UPPER TRUCKEE MARSH SEWER FACILITIES ADAPTIVE MANAGEMENT PLAN

2015 ANNUAL REPORT

Prepared for:

South Tahoe Public Utility District

16 November 2015

nhc
northwest hydraulic consultants
water resource specialists

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Prepared for:

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16 November 2015

NHC Ref No. 6000145

EXECUTIVE SUMMARY

The South Tahoe Public Utility District (District) is implementing an Adaptive Management Plan (AMP) to protect existing sewer facilities in the Upper Truckee Marsh. Two District sewer pipelines are located along the northern margin of the marsh in an easement over property owned by the California Tahoe Conservancy. The need for the plan was initiated by a channel avulsion in the vicinity of the easement following the record snowmelt year of 2011. The objective of the plan is to reduce inundation of the sewer easement and reduce the potential for stream channel development and erosion that would expose or damage the sewer lines and potentially lead to a sewage spill into the marsh and Lake Tahoe. The development of the plan is described in *Upper Truckee Marsh Sewer Facilities Adaptive Management Plan* (NHC, 2014). This annual report summarizes the measures implemented by the District in Year 1 (2014) of construction and describes baseline, construction, and post-construction monitoring for the purposes of evaluating effectiveness and guiding future AMP actions.

Baseline Information

The District retained Tri-State Surveying to set survey control and produce a topographic survey of the area near Bellevue Pump Station where the channel avulsion occurred and where the Year 1 improvements were focused. The survey included five cross sections previously surveyed by the California Tahoe Conservancy and nine new transects. Inundation of the sewer easement near Bellevue Avenue was mapped in October 2013 as part of the field survey and observed prior to Year 1 construction operations in the spring and summer of 2013 and 2014. In the baseline condition, a section of the main channel was entirely blocked as a result of the 2011 channel avulsion, and essentially all of the creek flow was passing over the right overbank and sewer easement. Thus, regardless of flows in the creek or season, the sewer easement was continuously inundated in the area near Bellevue Pump Station.

NHC and the District installed three pressure transducers in the project area near Bellevue Avenue to record water level data on a set time interval. The baseline water level conditions reflect discontinuous channel conditions – the Trout Creek channel between the middle and downstream gages was completely filled with sediment and the entire flow was occurring on the right overbank. In addition to the transducers along the stream channel, the District installed a transducer in an existing monitoring well (MW4) near the end of Bellevue Avenue in July 2014.

As part of the permitting process, the jurisdictional wetland habitats were mapped in the project area. The mapping shows that nearly the entire project area is in jurisdictional areas, and an objective of the AMP is to maintain the wetland habitat while reducing risk for the pipelines. Baseline vegetation transects were established on an abandoned road fill identified for removal and in locations where hummock features (slightly elevated planted areas were to be constructed. Baseline data showed average vegetative cover to be 90% in the road fill area 80% in the areas of the proposed hummocks. In both areas, very high percentages (greater than 90%) of the plants present were native species.

Baseline information on wildlife and fish was primarily obtained from previously published environmental documentation associated with the Conservancy's Upper Truckee Marsh Restoration Project. Monitoring of wildlife and fish populations is not a part of the AMP monitoring plan, but several mitigation measures were identified in the AMP to minimize construction impacts to wildlife and fish.

Pre-Construction and Construction Information

The District awarded the AMP work to V&C Construction, and the contractor mobilized on 22 September 2014. Due to the late start for construction (outside of the nesting bird season), pre-construction surveys for willow flycatcher and nesting birds were not required in Year 1. The District conducted daily construction observations to ensure that the work generally conformed to the Year 1 plans.

Field changes made during construction included 40 lineal feet of additional pilot channel construction (resulting in three pilot channels instead of two); an additional left overbank opening; widening of the three left overbank openings at the head of the pilot channels to increase flow capacity; and planting of salvaged wetland plugs in approximately 1100 square feet of the wetland hummocks. The first three items were undertaken to increase flows to the pilot channels and decrease flows to the right overbank. The fourth item was undertaken to increase vegetation in the constructed hummocks, partially compensating for lower than expected vegetative growth in the pre-grown marsh mats used to construct the hummocks due to seasonally late construction, material delivery problems affected by port labor disputes, and unfavorable weather conditions during the growing period.

During construction, qualified archaeologists and fisheries biologists from AECOM were present to monitor for cultural resources during excavation and to isolate, rescue, and relocate fish from the in-water work areas. No cultural resources were encountered that required modification or stoppage of work. Fish relocation used block nets and electrofishing to relocate approximately 35 trout and over one thousand speckled dace.

The District monitored excavation and dewatering work visually (using prepared sample vials for reference) to minimize turbidity discharged to the stream. Dewatering methods included pumping to a water disposal area where flows were spread on a dry area of the meadow for infiltration. The District made multiple tests of turbidity daily with a portable (Hach 2100Q turbidimeter). The recording turbidimeters were used to verify portable measurements and provide a record of turbidity during the entire construction period. Turbidity in excess of 20 NTUs occasionally occurred during excavation of the pilot channels and installation of hummocks in wet areas, but exceedances were relatively few and short in duration. The data indicate that the performance standard for sediment discharge and turbidity was met during construction.

Post-Construction Monitoring

Following Year 1 construction, the District surveyed the work area near Bellevue Avenue and the head of the secondary channel in the center of the meadow, including resurvey of the fourteen cross sections established in the Bellevue Avenue work area by the baseline survey, establishment of seven monumented cross sections on the pilot channels, and general topography and eight cross sections

along the secondary channel. Comparison of the 2013 and 2014 surveys indicated little change in the extent of overbank flooding in the sewer easement area near Bellevue Avenue but confirmed increased left overbank flow paths associated with the pilot channels.

Pilot channel flows were measured on 2 February 2015. Right overbank flows in the easement area were too shallow to measure on this date and were estimated to be less than 1 cfs. The mean daily flow at USGS Gage 10336780 for 2 February was approximately 11 cfs. A site visit on 12 February 2015 followed a small peak in runoff of approximately 60 cfs (annual peak for 2013/2014 water year). On 12 February, the flow at USGS Gage 10336780 was approximately 18 cfs. On this date, it was estimated that approximately 75 percent of the flow was passing through the pilot channels and left overbank and 25 percent through the right overbank/easement. These measurements indicate that although the extent of inundation was changed only slightly following Year 1 construction, flow through the easement was significantly reduced. The relative distribution of flows to the pilot channels is higher at lower flows (up to 90%), and lower at higher flows. This is because the area near Hummocks 4 and 5 in Year 1 construction function as a weir – at higher flows, distribution to the right overbank increases relatively rapidly as the stage on the weir increases. Flows were measured again prior to Year 2 construction on 20 August 2015 with a flow of 8 cfs at USGS Gage 10336780. Approximately 4 cfs was estimated to be passing through the three pilot channels with less than one cfs on the right overbank. These results indicate that the pilot channels serve to divert low flows, but natural development of the pilot channels (as envisioned in the AMP) will be necessary to achieve the desired reduction of flows in the easement.

Pilot channels were observed periodically during after construction and bed load transport minor local scour was observed between November and May 2015. However, no significant increase in pilot channel size was observed and bed materials were observed to be relatively cohesive and resistant to erosion, although relatively high velocities (2-4 fps) were observed in the downstream portions of the channels. In some areas, remaining root mass from vegetation appeared to contribute to stability. In August 2015, PCXS3, PCX6, and PCXS7 were measured as part of flow measurements. These measurements indicated no expansion in pilot channel area and observations between May and August indicated a trend for reduction in effective flow area due to vigorous growth of vegetation on the pilot channel banks. A profile survey was also conducted for the pilot channels which indicated no general increase in depth or changes in slope since construction.

The pressure transducers continued to operate following Year 1 construction and the data indicate that water levels at the middle and upper stations on Trout Creek have remained relatively constant since the baseline period. The lower station is below the channel avulsion area and stages vary more with flow than for the other two stations. Groundwater levels remained relatively constant with a slight increase during the spring that may correlate to precipitation. In the data collected to date, groundwater levels are not well correlated to stream stage and are below the stream levels, indicating potential for loss of flow from the stream to groundwater in the local area.

Planted vegetation was surveyed in July 2015 by Western Botanical Services. Herbaceous vegetation was monitored on the six transects established for baseline conditions on the road fill removal and hummock areas. Vegetative cover averaged 96% in the road fill removal area transects and 34% in the hummock transects. Vegetative cover by native species was greater than 90% of vegetative cover for both locations and vigor was very good to excellent.

The performance standard for herbaceous vegetation established in the AMP is 70 percent of baseline cover after 2 years; 90 percent of baseline after three years; and vigor comparable to surrounding marsh areas. The data for the road fill removal area indicate that the performance standards were met in Year 1. The performance standards were not met in the hummock transects, where baseline vegetative cover averaged about 80%. The pre-planted marsh mats for Year 1 were delivered with much lower than expected vegetative growth due to a combination of shipping, weather, and construction timing problems. The revegetation monitoring report notes that in spite of the planting problems the hummocks are growing well and are expected to meet cover standards over time.

Willow stake counts were made for the willow sausal and the willow fences. Survival was 13% for the willow sausal and 40% for the willow fence, not meeting the performance standard of 80% survival. The vegetation monitoring report attributes the low success to improper materials and planting methods, but notes that the survival rate is sufficient for the features to serve their intended function if the material continues to grow.

Turbidity measurements in the period following construction and through the subsequent snowmelt season were intended to provide a means for assessing whether channel development was proceeding too rapidly or erosion was occurring as a result of project features. As noted above, pilot channel development did not progress as rapidly as expected, and project features were visually observed to be stable during the highest seasonal flows in February 2015. The turbidity measurements upstream and downstream of the work area near Bellevue Avenue for the period during and after Year 1 construction through June 2015 show turbidity levels to be similar at the two stations and to generally be less than about 5 NTUs.

Photos were collected at photo points identified in the AMP and are included in Appendix C of this report. Additional ground photos were collected to document conditions and an index is provided in Appendix C. In addition to ground photos, the District collected aerial views of the work area on 24 Oct 2014 and 17 Apr 2015 using a small unmanned aerial vehicle (UAV). The additional ground photos and UAV photos are available from the District's files on request.

Shortly after construction, beaver activity was observed upstream of the Bellevue Avenue work area in portions of the stream where beavers had not previously been present. A main dam is currently located on Trout Creek just downstream of the location of the secondary channel in the center of the meadow, and several auxiliary dams are in place to block return or distributary channels. The result is widespread flooding of the meadow at very low flows in the area upstream of Bellevue Avenue. This flooding has created new challenges for the District associated with flooding in the easement and persistent water around manholes.

Year 2 Plans

Year 1 project features were generally successful at reducing flows directly over the sewer lines, opening new flow pathways on the left bank, and reducing flow pathways toward the easement on the right bank. The pilot channels were constructed at a small size to reduce the potential for excessively rapid enlargement and erosion. Development of the pilot channels is a key component in redirecting Trout Creek flows in the vicinity of Bellevue Avenue and in lowering water levels in the overbanks upstream. Pilot channel development was slower than expected in Year 1. The following objectives were identified for Year 2 construction and reviewed with agencies and neighborhood residents in March 2015 meetings:

- Increase flow distribution to pilot channels to further reduce inundation of easement
- Increase vegetation on right overbank near Bellevue to further increase resistance and reduce overbank flows
- Allow distribution of flows into center of meadow via secondary channel
- Mitigate ponding and increase in flows on right overbank due to current and future beaver activity

Following these meetings, the District decided not to pursue measures intended to mitigate for beaver activity in Year 2. This decision was based on the need to obtain agreements for access to the upstream flooding from El Dorado Avenue, supplemental environmental work needed to include the inundated areas in the project area, and potential improvements associated with reduced water levels with better flow distribution to the pilot channels. The District has in place a contingency plan for access to the flooded manholes without vehicles in case a blockage or problem emergency occurs. Additional work to mitigate the effects of flooding due to beaver activity may be undertaken in Year 3.

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1 INTRODUCTION

1.1 Purpose

The South Tahoe Public Utility District (District) is implementing an Adaptive Management Plan (AMP) to protect existing sewer facilities in the Upper Truckee Marsh. Two District sewer pipelines are located along the northern margin of the marsh in an easement over property owned by the California Tahoe Conservancy. The need for the plan was initiated by a channel avulsion in the vicinity of the easement following the record snowmelt year of 2011. The objective of the plan is to reduce inundation of the sewer easement and reduce the potential for stream channel development and erosion that would expose or damage the sewer lines and potentially lead to a sewage spill into the marsh and Lake Tahoe. The development of the plan is described in *Upper Truckee Marsh Sewer Facilities Adaptive Management Plan* (NHC, 2014). This annual report summarizes the measures implemented by the District in Year 1 (2014) of construction and describes baseline, construction, and post-construction monitoring for the purposes of evaluating effectiveness and guiding future AMP actions.

1.2 Scope of Monitoring

The scope of the monitoring includes flow conditions and water surface elevations (including flow outside the main channel in the sewer easement area); topographic changes; turbidity; and vegetation. The complete monitoring plan is included in the AMP and is summarized in Table 1-1. The purpose of the Annual Report is to provide permitting agencies and other stakeholders with information related to the success of the project so that they may continue to be engaged effectively in the adaptive management process. The permits for the project cover the entire expected 5-year implementation period and thus there is no specific agency approval or action required in response to the Annual Report.

Table 1-1. Monitoring Plan Summary

Monitoring Component	Performance Standard	Frequency	Duration
Baseline Conditions			
Topography	Baseline 2014	Once	NA
Inundation of Easement	Baseline 2014	Once	NA
Trout Creek Water Levels	Baseline 2014	Continuous recorders installed 3 locations	NA

Table 1-1. Monitoring Plan Summary

Monitoring Component	Performance Standard	Frequency	Duration
Groundwater Levels	Baseline 2014	Continuous recorder in well at end of Bellevue Ave	NA
Wetland Extent	Baseline 2014	Once	NA
Woody Riparian	Baseline 2014	Once	NA
Herbaceous Cover and Natives Composition	Baseline 2014	Once	NA
Pre-Construction and During Construction			
Willow Flycatcher Surveys	Establish buffers or other measures to avoid disturbance, if present	Annually, if construction within nesting season	NA
Yellow Warbler, Long-Eared Owl, Waterfowl, and Northern Harrier Surveys	Establish buffers or other measures to avoid disturbance, if present	Annually, if construction within nesting season	NA
American Mannagrass Surveys	Avoid disturbance or translocate, if present	Once, prior to construction	NA
Fisheries	Fish rescue and relocation as needed; reporting if endangered species present	During dewatering and in-channel operations	Years 1-7
Cultural Resources	Observations during ground disturbance; avoidance of unknown cultural resources	Daily during ground disturbance	Years 1-7
Sediment Discharge	Turbidity below 20 NTUs except temporary periods during in channel work and pilot channel activation	Periodic field measurements plus logging turbidimeter at 15 minute intervals	During construction operations
Trout Creek Turbidity	Turbidity below project area shall not exceed turbidity above project area by more than 10 percent except	Periodic field measurements plus logging turbidimeter	During construction operations

Table 1-1. Monitoring Plan Summary

Monitoring Component	Performance Standard	Frequency	Duration
	temporary periods during in channel work and pilot channel activation	at 15 minute intervals	
Pilot Channel Width	NA	Twice per week	During construction operations
Post-Construction			
Topography	NA – Repeat of topographic surveys or cross sections for information	Annually	Years 2-7
Right Overbank Flows	No more than 10 percent over right overbank at flows less than bankfull	Up to 3 times during snowmelt season	Years 2-7
Inundation of Easement	No inundation of easement at flows less than 50 cfs	Annually in snowmelt season	Years 2-7
Pilot Channels and Left Bank Pathways	NA – Information on channel development	Annually	Years 2-7
Trout Creek Water Levels	NA – Information for inundation extents and channel behavior	Continuous, reported annually	Years 2-7
Groundwater	NA – Information for vegetation survival	Continuous, reported annually	Years 2-7
Planted Herbaceous Vegetation	70 percent of baseline cover after 2 years; 90 percent of baseline after three years; vigor comparable to surrounding marsh areas	Annually	Years 2-7
Planted Woody Vegetation	80 percent survival and exhibit good vigor	Annually	Years 2-7

Table 1-1. Monitoring Plan Summary

Monitoring Component	Performance Standard	Frequency	Duration
Turbidity	Turbidity below project area shall not exceed turbidity above project area by more than 10 percent	Continuous, reported annually	Years 2-7
Photo Points	NA – Information to support channel and vegetation conditions	Annually	Years 1-7
Wetland Extent	No loss in jurisdictional wetland	Once	At completion
Final Topography	NA – for information	Once	At completion

1.3 Report Organization

This Annual Report is generally organized to follow the monitoring plan categories of baseline, pre-construction and construction, and post-construction monitoring in Sections 2,3, and 4, respectively. Table 1-2 provides a general timeframe for these monitoring categories.

Table 1-2. Schedule of AMP monitoring categories

AMP MONITORING	START	END
Baseline	October 2013	September 2014
Year 1 Construction	September 2014	October 2014
Year 1 Post Construction	November 2014	July 2015

Section 5 provides a discussion of results, observations on 2015 conditions, the rationale for adaptive management measures in Year 2, and a summary of Year 2 designs.

2 BASELINE CONDITIONS

2.1 Topography

The project area, as described in the AMP, is shown in Figure 2-1. The District retained Tri-State Surveying to set survey control and produce a topographic survey of the area near Bellevue Pump Station where the channel avulsion occurred and where the Year 1 improvements were focused (Tri-State Surveying, 2013). The survey included five cross sections previously surveyed by the California Tahoe Conservancy and nine new transects. The base map and cross section plots from the survey are included in Appendix A. In addition to the field survey, LiDAR-based mapping completed by TRPA (TRPA, 2010) provides general topographic information for the Upper Truckee Marsh. Figure 2-2 shows the LiDAR-based mapping. Note that this figure does not show topographic changes associated with the 2011 channel avulsion due to the date of the mapping.

2.2 Inundation of Easement

Inundation of the sewer easement near Bellevue Avenue was mapped in October 2013 as part of the field survey and observed prior to Year 1 construction operations in the spring and summer of 2013 and 2014. Figure 2-3 shows the area inundated on the baseline survey date, which had a recorded flow of 11 cfs at the USGS Gage 10336780 Trout Creek at Tahoe Valley. The median flow in October at the USGS gage is approximately 15 cfs. In the baseline condition, a section of the main channel was entirely blocked as a result of the 2011 channel avulsion, and essentially all of the creek flow was passing over the right overbank and sewer easement. Thus, regardless of flows in the creek or season, the sewer easement was continuously inundated in the area near Bellevue Pump Station. Figure 2-4 shows a photo of inundation in the easement near Bellevue Avenue in May 2013 at a flow of approximately 40 cfs. Figure 2-5 shows a photo of inundation during April 2014 at a flow of approximately 20 cfs. Hydrologic conditions in 2013 and 2014 reflected drought conditions - peak snowmelt runoff was approximately 50 cfs in mid-May in 2013 and 40 cfs in mid-May in 2014. The median flow in May at the USGS gage is approximately 65 cfs.

Legend

- Stream Environment Zone
- State of California Property
- Project Area
- Bellevue Pump Station
- Sewer Easment
- Soft Coverage in Project Area

SCALE - 1:12,000

0 500 1,000 1,500 Feet

N

Job: 600035

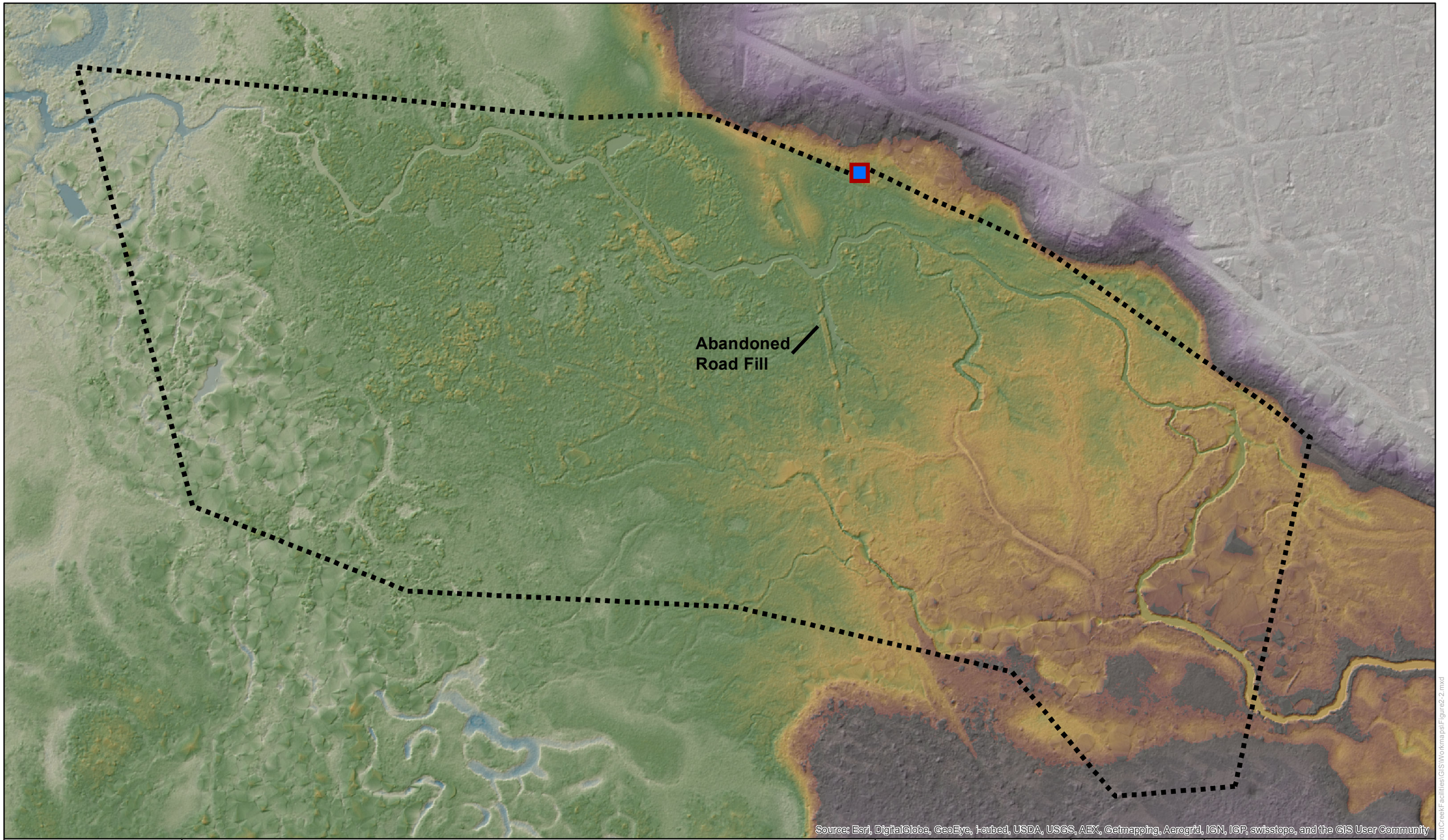
JANUARY 2014

DATA SOURCES:
AECOM, ESRI, CTC

Figure 2-1

Project Area and SEZ Boundaries

nhc
northwest hydraulic consultants



SOUTH TAHOE PUBLIC UTILITY DISTRICT

nhc
northwest hydraulic consultants

Legend

- Bellevue Pump Station
- Project Area

UT Marsh Topo [ft]
Value
High : 6238
Low : 6230

South Lake Tahoe [ft]
Value
High : 6260
Low : 6238

SCALE - 1:3,000
0 100 200 300 Feet

N

DATA SOURCES: Tahoe Regional Planning Agency

Job: 600035

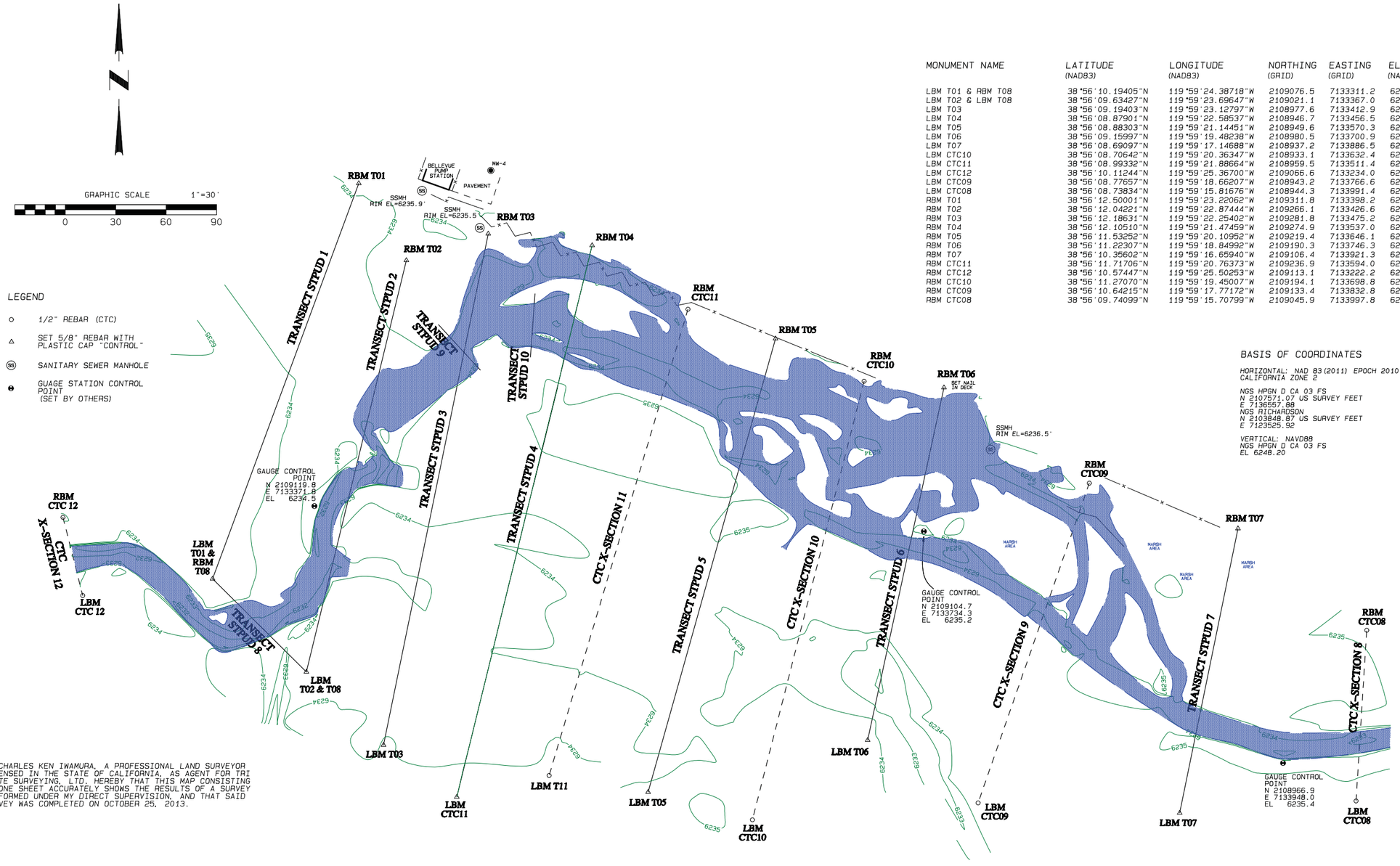
NOVEMBER 2015

FIGURE 2-2

2012 LiDAR Topography

ABC, L:\OldProj\600035_TroutCreek\Facilities\GIS\Workmaps\Figure2-2.mxd

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT FOR SOUTH TAHOE PUBLIC UTILTY DISTRICT



MONUMENT NAME	LATITUDE (NAD83)	LONGITUDE (NAD83)	NORTHING (GRID)	EASTING (GRID)	ELEV (NAVD88)	ELEV (NGVD29)
LBM T01 & RBM T08	38°56'10.19405"N	119°59'24.38718"W	2109076.5	7133311.2	6234.3	6230.3
LBM T02 & LBM T08	38°56'09.63427"N	119°59'23.69647"W	2109021.1	7133367.0	6233.9	6229.9
LBM T03	38°56'09.19403"N	119°59'23.12797"W	2108977.6	7133412.9	6234.2	6230.2
LBM T04	38°56'08.87901"N	119°59'22.58537"W	2108946.7	7133456.5	6234.4	6230.5
LBM T05	38°56'08.88303"N	119°59'21.14451"W	2108949.6	7133570.3	6234.2	6230.3
LBM T06	38°56'09.15997"N	119°59'19.48238"W	2108980.5	7133700.9	6234.6	6230.6
LBM T07	38°56'08.69097"N	119°59'17.14688"W	2108937.2	7133886.5	6234.5	6230.5
LBM CTC10	38°56'08.70642"N	119°59'20.36347"W	2108933.1	7133632.4	6234.6	6230.6
LBM CTC11	38°56'08.99332"N	119°59'21.88664"W	2108959.5	7133511.4	6234.4	6230.4
LBM CTC12	38°56'10.11244"N	119°59'25.36700"W	2109066.6	7133234.0	6233.9	6229.9
LBM CTC09	38°56'08.77657"N	119°59'18.66207"W	2108943.2	7133766.6	6235.2	6231.2
LBM CTC08	38°56'08.73834"N	119°59'15.81676"W	2108944.3	7133991.4	6234.9	6231.0
RBM T01	38°56'12.50001"N	119°59'23.22062"W	2109311.8	7133398.2	6234.3	6230.3
RBM T02	38°56'12.04221"N	119°59'22.87444"W	2109266.1	7133426.6	6234.4	6230.4
RBM T03	38°56'12.18631"N	119°59'22.25402"W	2109281.8	7133475.2	6234.4	6230.5
RBM T04	38°56'12.10510"N	119°59'21.47459"W	2109274.9	7133537.0	6234.3	6230.3
RBM T05	38°56'11.53252"N	119°59'20.10952"W	2109219.4	7133646.1	6235.0	6231.0
RBM T06	38°56'11.22307"N	119°59'18.84992"W	2109190.3	7133746.3	6236.5	6232.5
RBM T07	38°56'10.35602"N	119°59'16.65940"W	2109106.4	7133921.3	6234.9	6230.9
RBM CTC11	38°56'11.71706"N	119°59'20.76373"W	2109236.9	7133594.0	6235.2	6231.2
RBM CTC12	38°56'10.57447"N	119°59'25.50253"W	2109113.1	7133222.2	6234.3	6230.3
RBM CTC10	38°56'11.27070"N	119°59'19.45007"W	2109194.1	7133698.8	6235.1	6231.1
RBM CTC09	38°56'10.64215"N	119°59'17.77172"W	2109133.4	7133832.8	6235.0	6231.1
RBM CTC08	38°56'09.74099"N	119°59'15.70799"W	2109045.9	7133997.8	6235.6	6231.6

BASIS OF COORDINATES

HORIZONTAL: NAD 83(2011) EPOCH 2010.00
CALIFORNIA ZONE 2

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET
E 7136557.88
NGS RICHARDSON
N 2103848.87 US SURVEY FEET
E 7123525.92

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL 6248.20

I, CHARLES KEN IWAMURA, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF CALIFORNIA, AS AGENT FOR TRI STATE SURVEYING, LTD. HEREBY THAT THIS MAP CONSISTING OF ONE SHEET ACCURATELY SHOWS THE RESULTS OF A SURVEY PERFORMED UNDER MY DIRECT SUPERVISION, AND THAT SAID SURVEY WAS COMPLETED ON OCTOBER 25, 2013.

