and outlet transition wing walls are in excellent condition.

J. Sturm

July 25, 2008

Photo 6

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / MAIN CANAL -- MP 1.44

View looking west (upstream) at the drop structure outlet and wasteway. A well-defined, open channel or waterway flanked by dense reeds is present for a distance of about 1,000 feet downstream of the drop structure. A 3- to 4-foot-high, vertical cutbank was locally observed where the channel runs along the toe of the right and left wasteway cutslopes.

J. Sturm

July 25, 2008

Photo 7

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

View looking southeast at a beaver dam located about 1,000 feet downstream of the Main Canal Drop Structure. The dam is constructed of reeds and mud and extends diagonally across the wasteway invert from the left wasteway bank at the lower center of the photo to the white plastic debris at the photo's upper center.

J. Sturm

July 25, 2008

Photo 8

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

View looking southeast at the wasteway up- and downstream of the beaver dam. A well-defined, open channel is present upstream of the dam. The channel is overgrown with reeds and is far less evident downstream of the dam.

J. Sturm

July 25, 2008

Photo 9

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE -- MP 2.17

View looking southeast at Draper Road Bridge. The drain inlet on the right side of the canal (below the white pickup) is discharging relatively clear field drainage into the wasteway.

J. Sturm

July 25, 2008

Photo 10

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE -- MP 2.17

View looking west (upstream) from Draper Road Bridge. The entire wasteway invert is heavily vegetated with dense reeds for a distance of over 1,000 feet upstream of the bridge.

J. Sturm

July 25, 2008

Photo 11

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE -- MP 2.17

View looking east (downstream) from Draper Road Bridge. . The entire wasteway invert is heavily vegetated with dense reeds for a distance of over 1,000 feet downstream of the bridge.

J. Sturm

July 25, 2008

Photo 12

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 2.48

View looking northeast at the drop structure inlet. The reinforced concrete drop structure is in excellent condition.

J. Sturm

July 25, 2008

Photo 13

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 2.48

Closeup view of an erosional void (enlarged rodent hole?) in erosive/dispersive sandy clay backfill behind the right inlet wing wall. The void pictured was observed in 1999 and has remained unchanged for nearly 10 years.

J. Sturm

July 25, 2008

Photo 14

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 2.48

View looking southeast (downstream) from left side of the wasteway, immediately downstream of the drop structure.

J. Sturm

July 25, 2008

Photo 15

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 2.48

View looking northwest at the drop structure outlet.
J. Sturm

July 25, 2008

Photo 16

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 2.48

View looking east (downstream) from the drop structure. A densely-vegetated deposit of fine-grained sediment is present downstream of the left barrel. A well-defined, sinuous channel flanked by dense reeds extends from the drop structure downstream to Upper Road Bridge, a distance of 0.7 miles. The channel is filled with a dense growth of water plants (see also Photos 17, 18 and 19).

J. Sturm

July 25, 2008

Photo 17

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

UPPER ROAD BRIDGE – MP 3.17

View looking west (upstream) from the bridge. A well-defined, sinuous channel flanked by dense reeds extends from the bridge upstream to the MP 2.48 drop structure. The channel is filled with a dense growth of water plants.

J. Sturm

July 25, 2008

Photo 18

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

UPPER ROAD BRIDGE – MP 3.17

View looking east (downstream) from the bridge. A well-defined, sinuous channel flanked by dense reeds extends from the bridge downstream to the MP 4.21 drop structure (Hwy 33). The channel is filled with a dense growth of water plants (see also Photos 17 and 18).

J. Sturm

July 25, 2008

Photo 19

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / HWY 33 -- MP 4.21

View looking west (upstream) from the drop structure. A well-defined, sinuous channel flanked by dense reeds extends from the drop structure upstream to the Upper Road Bridge at MP 3.17, a distance of over 1 mile. The channel is mostly filled with a dense growth of water plants. A flow velocity of about 7 fps and a Q of about 6 cfs were estimated for the short section of open channel located on the inlet apron (shown in the photo).