CHARLES KEN IWAMURA
PROFESSIONAL LAND SURVEYOR
CALIFORNIA CERTIFICATE NO. 8540

Figure 2-3. Baseline Topographic Survey near Bellevue Avenue (source: Tri-State Surveying; full survey in Appendix A)

TRI STATE SURVEYING, LTD
425 EAST LONG STREET
CARSON CITY, NEVADA 89706
(775) 887-9911 * FAX 887-9915

REVISIONS | NO. | DATE | MARK

BENCHMARK
DESIGNED BY
DRAWN BY CKI
CHECKED BY JS
DATE SURVEYED OCT 16, 2013
APPROVED BY

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT
PORTIONS OF THE N 1/2 OF SECTION 4, TOWNSHIP 12 NORTH, RANGE 18 EAST, M.D.M.
EL DORADO COUNTY CALIFORNIA

JOB NO 13120.01.CM
DATE 11-5-13
SHEET 1 OF 3

Figure 2-4. Inundation of the sewer easement near Bellevue Avenue at a flow of approximately 40 cfs, looking upstream, 20 May 2013

Figure 2-5. Inundation of the sewer easement near Bellevue Avenue at a flow of approximately 20 cfs, looking upstream, 1 Apr 2014

2.3 Water Levels

NHC and the District installed three pressure transducers in the project area near Bellevue Avenue along the Trout Creek channel in November 2013. The pressure transducers record data on a set time interval for later download. Figure 2-6 shows the location of the stream water level sensors and Figure 2-7 shows the water level data plotted against flows at the USGS gage. The baseline water level conditions reflect discontinuous channel conditions – the Trout Creek channel between the middle and downstream gages was completely filled with sediment and the entire flow was occurring on the right overbank. Water level measurements are intended to provide information that can be used in conjunction with survey data to map the area of inundation at various flow rates.

In addition to the transducers along the stream channel, the District installed a transducer in an existing monitoring well (MW4) near the end of Bellevue Avenue in July 2014. Groundwater levels prior to September 2014 (beginning of Year 1 construction) are shown in Figure 2-7.

2.4 Wetland Extent

AECOM (2014) mapped jurisdictional habitat in the project area as shown in Figure 2-8. The area of the avulsed channel is mapped as a habitat and is evident as a gap in the Trout Creek open water habitat component near the center of the map. Nearly the entire project area is mapped as potential jurisdictional area with the exception of some higher ground mapped as Lodgepole Pine Meadow (LPM)along the north and south margins of the delineation area.

2.5 Vegetation

General vegetation characteristics in the study area have been described in environmental documentation for the Upper Truckee River and Marsh Restoration Project (California Department of General Services and California Tahoe Conservancy, 2013). The project area is comprised primarily of montane meadow and willow scrub-wet meadow plant communities. Vegetation in the marsh and project vicinity is dominated by wetland graminoids, in particular the genera *Carex* (sedges) and *Juncus* (rushes). Dominant species include the wide spread *Carex nebrascensis* (Nebraska sedge) and *Juncus balticus* (Baltic rush). Species are largely sorted by elevation and hydrology, with *Carex utriculata* (beaked sedge), *Juncus nevadensis* (Nevada rush) and *Juncus ensifloius* (Iris-leaved rush) occurring in the most saturated soils, while Nebraska sedge and Baltic rush generally occur on drier sites. Grasses are also present but do not comprise a dominant component in the project area because conditions are too wet. The willow scrub–wet meadow community occurs primarily in association with the stream channel and as scattered patches within the floodplain. Willows, primarily *Salix lemmonii* (Lemmons' willow), are mostly restricted to depositional areas because they typically establish on disturbed surfaces and do not readily encroach on dense stands of rhizomatous graminoids.

MW-4

Stream Flow Cross Section #1

TC 003

TC 002

Down-Stream Turbidimeter

Up-Stream Turbidimeter

TC 001

Stream Flow Cross Section #2

TC 001 = Up-Stream Gage
TC 002 = Mid-Stream Gage
TC 003 = Down-Stream Gage

Pre-1968 Alignment
Crest Stage Gage

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

SOUTH TAHOE PUBLIC UTILITY DISTRICT

nhc
northwest hydraulic consultants

Legend

- Crest Stage Gauge
- Groundwater Elevation Gage
- Surface Water Elevation Gage
- Turbidimeter
- Streamflow Measurement Cross Sections

SCALE - 1:1,800
0 50 100 150 200 Feet
N

DATA SOURCES:
Google Earth

Job: 600035

NOVEMBER 2015

Figure 2-6

Streamflow Measurement Sites

ABC, L:\OldProj\600035_TroutCreekFacilities\GIS\Workmaps\Figure2-6.mxd

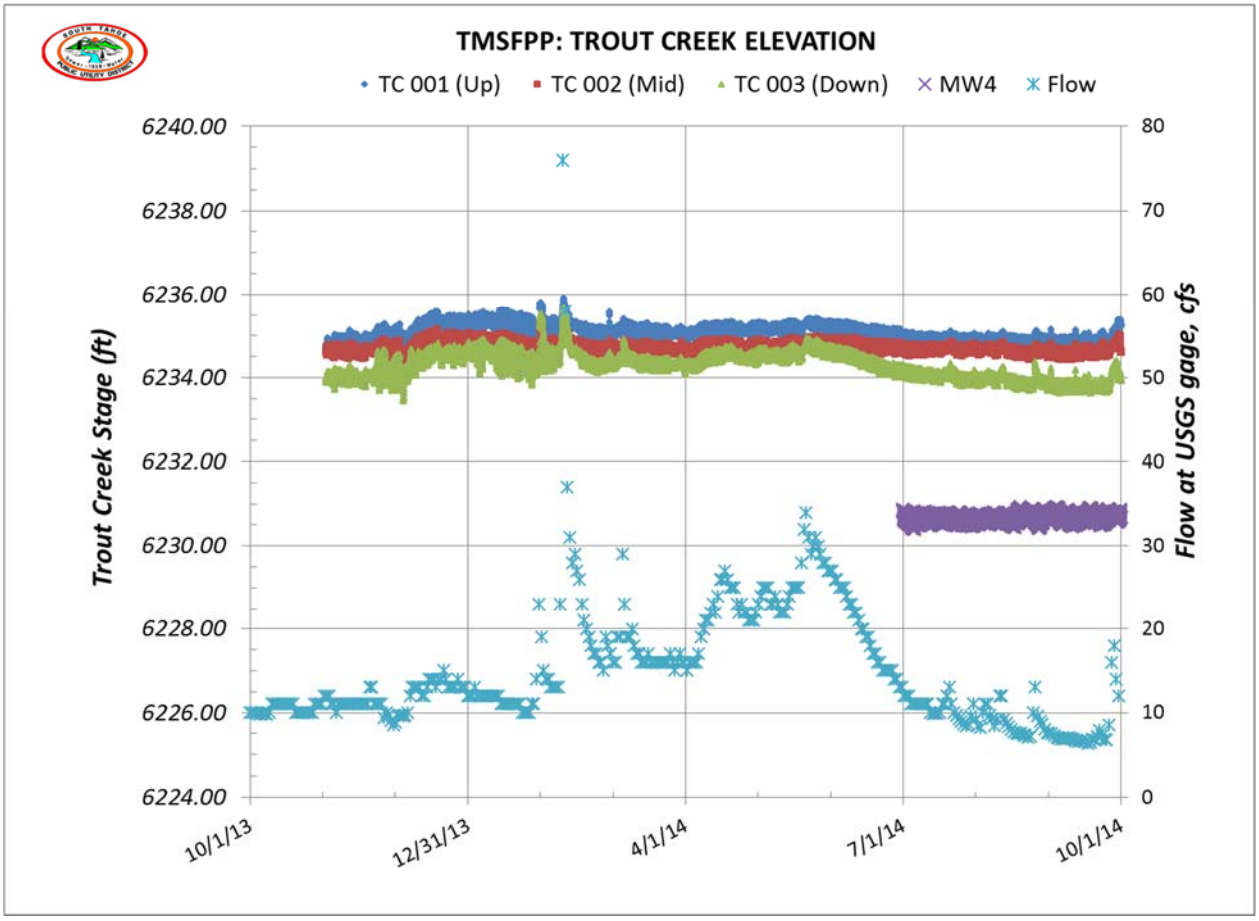


Figure 2-7. Water levels and flows at USGS Gage 10336780 in prior to Year 1 activities

STPUD Trout Creek Upper Truckee Marsh Sewer Protection Project

Wetland Delineation Map

LEGEND

- Sample Points
- 1ft Contours
- Study Area Boundary *(233.78 acres)*
- Adaptive Management Action Area*(95.99 acres)*

Potentially Jurisdictional Habitats *(185.47 acres)*

Relatively Permanent Waters (RPWs) *(6.64 acres)*

- Main Channel *(3.41 acres)*
- Secondary Channel *(0.69 acre)*
- Distributary Channel *(1.83 acres)*
- Avulsed Channel *(0.71 acre)*

Wetlands Adjacent to or Abutting RPWs *(178.81 acres)*

- Lodgepole Pine Meadow *(4.89 acres)*
- Wet Montane Meadow *(126.50 acres)*
- Willow Scrub-Wet Meadow *(47.43 acres)*

Delineated by T. Beyerl and P. Valle on November 21 and 22, 2013.

Directions to Site:
U.S 50 to Los Angeles Ave to Bellevue Ave.

0 200 400
FEET

NORTH

Aerial Image: NAIP 2012
X 60311654 002 2/14

Potentially Jurisdictional Features

Relatively Permanent Waters							**6.64**
	Trout Creek (Main Channel)	3.41	Trout Creek (Secondary Channel)	0.69	Trout Creek (Distributary Channel)	1.83	
	Trout Creek (Avulsed Channel)	0.71					
Wetlands Adjacent to or Abutting Relatively Permanent Waters							**178.83**
Wet Montane Meadow							126.50
	WM1	27.34	WM2	0.57	WM3	0.56	
	WM4	0.01	WM5	5.45	WM6	0.11	
	WM7	1.58	WM8	34.72	WM9	0.85	
	WM10	0.01	WM11	0.15	WM12	0.004	
	WM13	0.01	WM14	0.02	WM15	0.01	
	WM16	0.03	WM17	0.15	WM18	7.52	
	WM19	17.87	WM20	1.94	WM21	26.84	
	WM22	0.77	WM23	0.002			
Willow Scrub-Wet Meadow							47.43
	WSM1	0.18	WSM2	0.06	WSM3	4.45	
	WSM4	6.18	WSM5	0.18	WSM6	0.09	
	WSM7	0.17	WSM8	4.04	WSM9	0.14	
	WSM10	0.76	WSM11	0.04	WSM12	0.04	
	WSM13	1.06	WSM14	13.67	WSM15	3.98	
	WSM16	0.07	WSM17	0.49	WSM18	0.20	
	WSM19	0.34	WSM20	5.24	WSM21	0.27	
	WSM22	0.07	WSM23	0.07	WSM24	3.21	
	WSM25	1.26	WSM26	0.48	WSM27	0.72	
Lodgepole Pine Meadow							4.89
	LPM1	3.95	LPM2	0.93	LPM3	0.01	
						Total Potentially Jurisdictional Features:	**185.47**

Figure 2-8. Wetland Delineation Map (Source: AECOM, 2013)

Woody Riparian Vegetation

Figure 2-8 includes mapping of willow scrub wet meadow habitat that is dominated by mature willows and primarily occurs along channel boundaries. In addition to the areas mapped as willow scrub, the channel avulsion area was colonized by willows. This area had numerous willow saplings that were 2 to 4 feet tall in the baseline condition.

Herbaceous Vegetation

Baseline vegetation surveys were conducted by Western Botanical Services in August 2014 and are summarized in a report provided in Appendix A. Three reference transects were established in the area proposed for abandoned road fill removal and three were established in areas proposed for hummock construction in Year 1. All transects were 100 feet long. Total cover, vegetative cover, and dominance by natives was determined by point-intercept method for the transects. Baseline vegetative cover varied from 84% to 98% (average 90%) in the road fill removal transects and from 58% to 98% (average 80%) in the proposed hummock area transects. Cover by native plants averaged 86% and 80% in the road fill removal and proposed hummock area transects, respectively.

Table 2-1. Cover in Baseline Vegetation Transects

Community at Road Fill	**Transect 1**	**Transect 2**	**Transect 3**	**Average**
Total Cover (including litter, gravel, rock)	100%	100%	100%	100%
Total Vegetative Cover	88%	98%	84%	90%
Vegetative Cover by Native Species	84%	90%	83%	85.7%
Community at Proposed Hummocks	**Transect 1**	**Transect 2**	**Transect 3**	**Average**
Total Cover (including litter, gravel, rock)	100%	61%	90%	83.7%
Total Vegetative Cover	95%	58%	88%	80.3%
Vegetative Cover by Native Species	93%	58%	88%	79.7%

2.6 Wildlife and Fish

Information on wildlife and fish in the project area was compiled for the Upper Truckee River and Marsh Restoration Project EIS/EIS/EIR (California Department of General Services and California Tahoe Conservancy, 2013). The Upper Truckee River marsh provides habitat for approximately 200 amphibian, reptile, bird, and mammal species.

The montane meadow habitat provides resident habitat for small mammals, such as voles, shrews, and mice, with voles being the most abundant. The habitat serves as foraging and refuge habitat for larger mammals such as coyotes and bears. Beavers and muskrats use the stream/meadow interface. Under baseline conditions, evidence of beaver activity was noted downstream of the project area but no active dams were present in the project area. Evidence of beaver activity within the project area was first noted during the Year 1 Post Construction monitoring period (see Section 4.7 of this report).

The meadow can provide nesting habitat for ground nesting birds. Waterfowl and shore birds may use the stream interface, while raptors and bats use the meadow primarily for foraging. The willow scrub-wet meadow provides cover and foraging habitat for songbirds, including flycatchers, warblers and sparrows. In wetter areas, it may serve as habitat for the Pacific Tree frog, and within fish-free ponds as habitat for the long-toed salamander. Within the entire marsh, 12 special status species have a high to moderate likelihood of occurrence. Of these, eight have been observed within the marsh. However, with the exception of the Yellow Warbler, they are all raptors and bats, which forage over wide areas.

Trout Creek, because of its lack of riffles and predominance of a uniform coarse sand bed, does not generally provide resident habitat for salmonids or most other species of fish. However, Trout Creek within the project area provides migratory habitat for rainbow and brown trout, and may also provide temporary migratory habitat for Paiute Sculpin, Tahoe sucker, mountain sucker, Lahontan redside, Lahontan tui chub, and mountain whitefish. California Department of Fish and Wildlife (CDFW) species of special concern include the Tahoe sucker, Lahontan Lake tui chub, and Lahontan redside, which have some potential for occurrence. Additionally, the Lahontan cutthroat trout is a federally listed threatened species which has the potential to use the project reach for migration. In 2011, two hatchery-raised Lahontan cutthroat were observed in the Upper Truckee River during a fisheries survey conducted by the U.S. Forest Service.

Monitoring of wildlife and fish populations is not a component of the AMP monitoring. However, mitigation measures were identified in the AMP to minimize construction impacts to wildlife and fish. These measures, and the data from pre-construction and construction monitoring are described in Section 3.

3 PRE-CONSTRUCTION AND CONSTRUCTION MONITORING

3.1 Pre-Construction Bird Surveys

Willow Flycatcher and Nesting Bird Surveys

Willow flycatcher and nesting bird surveys were identified as measures to avoid potential impacts to bird species in the project area. Construction of Year 1 improvements did not commence until late September, outside of the nesting season. Therefore, pre-construction bird surveys were not conducted for Year 1.

3.2 Pre-Construction Mannagrass Survey

A review of a specimen previously identified as American Mannagrass near the project area determined that the specimen was incorrectly identified and that American Mannagrass was unlikely to be present in the project area. Surveys for this species were therefore eliminated from the monitoring plan.

3.3 Year 1 Construction

The District awarded the Year 1 work to V&C Construction, and the contractor mobilized on 22 Sep 2014. Construction was generally conducted according to plans provided in the AMP (NHC,2014). The District conducted daily inspections of the work. Field changes included the following items:

- 40 lineal feet of additional pilot channel construction to add a third pilot channel connecting the main channel of Trout Creek to an existing remnant channel on the left overbank;
- Addition of a left overbank opening at the head of the third pilot channel;
- Widening of the three left overbank openings at the head of the pilot channels to increase flow capacity;
- Planting of salvaged wetland plugs in approximately 1100 square feet of the wetland hummocks.

The first three items were undertaken to increase flows to the pilot channels along the left bank and decrease flows to the right overbank. The fourth item was undertaken to increase vegetation in the constructed hummocks. Due to a seasonally late start for construction, material delivery problems affected by seaport labor disputes, and unfavorable weather conditions during the growing period, pre-grown marsh mats delivered to the site had significantly less vegetative growth then intended in the design. The sod planting was intended to partially compensate for this deficiency. A red-line drawing showing the field changes is provided in Appendix B (Sheet C2).

3.4 Fisheries

An AECOM fisheries biologist was present during construction activities involving dewatering and in-water work. Block nets and electroshocking were used to isolate and relocate fish from the areas of

work. Fish were relocated to an upstream reach of Trout Creek southeast of the work area. The fish relocated included speckled dace, brown trout, and rainbow trout. Approximately 35 trout and over one thousand speckled dace were relocated. Logs of the electrofishing data are provided in Appendix B.

3.5 Cultural Resources

An AECOM specialist in archaeological and historical resources was onsite during ground disturbing activities. Minor artifacts encountered including pieces of timber bridges, nails, one obsidian flake tool, and shards of pottery and glass. No resources were encountered that required stoppage or relocation of the work. Field observations and a photo log are provided in Appendix B; photos are on file at AECOM.

3.6 Sediment Discharge and Trout Creek Turbidity

The District monitored excavation and dewatering work visually (using prepared sample vials for reference) to minimize turbidity discharged to the stream. Dewatering methods included pumping to a water disposal area where flows were spread on a dry area of the meadow for infiltration. The District made multiple tests of turbidity daily with a portable (Hach 2100Q turbidimeter). The recording turbidimeters were used to verify portable measurements and provide a record of turbidity during the entire construction period. Turbidity in excess of 20 NTUs was recorded occasionally during excavation of the pilot channels and installation of hummocks in wet areas, but exceedances were relatively few and short in duration. These data indicate that the performance standard for sediment discharge and turbidity was met during construction.

Figure 3-1 shows the data from the recording turbidimeters upstream and immediately downstream of the Bellevue work area.

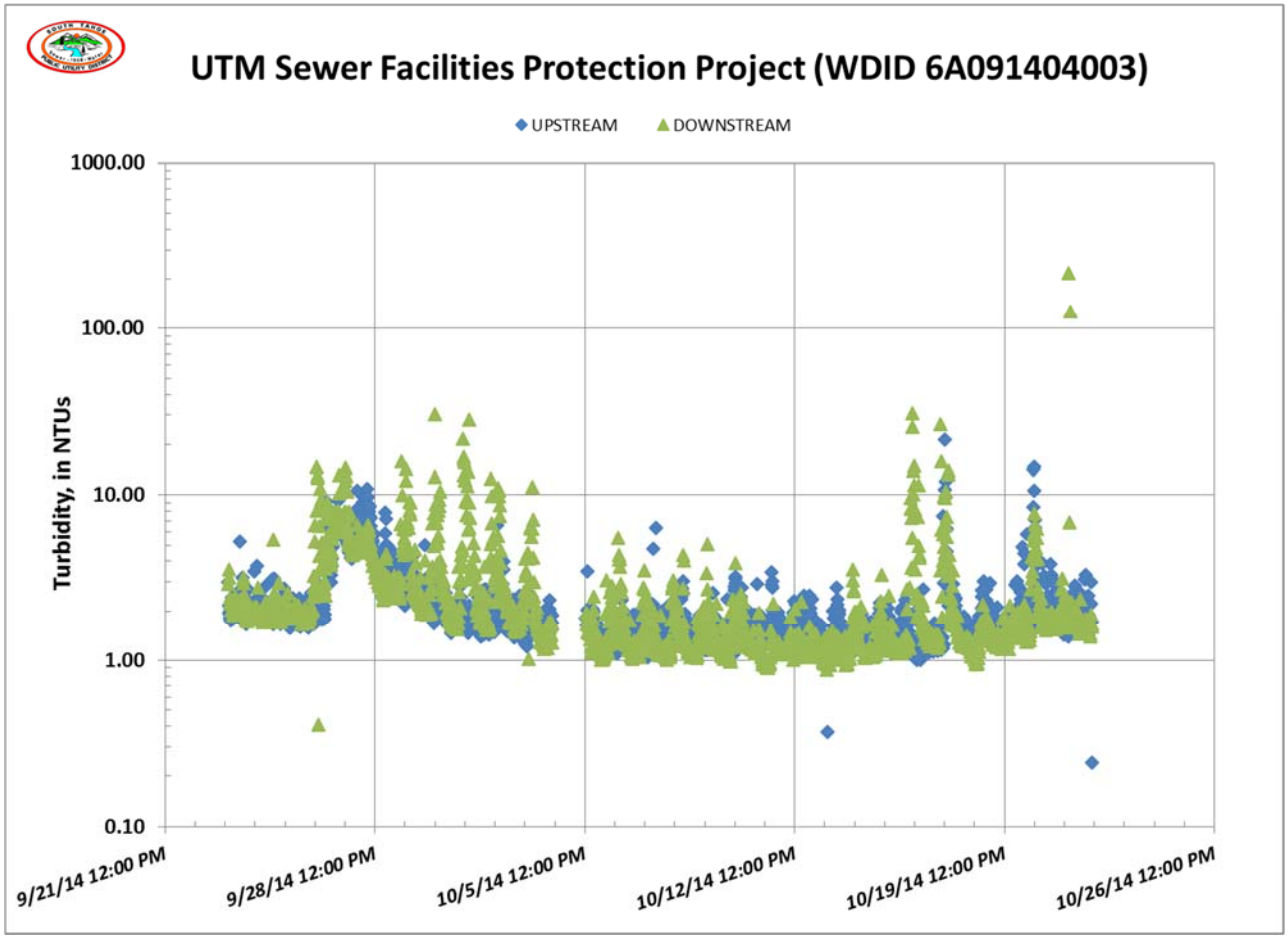


Figure 3-1. Turbidity upstream and downstream of Bellevue Avenue work area during Year 1 construction period

3.4 Pilot Channel Width

The pilot channels were monitored visually during and immediately after construction and were found to be very stable in size and vertical profile. Therefore, no data are reported here for pilot channel width as part of construction monitoring. The pilot channels were surveyed and monumented in post-construction monitoring described in Section 4.

4 POST-CONSTRUCTION MONITORING

4.1 Topography

Following Year 1 construction, the District surveyed the work area near Bellevue Avenue and the head of the secondary channel in the center of the meadow. The mapping included general topography and mapping of Year 1 hummocks and pilot channel near Bellevue Avenue, resurvey of the fourteen cross sections established in the Bellevue Avenue work area by the baseline survey, establishment of seven monumented cross sections on the pilot channels, and general topography and eight cross sections along the secondary channel. The survey was conducted on November 25 and 26, 2014. Trout Creek mean daily flows at USGS 10336780 for the survey dates were 11 and 10 cfs. Figure 4-1 shows the mapping in the Bellevue Avenue work area and the full set of survey products is included in Appendix C. Comparison of Figure 4-1 and Figure 2-3 indicates reduced right overbank flow paths due to installation of the right overbank plugs and increased left overbank flow paths associated with the pilot channels. However, the comparison shows little change in the extent of flooding in the easement area. Appendix C includes a comparison of baseline and 2014 cross sections. The cross sections show relatively little change other than changes associated with pilot channel construction. This is expected due to the locations of cross sections outside of the hummock areas, and the low levels of fill associated with the hummocks (less than one foot).

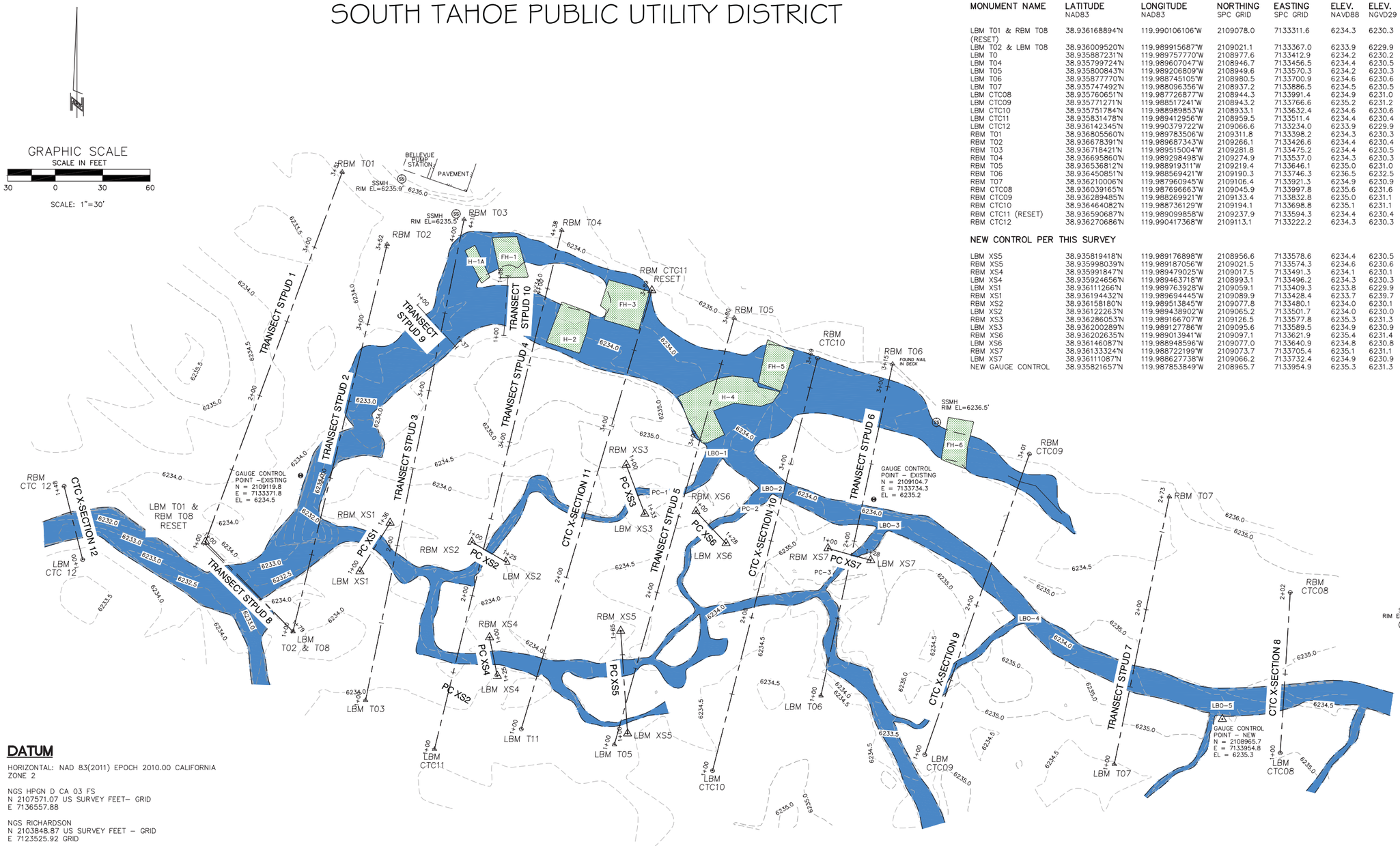
4.2 Right Overbank Flows and Inundation of Easement

Pilot channel flows were measured on 2 February 2015. Right overbank flows in the easement area were too shallow to measure on this date and were estimated to be less than 1 cfs. The mean daily flow at USGS Gage 10336780 for 2 February was approximately 11 cfs. A site visit on 12 February 2015 followed a small peak in runoff of approximately 60 cfs (annual peak for 2013/2014 water year). On 12 February, the flow at USGS Gage 10336780 was approximately 18 cfs. On this date, it was estimated that approximately 75 percent of the flow was passing through the pilot channels and left overbank and 25 percent through the right overbank/easement. These measurements indicate that although the extent of inundation was changed only slightly following Year 1 construction, flow through the easement was significantly reduced. The relative distribution of flows to the pilot channels is higher at lower flows (up to 90%), and lower at higher flows. This is because the area near Hummocks H-4 and FH-5 in Year 1 construction function as a weir – at higher flows, distribution to the right overbank increases relatively rapidly as the stage on the weir increases.