J. Sturm

July 25, 2008

Photo 20

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / HWY 33 -- MP 4.21

View looking east (downstream) from the drop structure. The Canal School Road Bridge is visible in the distance. A densely-vegetated deposit of fine-grained sediment is present downstream of the left barrel.

J. Sturm

July 25, 2008

Photo 21

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

“BIG BEND” -- MP 4.65

View looking east (downstream) at the “Big Bend”. A number of broad, shallow erosional swales, characteristic of erosion of erosive/dispersive soils by surface runoff and a few slumps near the water’s edge, probably caused by collapsed animal burrows, are present on the right, outside wasteway cutslope.

J. Sturm

July 25, 2008

Photo 22

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

"BIG BEND" -- MP 4.65

View looking west at the "Big Bend". Several erosional swales are visible on the lower half of the outside cutslope.

J. Sturm

July 25, 2008

Photo 23

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View looking northeast at the drop structure inlet. The reinforced concrete drop structure is in excellent condition. The “Braza Road” Dairy is visible in the background.

J. Sturm

July 25, 2008

Photo 24

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View looking southwest (upstream) from the drop structure.

J. Sturm

July 25, 2008

Photo 25

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View looking northeast (downstream) from the drop structure. A deposit of fine-grained sediment that has been stabilized by dense vegetation is present downsteam of the right barrel (see also Photo 26).

J. Sturm

July 25, 2008

Photo 26

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View looking southwest at the drop structure outlet.
J. Sturm

July 25, 2008

Photo 27

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 6.86

View looking northeast at the drop structure inlet.

J. Sturm

July 25, 2008

Photo 28

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 6.86

View looking southwest (upstream) from the drop structure.

J. Sturm

July 25, 2008

Photo 29

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation

Project

DROP STRUCTURE -- MP 6.86

View looking northeast (downstream) from the drop structure. A large deposit of well-vegetated fine-grained sediment extends over 500 feet downstream of the right barrel. Immediately downstream of the outlet wing walls, the right embankment /cutslope and, to a lesser extent, the left embankment/cutslope have experienced some degree of erosion. Riprap scour protection is present at the downstream ends of both wing walls.

J. Sturm

July 25, 2008

Photo 30

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View looking southwest (upstream) at the terminal reach at about MP 8.07.

J. Sturm

July 25, 2008

Photo 31

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View looking northeast (downstream) at the terminal reach from about MP 8.07.

J. Sturm

July 25, 2008

Photo 32

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

CONFLUENCE SAN JOAQUIN RIVER -- MP 8.21

View looking northeast at the confluence. The Newman Wasteway - Pre-Test Flow (Baseline) Conditions flow is from left to right (west to east). The San Joaquin River flow is from right to left (south to north).

J. Sturm

July 25, 2008

Photo 33

Newman Wasteway - Pre-Test Flow (Baseline) Conditions
Delta Mendota Canal Recirculation Project

CONFLUENCE SAN JOAQUIN RIVER -- MP 8.21

View looking northwest at the turbidity boundary that marks the entry of the more turbid Newman Wasteway - Pre-Test Flow (Baseline) Conditions (photo left) into the San Joaquin River (photo right). Wasteway flow is from left to right (west to east). The San Joaquin River flow is from bottom to top (south to north).

J. Sturm

July 25, 2008

II. TEST FLOW CONDITIONS

SEPTEMBER 4, 2008

Photo 1

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION -- MP 0.00 (HEADWORKS) TO 1.14 (EASTIN ROAD)