Flows were measured again prior to Year 2 construction on 20 August 2015 with a flow of 8 cfs at USGS Gage 10336780. Approximately 4 cfs was estimated to be passing through the three pilot channels with less than one cfs on the right overbank.

These results indicate that the pilot channels serve to divert low flows, but natural development of the pilot channels (as envisioned in the AMP) will be necessary to achieve the desired reduction of flows in the easement.

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT - AS BUILT FOR SOUTH TAHOE PUBLIC UTILITY DISTRICT



EXISTING CONTROL PROVIDED BY S.T.P.U.D.

MONUMENT NAME	LATITUDE NAD83	LONGITUDE NAD83	NORTHING SPC GRID	EASTING SPC GRID	ELEV. NAVD88	ELEV. NGVD29
LBM T01 & RBM T08 (RESET)	38.936168894"N	119.990106106"W	2109078.0	7133311.6	6234.3	6230.3
LBM T02 & LBM T08	38.936009520"N	119.989915687"W	2109021.1	7133367.0	6233.9	6229.9
LBM T0	38.935887231"N	119.989757770"W	2108977.6	7133412.9	6234.2	6230.2
LBM T04	38.935799724"N	119.989607047"W	2108946.7	7133456.5	6234.4	6230.5
LBM T05	38.935800843"N	119.989206809"W	2108949.6	7133570.3	6234.2	6230.3
LBM T06	38.935877770"N	119.988745105"W	2108980.5	7133700.9	6234.6	6230.6
LBM T07	38.935747492"N	119.988096356"W	2108937.2	7133886.5	6234.5	6230.5
LBM CTC08	38.935760651"N	119.987726877"W	2108944.3	7133991.4	6234.9	6231.0
LBM CTC09	38.935771271"N	119.988517241"W	2108943.2	7133766.6	6235.2	6231.2
LBM CTC10	38.935751784"N	119.988989853"W	2108933.1	7133632.4	6234.6	6230.6
LBM CTC11	38.935831478"N	119.989412956"W	2108959.5	7133511.4	6234.4	6230.4
LBM CTC12	38.936142345"N	119.990379722"W	2109066.6	7133234.0	6233.9	6229.9
RBM T01	38.936805560"N	119.989783506"W	2109311.8	7133398.2	6234.3	6230.3
RBM T02	38.936678391"N	119.989687343"W	2109266.1	7133426.6	6234.4	6230.4
RBM T03	38.936718421"N	119.989515004"W	2109281.8	7133475.2	6234.4	6230.5
RBM T04	38.936695860"N	119.989298498"W	2109274.9	7133537.0	6234.3	6230.3
RBM T05	38.936536812"N	119.988919311"W	2109219.4	7133646.1	6235.0	6231.0
RBM T06	38.936450851"N	119.988569421"W	2109190.3	7133746.3	6236.5	6232.5
RBM T07	38.936210006"N	119.987960945"W	2109106.4	7133921.3	6234.9	6230.9
RBM CTC08	38.936039165"N	119.987696663"W	2109045.9	7133997.8	6235.6	6231.6
RBM CTC09	38.936289485"N	119.988269921"W	2109133.4	7133832.8	6235.0	6231.1
RBM CTC10	38.936464082"N	119.988736129"W	2109194.1	7133698.8	6235.1	6231.1
RBM CTC11 (RESET)	38.936590687"N	119.989099858"W	2109237.9	7133594.3	6234.4	6230.4
RBM CTC12	38.936270686"N	119.990417368"W	2109113.1	7133222.2	6234.3	6230.3

NEW CONTROL PER THIS SURVEY

LBM XS5	38.935819418"N	119.989176898"W	2108956.6	7133578.6	6234.4	6230.5
RBM XS5	38.935998039"N	119.989187056"W	2109021.5	7133574.3	6234.6	6230.6
RBM XS4	38.935991847"N	119.989479025"W	2109017.5	7133491.3	6234.1	6230.1
LBM XS4	38.935924656"N	119.989463718"W	2108993.1	7133496.2	6234.3	6230.3
LBM XS1	38.936111266"N	119.989763928"W	2109059.1	7133409.3	6233.8	6229.9
RBM XS1	38.936194432"N	119.989694445"W	2109089.9	7133428.4	6233.7	6229.7
RBM XS2	38.936158180"N	119.989513845"W	2109077.8	7133480.1	6234.0	6230.1
LBM XS2	38.936122263"N	119.989438902"W	2109065.2	7133501.7	6234.0	6230.0
RBM XS3	38.936286053"N	119.989166707"W	2109126.5	7133577.8	6235.3	6231.3
LBM XS3	38.936200289"N	119.989127786"W	2109095.6	7133589.5	6234.9	6230.9
RBM XS6	38.936202635"N	119.989013941"W	2109097.1	7133621.9	6235.4	6231.4
LBM XS6	38.936146087"N	119.988948596"W	2109077.0	7133640.9	6234.8	6230.8
RBM XS7	38.936133324"N	119.988722199"W	2109073.7	7133705.4	6235.1	6231.1
LBM XS7	38.936111087"N	119.988627738"W	2109066.2	7133732.4	6234.9	6230.9
NEW GAUGE CONTROL	38.935821657"N	119.987853849"W	2108965.7	7133954.9	6235.3	6231.3

DATUM

HORIZONTAL: NAD 83(2011) EPOCH 2010.00 CALIFORNIA ZONE 2

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET– GRID
E 7136557.88

NGS RICHARDSON
N 2103848.87 US SURVEY FEET – GRID
E 7123525.92 GRID

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL = 6248.20

PER CONTROL SURVEY PROVIDED BY S.T.P.U.D., PREPARED BY TRI STATE SURVEYING, LTD., DATED 11–05–13

LEGEND:

△ SET 5/8" REBAR AND CAP "LUMOS CONTROL"

△ FOUND 5/8" REBAR AND CAP "TR–STATE CONTROL" – UNLESS OTHERWISE NOTED

○ FOUND 1/2" REBAR W/ NO CAP (CTC)

NOTE:

FIELD SURVEY CONDUCTED ON NOVEMBER 25 & 26, 2014.

Figure 4-1. Survey of Year 1 Topography near Bellevue Avenue (Source: Lumos & Associates, 2014; full survey in Appendix C)

LUMOS & ASSOCIATES

800 E. COLLEGE PARKWAY
CARSON CITY, NEVADA 89706
TEL (775) 883-7077
FAX (775) 883-7114

WWW.LUMOSENGINEERING.COM

CIVIL ENGINEERING
GEOTECHNICAL ENGINEERING
PLANNING
LANDSCAPE ARCHITECTURE
SURVEYING / GIS
CONSTRUCTION SERVICES
MATERIALS TESTING

SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - BELLEVUE AREA
A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

REV	DATE	DESCRIPTION	BY

B1

DATE: DECEMBER 2(
DRAWN BY: K
DESIGNED BY:
CHECKED BY:
JOB NO.: 8688.(

12/29/2014 01:23 pm gphillips

4.3 Pilot Channels

Pilot channels were observed periodically during and after construction. Bed load transport and minor local scour was observed between November 2014 and May 2015. However, no significant increase in pilot channel size was observed and bed materials were observed to be relatively cohesive and resistant to erosion, although relatively high velocities (2-4 fps) were observed in the downstream portions of the channels. In some areas, remaining root mass from vegetation appeared to contribute to stability. In August 2015, PCXS3, PCX6, and PCXS7 were measured as part of flow measurements. These measurements indicated no expansion in pilot channel area and observations between May and August 2015 indicated a trend for reduction in effective flow area due to vigorous growth of vegetation on the pilot channel banks. A profile survey was also conducted for the pilot channels which indicated no general increase in depth or changes in slope since construction.

4.4 Water Levels

The pressure transducers shown in Figure 2-6 continued to operate following Year 1 construction. Figure 4-2 shows the water level record between October 2014 and July 2015. The water levels are intended to supplement observations on easement inundation and pilot channel performance in conjunction with survey data. The data indicate that water levels at the middle and upper stations on Trout Creek have remained relatively constant since the baseline period. The lower station is below the channel avulsion area and stages vary more with flow than for the other two stations. The data indicate that at low flows there is about a foot of drop between the middle and lower station, which is a higher gradient than the Trout Creek slope in the reach. The higher gradient represents potential for pilot channel development, but as noted above, little development was observed in the period following Year 1 construction.

Groundwater levels remained relatively constant with a slight increase during the spring that may correlate to precipitation. In the data collected to date, groundwater levels are not well correlated to stream stage and are below the stream levels, indicating potential for loss of flow from the stream to groundwater in the local area.

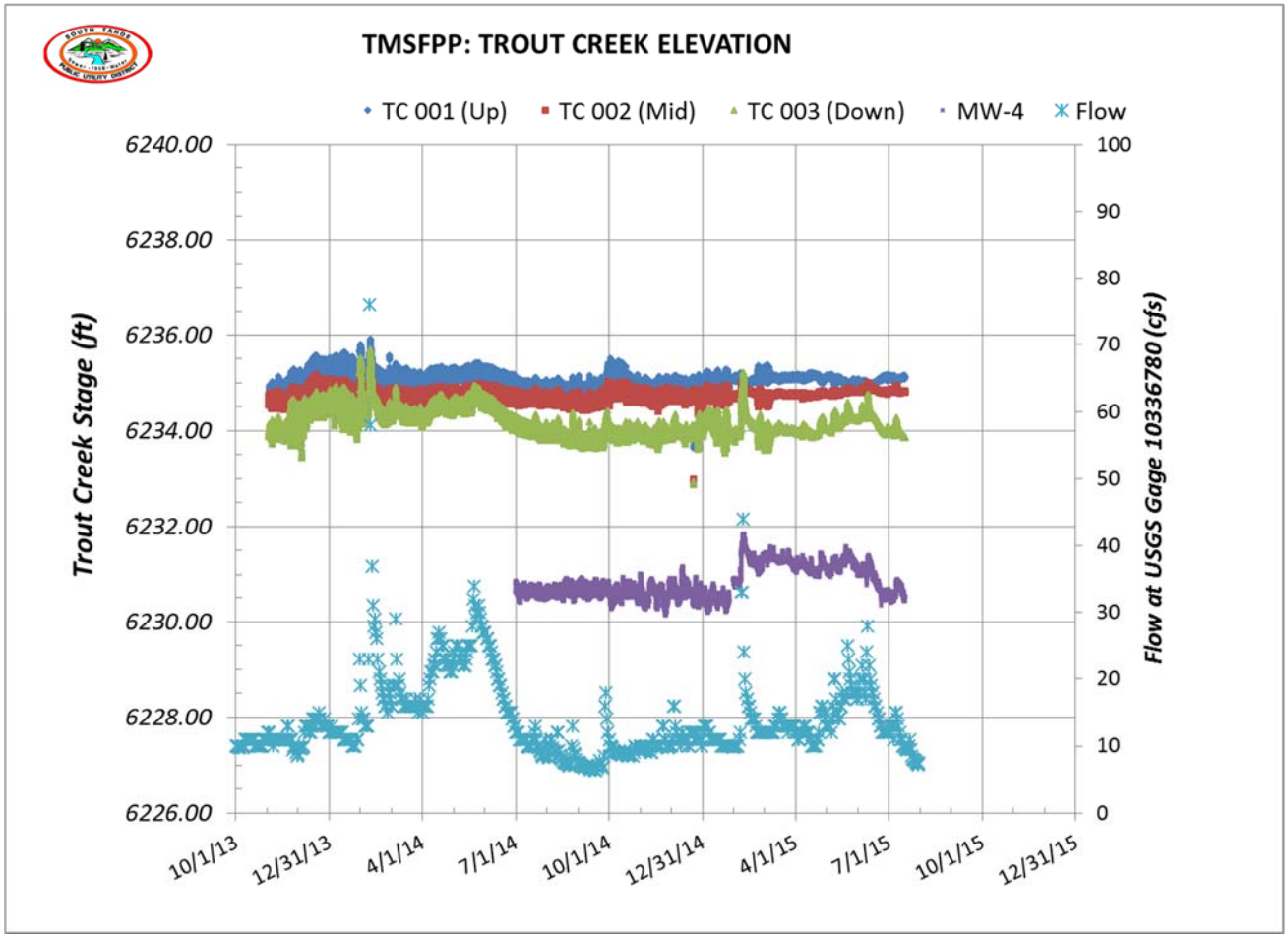


Figure 4-2. Water levels through end of July 2015

4.5 Planted Vegetation

Herbaceous Vegetation

Vegetation replanted on the road fill removal area and planted in the hummocks was surveyed in July 2015 by Western Botanical Services. The monitoring report is provided in Appendix C. Herbaceous vegetation was monitored on the six transects established for baseline conditions on the road fill removal and hummock areas. Table 4-1 summarizes the results of cover measurements on the road fill removal area and Table 4-2 summarizes the hummock transects.

Table 4-1. Road Fill Removal Area Cover Summary (from WBS, 2015)

Cover Type	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	100%	100%	100%	100%
Total Vegetative Cover	97%	97%	95%	96%
Vegetative Cover By Native Species	92%	89%	88%	90%

Table 4-2. Hummock Cover Summary (from WBS, 2015)

Cover Type	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	68%	85%	62%	72%
Total Vegetative Cover	37%	35%	31%	34%
Vegetative Cover By Native Species	36%	35%	31%	34%

The performance standard for herbaceous vegetation established in the AMP is 70 percent of baseline cover after 2 years; 90 percent of baseline after three years; and vigor comparable to surrounding marsh areas. The data for the road fill removal area indicate that the performance standards were met in Year 1. The performance standards were not met in the hummock transects, where baseline vegetative cover averaged about 80%. The pre-planted marsh mats for Year 1 were delivered with much lower than expected vegetative growth due to a combination of shipping, weather, and construction timing problems. The revegetation monitoring report notes that in spite of the planting problems the hummocks are growing well and are expected to meet cover standards over time.

Vigor was ranked as excellent for the road fill removal area and as very good for the hummock transects, meeting the performance standards.

Woody Vegetation

Willow stake counts were made for the willow sausal and the willow fences. Survival was 13% for the willow sausal and 40% for the willow fence, not meeting the performance standard of 80% survival. The vegetation monitoring report attributes the low success to improper materials and planting methods, but notes that the survival rate is sufficient for the features to serve their intended function if the material continues to grow.

4.6 Turbidity

Turbidity measurements in the period following construction and through the subsequent snowmelt season were considered to be a means of assessing whether channel development was proceeding too rapidly or erosion was occurring as a result of project features. As noted above, pilot channel

development did not progress as rapidly as expected, and project features were visually observed to be stable during the highest seasonal flows in February 2015.

Figure 4-3 shows the turbidity measurements upstream and downstream of the work area near Bellevue Avenue for the period during and after Year 1 construction through May 2015. Trout Creek flows at USGS 10336780 are also shown in the plot. Although there are outlying data points indicating short duration elevated turbidity levels both upstream and downstream of the work area, the data generally show turbidity levels to be similar at the two stations and to generally be less than about 5 NTUs.

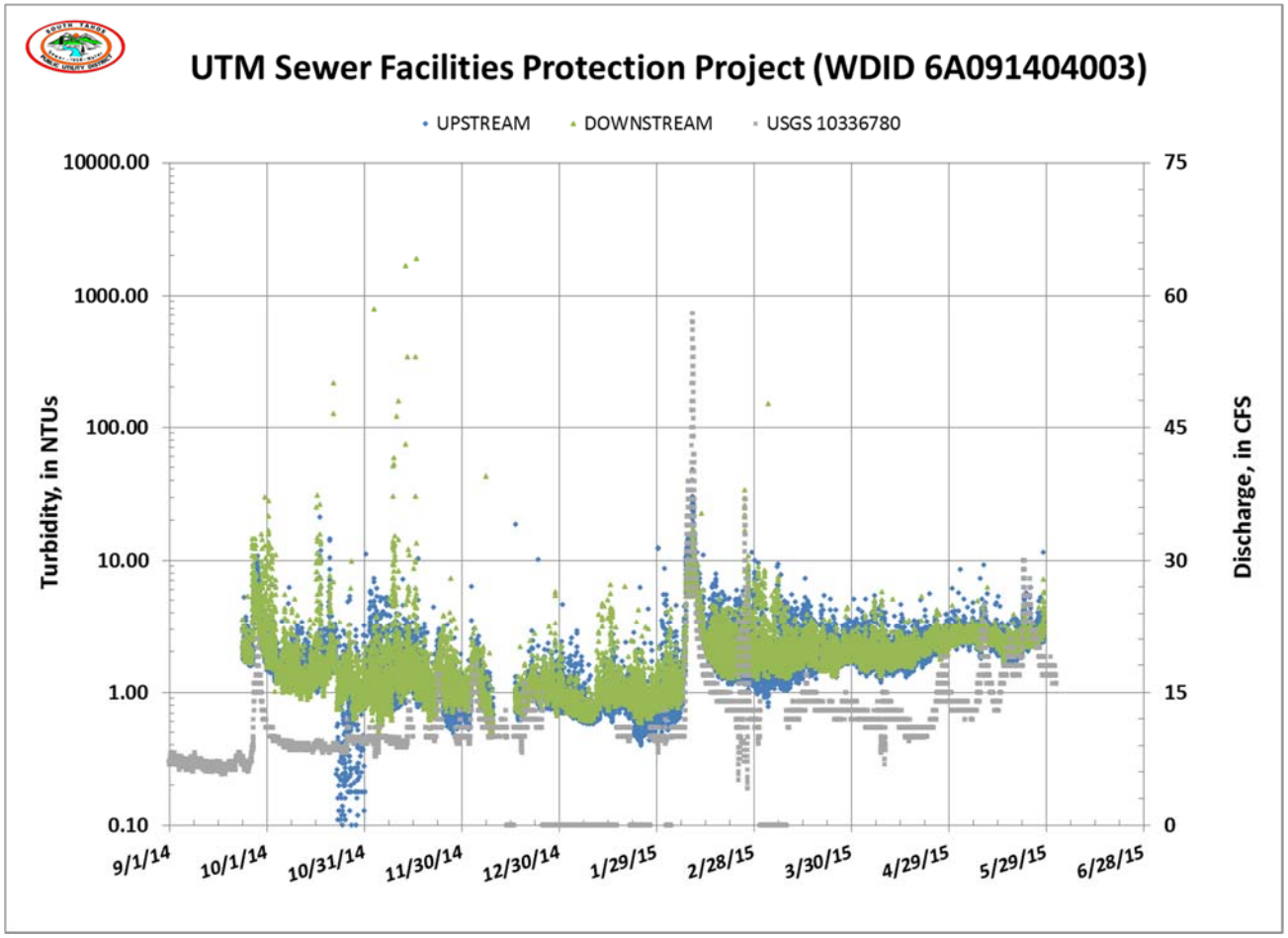


Figure 4-3. Turbidity upstream and downstream of work area near Bellevue Avenue through June 2015

4.7 Photo Points

Photos were collected at photo points indicated in Figure 4-4 on 24 Oct 2014 (immediately after construction), and are included in Appendix C. Additional photos were collected as listed in the photo index in Appendix C, and are available from the District's files on request. In addition to ground photos, the District collected aerial views of the work area on 24 Oct 2014 and 17 Apr 2015 using a small unmanned aerial vehicle (UAV). Figures 4-5 and 4-6 show two views collected using this method.

South Tahoe Public Utility District

nhc
northwest hydraulic consultants

Legend

Photo Monitoring Stations

Survey Cross Sections

SCALE - 1:800

0 25 50 75 100 ft

N

Job: 600035

JANUARY 2014

DATA SOURCES:
Google Earth

Figure 4-4

Locations of Photo Points

Figure 4-5. Upstream of Bellevue work area looking west, 17 Apr 2015 (pilot channels diverting flow to left overbank and right overbank plugs as disconnections in channels on right overbank)

Figure 4-6. Easement and avulsed channel area looking west, 17 Apr 2015 (hummocks in right center of frame and along fence, pilot channels on left overbank)

4.8 Wetland Extent

This standard applies at the end of the project to ensure that AMP measures have not converted functional wetland and Stream Environment Zone (SEZ) jurisdictional areas into mesic or upland conditions. As evident in the aerial views, project features are still subject to shallow inundation and were constructed within the range of elevations for adjacent areas of the marsh. The road fill removal area lowered approximately 6000 sf of the surface to be flush with the adjacent marsh and distributed overflow of the lowered area was observed in February and April. This area has therefore had a functional lift in wetland function, and other project features are expected to provide wetland habitat equivalent to adjacent areas of the marsh after fully revegetated. Figure 4-7 shows an aerial view of the road fill removal area.

Figure 4-7. Aerial view of road fill removal area looking south, 17 Apr 2015 (road fill removal in right center of frame, pilot channel outlet in left foreground)

4.9 Final Topography

This data will be compiled at the completion of the project.

4.10 New Challenges - Beaver Activity

Although the effects of beaver dams downstream of the project area were acknowledged in the development of the AMP, no beaver activity was occurring in the project area at the time the AMP was prepared. Following Year 1 construction, extensive beaver activity began to occur upstream of the Bellevue Avenue work area and in the vicinity of the head of the secondary channel in the center of the

meadow. A main dam is currently located on Trout Creek in the location shown in Figure 4-8, and several auxiliary dams are in place to block return or distributary channels. The result is widespread flooding of the meadow at very low flows in the area upstream of Bellevue Avenue. This flooding has created new challenges for the District associated with flooding in the easement and persistent water around manholes (see Figure 4-9). Although some potential solutions were considered in the Year 2 planning (see Section 5), these efforts were postponed to allow sufficient time for planning and environmental support work, and to assess the effects of other Year 2 work on water levels.

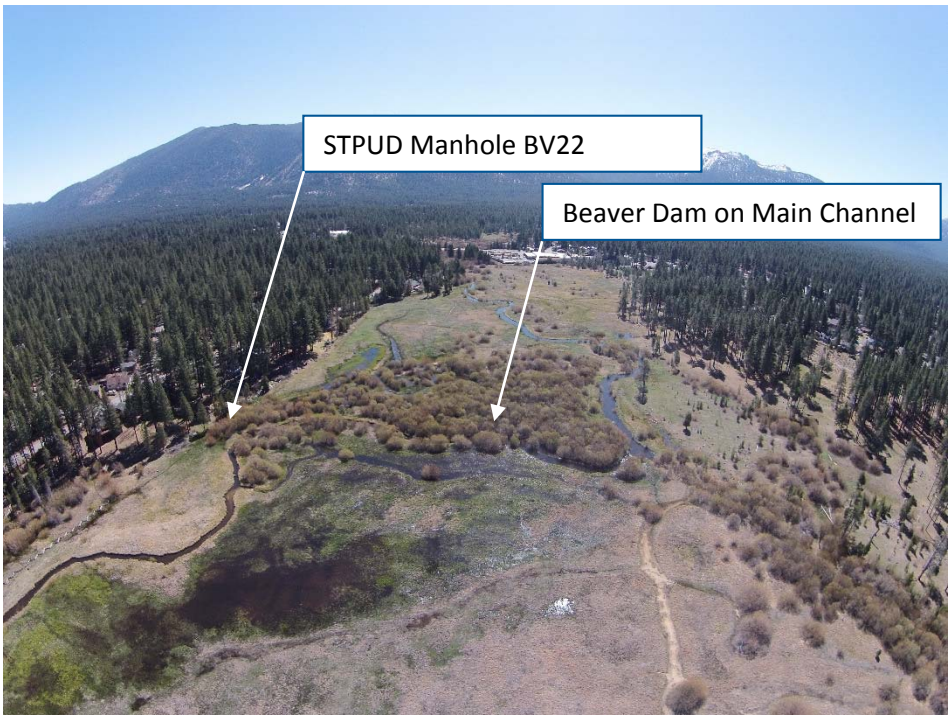


Figure 4-8. Inundation of meadow at low flow (approximately 25 cfs) due to beaver activity, looking east upstream of Bellevue Avenue, 17 Apr 2015

Figure 4-9. STPUD Manhole BV22, inundation due to beaver activity, 12 Feb 2015

5 YEAR 2 PLAN

5.1 Objectives for Year 2

Year 1 project features were generally successful at reducing flows directly over the sewer lines, opening new flow pathways on the left bank, and reducing flow pathways toward the easement on the right bank. The pilot channels were constructed at a small size to reduce the potential for excessively rapid enlargement and erosion. Observations after construction indicated that bed scour was occurring in some locations and bed sediment (primarily sand) was being transported in the channels. Although some of the desired slow expansion of the channels occurred, during the spring months flow was relatively low and vegetation regrowth along the pilot channel banks was extremely rapid. Development of the pilot channels is a key component in redirecting Trout Creek flows in the vicinity of Bellevue Avenue, and in lowering water levels in the overbanks upstream. In order to meet the objectives for reduced inundation of the easement over the implementation period of the AMP, the following objectives were identified for Year 2 construction and reviewed with stakeholders in March 2015 meetings:

- Increase flow distribution to pilot channels to further reduce inundation of easement
- Increase vegetation on right overbank near Bellevue to further increase resistance and reduce overbank flows
- Allow distribution of flows into center of meadow via secondary channel
- Mitigate ponding and increase in flows on right overbank due to current and future beaver activity

Following these meetings, the District decided not to pursue measures intended to mitigate for beaver activity in Year 2. This decision was based on the need to obtain agreements for access to the upstream flooding from El Dorado Avenue, supplemental environmental work needed to include the inundated areas in the project area, and potential improvements associated with reduced water levels with better flow distribution to the pilot channels. The District has in place a contingency plan for access to the flooded manholes without vehicles in case a blockage or problem emergency occurs. Additional work to mitigate the effects of flooding due to beaver activity may be undertaken in Year 3.

5.2 Year2 Plans

Appendix D includes Year 2 Plans designed to meet the objectives above. The plans were distributed to resource and regulatory agencies in June 2015. The plans include deepening of 260 lineal feet of Pilot Channels 1 and 3 constructed in Year 1, installation of an additional 600 sf hummock along the easement, construction of an additional right overbank plug upstream of those constructed in Year 1, and construction of a pilot channel to activate the secondary channel in the center of the meadow.

6 REFERENCES

AECOM, 2014. Preliminary Delineation of Waters of the United States, Including Wetlands, Trout Creek Upper Truckee Marsh Sewer Protection project, prepared for South Tahoe Public Utility District, April 2014.

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APPENDIX A

Baseline Information

2015 ANNUAL REPORT

APPENDIX A – BASELINE INFORMATION

LIST OF CONTENTS

Baseline Survey in area near Bellevue Avenue, Tri-State Surveying, 2013

Baseline Vegetation Monitoring Report, Western Botanical Services, 2014

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT FOR SOUTH TAHOE PUBLIC UTILTY DISTRICT

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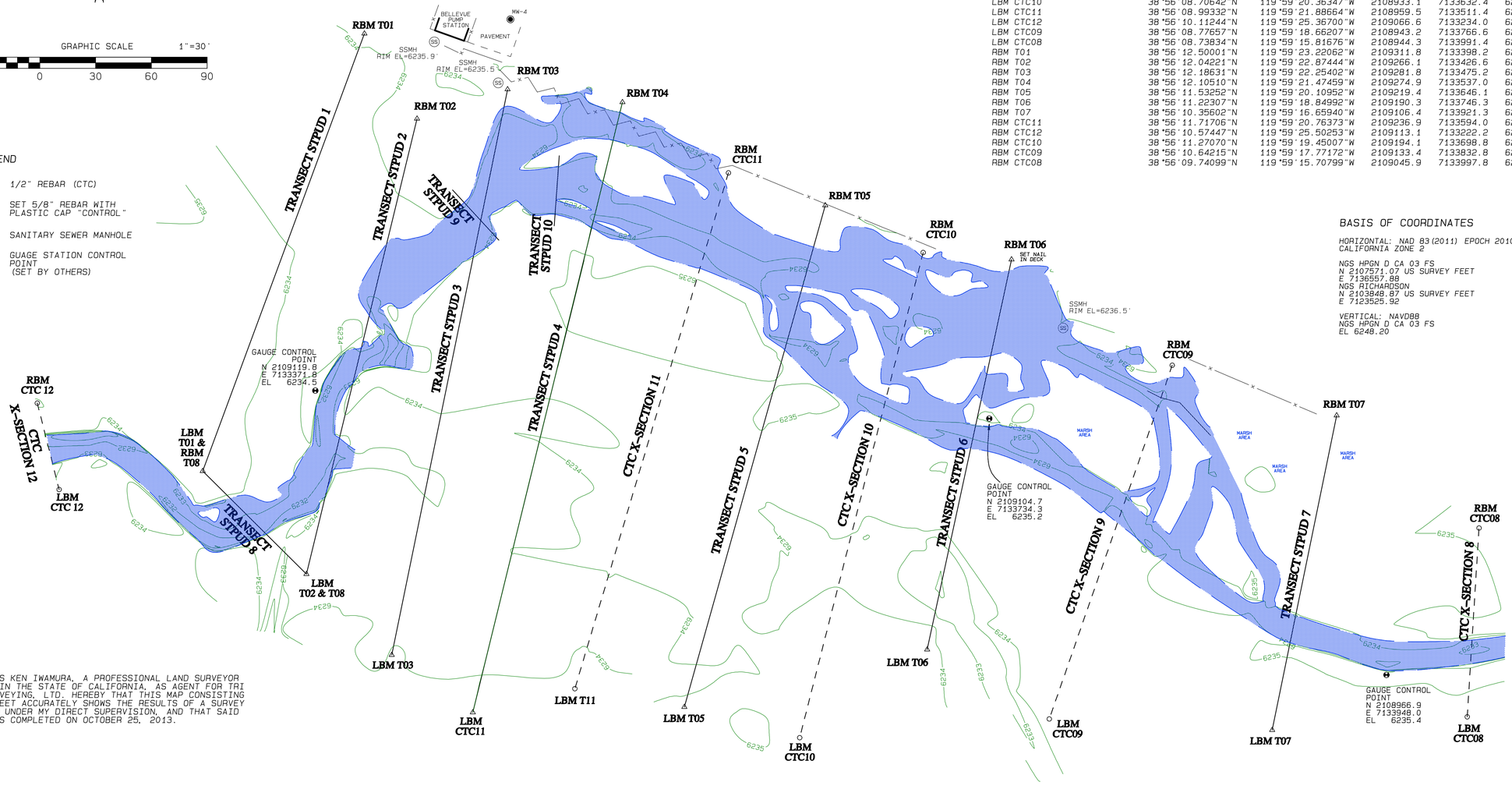
0 30 60 90

LEGEND

- ○ 1/2" REBAR (CTC)
- △ SET 5/8" REBAR WITH PLASTIC CAP "CONTROL"
- (SS) SANITARY SEWER MANHOLE
- GUAGE STATION CONTROL POINT (SET BY OTHERS)



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E 7136557.88
NGS RICHARDSON
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E 7123525.92

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL 6248.20

I, CHARLES KEN IWAMURA, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF CALIFORNIA, AS AGENT FOR TRI STATE SURVEYING, LTD. HEREBY THAT THIS MAP CONSISTING OF ONE SHEET ACCURATELY SHOWS THE RESULTS OF A SURVEY PERFORMED UNDER MY DIRECT SUPERVISION, AND THAT SAID SURVEY WAS COMPLETED ON OCTOBER 25, 2013.

CHARLES KEN IWAMURA
PROFESSIONAL LAND SURVEYOR
CALIFORNIA CERTIFICATE NO. 8540

TRI STATE SURVEYING, LTD
425 EAST LONG STREET
CARSON CITY, NEVADA 89706
(775) 887-9911 * FAX 887-9915

REVISIONS

NO.	DATE	MARK

BENCHMARK

DESIGNED BY
DRAWN BY CKI
CHECKED BY JS
DATE SURVEYED OCT 16, 2013
APPROVED BY

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT
PORTIONS OF THE N 1/2 OF SECTION 4, TOWNSHIP 12 NORTH, RANGE 18 EAST, M.D.M.
EL DORADO COUNTY CALIFORNIA

JOB NO 13120.01.CM
DATE 11-5-13

SHEET 1 OF 3

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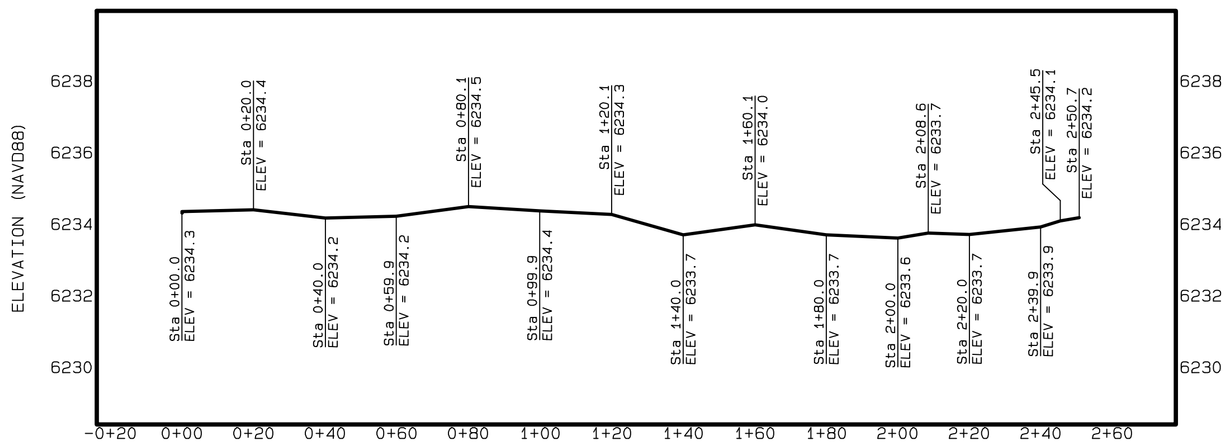

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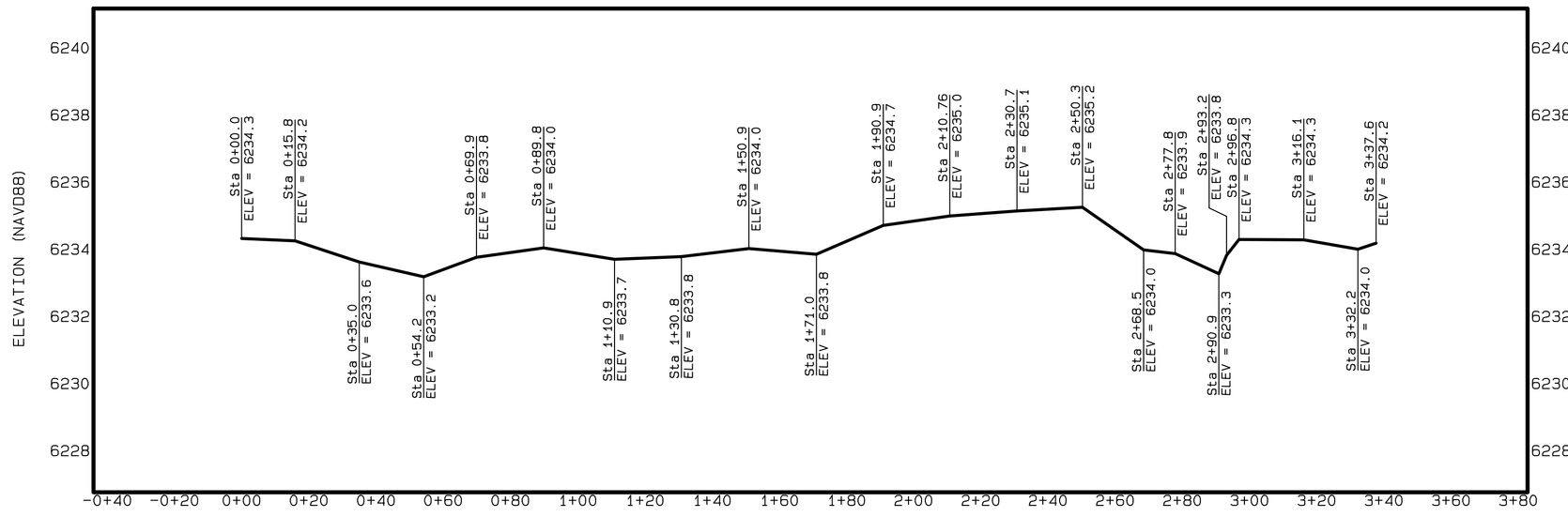

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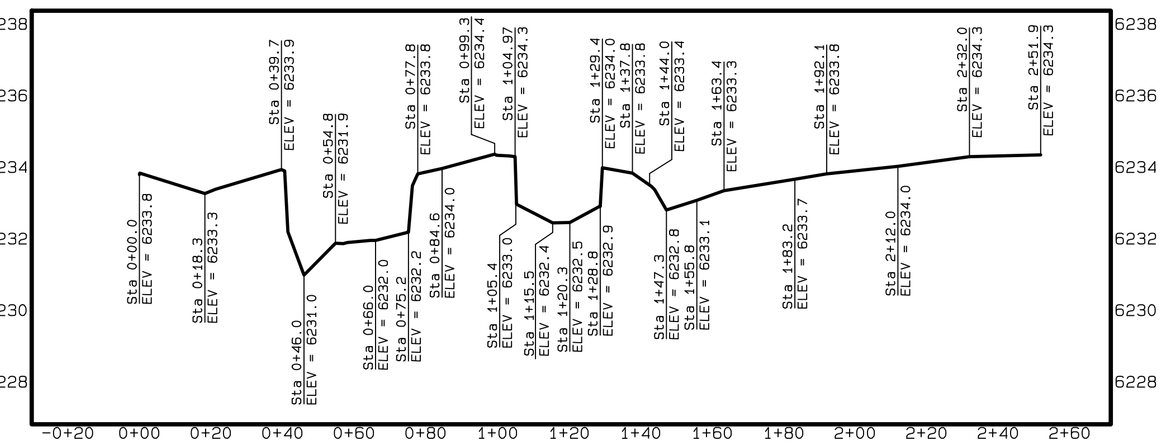

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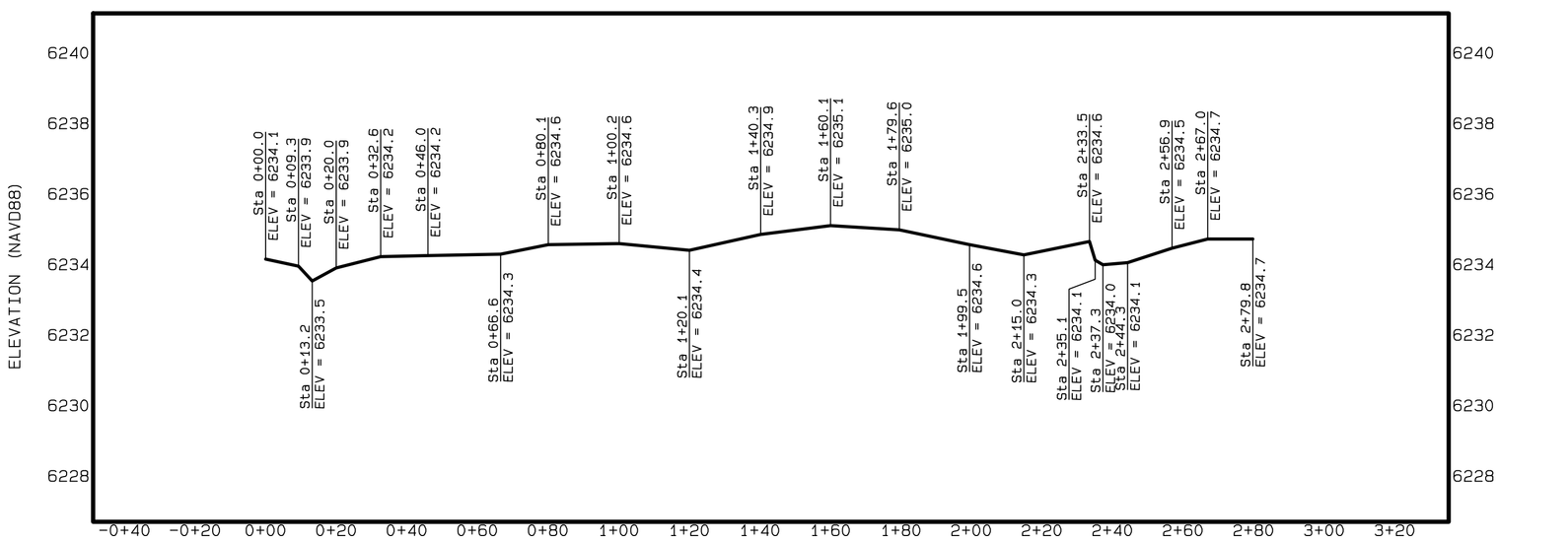

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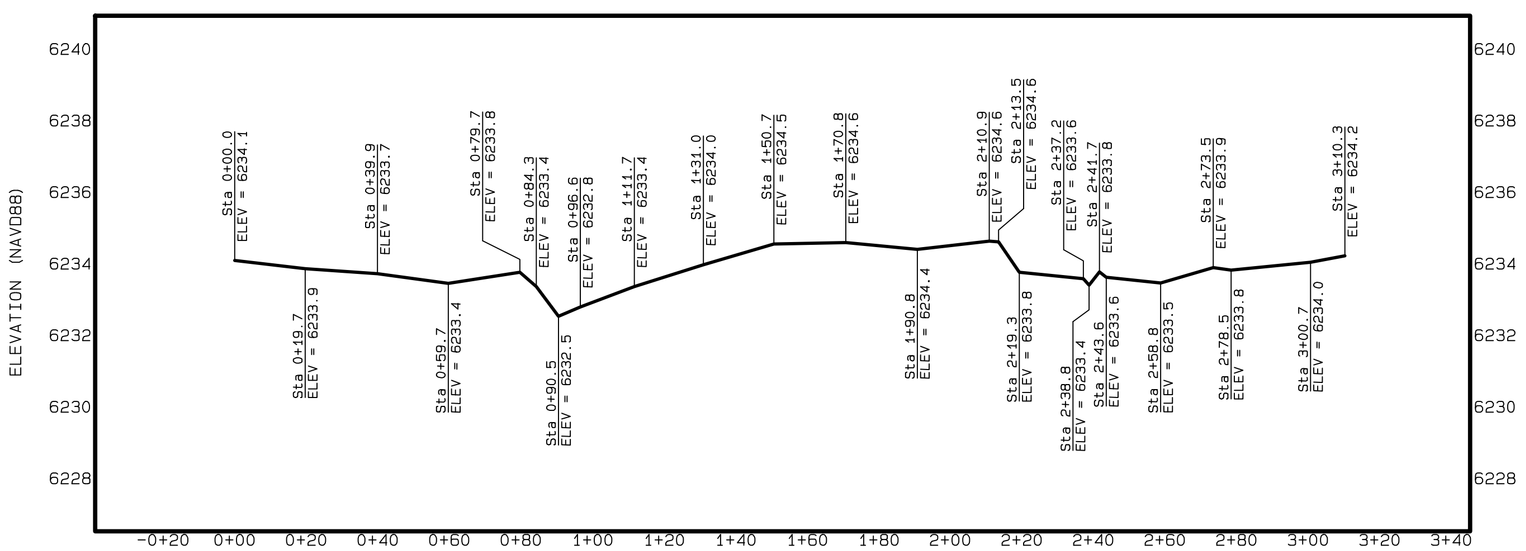

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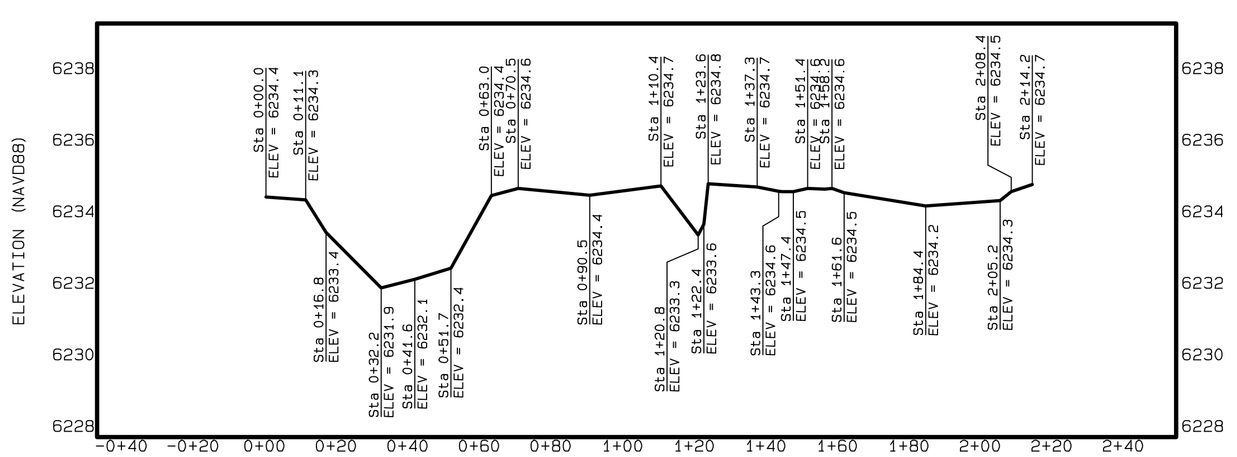

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MARK	DATE	REVISIONS

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DESIGNED BY	DRAWN BY
	CKI
CHECKED BY	DATE SURVEYED
JS	OCT 16, 2013
APPROVED BY	NO.

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT

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EL DORADO COUNTY *CALIFORNIA*

JOB NO 13120.01.CM

DATE 11-5-13

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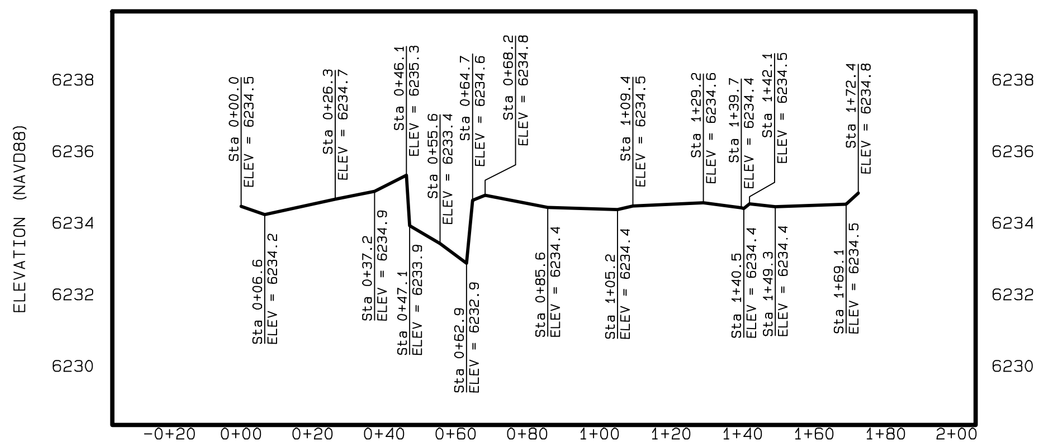

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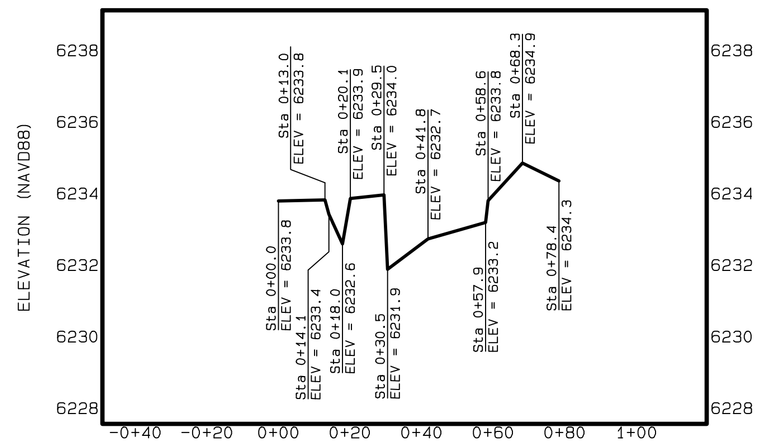

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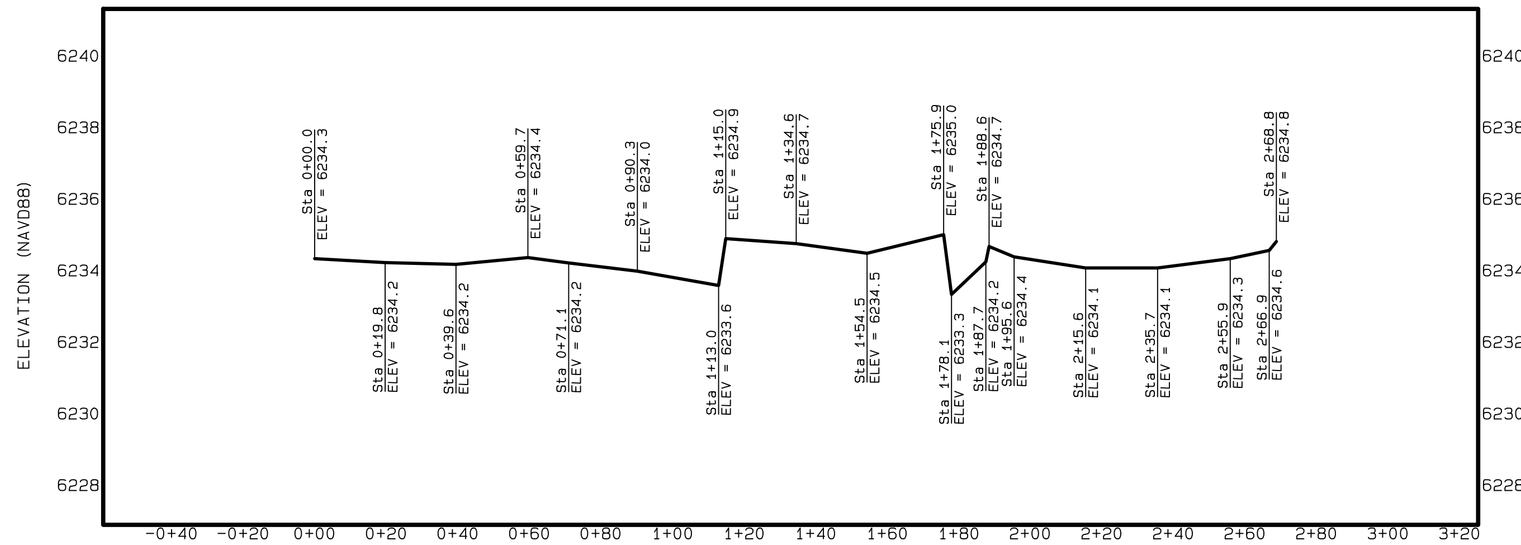

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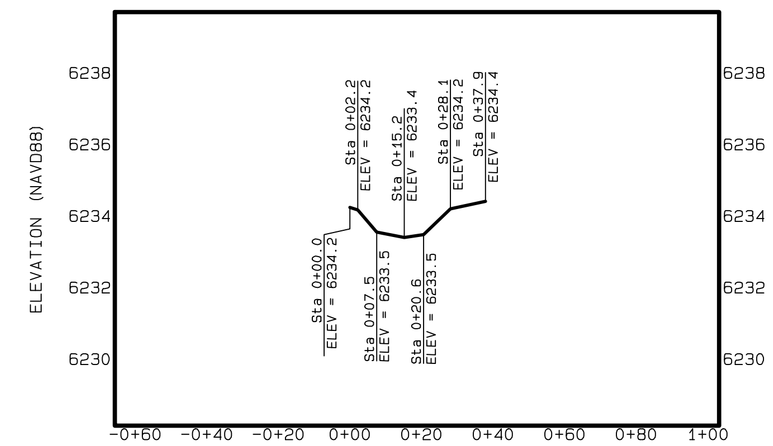

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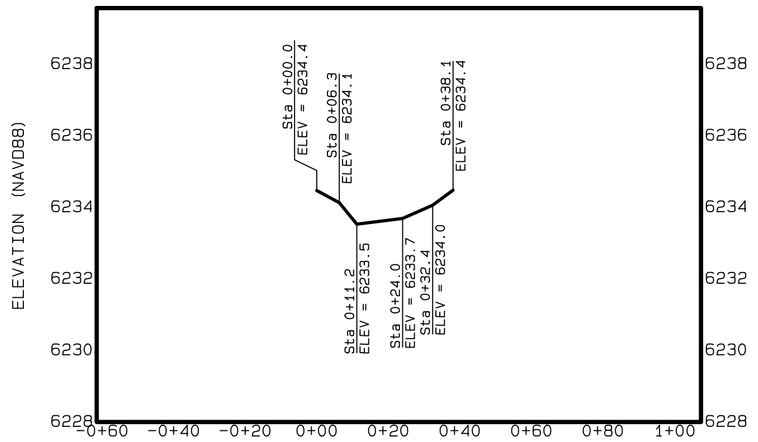

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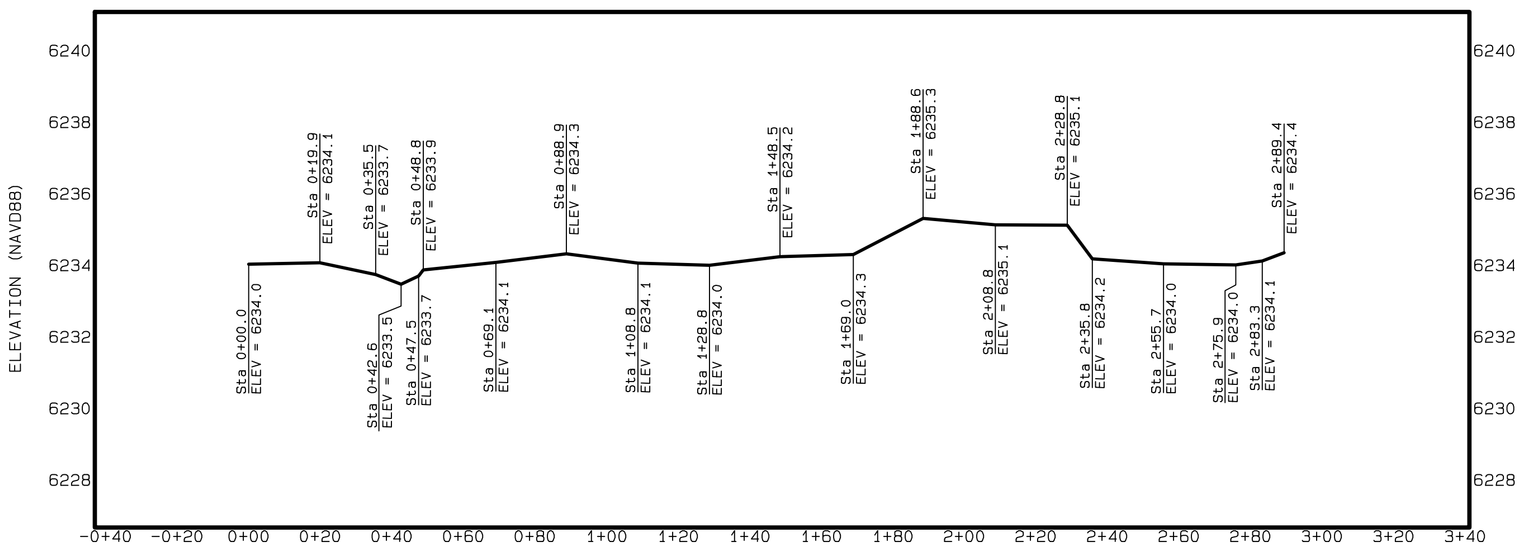

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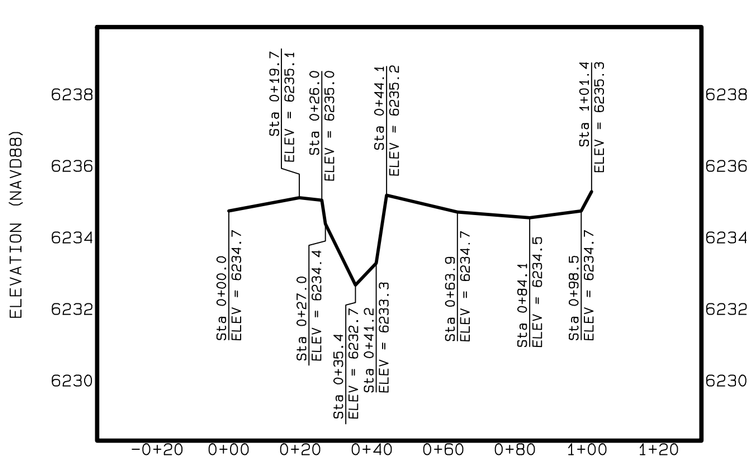

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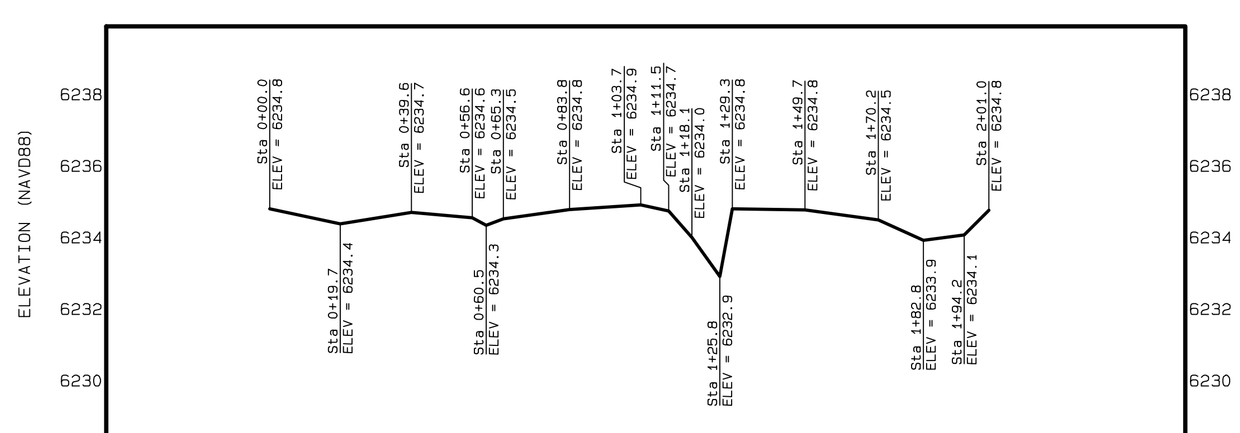

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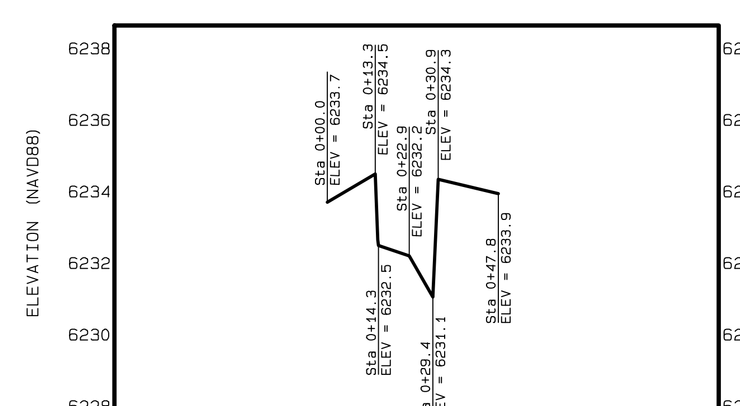

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REVISIONS

NO.	DATE	MARK

BENCHMARK

DESIGNED BY JS | DRAWN BY CKI
CHECKED BY JS | DATE SURVEYED OCT 16, 2013
APPROVED BY

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT

PORTIONS OF THE N 1/2 OF SECTION 4, TOWNSHIP 12 NORTH, RANGE 18 EAST, M.D.M.