View east (downstream) at a test flow of approximately 250 cfs,
R. Patras

September 4, 2008

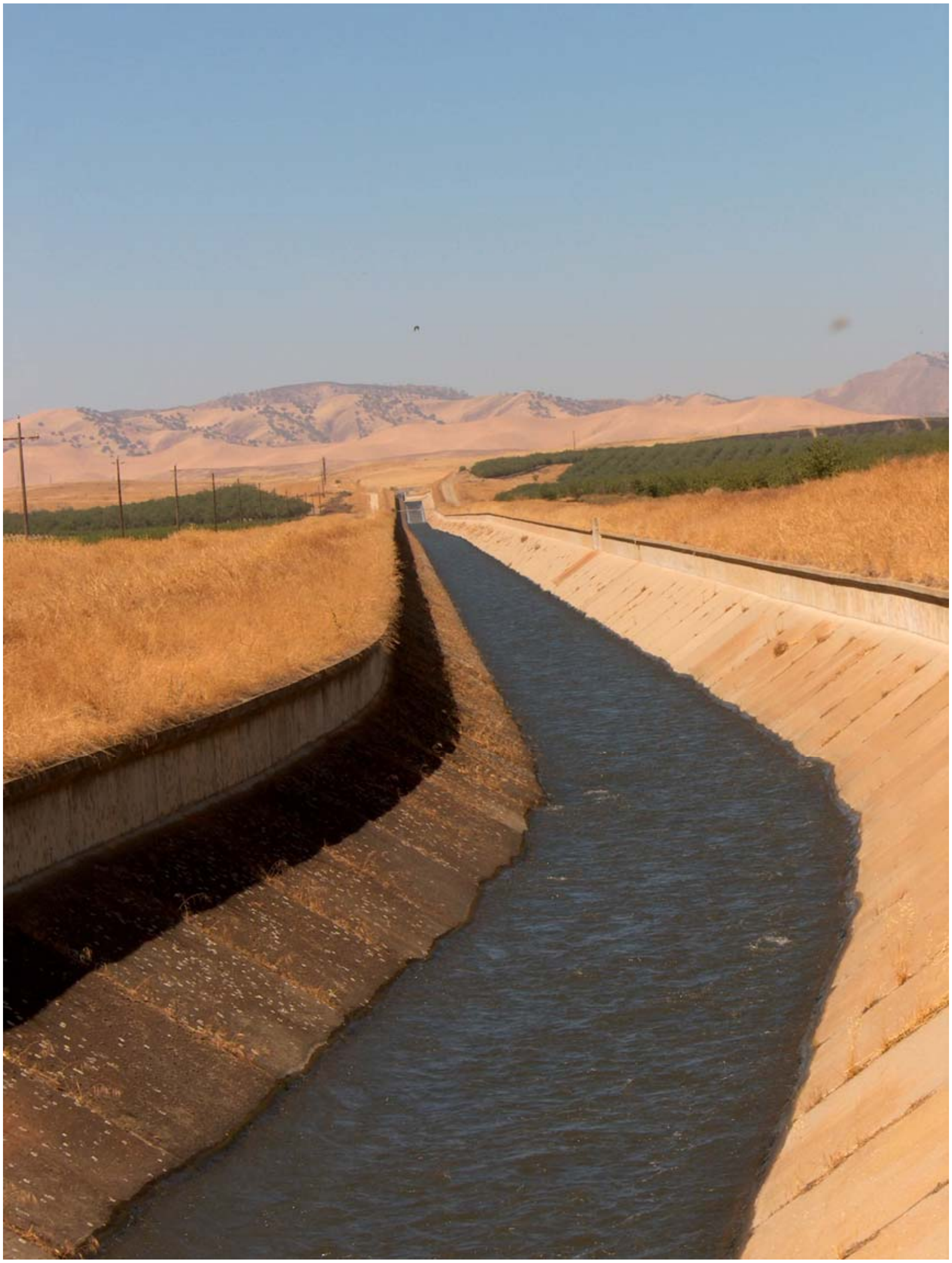


Photo 2 Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION -- MP 1.14 (EASTIN ROAD) to 0.00 (HEADWORKS)

View west (upstream) at a test flow of approximately 250 cfs,
R. Patras September 4, 2008

Photo 3

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION -- MP 1.14 (EASTIN ROAD) TO MP 1.44 (MAIN CANAL)

View east (downstream) at a test flow of approximately 250 cfs.
R. Patras

September 4, 2008

Photo 4

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / MAIN CANAL – MP 1.44

View northeast (downstream) at the drop structure inlet passing approximately 250 cfs,
R. Patras

September 4, 2008

Photo 5

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 1.44 DOWNSTREAM CHANNEL

View southwest (upstream) at the drop structure outlet and outlet transition wing walls.

R. Patras

September 4, 2008

Photo 6

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 1.44 DOWNSTREAM CHANNEL

View northeast of the drop structure outlet and downstream wasteway channel

R. Patras

September 4, 2008

Photo 7

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

MP 1.55

View northeast (downstream left) of the wasteway invert and left cutslope approximately 500 feet downstream of the MP 1.44 Drop Structure.

R. Patras

September 4, 2008

Photo 8

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

View north in the vicinity of the beaver dam at MP 1.66.
R. Patras

September 4, 2008

Photo 9

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View northwest (upstream left) at a drain inlet that was replaced prior to the high test flows. No erosion or degradation of the compacted, fine-grained fill is evident.

R. Patras

September 4, 2008

Photo 10

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View west (upstream) from Draper Road Bridge.
R. Patras

September 4, 2008

Photo 11

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View east (downstream) from Draper Road Bridge.

R. Patras

September 4, 2008

Photo 12

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

Telephoto view east (downstream) from Draper Road Bridge. The MP 2.48 Drop Structure is visible in the center background.

R. Patras

September 4, 2008

Photo 13

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View east (downstream) from Draper Road Bridge. Minor sidecutting at the right cutslope toe is evident about 200 feet downstream of the bridge.

R. Patras

September 4, 2008

Photo 14

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

Close-up view east (downstream) from Draper Road Bridge showing minor sidecutting at the right cutslope toe, about 200 feet downstream of the bridge.

R. Patras

September 4, 2008

Photo 15

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View west (upstream) from the drop structure.
R. Patras

September 4, 2008

Photo 16

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View east (downstream) from the MP 2.48 drop.
R. Patras

September 4, 2008

Photo 17

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

UPPER ROAD BRIDGE – MP 3.17

View west (upstream) from the bridge.
R. Patras

September 4, 2008

Photo 18

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

UPPER ROAD BRIDGE – MP 3.17

View east (downstream) from the bridge.
R. Patras

September 4, 2008

Photo 19

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View southwest of the drop structure outlet.
R. Patras

September 4, 2008

Photo 20

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View west of the drop structure outlet. Seepage is discharging from the three most-downstream vertical construction joints.

R. Patras

September 4, 2008

Photo 21

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View north (downstream) at the wasteway channel downstream of the drop.

R. Patras

September 4, 2008

Photo 22

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 6.86

View southwest (upstream) from the drop.
R. Patras

September 4, 2008

Photo 23

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 6.86

View northeast (downstream) from the drop.
R. Patras

September 4, 2008

Photo 24

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View northeast (downstream) of the wasteway channel about ___ feet downstream of the MP 6.86 drop.

R. Patras

September 4, 2008

Photo 25

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View south (upstream) of the wasteway just upstream of its confluence with the San Joaquin River.

R. Patras

September 4, 2008

Photo 26

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONFLUENCE SAN JOAQUIN RIVER -- MP 8.21

View northeast (downstream) of the confluence.
R. Patras

September 4, 2008

Photo 27

Newman Wasteway - Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONFLUENCE SAN JOAQUIN RIVER -- MP 8.21

View northwest of the confluence.
R. Patras

September 4, 2008

III. POST-TEST FLOW CONDITIONS

SEPTEMBER 29, 2008

Photo 1 | Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION -- MP 0.00 (HEADWORKS) TO MP 1.14 (EASTIN ROAD)

View east (downstream). All concrete remains in excellent condition following high test flows. Compare to Pre-Test Flow Photo 1.

J. Sturm | September 29, 2008

Photo 2

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION -- MP 1.14 (EASTIN ROAD) to MP 0.00 (HEADWORKS)

View west (upstream). All concrete remains in excellent condition following high test flows. Compare to Pre-Test Flow Photo 2.