EL DORADO COUNTY *CALIFORNIA*

JOB NO 13120.01.CM

DATE 11-5-13

SHEET 3 OF 3

REFERENCE VEGETATION MEMORANDUM

UPPER TRUCKEE MARSH SEWER FACILITIES

SOUTH LAKE TAHOE, CA

Prepared for:

nhc
80 South Lake Avenue, Suite 800
Pasadena, California 91101

September 2, 2014

Western Botanical Services, Inc.
5859 Mt. Rose Highway / Reno, NV 89511

Table of Contents

Appendices

1 Introduction

This report evaluates revegetation conditions at the Upper Truckee Marsh Sewer Facilities site in South Lake Tahoe, CA. It also presents the results of the revegetation baseline surveys conducted by Western Botanical Services, Inc. (WBS) within two distinct plant communities that will be disturbed during the course of the project in the road fill and hummocks. The survey results document reference conditions that will be used to measure progress toward meeting performance criteria goals. The survey was conducted on July 21st, 2014.

2 Methodology

Cover was determined using the point-intercept sampling method. All plants intercepted along transects were identified to the lowest possible taxonomic level. One-hundred 'hits' were obtained per transect, taken every foot. This methodology measures absolute and species-specific foliar cover. A laser point sampler device (Synergy Resource Solutions, Inc., www.countgrass.com) was lined up with the tape at a level 90-degree angle at each foot along the tape. All plant species and non-plant elements (bare ground, rock, litter) intercepted by the projected laser 'dot' were recorded. Field data sheets are included in Appendix C.

Although this sampling technique does not in itself evaluate root type or degree of plant or community development, the data has been organized by growth form (annual, perennial forb, grass, etc.), which in turn gives an indication of plant succession and community structure. Data were also organized by native status. A broader species list was developed for the project area to identify those species not intercepted by transects. This list is included in Appendix B.

Percent litter, rock, and bare areas are calculated separately. Total cover includes vegetation, standing dead, fine gravel (4–8 mm), coarse gravel (8-32 mm), rock (>32 mm) and litter. Litter refers to material detached from growing vegetation older than one year and includes decomposing vegetation, animal waste, and garbage. Total vegetative cover refers only to live vegetation. Frequency was calculated by determining the number transects in which a species was intercepted.

Three consecutive 100-ft. transects were surveyed in the road fill area, and three transects (two of which were adjacent and parallel) in the hummock community (Figure 1). The hummock transects 2 and 3 appear to be over water in Figure 1 because the background Google Earth image is from 2011, but the water has receded since then. Each transect was sampled for quantitative cover data using the point-intercept method. All vegetation was identified to the lowest taxonomic group possible. The Theodolite iPad app was used to record the location of each transect (Appendix A).

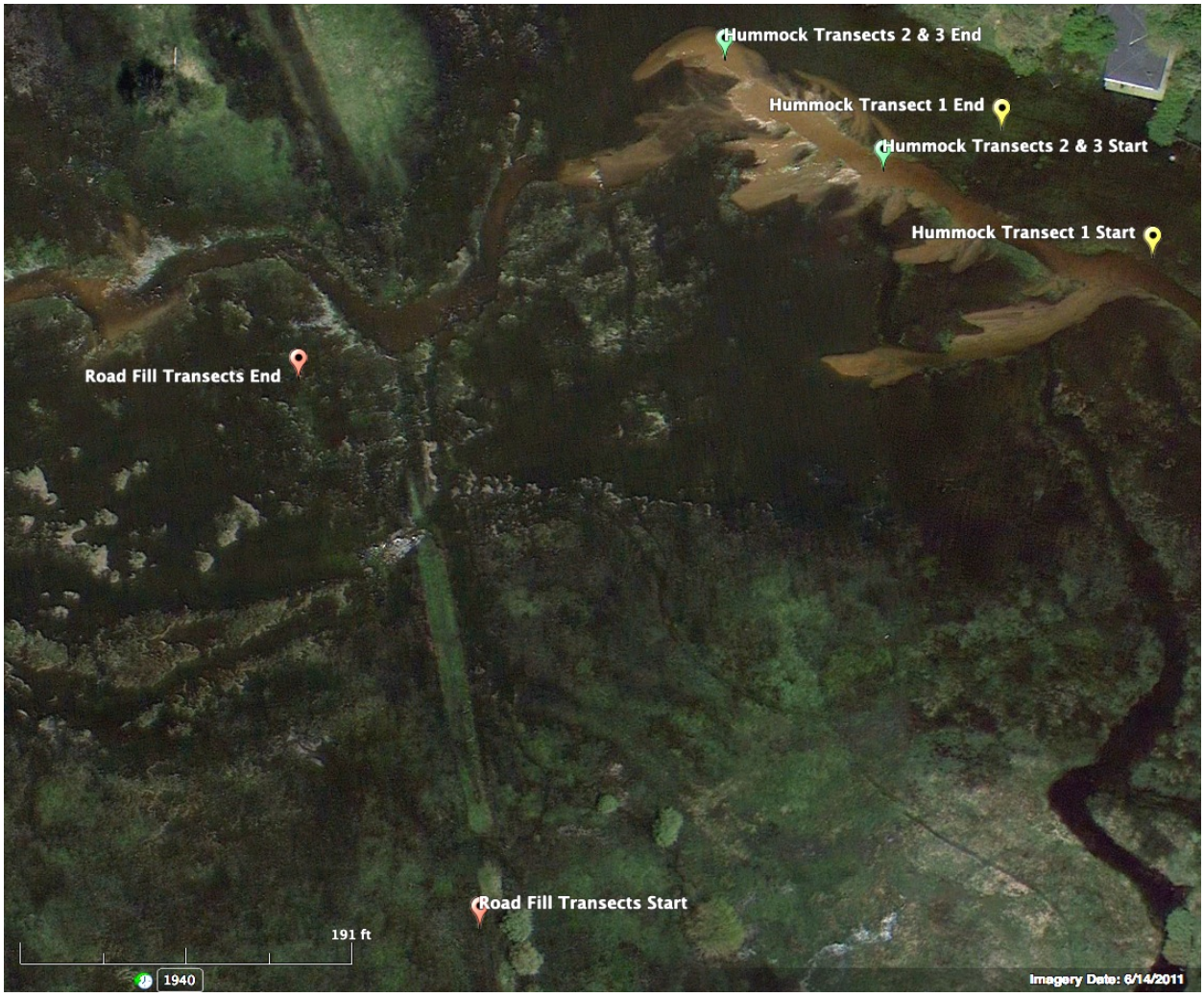

Figure 1. Locations of Transects

3 Results and Discussion

3.1 Road Fill Plant Community Cover

Data for total cover, vegetative cover, and dominance by natives are presented in Table 1. Detailed cover calculations are included in Appendix C. Total cover in the road fill community averaged 100%, while total vegetative cover averaged 90% with a range between 84% (Transect 3) and 98% (Transect 2). Relative cover by native species averaged 85.7% with a range between 83% (Transect 3) and 90% (Transect 2). Vegetative cover was dominated by native perennial graminoids, (esp. Baltic rush).

Table 1. Road Fill Cover Summary

	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	100%	100%	100%	100%
Total Vegetative Cover	88%	98%	84%	90%
Vegetative Cover By Native Species	84%	90%	83%	85.7%

3.2 Hummock Plant Community

Data for total cover, vegetative cover, and dominance by natives are presented in Table 2. Detailed cover calculations are included in Appendix C. Total cover in the hummock community averaged 83.7%, while total vegetative cover averaged 80.3% with a range between 58% (Transect 2) and 95% (Transect 1). Relative cover by native species averaged 79.7% with a range between 58% (Transect 2) and 93% (Transect 1). Vegetative cover was dominated by native perennial graminoids and forbs. Several non-native pasture grasses species were either intercepted or identified off-transects. These grasses may be remnants from prior grazing activities before the California Tahoe Conservancy (CTC) took ownership in 2001.

Table 2. Hummock Community Cover Summary

	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	100%	61%	90%	83.7%
Total Vegetative Cover	95%	58%	88%	80.3%
Vegetative Cover By Native Species	93%	58%	88%	79.7%

4 References

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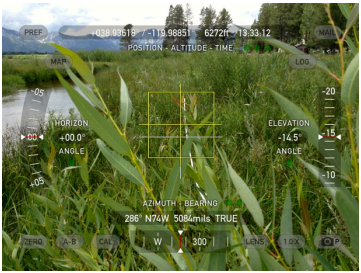
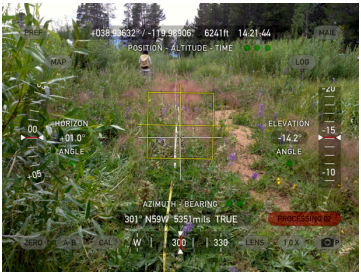
Appendix A

Transect Photos and Locations



Hummock Transect 1 Begin

Hummock Transect 1 End



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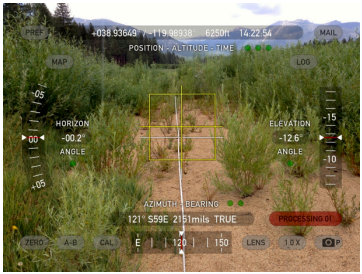

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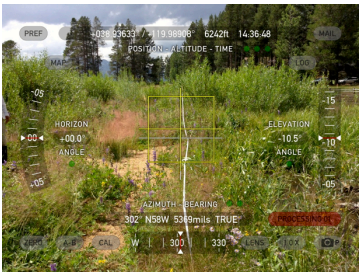
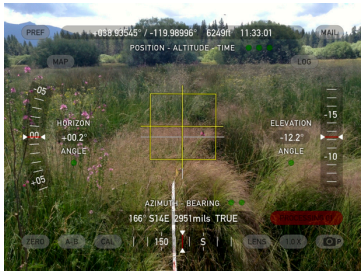


Hummock Transect 3 Begin

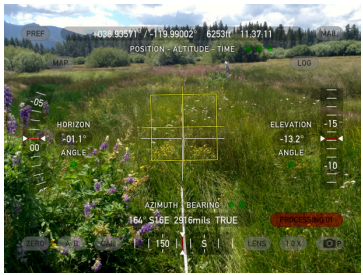
Hummock Transect 3 End

Road Fill Transect 1 Begin

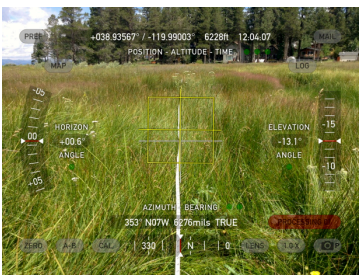


Road Fill Transect 1 End

Road Fill Transect 2 Begin



Road Fill Transect 2 End



Road Fill Transect 3 Begin

Road Fill Transect 3 End

Appendix B

Reference Species List

Upper Truckee Marsh Species List

FAMILY	SCIENTIFIC NAME	COMMON NAME	HYD STATUS[1]
ASTERACEAE	*Achillea millefolium*	Yarrow	FACU
	Arnica chamissonis	Chamisso arnica	FACW
	Solidago Canadensis	Canada goldenrod	FACU
	Symphyotrichum spathulatum var yosemitanum	Western aster	FAC
CYPERACEAE	*Carex aqualtilis*	Water sedge	OBL
	Carex athrostachya	Slenderbeak sedge	FACW
	Carex lanuginosa	Wooly sedge	OBL
	Carex nebrascensis	Nebraska sedge	OBL
	Carex utriculata	Beaked sedge	OBL
	Scirpus microcarpus	Panicled bulrush	OBL
FABACEAE	*Lupinus polyphyllus*	Tahoe lupine	FAC
IRIDACEAE	*Iris missouriensis*	Rocky mtn. Iris	FACW
JUNCACEAE	*Juncus balticus*	Baltic rush	FACW
	Juncus ensifolius	Equitant rush	OBL
	Juncus nevadensis	Nevada rush	FACW
MALVACEAE	*Sidalcea oregana*	Oregon checkerbloom	FACW
ONAGRACEAE	*Eplilobium ciliatum*	Fringed willowherb	FACW
POACEAE	*Alopecurus aequalis*	Shortawn foxtail	OBL
	Alopecurus pratensis	Meadow foxtail	FAC
	Agrostis exarata	Spike bentgrass	FACW
	Agrostis scabra	Rough bentgrass	FAC

FAMILY	SCIENTIFIC NAME	COMMON NAME	HYD STATUS[1]
	Agrosits stolonifera	Creeping bentgrass	FAC
	Deschampsia danthonoides	Annual hairgrass	FACW
	Phleum pratense	Timothy	FAC
	Poa palustris	Fowl bluegrass	FAC
	Poa pratensis	Kentucky bluegrass	FAC
	Torreyochloa pallida	Pale false mannagrass	OBL
POLYGONACEAE	*Rumex acetosella*	Common sheep sorrel	FACU
	Rumex crispus	Curly dock	FAC
ROSACEAE	*Fragaria virginiana*	Strawberry	FACU
	Geum macrophyllum	Big-leaved avens	FAC
	Potentilla glandulosa	Sticky cinquefoil	FACU
	Potentilla gracilis	Cinquefoil	FAC
RUBAIACEAE	*Galium trifidum*	Bedstraw	FACW
SALICACEAE	*Salix exigua*	Sandbar willow	OBL
	Salix lemmonii	Lemmon's willow	OBL
	Salix lucida ssp lasiandra	Pacific willow	FACW
SCROPHULAREACEAE	*Mimulus guttatus*	Seep monkeyflower	OBL
	Mimulus primuloides	Primrose monkeyflower	OBL
	Veronica americana	America brooklime	OBL

[1] Army Corps of Engineers; Western Mountains, Valleys, and Coast
N/A = Not Applicable
OBL = Obligate
FACW = Facultative Wetland
FAC = Facultative
FACU = Facultative Upland

* = Non-native species

Appendix C

Point-Intercept Cover Data Calculations

POINT INTERCEPT COVER DATA ANALYSIS

SAMPLING AREA: Hummock Transects

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
Native Perennial Forbs						
Mimulus guttatus (Seep monkeyflower)	1	-	-	33%	0.4%	0.4%
Epilobium ciliatum (fringed willowherb)	-	1	-	33%	0.4%	0.4%
Lupinus polyphyllus (Tahoe lupine)	-	17	12	66%	12.0%	11.6%
Veronica americana (American brooklime)	3	-	-	33%	1.2%	1.2%
Symphyotrichum spathulatum (western mountain aster)	-	-	1	33%	0.4%	0.4%
Sidalcea oregana (Oregon checkerbloom)	-	1	-	33%	0.4%	0.4%
Total Native Perennial Forbs	4	19	13	100%	14.9%	14.3%
Introduced Perennial Grasses						
Phleum pratense (timothy)	2	-	-	33%	0.8%	0.8%
Total Intro. Perennial Grasses	2	0	0	33%	0.8%	0.8%
Native Perennial Graminoids						
Carex nebrascensis (Nebraska sedge)	6	1	16	100%	9.5%	9.2%
Juncus balticus (Baltic rush)	3	1	-	66%	1.7%	1.6%
Deschampsia caespitosa (hairgrass)	1	2	1	100%	1.7%	1.6%
Poa pratensis (Kentucky bluegrass)	1	-	-	33%	0.4%	0.4%
Poa palustris (fowl bluegrass)	1	-	-	33%	0.4%	0.4%
Juncus nevadensis (Nevada rush)	2	-	-	33%	0.8%	0.8%
Agrostis scabra (rough bentgrass)	2	19	10	100%	12.9%	12.4%
Alopecurus aequalis (shortawn foxtail)	-	-	1	33%	0.4%	0.4%
Scirpus microcarpus (panicled bulrush)	47	-	1	66%	19.9%	19.1%
Carex utriculata (beaked sedge)	8	2	26	100%	14.9%	14.3%
Juncus ensifolius	-	2	-	33%	0.8%	0.8%
Glyceria	1	-	-	33%	0.4%	0.4%
Total Native Perennial Grasses	72	27	55	100%	63.9%	61.4%
Native Shrubs and Subshrubs						
Salix lucida ssp. Lasiandra (Pacific willow)	10	7	20	100%	15.4%	14.7%
Salix exigua (sandbar willow)	-	1	-	33%	0.4%	0.4%
Salix lemmonii (Lemmon's willow)	4	4	-	66%	3.3%	3.2%
Salix geyeriana (Geyer willow)	3	-	-	33%	1.2%	1.2%
Total Nat. Shrubs & Subshrubs	17	12	20	100%	20.3%	19.5%

POINT INTERCEPT COVER DATA ANALYSIS

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
NATIVE VEGETATIVE COVER	**93**	**58**	**88**	**n/a**	**99.2%**	**95.2%**
NON-NATIVE VEGETATIVE COVER	**2**	**0**	**0**	**n/a**	**0.8%**	**0.8%**
TOTAL VEGETATIVE COVER	**95**	**58**	**88**	**n/a**	**100.0%**	**96.0%**
Bare Soil	0	39	8	n/a	n/a	n/a
Litter	5	3	2	n/a	n/a	4.0%
TOTAL COVER	**100**	**61**	**90**	**n/a**	**n/a**	**100.0%**
TOTAL OVER ALL (300) SAMPLING POINTS		**ALL COVER:**	**83.7%**	**NON-NATIVE:**	**0.7%**	
		VEGETATIVE COVER:	**80.3%**	**NATIVE:**	**79.7%**	

POINT INTERCEPT COVER DATA ANALYSIS

SAMPLING AREA: Road Fill Transects

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
Native Annual & Biennial Forbs						
Galium sp. (bedstraw)	-	2	2	66.0%	1.5%	1.3%
Total Native Ann. & Bien. Forbs	0	2	2	66.0%	1.5%	1.3%
Introduced Annual & Biennial Forbs						
Cirsium vulgare (bull thistle)	-	-	1	33.0%	0.4%	0.3%
Total Introduced Ann. & Bien. Forbs	0	0	1	33.0%	0.4%	0.3%
Native Perennial Forbs						
Solidago canadensis (Canada goldenrod)	12	-	-	33.0%	4.4%	4.0%
Fragaria virginiana (Virginia strawberry)	8	5	-	66.0%	4.8%	4.3%
Epilobium ciliatum (fringed willowherb)	-	-	2	33.0%	0.7%	0.7%
Mimulus primuloides (primrose monkeyflower)	-	1	9	66.0%	3.7%	3.3%
Lupinus polyphyllus (Tahoe lupine)	-	-	1	33.0%	0.4%	0.3%
Veronica americana (American brooklime)	-	-	3	33.0%	1.1%	1.0%
Achillea millefolium (yarrow)	-	3	3	66.0%	2.2%	2.0%
Arnica chamissonis (Chamisso arnica)	-	-	4	33.0%	1.5%	1.3%
Symphyotrichumspathulatum (western mountain aster)	3	10	3	100.0%	5.9%	5.3%
Sidalcea oregana (Oregon checkerbloom)	1	13	-	66.0%	5.2%	4.7%
Potentilla gracilis (cinquefoil)	6	10	1	100.0%	6.3%	5.7%
Total Native Perennial Forbs	30	42	26	100.0%	36.3%	32.7%
Introduced Perennial Forbs						
Rumex acetosella (common sheep sorrel)	1	8	-	66.0%	3.3%	3.0%
Rumes crispus (curly dock)	2	-	-	33.0%	0.7%	0.7%
Total Intro. Perennial Forbs	3	8	0	66.0%	4.1%	3.7%
Introduced Perennial Grasses						
Phleum pratense (timothy)	1	-	-	33.0%	0.4%	0.3%
Total Intro. Perennial Grasses	1	0	0	33.0%	0.4%	0.3%

POINT INTERCEPT COVER DATA ANALYSIS

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
Native Perennial Graminoids						
Carex nebrascensis (Nebraska sedge)	1	1	1	100.0%	1.1%	1.0%
Juncus balticus (Baltic rush)	37	22	25	100.0%	31.1%	28.0%
Deschampsia caespitosa (hairgrass)	4	-	7	66.0%	4.1%	3.7%
Poa pratensis (Kentucky bluegrass)	6	19	8	100.0%	12.2%	11.0%
Eleocharis macrostachya (pale spikerush)	-	-	5	33.0%	1.9%	1.7%
Agrostis scabra (rough bentgrass)	6	4	7	100.0%	6.3%	5.7%
Carex utriculata (beaked sedge)	-	-	2	33.0%	0.7%	0.7%
Total Native Perennial Grasses	54	46	55	100.0%	57.4%	51.7%
NATIVE VEGETATIVE COVER	**84**	**90**	**83**	**n/a**	**95.2%**	**85.7%**
NON-NATIVE VEGETATIVE COVER	**4**	**8**	**1**	**n/a**	**4.8%**	**4.3%**
TOTAL VEGETATIVE COVER	**88**	**98**	**84**	**n/a**	**100.0%**	**90.0%**
Litter	12	2	16	n/a	n/a	10.0%
TOTAL COVER	**100**	**100**	**100**	**n/a**	**n/a**	**100.0%**
TOTAL OVER ALL (300) SAMPLING POINTS		**ALL COVER:**	**100.0%**	**NON-NATIVE:**	**4.3%**	
		VEGETATIVE COVER:	**90.0%**	**NATIVE:**	**85.7%**	

APPENDIX B

Pre-Construction and Construction Information

2015 ANNUAL REPORT

APPENDIX B – PRE-CONSTRUCTION AND CONSTRUCTION INFORMATION

LIST OF CONTENTS

Adaptive Management Plan – Year 1 Improvements, Final Plans, NHC, 2014

Redline drawing showing Field Changes, Year 1 Improvements, NHC, 2014

Fisheries Rescue and Relocation Information– Electrofisher Data Sheets, AECOM, 2014

Cultural Resources Monitoring Information– Observations and Photo Log (photos on file with District), AECOM, 2014

SHEET INDEX

South Tahoe Public Utility District

CONSTRUCTION PLANS FOR

Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan - Year 1 Improvements

JUNE 2014

PROJECT MANAGER

Ivo Bergsohn, Hydrogeologist
South Tahoe Public Utility District
1275 Meadow Crest Road
South Lake Tahoe, California 96150

APPROVED BY:

Paul A. Sciuto, PE, Assistant General Manager — *6/25/14* (date)
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northwest hydraulic consultants
80 south lake avenue, suite 800
pasadena, california 91101–2585
phone: (626) 440–0080 fax: (626) 440–1881
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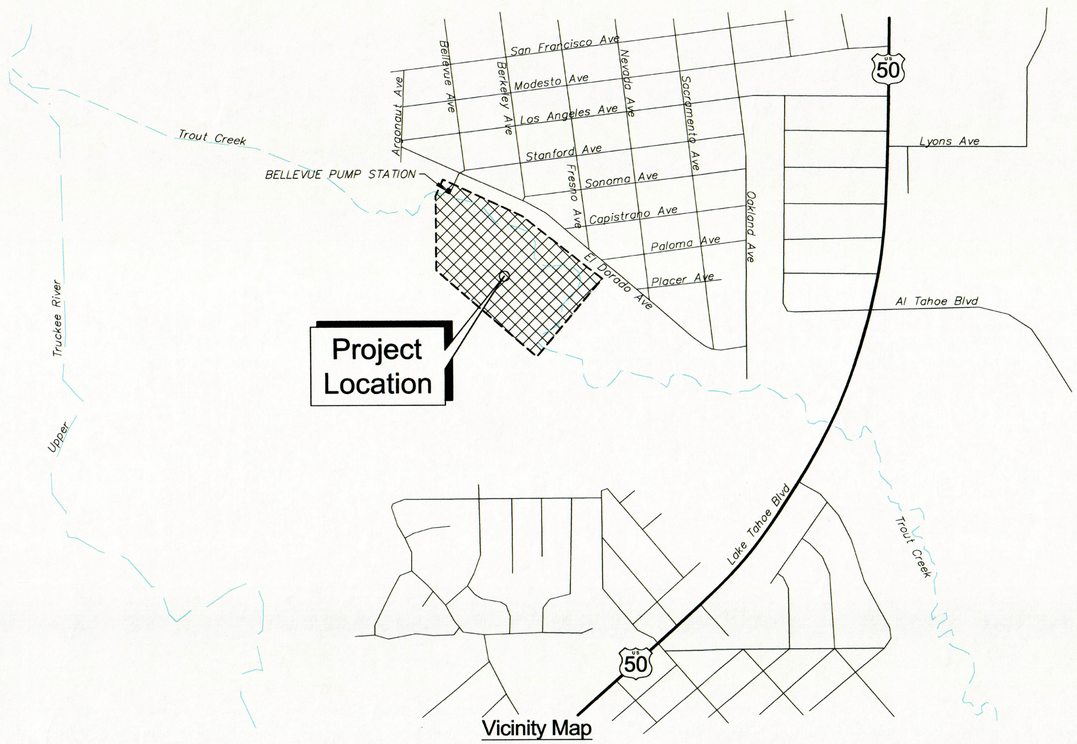
Western Botanical Services, Inc.
5859 Mt Rose Highway
Reno, Nevada 89511
(775) 849–3223
www.wbsinc.us

REGISTERED PROFESSIONAL ENGINEER — EDWARD E. WALLACE — No. 32301 — Exp: 12/31/14 — CIVIL — STATE OF CALIFORNIA

Edward E. Wallace — *23 June 2014* (date)
CALIFORNIA REGISTERED
PROFESSIONAL ENGINEER NO. # 32301
northwest hydraulic consultants



Vicinity Map

Project Location Map

Drawing Name: UT MARSH COVER				Date: 23 JUNE 2014
P:\600035 Truckee Marsh\AC\600035dwg\YR1				
Drawing Status: Final Submittal	Designer: eew	Drafter: tvs	Checked: eew	Job Number: 600035
Sheet 1 of 9				Sheet Number: T1

GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING UTILITY COMPANIES TO DETERMINE THE LOCATION OF UNDERGROUND FACILITIES. THE LOCATION OF KNOWN EXISTING FACILITIES IN THE WORK AREA ARE SHOWN, BUT NO GUARANTEE IS MADE AS TO THE ACCURACY OF THIS INFORMATION.
2. THE CONTRACTOR SHALL PROTECT EXISTING SURVEY CONTROL POINTS AND SHALL BE RESPONSIBLE FOR CONSTRUCTION STAKING. IF EXISTING MONUMENT(S) MUST BE DISTURBED TO PERFORM THE WORK, THE CONTRACTOR SHALL NOTIFY THE DISTRICT FOR RELOCATION OF THE MONUMENT PRIOR TO BEGINNING TO WORK.
3. EXCESS MATERIAL IS TO BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED SITE.
4. THE ENGINEER MAY MAKE MINOR CHANGES TO THE CONFIGURATION AND DESIGN GRADES OF PROJECT FEATURES AND TO REVEGETATION LAYOUTS TO SUIT FIELD CONDITIONS.
5. THE CONTRACTOR SHALL CONTACT THE DISTRICT IMMEDIATELY IF FIELD CONDITIONS ARE FOUND THAT CONFLICT WITH THESE PLANS. FIELD ADJUSTMENTS MUST BE APPROVED BY THE DISTRICT PRIOR TO CONSTRUCTION.
6. IF ANY ARTIFACTS OR OTHER MATERIALS ARE FOUND INDICATING POTENTIAL ARCHAEOLOGICAL OR HISTORICAL RESOURCES, WORK SHALL BE HALTED IMMEDIATELY AND THE CONTRACTOR SHALL CONTACT THE DISTRICT.
7. NO TREES ARE DESIGNATED FOR REMOVAL. IF FIELD CONDITIONS INDICATE THE NEED FOR TREE REMOVAL, PRIOR APPROVAL FROM THE DISTRICT AND TRPA IS REQUIRED.
8. NO GRADING SHALL OCCUR PRIOR TO INSTALLATION OF CONSTRUCTION BMPs AND APPROVAL BY TRPA AT A PRE-GRADE INSPECTION. BMPs TO BE INSTALLED PRIOR TO EQUIPMENT OR TRUCK USE OF ACCESS ROUTES IN PROJECT AREA.
9. WORK TO BE PERFORMED IS PART OF A MULTI-YEAR ADAPTIVE MANAGEMENT PLAN(AMP). PERMIT CONDITIONS FOR THE AMP APPLY TO THE PROJECT.
10. ON-SITE WORK SHALL BE PERFORMED FROM 8AM TO 6PM, MONDAY THROUGH FRIDAY. WORK OUTSIDE THESE HOURS MUST BE APPROVED BY THE DISTRICT A MINIMUM OF 48 HOURS BEFORE THE ABNORMAL WORKING HOURS ARE SCHEDULED TO BEGIN.