J. Sturm

September 29, 2008

Photo 3

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONCRETE LINED SECTION -- MP 1.14 (EASTIN ROAD) TO MP 1.44 (DROP STRUCTURE / MAIN CANAL

View east (downstream). All concrete remains in excellent condition following high test flows. Compare to Pre-Test Flow Photo 3.

J. Sturm

September 29, 2008

Photo 4

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 1.44

View northeast (downstream) at the drop structure inlet and a typical drain inlet on the left sideslope. The drain inlet is discharging extremely turbid flow into the wasteway. Compare to Pre-Test Flow Photo 4 and Test Flow Photo 4.

J. Sturm

September 29, 2008

Photo 5

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 1.44

View southwest (upstream) at the drop structure outlet and outlet transition wing walls. High test flows flattened or removed a significant amount of vegetation and the inner channel shifted to the left (looking downstream) just downstream of the outlet (see also Photo 6). Compare to Pre-Test Flow Photo 5.

J. Sturm

September 29, 2008

Photo 6

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 1.44 DOWNSTREAM CHANNEL

View northwest of the drop structure outlet and downstream wasteway channel. High test flows flattened or removed patches of vegetation but caused no appreciable erosion of the wasteway invert or sideslopes and no deposition of new sediment for a distance of approximately 200 feet downstream of the drop structure outlet.

J. Sturm

September 29, 2008

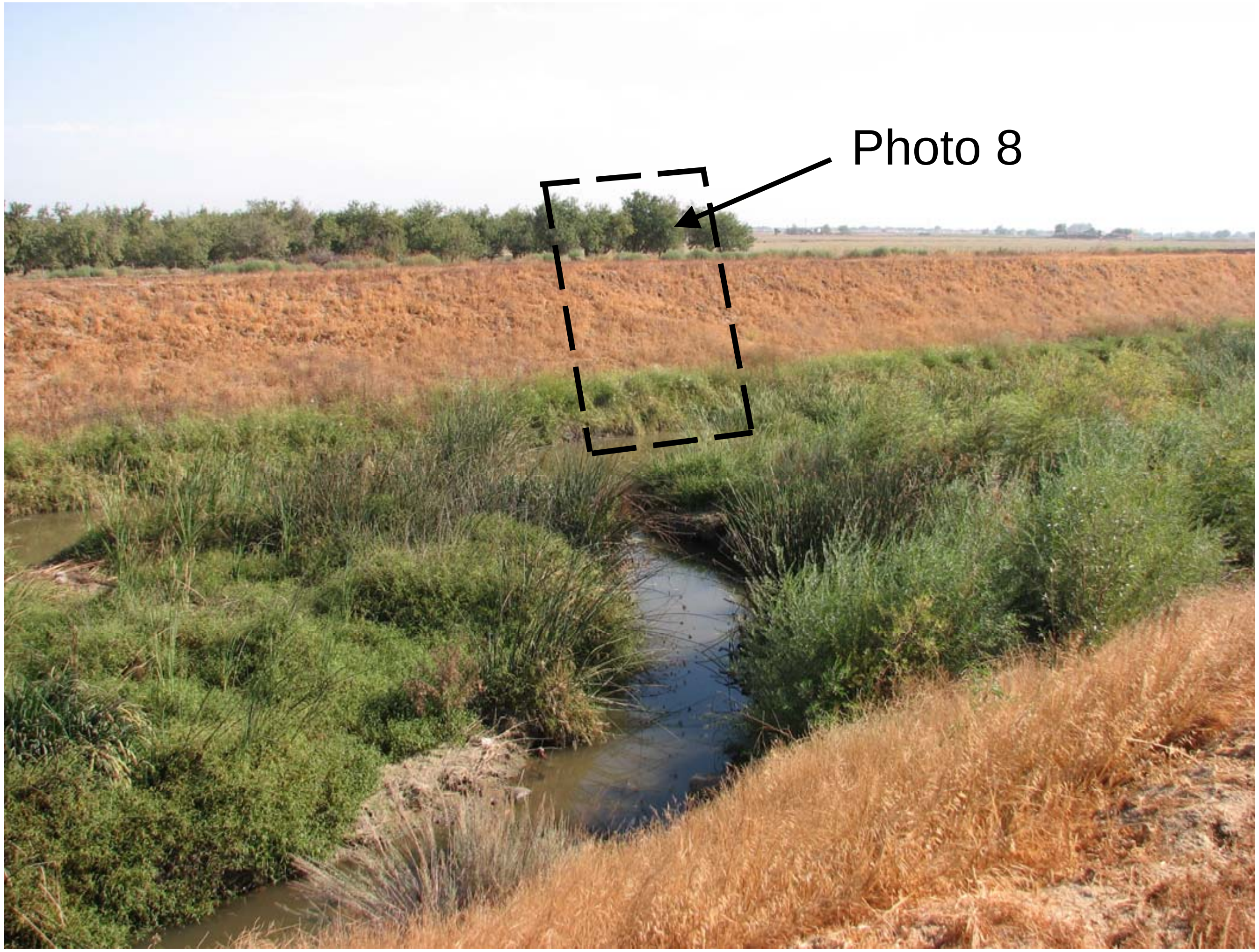


Photo 7

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

MP 1.55

View northeast (downstream left) of the wasteway invert and left cutslope at about MP 1.55, approximately 500 feet downstream of the MP 1.44 Drop Structure. Only small, localized, patches of vegetation were removed by high test flows (lower left foreground). No erosion is evident where the channel runs along the well-vegetated base of the left cutslope. Compare to Test Flow Photo 7.

J. Sturm

September 29, 2008

Photo 8 Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

MP 1.55

Close-up view northeast of the left cutslope near MP 1.55 showing a complete absence of erosion where the toe of the slope was exposed to high test flows.

J. Sturm September 29, 2008

Photo 9

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

View west (upstream) of the drop structure outlet and downstream wasteway channel. A beaver dam is visible at photo center at about MP 1.66. Compare to Pre-Test Flow Photos 7 and 8 and Test Flow Photo 8.

J. Sturm

September 29, 2008

Photo 10

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

Close-up view of beaver dam at MP 1.66. The beaver dam survived and/or was rebuilt following the high test flows.

J. Sturm

September 29, 2008

Photo 11

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

View south (downstream right) at a beaver dam at MP 1.66, about 1000 feet downstream of Drop Structure MP 1.44. Vegetation was flattened or removed by high test flows just downstream of the beaver dam. Sidecutting at the base of the right cutslope was evident for a few hundred feet up- and downstream of the beaver dam. Compare to Pre-Test Flow Photo 7 and Test Flow Photo 8.

J. Sturm

September 29, 2008

Photo 12 Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

BEAVER DAM -- MP 1.66

Close-up view of sidecutting at the base of the right cutslope. Although sidecutting by high test flows has exposed the trunks and roots of willows, the willows appear stable and firmly rooted and should provide continued erosion protection for the cutslope.

J. Sturm September 29, 2008

Photo 13

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE -- MP 2.17

View southeast (downstream right) at Draper Road Bridge. Flattening and some removal of vegetation by high test flows but no soil erosion are evident. Compare to Pre-Test Flow Photo 9.

J. Sturm

September 29, 2008

Photo 14

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View northwest (upstream left) at a drain inlet that was replaced prior to the high test flows. No erosion or degradation of the compacted, fine-grained fill was observed. The drain pipe was clear. Compare to Test Flow Photo 9.

J. Sturm

September 29, 2008

Photo 15

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View west (upstream) from Draper Road Bridge. High test flows removed a significant amount of vegetation for a distance of about 300 feet upstream of the bridge. Erosion of the wasteway invert and sideslopes is negligible. Compare to Pre-Test Flow Photo 10 and Test Flow Photo 10.

J. Sturm

September 29, 2008

Photo 16

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DRAPER ROAD BRIDGE – MP 2.17

View east (downstream) from Draper Road Bridge. Significant vegetation flattening and removal is evident, mainly on the left side of the wasteway, from Draper Road to the MP 2.48 Drop Structure (center background). A few inches of downcutting of the inner channel and localized sidecutting at the base of the right cutslope are evident for about 100 feet downstream of the bridge. Compare to Pre-Test Flow Photo 11 and Test Flow Photo 11.