AREAS & QUANTITIES - YEAR 1 IMPROVEMENTS

DISTURBANCE AREAS AND APPROXIMATE CUT/FILL QUANTITIES

COMPONENT	SURFACE AREA, SF	CUT (−)/FILL(+) CY
ACCESS ROUTES	11,000	0
PILOT CHANNELS	1,350	−37
LEFT BANK OVERFLOWS	350	−6
LOCAL WIDENING/DEEPING ON FAVORABLE FLOW PATHS	450	−10
HUMMOCKS (VEGETATION ONLY)	2,800	0
FILL HUMMOCKS	2,850	+91
MISCELLANEOUS FILL	3,600	+10
RIGHT BANK PLUGS	600	+12
ABANDONED ROAD FILL REMOVAL	7,000	−390
INTERMITTENT FILL IN EROSIONAL DEPRESSION	1,150	+65
PLANTING AND VEGETATION MANAGEMENT AREAS-FAVORABLE AND UNFAVORABLE FLOW PATHS	4,060	0
TOTALS	36,050 GRADING-17,350[1]	−455/+190 −265 NET

[1]EXCLUDES AREAS WHERE ONLY PLANTING OCCURS

MONUMENT LOCATIONS

NAME	LATITUDE (NAD83)	LONGITUDE (NAD83)	NORTHING (GRID)	EASTING (GRID)	ELEVATION (NAVD88)
RBM T01	38.936805560°N	119.989783506°W	2109311.8	7133398.2	6234.3
RBM T02	38.936678391°N	119.989687343°W	2109266.1	7133426.6	6234.4
RBM T04	38.936695860°N	119.989298498°W	2109274.9	7133537.0	6234.3
RBM T05	38.936536812°N	119.988919311°W	2109219.4	7133646.1	6235.0
RBM T07	38.936210006°N	119.987960945°W	2109106.4	7133921.3	6234.9

LEGEND

- EXISTING TREES
- EXISTING EDGE OF PAVED ROAD
- EXISTING TRAIL
- EXISTING CONTOURS (MAJOR) — 60
- EXISTING CONTOURS (MINOR) — 61
- EXISTING FENCE
- EXISTING EDGE OF WATER (10/25/13)
- EXISTING BUILDINGS & STRUCTURES
- SURVEY CONTROL POINT
- PROPOSED SLOPE
- CONSTRUCTION BASELINE — 1+00
- SILT BARRIER
- SAFETY PRESERVATION FENCE WITH SILT BARRIER
- PROPOSED CONTOURS (MAJOR) — 80
- PROPOSED CONTOURS (MINOR) — 79
- PROPOSED SPOT ELEVATIONS — 83.2
- HUMMOCK
- DIVERSION DAM
- STAGING AREA

SURVEY
TOPOGRAPHY BASED ON FIELD SURVEY, 25 OCTOBER 2013, BY TRI-STATE SURVEYING, LTD.

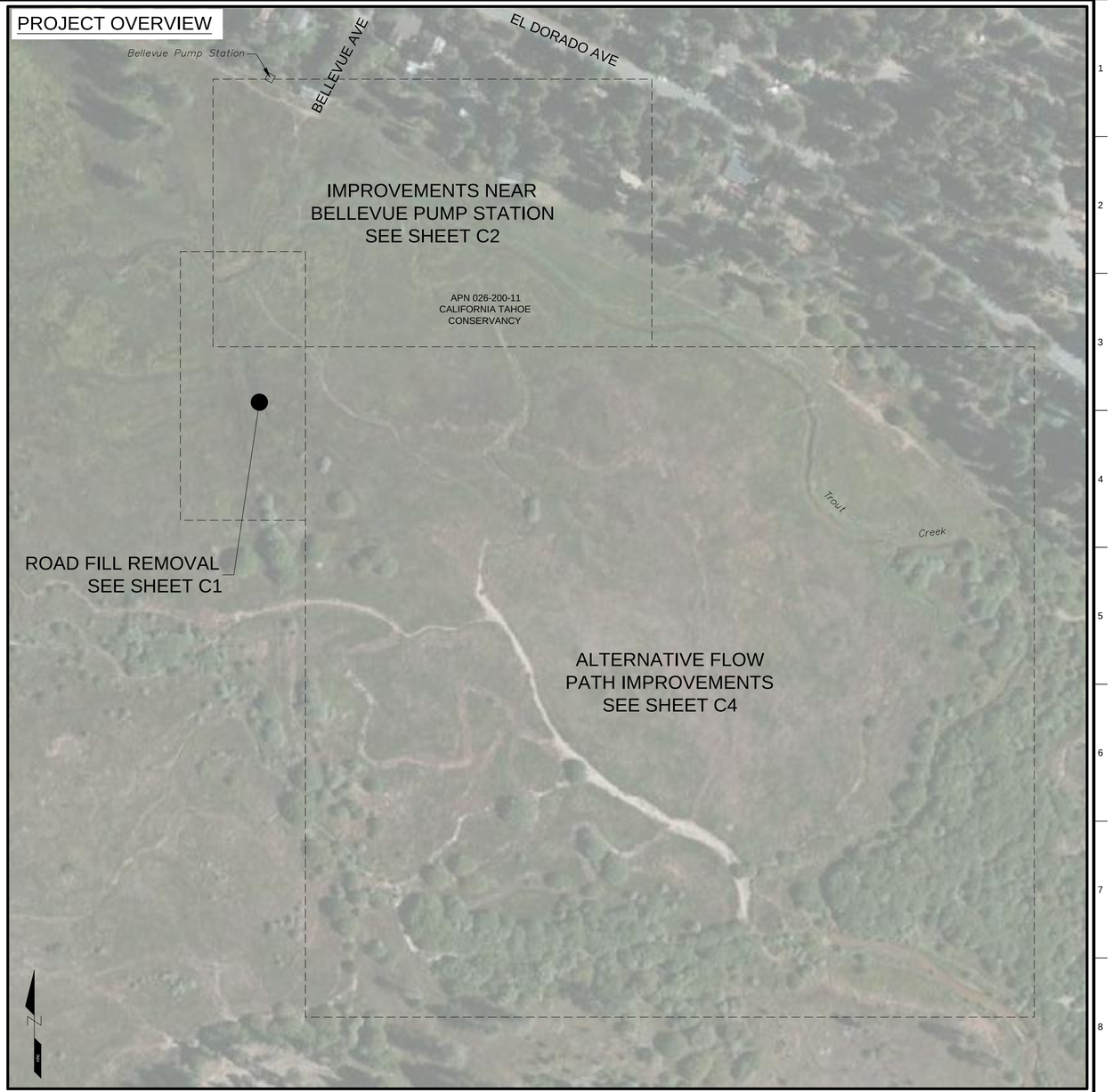
HORIZONTAL: NAD 83(2011) EPOCH 2010.00
CALIFORNIA STATE PLANE ZONE II, US SURVEY FEET

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET-GRID
E 7136557.88

NGS RICHARDSON
N 2103848.87 US SURVEY FEET - GRID
E 7123525.92 GRID

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL 6248.20

PROJECT OVERVIEW



PROJECT OVERVIEW
SCALE: 1"=100'

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REGISTERED PROFESSIONAL ENGINEER EDWARD E. WALLACE No. 32301 Exp: 12/31/14 CIVIL STATE OF CALIFORNIA

Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH COVER
Plotted Scale	0 1/2 1 (1/2 IN)

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Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements
Legend & Notes Sheet

Job Number 600035
Sheet Number G1
Sheet 2 of 9

NOTES

1. ACCESS ROUTE AREA 'A' WILL BE USED FOR LGP EQUIPMENT AND FOOT TRAFFIC ONLY AND SHALL BE PROTECTED WITH CONSTRUCTION MATS OR PLATES. ACCESS ROUTE 'B' WILL BE USED FOR TRUCK AND LGP EQUIPMENT TRAFFIC AND SHALL BE PROTECTED WITH WOOD CHIPS, SUPPLEMENTED BY PLATES OR MATS AS NEEDED TO PREVENT RUTS. ACCESS ROUTE 'C' WILL BE USED FOR TRUCKS AND EQUIPMENT AND WILL BE PROTECTED WITH A LAYER OF WOOD CHIPS AND PLATES OR MATS SUITABLE FOR TRUCK LOADS. SEE SPECIFICATIONS FOR DETAILS ON PROTECTION AND RESTORATION OF THE THREE AREAS.
2. ACCESS ROUTE 'A' IS CURRENTLY FLOODED AND MAY NOT BE AVAILABLE TO THE CONTRACTOR UNTIL AFTER PILOT CHANNELS AND RIGHT OVERBANK PLUGS HAVE BEEN CONSTRUCTED.
3. WATER DISPOSAL AREAS TO BE FIELD LOCATED WITH DISTRICT.PERIMETER BMPs TO BE INSTALLED, IF REQUIRED TO PREVENT DISCHARGE OF SURFACE RUNOFF OR SEDIMENT FROM WATER DISPOSAL AREAS. SEE SPECIFICATIONS FOR REQUIREMENTS FOR OPERATION AND RESTORATION OF WATER DISPOSAL AREAS.
4. NO WORK IN THE CHANNEL OR DIVERSION OF FLOWS WILL BE PERMITTED UNTIL AQUATIC ORGANISM RELOCATION IS COMPLETED BY DISTRICT
5. ACCESS TO THE SOUTH SIDE OF THE CHANNEL, EXCEPT IN THE ROAD FILL REMOVAL AREA, IS LIMITED TO HAND CREWS. HEAVILY TRAVELED HAND CREW ACCESS ROUTES SHALL BE PROTECTED WITH PLANKS OR MATS TO THE EXTENT NECESSARY TO PREVENT RUTS OR COMPACTION OF THE MARSH SURFACE.
6. ROAD CLOSURE AT BELLEVUE AVENUE IS SUBJECT TO THE CONDITIONS OF THE ENCROACHMENT PERMIT FROM THE CITY OF SOUTH LAKE TAHOE. SIGNAGE TO INDICATE ROAD CLOSED, LOCAL TRAFFIC ONLY. ACCESS TO THE DRIVEWAY ON THE WEST SIDE OF BELLEVUE AVENUE TO BE MAINTAINED.

EL DORADO AVENUE
TEMPORARY TRAFFIC BARRIER AND SIGNAGE SEE NOTES (RIGHT)
BELLEVUE AVENUE
ACCESS ROUTE AREA 'B'
12'
12'x50' STAGING AND STORAGE AREA (ON EXISTING PAVEMENT AND SHOULDER) SEE SHEET D2
LINED SEDIMENTATION BASIN
SAFETY FENCE WITH SILT BARRIER
WATER DISPOSAL AREA 1 10,000 SF
ACCESS ROUTE AREA 'A'
TEMPORARY DAM, IF NEEDED TO CONTROL RUNOFF BACK TO CHANNEL
INSTALL SILT BARRIER AFTER DEWATERING RIGHT OVERBANK
12'
ACCESS ROUTE AREA 'C'
SAFETY FENCE WITH SILT BARRIER SEE DETAIL, SHEET D2
CONSTRUCT TEMPORARY DIVERSION DAM, IF NEEDED
WATER DISPOSAL AREA 2 11,600 SF
CONSTRUCT TEMPORARY DIVERSION DAM, IF NEEDED
TROUT CREEK
TURBIDITY MONITORING LOCATION
INSTALL TEMPORARY CHANNEL CROSSING SEE DETAIL, SHEET D2
INSTALL TEMPORARY DAM AND DEWATER DEPRESSION
PROTECT ROAD FILL REMOVAL AREA AS SPECIFIED FOR ACCESS ROUTE 'C'
ROAD FILL REMOVAL WORK AREA SEE SHEET C1
SAFETY FENCE WITH SILT BARRIER
TROUT CREEK
TURBIDITY MONITORING LOCATION
N
0' 30' 60' 90' 120'
SCALE 1"=30'

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Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH AERIAL
Plotted Scale	0 1/2 1

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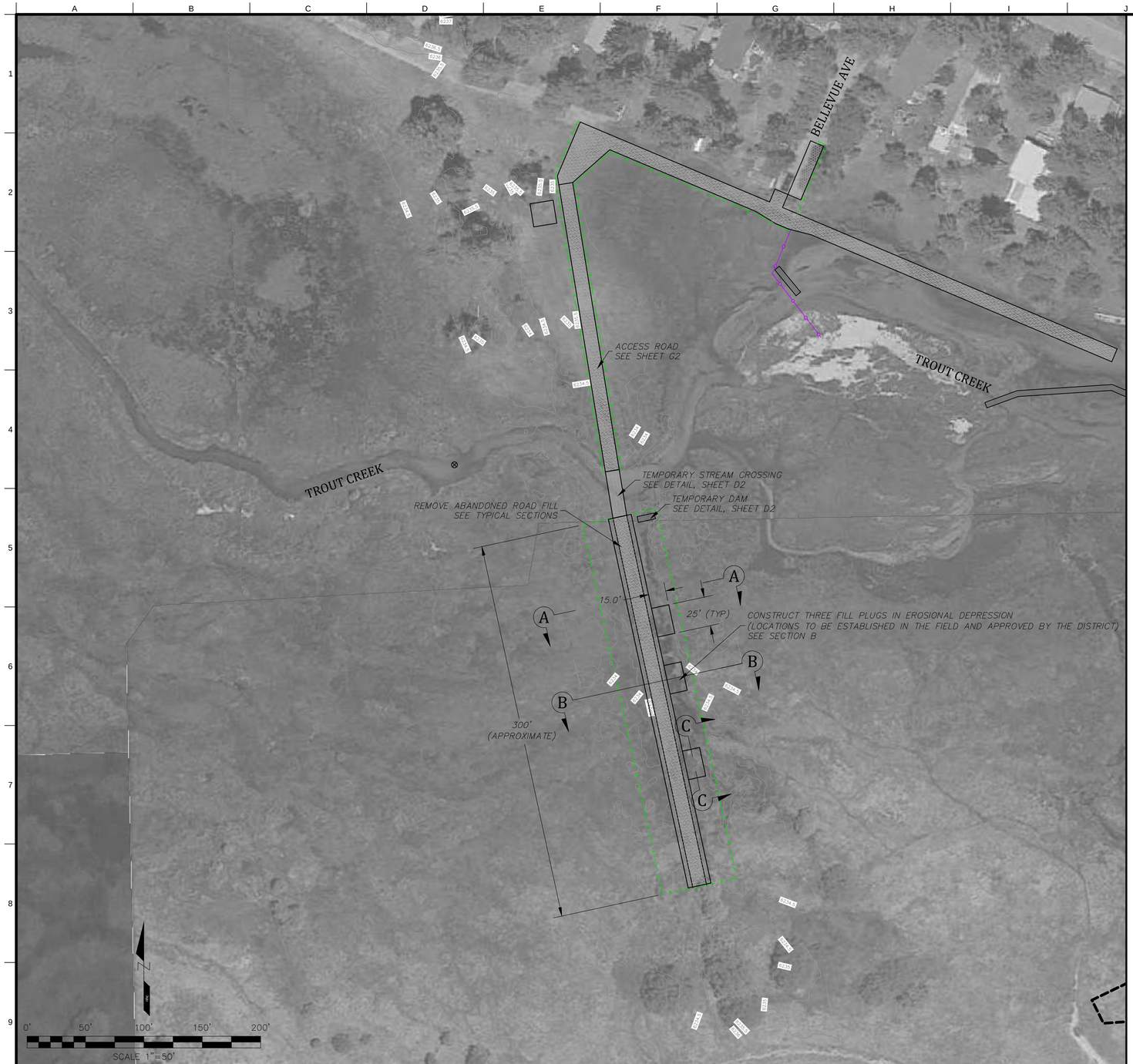
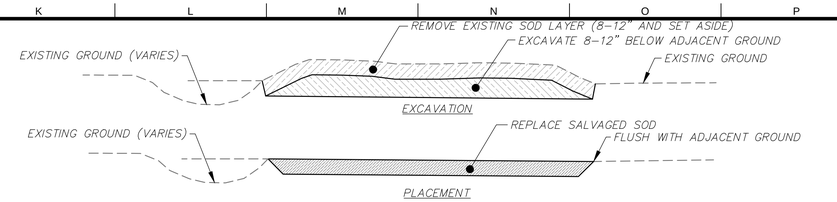
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements
Aerial & Staging Plan Sheet

Job Number 600035

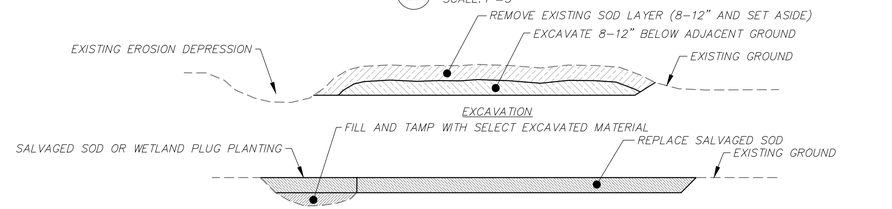
Sheet Number G2

Sheet 3 of 9





A SECTION
SCALE: 1"=5'



B SECTION
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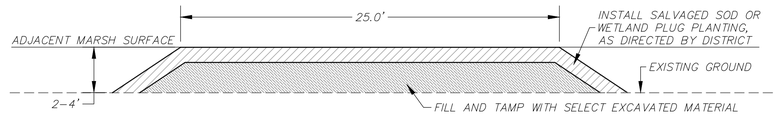
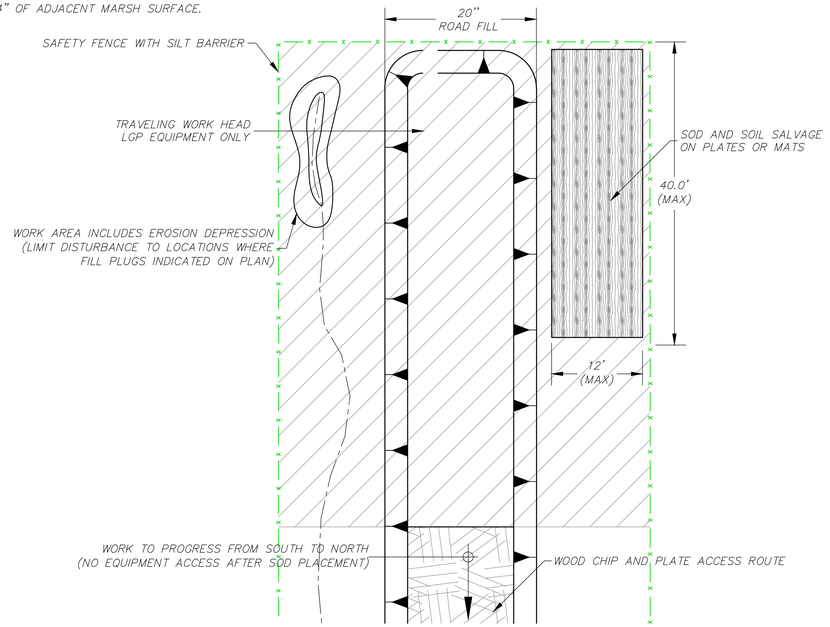


C SECTION
SCALE: 1"=5'

NOTE:
NO EXCAVATION IS REQUIRED WHERE ABANDONED ROAD FILL IS WITHIN 4" OF ADJACENT MARSH SURFACE.



TRAVELING WORK HEAD FOR ROAD FILL REMOVAL
SCALE: 1"=10'

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Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH ROAD FILL
Plotted Scale	0 1/2 1

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Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements

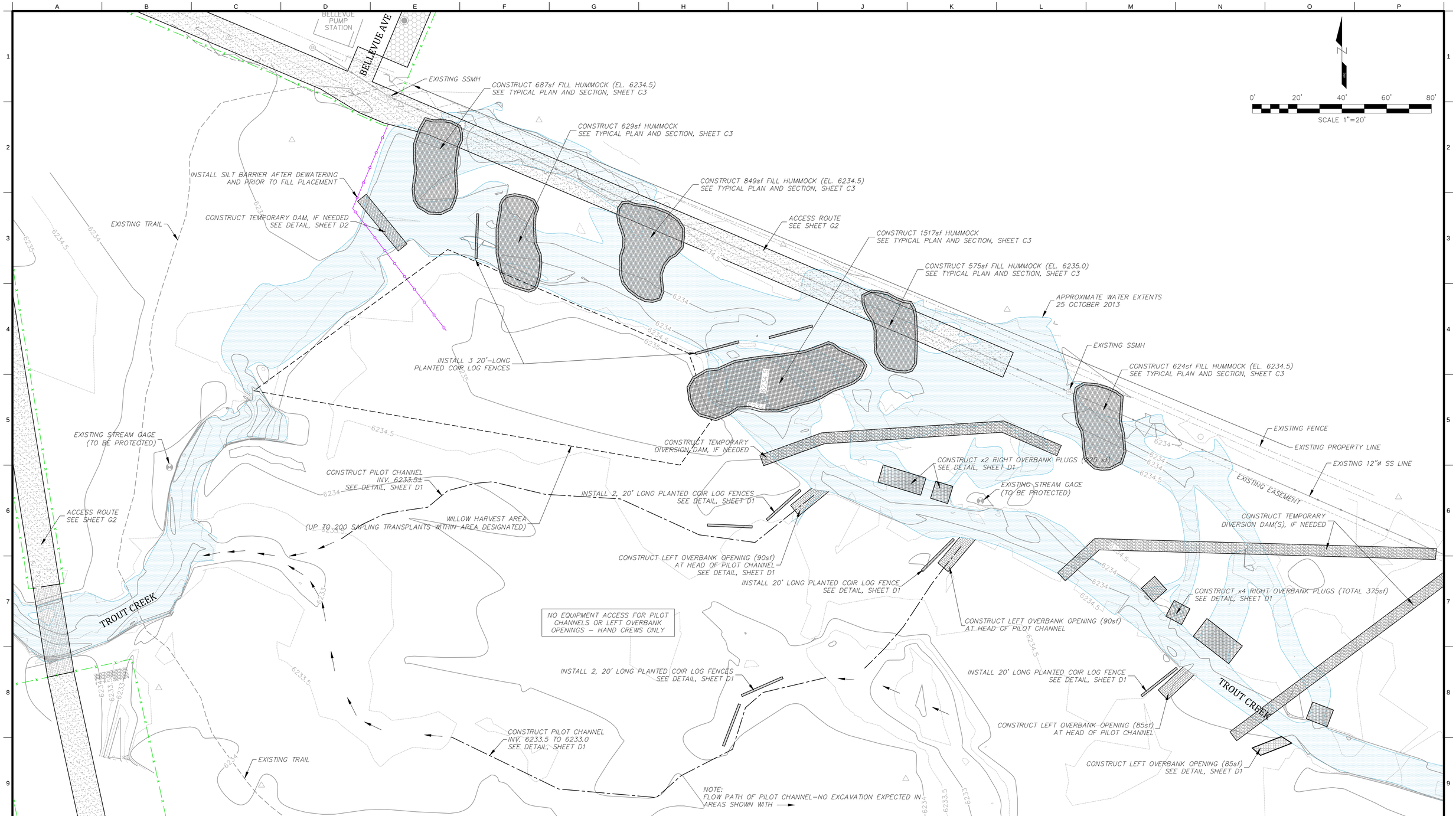
Road Fill Removal Sheet

Job Number 600035

Sheet Number

C1

Sheet 4 of 9



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Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH
Plotted Scale	0 1/2 1

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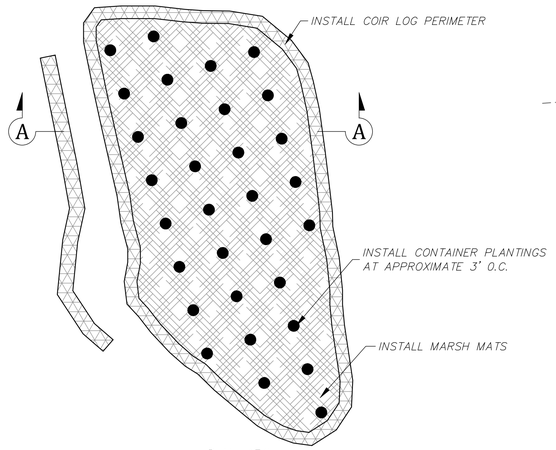
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements
Plan Sheet

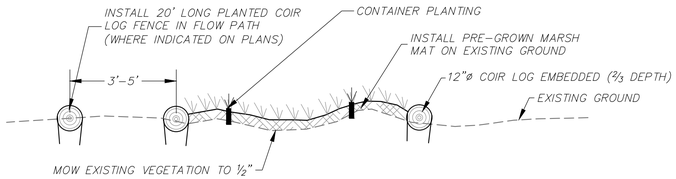
Job Number 600035

Sheet Number C2

Sheet 5 of 9



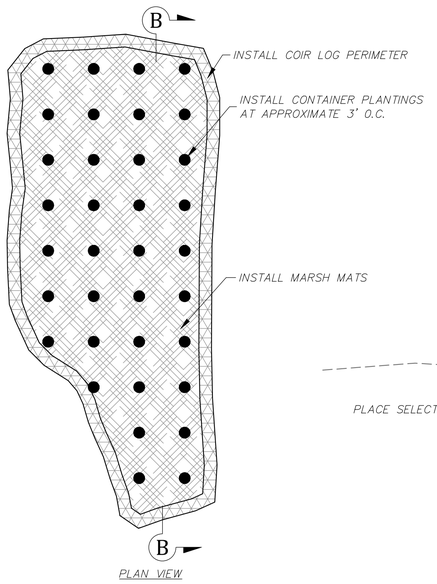
PLAN VIEW



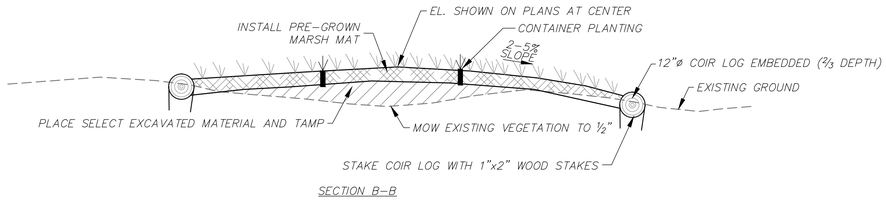
SECTION A–A

HUMMOCK DETAIL

Not to Scale



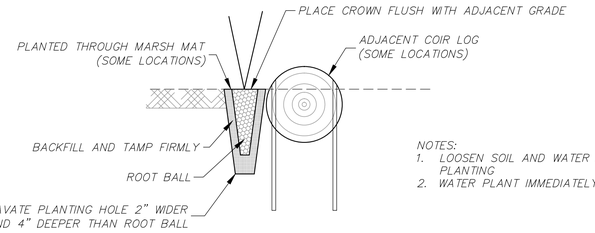
PLAN VIEW



SECTION B–B

FILL HUMMOCK DETAIL

Not to Scale



NOTES:
1. LOOSEN SOIL AND WATER HOLE PRIOR TO PLANTING
2. WATER PLANT IMMEDIATELY AFTER PLANTING

CONTAINER OR WILLOW SAPLING PLANTING

Not to Scale

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Revisions		
No.	Date	Description

Drawing Information	
Date	24 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH
Plotted Scale	0 1/2 1

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Upper Truckee Marsh Sewer Facilities Adaptive Management Plan Year 1 Improvements

Typical Cross Sections Sheet

Job Number 600035

Sheet Number C3

Sheet 6 of 9

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Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH AERIAL
Plotted Scale	0 1/2 1 (0.5:1)

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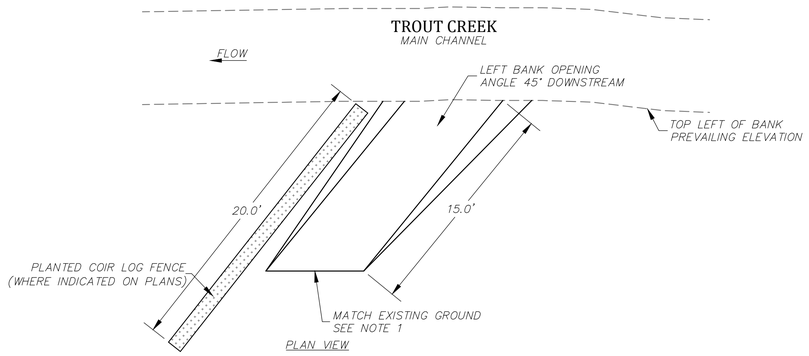
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements
Alternative Flow Path Improvements
Plan Sheet

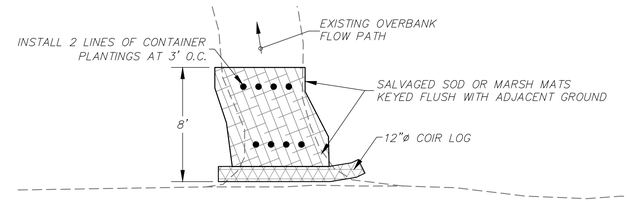
Job Number
600035

Sheet Number
C4

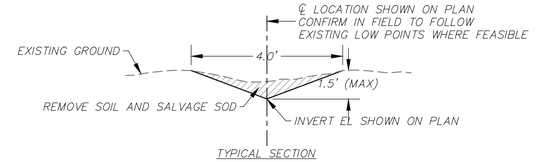


LEFT OVERBANK OPENING
Not to Scale

NOTES:
1. WHERE LEFT BANK OPENING CONNECTS TO PILOT CHANNEL, CONFORM DOWNSTREAM END TO TYPICAL PILOT CHANNEL SECTION

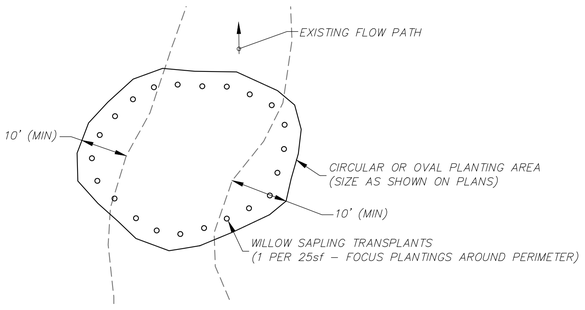


RIGHT OVERBANK PLUG
Not to Scale

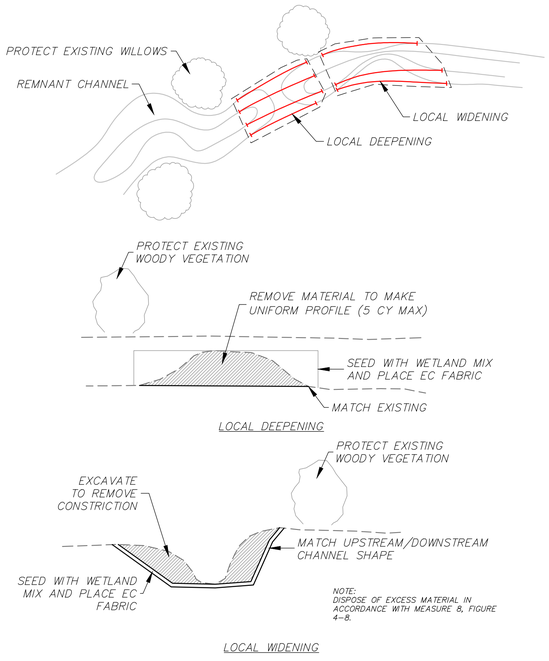


PILOT CHANNEL
Not to Scale

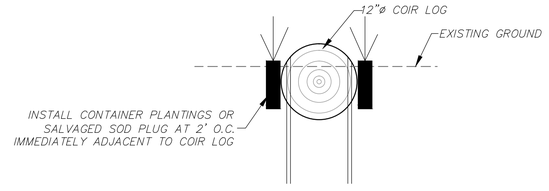
NOTES:
1. AT 40' INTERVALS ON PILOT CHANNEL, SALVAGE AND REPLACE SOD FLUSH WITH CHANNEL SHAPE TO FORM A 5' WIDE VEGETATED SILL FLUSH WITH THE CHANNEL BED AND BANKS. INSTALL ONE SILL AT OUTLET TO MAIN CHANNEL OR END OF EXCAVATED SECTIONS.



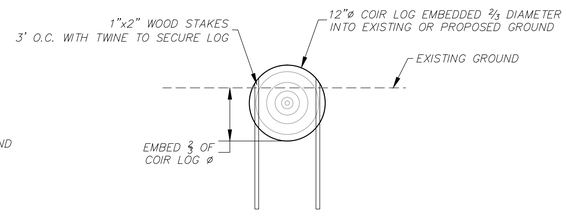
WILLOW SAUSAL
Not to Scale



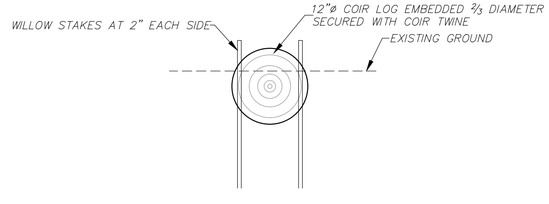
LOCAL WIDENING AND/OR DEEPENING OF DESIRABLE FLOW PATHS
Not to Scale



PLANTED COIR LOG
Not to Scale



COIR LOG INSTALLATION
Scale: 1"=5'



WILLOW FENCE
Not to Scale

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Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH DETAILS
Plotted Scale	0 1/2 1

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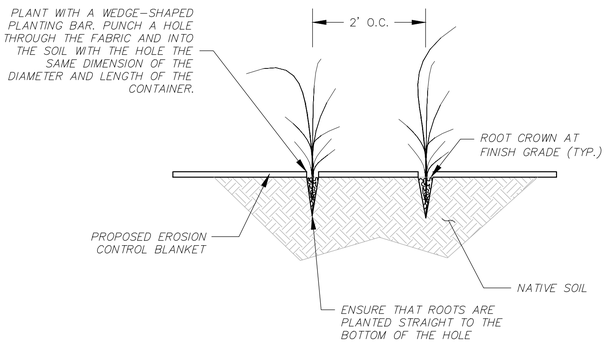
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements

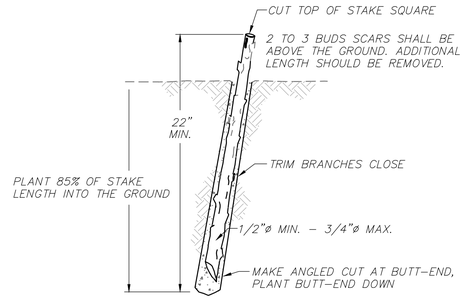
Details Sheet

Job Number 600035
Sheet Number D1
Sheet 8 of 9



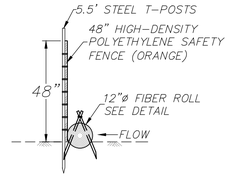
NOTES:
1. PULL NETTING APART PRIOR TO DIGGING THE PLANTING HOLE TO MINIMIZE THE NEED TO CUT THE FABRIC.
2. WETLAND PLUGS SHALL BE CAREX NEBRASCENSIS AND JUNCUS BALTICUS.
3. WETLAND PLUGS SHALL BE SUPERCELL 1.5 INCH WIDE AND 8 INCHES DEEP OR DEEPOTS (10-INCH DEPTH).

WETLAND PLUG PLANTING
Not to Scale

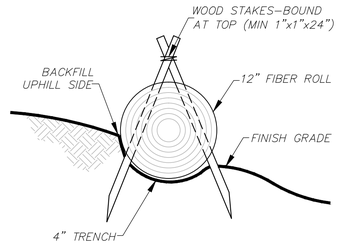


NOTES:
1. HARVEST AND PLANT STAKES DURING THE DORMANT SEASON.
2. USE HEALTHY, STRAIGHT AND LIVE WOOD AT LEAST 1 YEAR OLD.
3. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION, USE A PILOT BAR IN FIRM SOILS.
4. SOAK CUTTINGS FOR 24 HOURS (MIN.) PRIOR TO INSTALLATION.
5. TAMP THE SOIL AROUND THE STAKE.
6. USE SALIX SPP. FROM PROJECT AREA.
7. PLANT AT 4' O.C. BOTH SIDES OF CHANNEL.

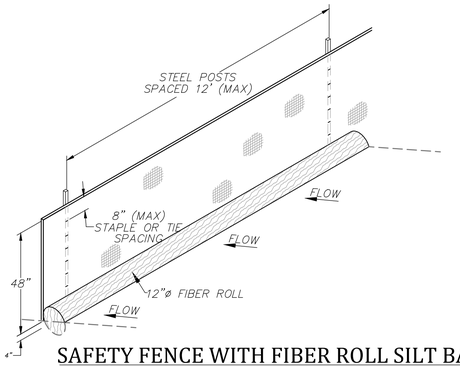
WILLOW LIVE STAKING
Not to Scale



SECTION
FIBER ROLL SILT BARRIER AT SAFETY FENCE

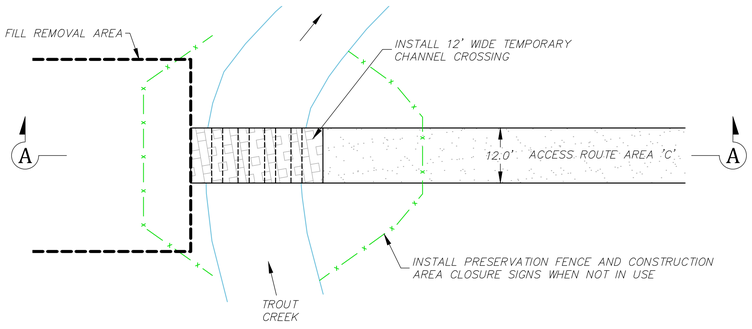


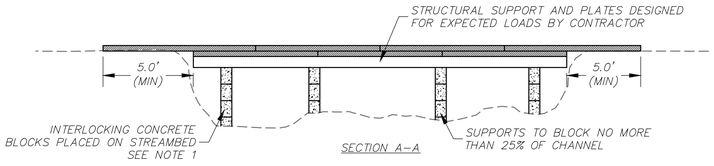
FIBER ROLL SILT BARRIER
Not to Scale



SAFETY FENCE WITH FIBER ROLL SILT BARRIER
Not to Scale

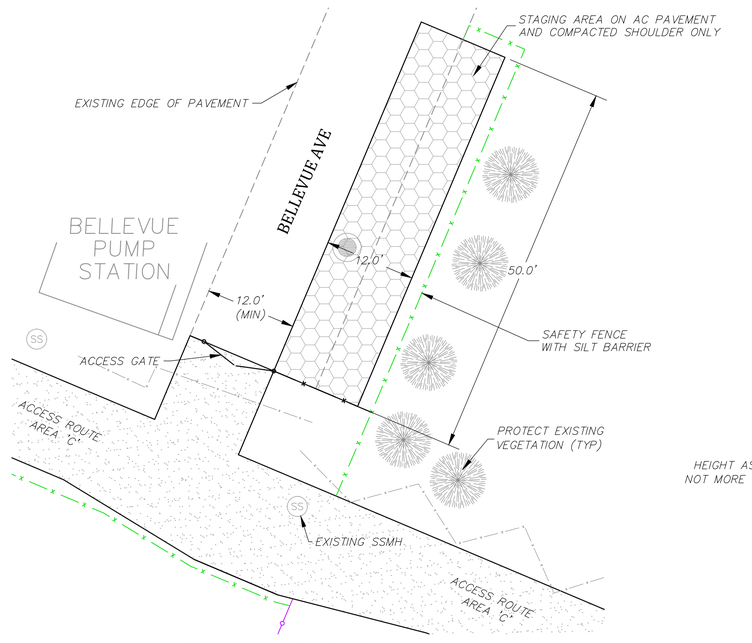
NOTES:
1. FIBER ROLL SHALL BE MADE FROM 100% MATTRESS GRADE COCONUT FIBER AND BOUND BY HIGH STRENGTH COIR NETTING, AND HAVE A MINIMUM WEIGHT OF 5 LBS PER LINEAL FOOT.
2. ORANGE SAFETY FENCE SHALL BE HIGH DENSITY POLYETHYLENE WITH A MESH OPENING OF APPROXIMATELY 1 INCH BY 4 INCHES AND A MINIMUM HEIGHT OF 4 FEET.
3. FIBER ROLL SILT BARRIER SHALL BE INSTALLED ALONG CONTOUR AND ON SLOPES 5H:1V OR FLATTER UNLESS OTHERWISE APPROVED BY TRPA.
4. THE INSTALLATION CONFIGURATION SHALL PREVENT RUNOFF FROM LEAVING THE SITE OR ENTERING A WATERCOURSE WITHOUT PASSING THROUGH A SILT BARRIER.
5. THE MAXIMUM LENGTH OF SLOPE DRAINING TO THE SILT BARRIER SHALL BE 100 FEET.
6. FIBER ROLL SHALL BE INSTALLED BY SHAPING A 4 INCH DEEP FURROW TO MATCH THE SHAPE OF THE LOG, SECURING IN FURROW WITH WOOD STAKES, AND TAMPING THE GROUND AROUND THE FIBER ROLL TO FILL VOIDS BETWEEN THE LOG AND THE GROUND.
7. TRPA BMP-517





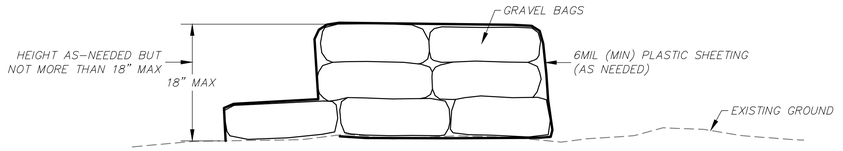
NOTES:
1. THE CONTRACTOR MAY PROPOSE ALTERNATIVE CROSSING DESIGNS AS DESCRIBED IN THE SPECIFICATIONS.
2. CONTRACTOR SHALL DESIGN CROSSING FOR EXPECTED EQUIPMENT AND TRUCK LOADS.
3. IF STREAMBANK DEFORMATION OCCURS OPERATIONS TO CEASE UNTIL CROSSING IS SUITABLY MODIFIED.

TEMPORARY CHANNEL CROSSING
Not to Scale



STAGING AREA BMPs
Not to Scale

STAGING AREA BMP NOTES:
1. STAGING AREA TO BE MAINTAINED IN A CLEAN CONDITION
2. CONTRACTOR IS RESPONSIBLE TO MAINTAIN OR RESTORE EXISTING AC PAVEMENT TO A PRE-PROJECT CONDITION.



TEMPORARY DIVERSION DAM
Not to Scale

NOTES
1. WATER-FILLED BARRIER OR OTHER ALTERNATE METHOD MAY BE SUBMITTED FOR APPROVAL.
2. GRAVEL BAGS SHALL BE WOVEN POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE, MULLEN BURST STRENGTH EXCEEDING 300 psi PER ASTM D.3786.
3. GRAVEL SHALL BE BETWEEN 0.4" AND 1" IN SIZE AND BE CLEAN AND FREE OF SOIL OR ORGANIC MATERIAL.

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REGISTERED PROFESSIONAL ENGINEER
EDWARD E. WALKER
No. 37201
Exp. 12/31/14
CIVIL
STATE OF CALIFORNIA

Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH DETAILS
Plotted Scale	0 1/2 1

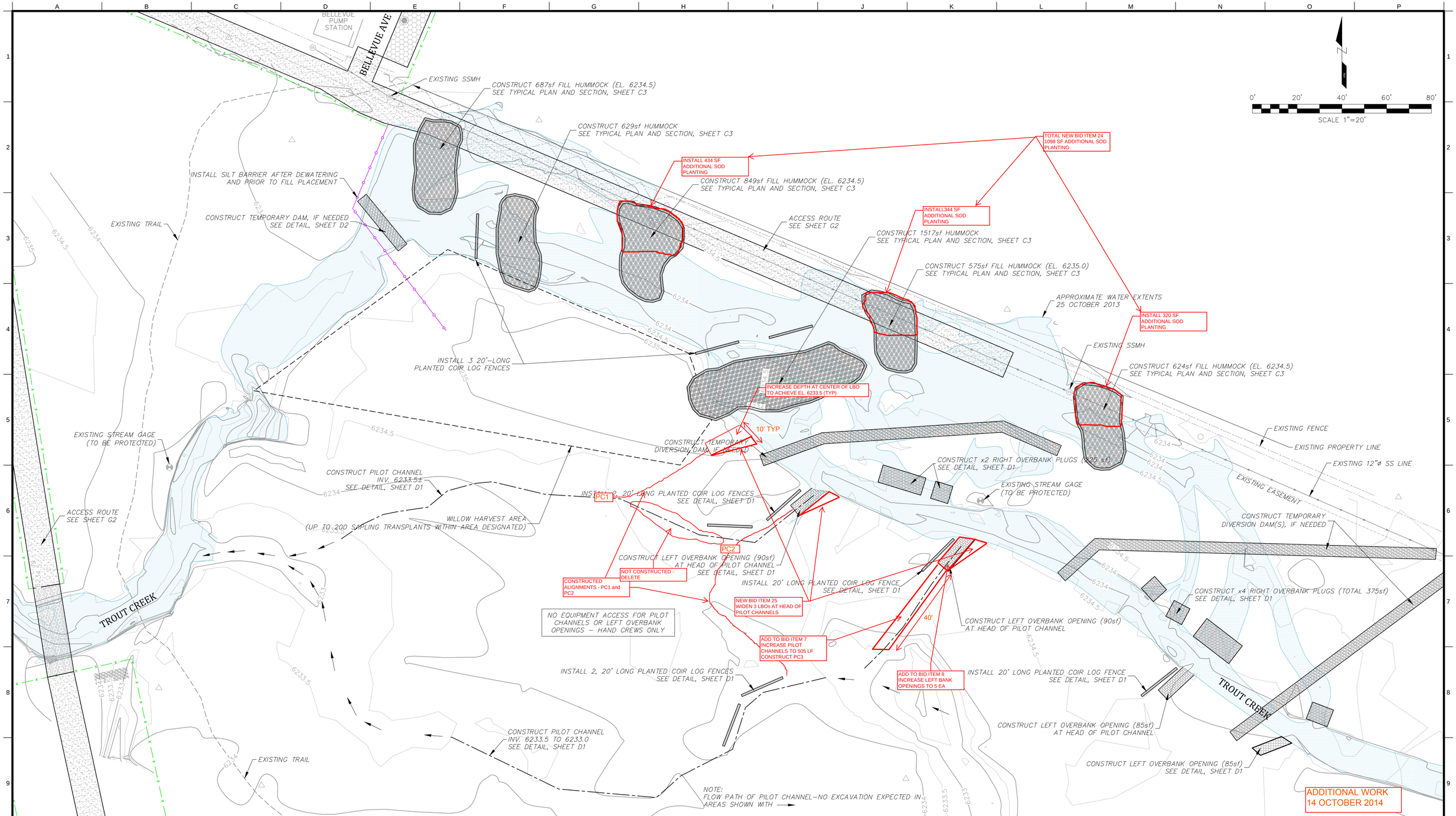
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements
Details Sheet

Job Number 600035

Sheet Number

D2

Sheet 9 of 9



South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, California 96150
(530) 544-6474
www.stpud.us

nhc northwest hydraulic consultants
80 south lake avenue, suite 800
pasadena, california 91101
phone: (626) 440–0080
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REGISTERED PROFESSIONAL ENGINEER
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Revisions		
No.	Date	Description

Drawing Information	
Date	23 June 2014
Status	Final Submittal
Designer	eew
Drafter	tvs
Checked	eew
File Name	UT MARSH
Plotted Scale	0 1/2 1

P:\600035_Truckee Marsh\AC-DWG\600035UTM.dwg

Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 1 Improvements

Plan Sheet

Job Number 600035

Sheet Number C2

Sheet 5 of 9

ELECTROFISHING, HYDROLOGIC AND WATER QUALITY FIELD DATA

DATE: 09/26/14 PAGE 1 OF 4
START FIELD TIME: 1045 END FIELD TIME: 1630

LOCATION
STREAM NAME: TROUT CREEK RIVER BASIN: UPPER TRUCKEE MARSH
REACH/SITE IDENTIFICATION NAME/NUMBER: —
TOWNSHIP: — RANGE: — SECTION: —

ENVIRONMENTAL CONDITIONS
WEATHER: OVERCAST, RAIN, HAIL
AIR TEMPERATURE (F) AND (TIME): 55°F @ 1045 WIND (mph): 0
WHR HABITAT TYPE OF WLPZ WITHIN REACH/SITE: —
CANOPY CLOSURE OVER WETTED SURFACE OF CHANNEL: 0 %

WATER QUALITY
WATER TEMPERATURE (F) AND (TIME): 50°F @ 1500 pH: / SULFATE (mg/L): /
DISSOLVED OXYGEN (mg/L): / TOTAL ALKALINITY (mg/L): /
CONDUCTIVITY (umhos/cm): / TOTAL DISSOLVED SOLIDS (mg/L): /

AVERAGE WETTED CHANNEL WIDTH

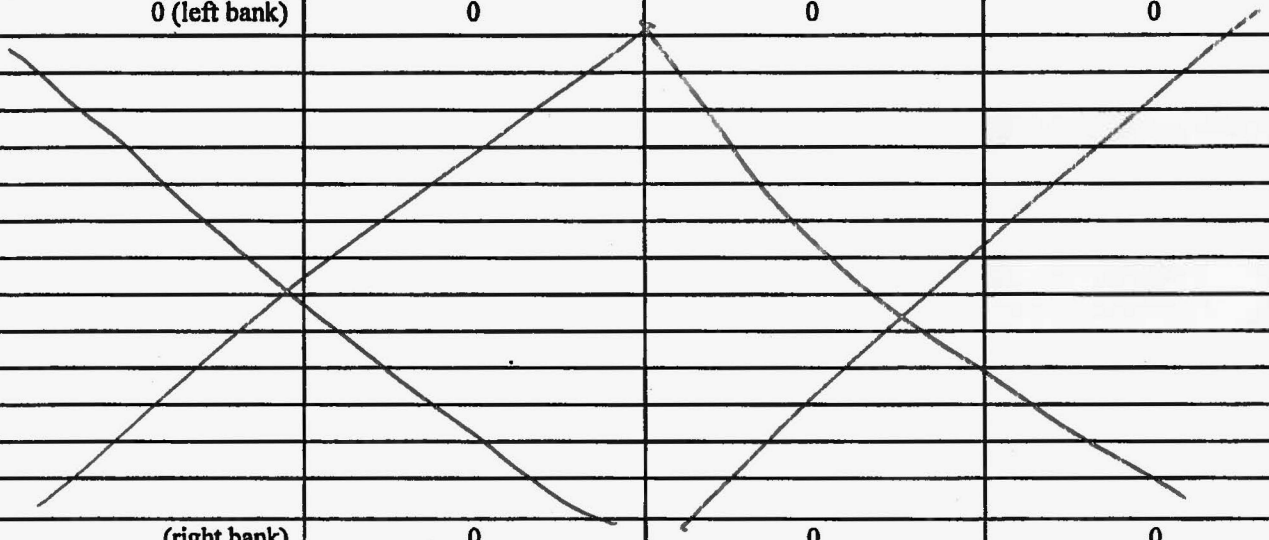
Distance (feet)	Channel Width (feet)
0 (downstream)	
30	
60	
90	
120	
150	
180	
210	
240	
270	
300 (upstream)	
Average Wetted Channel Width for 300 Feet =	
Total Reach/Site Length Sampled (feet) =	—

ADVERSE LAND USE IMPACTS NOTED
(livestock, logging, debris jams, bank erosion)

CONSTRUCTION -
HEAVY EQUIPMENT
EXCAVATION - EARTH
REMOVAL
DEWATERING ACTIVITIES
BANK EROSION

STREAM DISCHARGE MEASUREMENT

Distance (feet)	Water Depth (feet)	Water Velocity (fps)	Cell Discharge (cfs)
0 (left bank)	0	0	0
(right bank)	0	0	0
		Total Stream Discharge	



ELECTROFISHING DESIGN

UPSTREAM BLOCK: SEINE X WATERFALL _____ CULVERT _____ OTHER _____
DOWNSTREAM BLOCK: SEINE X OTHER _____
MAKE AND MODEL OF ELECTROFISHER USED: SMITH-ROOT LR-24
NAME OF UNIT OPERATOR: MATTHEW SILVA
NAME(S) OF NETTERS: WILL BEVARD, STEVE PAGLIUGHI
SALT ADDED (yes/no): NO
UNIT SETTINGS: VOLTS: 400 AMPS: 0.11 CYCLES: 15 % PWIDTH: 35 Hz

Pass Number	Timer Reading at Start (seconds)	Timer Reading at End (seconds)	Total Elapsed Time (seconds)
1	000000	002753	2753
2	000000	001652	1652
3	—	—	—
4	—	—	—

NOTES ON SAMPLING PROBLEMS/EQUIPMENT PROBLEMS

ELECTROFISHING FIELD DATA

DATE: 9/26/14
STREAM NAME:: TROUT CREEK
REACH/SITE IDENTIFICATION NAME/NUMBER: UPPER TRUCKEE MARSH

FISH SPECIES TALLY
PASS NUMBER: 1

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	NOTES
LAHONTAN SPECKLED DACE	66	2	7/ TOTAL LENGTH
" "	75	4	79 TOTAL LENGTH
" "	57	2	61 TL
LAHONTAN SPECKLED DACE	—	46	41 FISH - GROUP WEIGHT
19 groups of 41 fish, Speckled			
dace	N~779		

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	TOTAL LENGTH (mm) ~~NOTES~~
BROWN TROUT	158	44	165
" "	200	88	211
" "	158	50	168
" "	172	58	181
" "	157	44	165
" "	175	60	184
" "	85	6	90
" "	74	4	77
" "	70	4	75
" "	66	4	70

FISH SPECIES TALLY
PASS NUMBER: 2 (continued)

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	TOTAL LENGTH ~~NOTES~~
LAHONTAN SPECKLED DACE	65	4	70
" "	68	4	72
" "	62	4	66
11 groups of	41 fish,	LAHONTAN	SPECKLED
DACE N~	451*		

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	TOTAL LENGTH ~~NOTES~~
BROWN TROUT	161	50	170
" "	311	328	321
" "	288	254	294
" "	199	92	212
" "	345	454	365
" "	550	>4.4lbs*	562

* LAHONTAN SPECKLED DACE GROUP COUNTED IN GROUPS OF ROUGHLY 41 FISH

* FISH WEIGHT EXCEEDED CAPABILITIES OF SCALE (4.4lbs)

ELECTROFISHING, HYDROLOGIC AND WATER QUALITY FIELD DATA

DATE: 9/27/14 PAGE 1 OF 5
START FIELD TIME: 1000 END FIELD TIME: 1600

LOCATION
STREAM NAME: TROUT CREEK RIVER BASIN: UPPER TRUCKEE MARSH
REACH/SITE IDENTIFICATION NAME/NUMBER: \
TOWNSHIP: \ RANGE: \ SECTION: \

ENVIRONMENTAL CONDITIONS
WEATHER: RAIN, HAIL
AIR TEMPERATURE (F) AND (TIME): 50°F @ 1045 WIND (mph): 0-5
WHR HABITAT TYPE OF WLPZ WITHIN REACH/SITE: \
CANOPY CLOSURE OVER WETTED SURFACE OF CHANNEL: Ø %

WATER QUALITY
WATER TEMPERATURE (F) AND (TIME): 45°F @ 1000 pH: / SULFATE (mg/L): /
DISSOLVED OXYGEN (mg/L): / TOTAL ALKALINITY (mg/L): /
CONDUCTIVITY (umhos/cm): / TOTAL DISSOLVED SOLIDS (mg/L): /

AVERAGE WETTED CHANNEL WIDTH

Distance (feet)	Channel Width (feet)
0 (downstream)	
30	
60	
90	
120	
150	
180	
210	
240	
270	
300 (upstream)	
Average Wetted Channel Width for 300 Feet =	\
Total Reach/Site Length Sampled (feet) =	\

ADVERSE LAND USE IMPACTS NOTED
(livestock, logging, debris jams, bank erosion)

CONSTRUCTION.
HEAVY EQUIPMENT,
EXCAVATION, EARTH REMOVAL
DEWATERING ACTIVITIES
BANK EROSION

STREAM DISCHARGE MEASUREMENT

Distance (feet)	Water Depth (feet)	Water Velocity (fps)	Cell Discharge (cfs)
0 (left bank)	0	0	0
(right bank)	0	0	0
		Total Stream Discharge	