J. Sturm

September 29, 2008

Photo 17

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View northeast (downstream left) at the drop structure inlet. High test flows flattened and removed vegetation but did not cause noticeable soil erosion in this area. Compare to Pre-Test Flow Photo 12.

J. Sturm

September 29, 2008

Photo 18

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View west (upstream) from the drop structure. Flattening and removal of vegetation is most pronounced within the inlet transition (i.e. between the inlet wing walls). Significant flattening and removal extends upstream to Draper Road Bridge (center background). Erosion of the wasteway invert and basal left (north) cutslope is negligible or absent. Minor sidecutting is evident at the base of the right (south) cutslope, but not the base of the left (north) cutslope, from Draper Road to the MP 2.48 drop. Compare to Test Flow Photo 15.

J. Sturm

September 29, 2008

Photo 19

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View northwest (upstream) of the wasteway upstream of the MP 2.48 drop. Vegetation flattening and removal but no erosion occurred as a result of the high test flows. Compare to Pre-Test Flow Photo 14.

J. Sturm

September 29, 2008

Photo 20

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View southwest (upstream) of the wasteway channel upstream of the MP 2.48 drop. Vegetation flattening and removal and minor sidecutting at the base of the right (south) cutslope is evident from Draper Road (right background) to the MP 2.48 drop.

J. Sturm

September 29, 2008

Photo 21

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE – MP 2.48

View east (downstream) from the MP 2.48 drop. High test flows flattened and/or removed vegetation within and adjacent to the inner channel and caused no erosion within the outlet transition. Compare to Pre-Test Flow Photo 16.

J. Sturm

September 29, 2008

Photo 22

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

UPPER ROAD BRIDGE – MP 3.17

View west (upstream) from the bridge. High test flows removed most of the water plants (primrose) from the inner channel but had minimal impact on the cattails (reeds) and caused no invert or sideslope erosion in this area. Compare to Pre-Test Flow Photo 17 and Test Flow Photo 17.

J. Sturm

September 29, 2008

Photo 23

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

UPPER ROAD BRIDGE – MP 3.17

View east (downstream) from the bridge. High test flows removed most of the water plants (primrose) from the inner channel but had minimal impact on the cattails (reeds). Minor erosion is evident as a vertical step at the base of the right cutslope (shaded band at base of slope). Compare to Pre-Test Flow Photo 18 and Test Flow Photo 18.

J. Sturm

September 29, 2008

Photo 24

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / HWY 33 -- MP 4.21

View southeast (downstream) of the MP 4.21 drop. High test flows flattened cattails (reeds) and removed water plants (primrose) from the inner channel but caused no observable erosion.

J. Sturm

September 29, 2008

Photo 25

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / HWY 33 -- MP 4.21

View west (upstream) from the drop structure. High test flows flattened cattails (reeds) and removed water plants (primrose) from the inner channel but caused no observable erosion. A beaver dam constructed of reeds blocks the inner channel. Compare to Pre-Test Flow Photo 19.

J. Sturm

September 29, 2008

Photo 26

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / HWY 33 -- MP 4.21

View east (downstream) from the drop structure toward Canal School Road Bridge (center background). High test flows flattened and/or removed vegetation within and adjacent to the inner channel and caused no erosion within the outlet transition. Compare to Pre-Test Flow Photo 20.

J. Sturm

September 29, 2008

Photo 27

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / HWY 33 -- MP 4.21

Minor additional sidecutting erosion by high test flows caused further oversteepening at the base of the right cutslope. Sidecutting erosion was observed in the same location on July 25.

J. Sturm

September 29, 2008

Photo 28

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

“BIG BEND” -- MP 4.65

View east (downstream) of the “Big Bend”. The broad, shallow erosional swales and slumps on the right cutslope appear unchanged from July 25. Flattening and partial removal of reeds (cattails) by high test flows is evident. Coverage of water plants (primrose) has expanded into areas previously occupied by open water or reeds. Compare to Pre-Test Flow Photo 21.

J. Sturm

September 29, 2008

Photo 29

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

"BIG BEND" -- MP 4.65

View west (upstream) of the "Big Bend". Conditions appear unaffected by the high test flows and largely unchanged from those observed on July 25. Expanded coverage by water plants (primrose) is evident downstream of the bend (lower right). Compare to Pre-Test Flow Photo 22.

J. Sturm

September 29, 2008

Photo 30

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

"BIG BEND" -- MP 4.65

Close-up view west of base of right, outside cutslope. High test flows removed grasses and reeds but caused little or no significant erosion.

J. Sturm

September 29, 2008

Photo 31

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

“BIG BEND” -- MP 4.65

Panoramic view to southeast of the right, outside cutslope showing erosional swales, sidecutting and slumps. The observed erosional features are largely unchanged from July 25. Compare to Pre-Test Flow Photo 21.

J. Sturm

September 29, 2008

Photo 32

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View southwest (upstream) from the drop. High test flows flattened reeds, removed some water plants from the inner channel and caused no apparent erosion of the wasteway invert or sideslopes. Compare to Pre-Test Flow Photo 24.

J. Sturm

September 29, 2008

Photo 33

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE / BRAZA ROAD -- MP 5.49

View northeast (downstream) from the drop. High test flows flattened reeds, removed most water plants from the inner channel and caused no apparent removal of brushy vegetation or erosion of the wasteway invert or sideslopes. Compare to Pre-Test Flow Photo 25.

J. Sturm

September 29, 2008

Photo 34

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 6.86

View southwest (upstream) from the drop. High test flows flattened reeds within the inlet transition, removed water plants from the inner channel and caused no apparent erosion of the wasteway invert or sideslopes. A beaver dam crosses the inner channel near the upstream edge of the inlet transition (photo center). Compare to Pre-Test Flow Photo 28 and Test Flow Photo 22.

J. Sturm

September 29, 2008

Photo 35

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

DROP STRUCTURE -- MP 6.86

View northeast (downstream) from the drop. Removal of low-lying ground-cover-type plants and grasses is evident for about 300 feet downstream of the outlet. No erosion is apparent. Compare to Pre-Test Flow Photo 29.

J. Sturm

September 29, 2008

Photo 36

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View northeast (downstream) at the termimal reach at about MP 8.07. Reed growth appears to be denser and more extensive along both sides of the wasteway invert as compared to conditions observed on July 25. Compare to Pre-Test Flow Photo 31.

J. Sturm

September 29, 2008

Photo 37

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View southwest (upstream) at the terminal reach at about MP 8.10, Reed growth appears to have been enhanced by high test flows. Water plants (primrose) have established saturated beach areas that were exposed following the cessation of the high test flows and lowering of the wasteway water level. Lower flows in the San Joaquin River (i.e. a lowering of base level) also contributed to the lower wasteway water level.

J. Sturm

September 29, 2008

Photo 38

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

TERMINAL REACH -- MP 6.86 to MP 8.21

View south Reed growth appears to have been enhanced by high test flows. Water plants (primrose) have established in saturated beach areas that were exposed following the cessation of the high test flows and lowering of the wasteway water level.

J. Sturm

September 29, 2008

Photo 39

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONFLUENCE SAN JOAQUIN RIVER -- MP 8.21

View northeast (downstream) at the confluence. Some new reed growth and expansion of water plants (primrose) into beach areas is evident. Compare to Pre-Test Flow Photo 32.

J. Sturm

September 29, 2008

Photo 40

Newman Wasteway - Post-Test Flow Conditions
Delta Mendota Canal Recirculation Project

CONFLUENCE SAN JOAQUIN RIVER -- MP 8.21

View northwest of the confluence. The pronounced turbidity boundary observed on July 25 is barely evident, probably because flows in the San Joaquin River are lower and more turbid than was the case on July 25. Compare to Pre-Test Flow Photo 33.

J. Sturm

September 29, 2008