ELECTROFISHING DESIGN

UPSTREAM BLOCK: SEINE X WATERFALL _____ CULVERT _____ OTHER _____
DOWNSTREAM BLOCK: SEINE X OTHER _____
MAKE AND MODEL OF ELECTROFISHER USED: SMITH-ROOT LR-24
NAME OF UNIT OPERATOR: MATTHEW SIWA
NAME(S) OF NETTERS: WILL REWARD, STEVE PAGLUGHI
SALT ADDED (yes/no): NO
UNIT SETTINGS: VOLTS: 400 AMPS: 0.11 CYCLES: 15% PWIDTH: 35

Pass Number	Timer Reading at Start (seconds)	Timer Reading at End (seconds)	Total Elapsed Time (seconds)
1	001652	3220	1568
2	000000	1347	1347
3	—	—	—
4	—	—	—

NOTES ON SAMPLING PROBLEMS/EQUIPMENT PROBLEMS

INCREASED TURBIDITY DUE TO RAIN, SEDIMENT INPUTS FROM CONSTRUCTION ACTIVITY

ELECTROFISHING FIELD DATA

DATE: 09/27/14
STREAM NAME:: TROUT CREEK
REACH/SITE IDENTIFICATION NAME/NUMBER: UPPER TRUCKEE MARSH

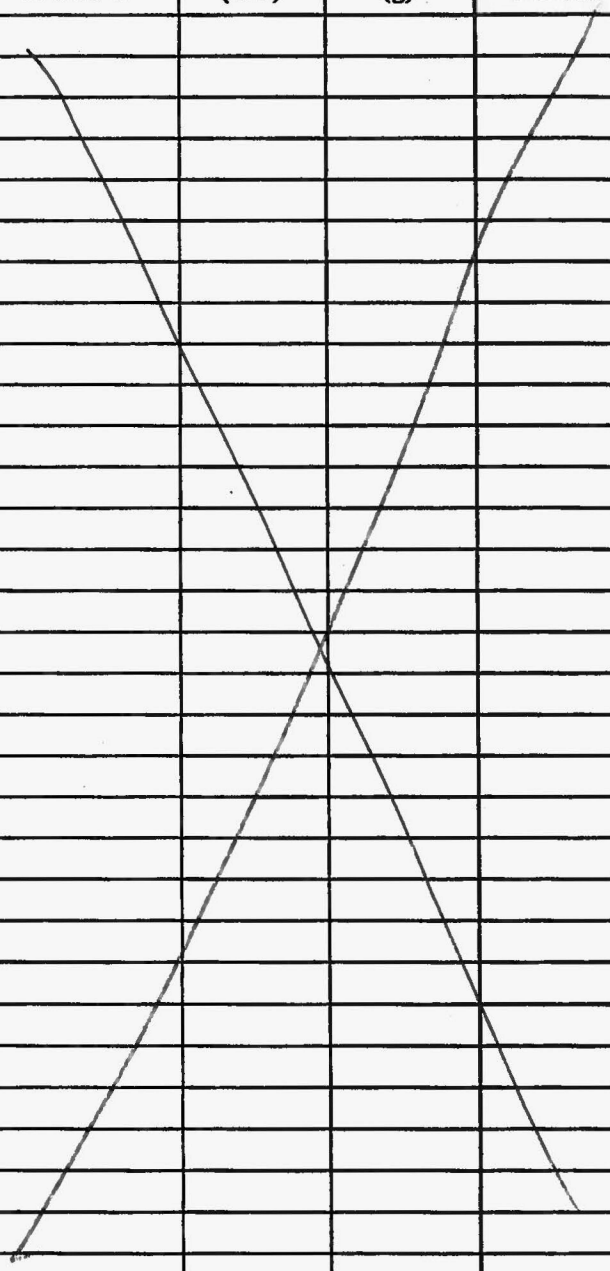
FISH SPECIES TALLY
PASS NUMBER: 1

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	TOTAL LENGTH (mm) ~~NOTES~~
BROWN TROUT	521	1432	541
" "	158	46	168
" "	155	46	163
" "	366	622	375
" "	309	344	318
" "	346	488	361
" "	442	850	455
" "	182	72	191
" "	365	570	379
" "	311	278	330

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	TOTAL LENGTH (mm) ~~NOTES~~
RAINBOW TROUT	290	304	309

FISH SPECIES TALLY
PASS NUMBER: 1 (continued)

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	NOTES		SPECIES	FORK LENGTH (mm)	WEIGHT (g)	NOTES
LAHONTAN SPECKLED DACE	—	-	—					
	ESTIMATED N=35,							
	group weight = 30g							
	(1 MORTALITY)							



FISH SPECIES TALLY
PASS NUMBER: 2 (continued)

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	NOTES
BROWN TROUT	610	>4.4 lbs*	620
" "	312	356	327
" "	228	130	240
" "	330	430	343
" "	79	4	83
" "	161	46	167
" "	247	148	259

SPECIES	FORK LENGTH (mm)	WEIGHT (g)	NOTES
LAHONTAN SPECKLED DACE	—	—	—
	EST N= 50, group		
	weight=	30g	

* FISH WEIGHT EXCEEDED CAPABILITIES OF SCALE (4.4 lbs)

Tahoe – Upper Truckee Marsh Project

Sept. 26, 2014

Julie Sage

I arrived at the work site at 7:55 am. The monitoring area is located to the south of Bellevue Avenue, in the town of South Lake Tahoe. I met with Danielle (AECOM), Ivo (STPUD), and Ray (the Vac operator). Danielle and I discussed the existing cultural resources within the APE; specifically, the Old Wagon road (ELD-271). We asked the excavation crew that they do not disturb the intact portion of a timber bridge that was determined ineligible. According to Danielle, the crew said that the feature could be left alone, so we reiterated that to the crew. We discussed protocol, as far as when any resources were to be encountered. We told them that a photo would need to be taken, and would be sent to Danielle, and that the crew would need to move over 50 feet away from the area of the resource, and continue with excavating. However, if something pops-up that is not very substantial (they used "chert chips, for example), then they could continue with excavating.

Today, excavation began at the southern end of the APE. The southern portion of the excavation corridor ranged from 6 to 18 m wide. This included any raking and dumping areas. The following is a description of the artifacts and features encountered during this day.

Artifact 1: Obsidian flake tool, flaked on one edge of the dorsal surface, 2.7 by 1.0 by 0.3 cm.

Artifact 2: Obsidian flake, tiny pressure flake discovered next to Artifact 1.

Artifact 3: Cut nail, heavily decomposed, 3-1/4" (length) by 3/8" (head)

Artifact 4: Wire nail, 6-3/8" (length) by ½" (head), no GPS coordinates

Artifact 5: One white earthenware sherd, 1" long. It was chipped off (probably tramped or chipped from excavator), so no thickness could be measured. A second sherd (Artifact 6), likely from the same vessel, was discovered within the same area. Both were found on the west edge of the corridor, at the halfway mark.

Artifact 6: See above.

Artifact 7: One olive colored glass bottle body shard, likely from a wine/champagne bottle. The shard measured 1" (length) by 1/8" (thick). No pic or GPS coordinates. It was located within the east edge of the corridor, approximately 20 m south of the north end of the excavation corridor.

Feature 1: Three cedar timber remnants (likely a remnant from the Old wagon road/timber bridge. The area of the feature measured 5 by 4 feet.

I left the work site at 5:15 pm.

The first pic is the back hoe scraping dirt around to make small islands. The pic with all the guys standing around is there attempt to fill in low spots. After island is created it is covered with a sheet of coconut bark fabric.

The last pic is the little trenches they created around the island. Waddles rolls were placed in these trenches and small stakes were hammered in on both sides to hold the waddles in place.

No archaeological materials were uncovered. Ground disturbance was limited to less than a foot. The soil was a decomposed peat type soil overlain by alluvial deposits.

Tahoe – Upper Truckee Marsh Project

Photos

Sept. 26, 2014

Frame 1: Overview of southernmost area of excavation, rainbow in background, facing north-northwest

Frame 2: Overview of the area to the west of the excavation, rainbow in background, facing west-northwest

Frame 3: Overview of southernmost area of excavation, facing northeast

Frame 4: Artifact 1, obsidian flake tool, dorsal surface

Frame 5: Artifact 2, obsidian pressure flake

Frame 6: Overview of area of where Artifacts 1 and 2 were discovered

Frame 7: Artifact 1, flake tool, dorsal surface, displaying modified edge

Frame 8: Artifact 1, flake tool, dorsal surface, displaying modified edge

Frame 9: Artifact 1, flake tool, dorsal surface, displaying modified edge

Frame 10: Overview of the area to the west of the excavation, facing west-southwest

Frame 11: Artifact 3, cut nail

Frame 12: Overview of excavation (grading) within southernmost end of project. Operator is placing sod back onto where they have leveled to grade, facing north-northeast

Frame 13: Overview of excavation (grading) within southernmost end of project. Operator is placing sod back onto where they have leveled to grade, facing north-northeast

Frame 14: Artifact 4, wire nail

Frame 15: Overview of halfway point of excavation, crew has placed in sod, facing north-northeast

Frame 16: Overview of the area of excavation, taken from southernmost end, facing north

Frame 17: Artifact 5, white earthenware sherd

Frame 18: Feature 1, planview of three cedar timber planks, in situ, facing east

Frame 19: Feature 1, overview of three cedar timber planks, in situ, facing north

APPENDIX C

Post-Construction Monitoring

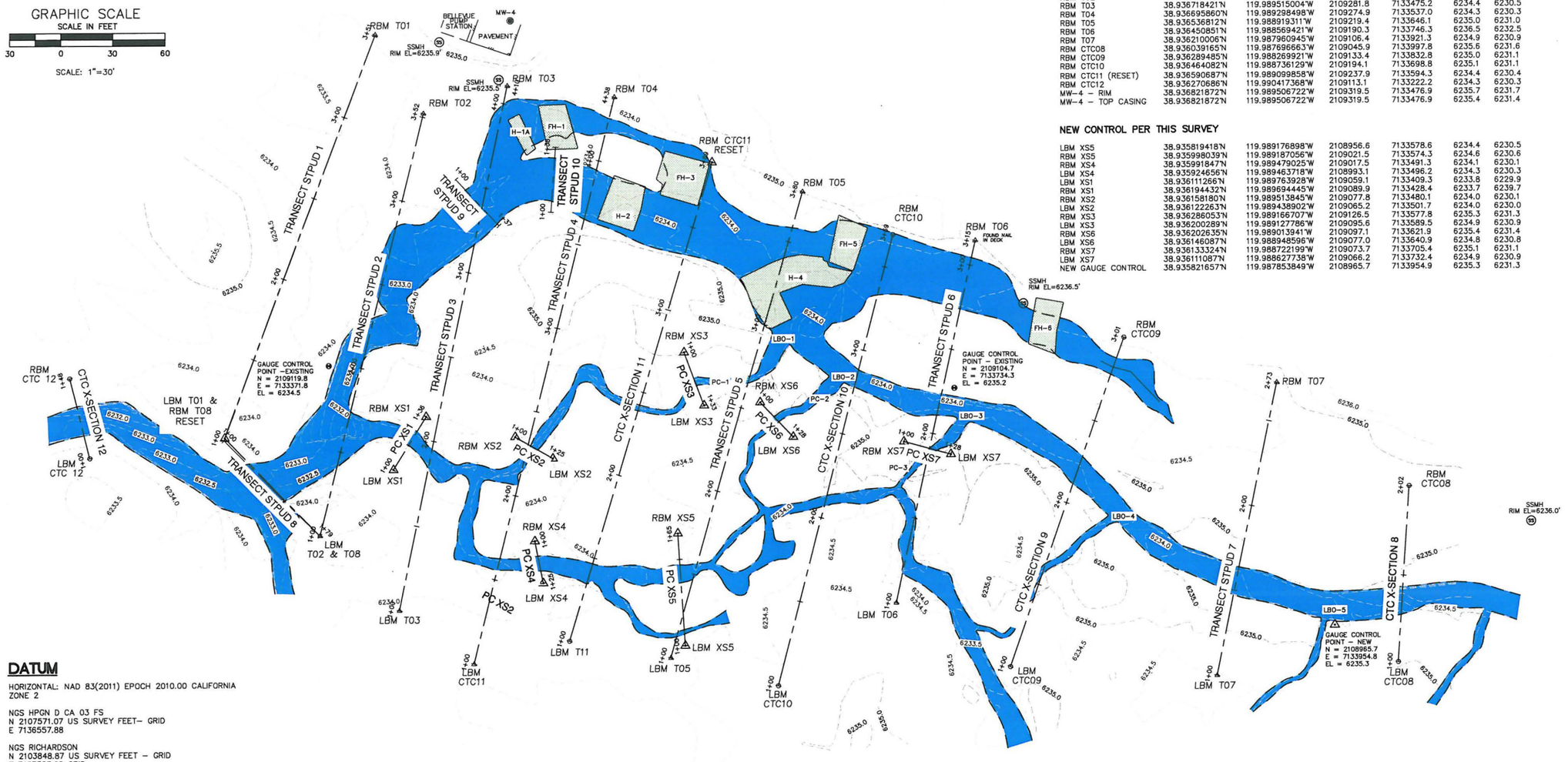
2015 ANNUAL REPORT

APPENDIX C – POST-CONSTRUCTION MONITORING INFORMATION

LIST OF CONTENTS

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT - AS BUILT FOR SOUTH TAHOE PUBLIC UTILITY DISTRICT

GRAPHIC SCALE
SCALE IN FEET
30 0 30 60
SCALE: 1"=30'



DATUM

HORIZONTAL: NAD 83(2011) EPOCH 2010.00 CALIFORNIA ZONE 2

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET- GRID
E 7136557.88

NGS RICHARDSON
N 2103848.87 US SURVEY FEET – GRID
E 7123525.92 GRID

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL = 6248.20

PER CONTROL SURVEY PROVIDED BY S.T.P.U.D., PREPARED BY TRI STATE SURVEYING, LTD., DATED 11-05-13

LEGEND:

- ⚠ SET 5/8" REBAR AND CAP "LUMOS CONTROL"
- △ FOUND 5/8" REBAR AND CAP "TR-STATE CONTROL" – UNLESS OTHERWISE NOTED
- ○ FOUND 1/2" REBAR W/ NO CAP (CTC)

NOTE:

FIELD SURVEY CONDUCTED ON NOVEMBER 25 & 26, 2014.

EXISTING CONTROL PROVIDED BY S.T.P.U.D.

MONUMENT NAME	LATITUDE NAD83	LONGITUDE NAD83	NORTHING SPC GRID	EASTING SPC GRID	ELEV. NAVD88	ELEV. NGVD29
LBM T01 & RBM T08 (RESET)	38.936168894'N	119.990106106'W	2109078.0	7133311.6	6234.3	6230.3
LBM T02 & LBM T08	38.936009520'N	119.989915687'W	2109021.1	7133367.0	6233.9	6229.9
LBM T0	38.935887231'N	119.989757770'W	2108977.6	7133412.9	6234.2	6230.2
LBM T04	38.935799724'N	119.989607047'W	2108946.7	7133456.5	6234.4	6230.5
LBM T05	38.935800843'N	119.989206809'W	2108949.6	7133570.3	6234.2	6230.3
LBM T06	38.935877770'N	119.988745105'W	2108980.5	7133700.9	6234.6	6230.6
LBM T07	38.935747492'N	119.988096356'W	2108937.2	7133886.5	6234.5	6230.5
LBM CTC08	38.935760651'N	119.987726877'W	2108944.3	7133991.4	6234.9	6231.0
LBM CTC09	38.935771271'N	119.988517241'W	2108943.2	7133766.6	6235.2	6231.2
LBM CTC10	38.935751784'N	119.988989853'W	2108933.1	7133632.4	6234.6	6230.6
LBM CTC11	38.935831478'N	119.989412956'W	2108959.5	7133511.4	6234.4	6230.4
LBM CTC12	38.936142345'N	119.990379722'W	2109066.6	7133234.0	6233.9	6229.9
RBM T01	38.936805560'N	119.989783506'W	2109311.8	7133398.2	6234.3	6230.3
RBM T02	38.936678391'N	119.989687343'W	2109266.1	7133426.6	6234.4	6230.4
RBM T03	38.936718421'N	119.989515004'W	2109281.8	7133475.2	6234.4	6230.5
RBM T04	38.936695860'N	119.989298498'W	2109274.9	7133537.0	6234.3	6230.3
RBM T05	38.936536812'N	119.988919311'W	2109219.4	7133646.1	6235.0	6231.0
RBM T06	38.936450851'N	119.988569421'W	2109190.3	7133746.3	6236.5	6232.5
RBM T07	38.936210006'N	119.987960945'W	2109106.4	7133921.3	6234.9	6230.9
RBM CTC08	38.936039165'N	119.987696663'W	2109045.9	7133997.8	6235.6	6231.6
RBM CTC09	38.936289485'N	119.988269921'W	2109133.4	7133832.8	6235.0	6231.1
RBM CTC10	38.936464082'N	119.988736129'W	2109194.1	7133698.8	6235.1	6231.1
RBM CTC11 (RESET)	38.936590687'N	119.989099858'W	2109237.9	7133594.3	6234.4	6230.4
RBM CTC12	38.936270686'N	119.990417368'W	2109113.1	7133222.2	6234.3	6230.3
MW-4 – RIM	38.936821872'N	119.989506722'W	2109319.5	7133476.9	6235.7	6231.7
MW-4 – TOP CASING	38.936821872'N	119.989506722'W	2109319.5	7133476.9	6235.4	6231.4

NEW CONTROL PER THIS SURVEY

LBM XS5	38.935819418'N	119.989176898'W	2108956.6	7133578.6	6234.4	6230.5
RBM XS5	38.935998039'N	119.989187056'W	2109021.5	7133574.3	6234.6	6230.6
RBM XS4	38.935991847'N	119.989479025'W	2109017.5	7133491.3	6234.1	6230.1
LBM XS4	38.935924656'N	119.989463718'W	2108993.1	7133496.2	6234.3	6230.3
LBM XS1	38.936111266'N	119.989763928'W	2109059.1	7133409.3	6233.8	6229.9
RBM XS1	38.936194432'N	119.989694445'W	2109089.9	7133428.4	6233.7	6239.7
RBM XS2	38.936158180'N	119.989513845'W	2109077.8	7133480.1	6234.0	6230.1
LBM XS2	38.936122263'N	119.989438902'W	2109065.2	7133501.7	6234.0	6230.0
RBM XS3	38.936286053'N	119.989166707'W	2109126.5	7133577.8	6235.3	6231.3
LBM XS3	38.936200289'N	119.989127786'W	2109095.6	7133589.5	6234.9	6230.9
RBM XS6	38.936202635'N	119.989013941'W	2109097.1	7133621.9	6235.4	6231.4
LBM XS6	38.936146087'N	119.988948596'W	2109077.0	7133640.9	6234.8	6230.8
RBM XS7	38.936133324'N	119.988722199'W	2109073.7	7133705.4	6235.1	6231.1
LBM XS7	38.936111087'N	119.988627738'W	2109066.2	7133732.4	6234.9	6230.9
NEW GAUGE CONTROL	38.935821657'N	119.987853849'W	2108965.7	7133954.9	6235.3	6231.3

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WWW.LUMOSENGINEERING.COM
CIVIL ENGINEERING
GEOTECHNICAL ENGINEERING
PLANNING
LANDSCAPE ARCHITECTURE
SURVEYING / GIS
CONSTRUCTION SERVICES
MATERIALS TESTING

PROFESSIONAL LAND SURVEYOR GREGORY S. PHILLIPS NO. 7936 EXP. 12/31/15 STATE OF CALIFORNIA

SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - BELLEVUE AREA
A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

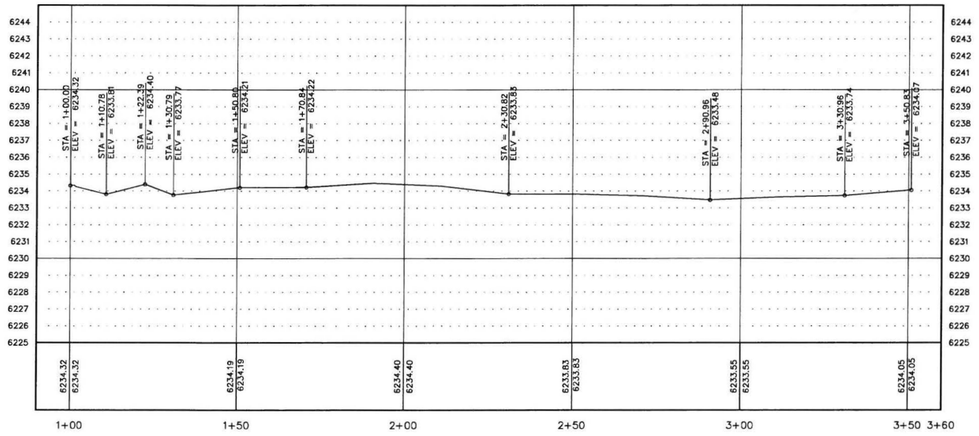
B1

DATE:	JANUARY 2015
DRAWN BY:	KLN
DESIGNED BY:	GP
CHECKED BY:	GP
JOB NO.:	8688.000

L:\LAPro\8688.000 – Upper Truckee Marsh\Survey\DWG\8688000 Upper Truckee Marsh profiles.dwg,B1 OVERALL
01/10/2015 10:06 am gphillips

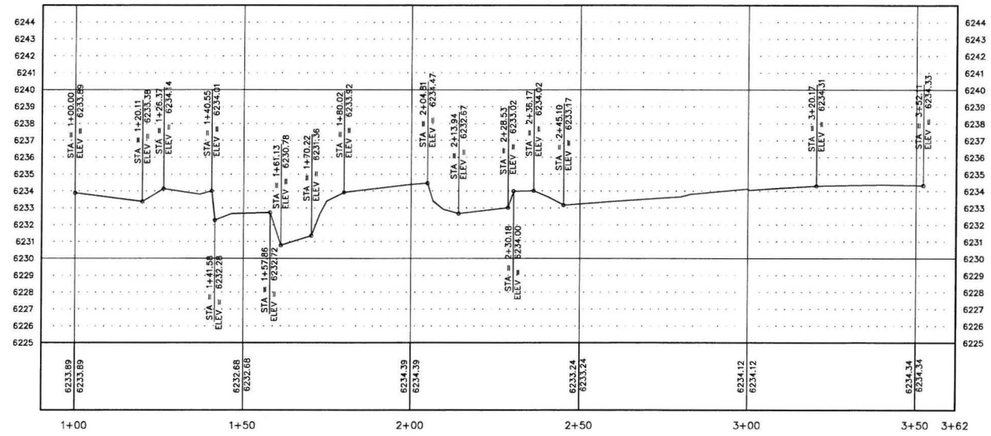
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 1 – STA: 0+90 TO STA: 3+60



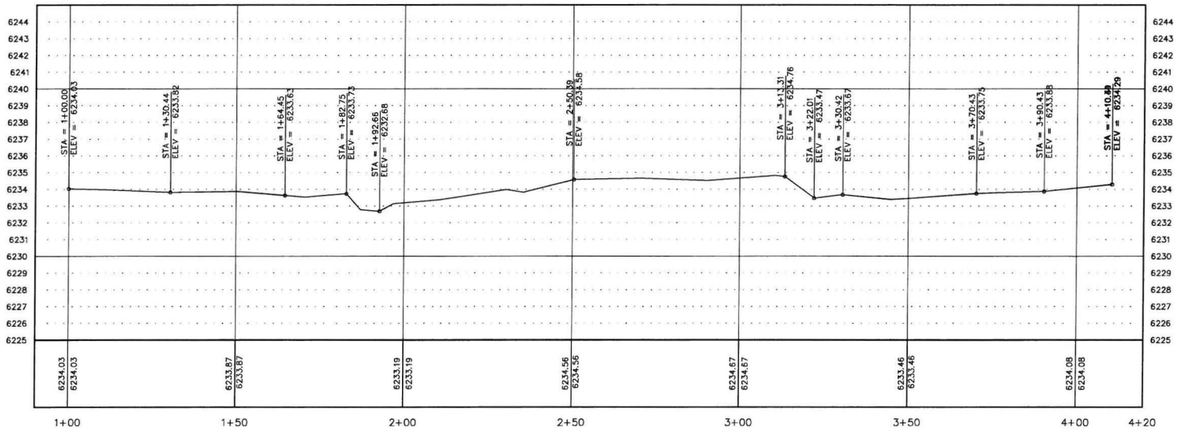
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 2 – STA: 0+90 TO STA: 3+62



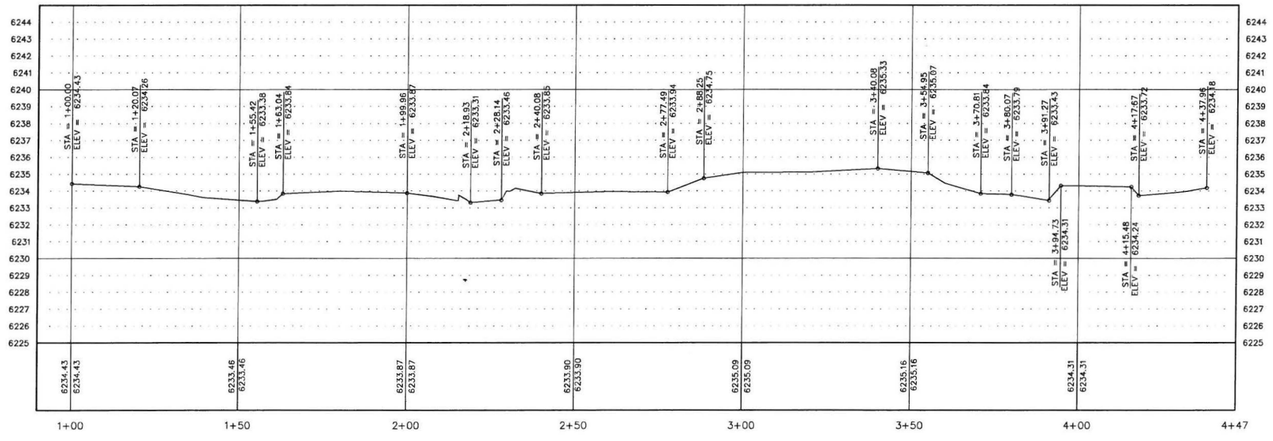
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 3 – STA: 0+90 TO STA: 4+20



SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 4 – STA: 0+90 TO STA: 4+47



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SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - BELLEVUE AREA

A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

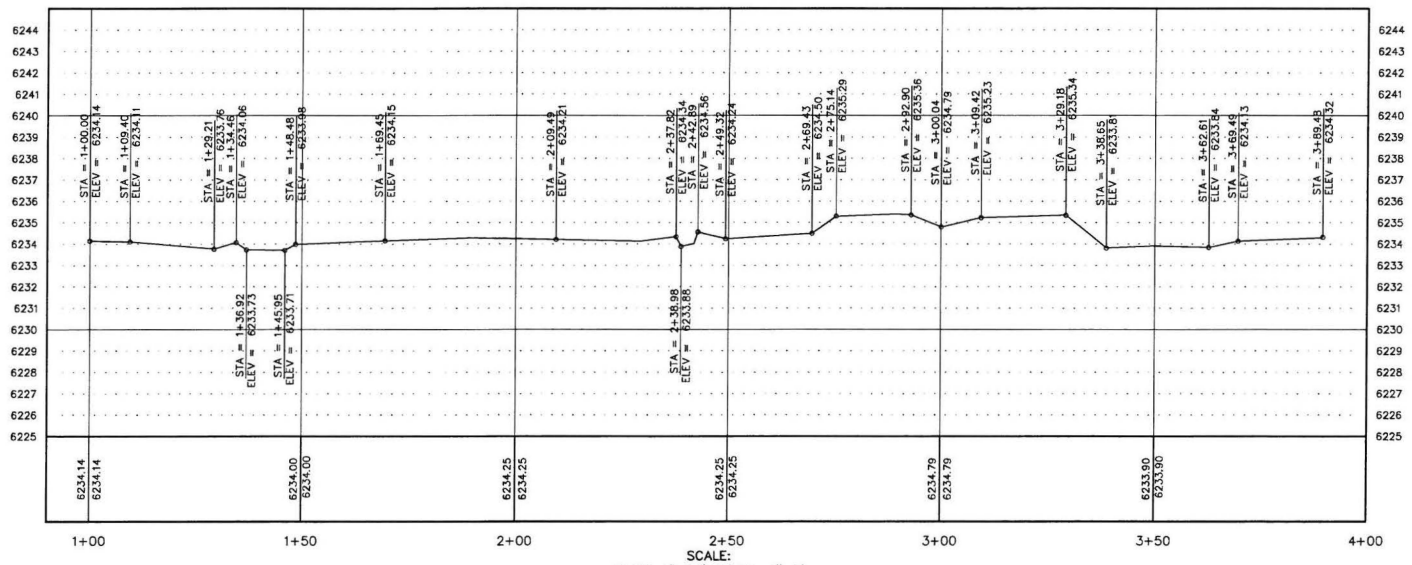
B2

DATE:	JANUARY 2015
DRAWN BY:	KLN
DESIGNED BY:	GP
CHECKED BY:	GP
JOB NO.:	8688.000

L:\Active\8688.002 - Upper Truckee Marsh\Survey\DWG\8688000 Upper Truckee Marsh profiles.dwg,B2 PROFILES, 01/08/2015 01:35 pm khunnes

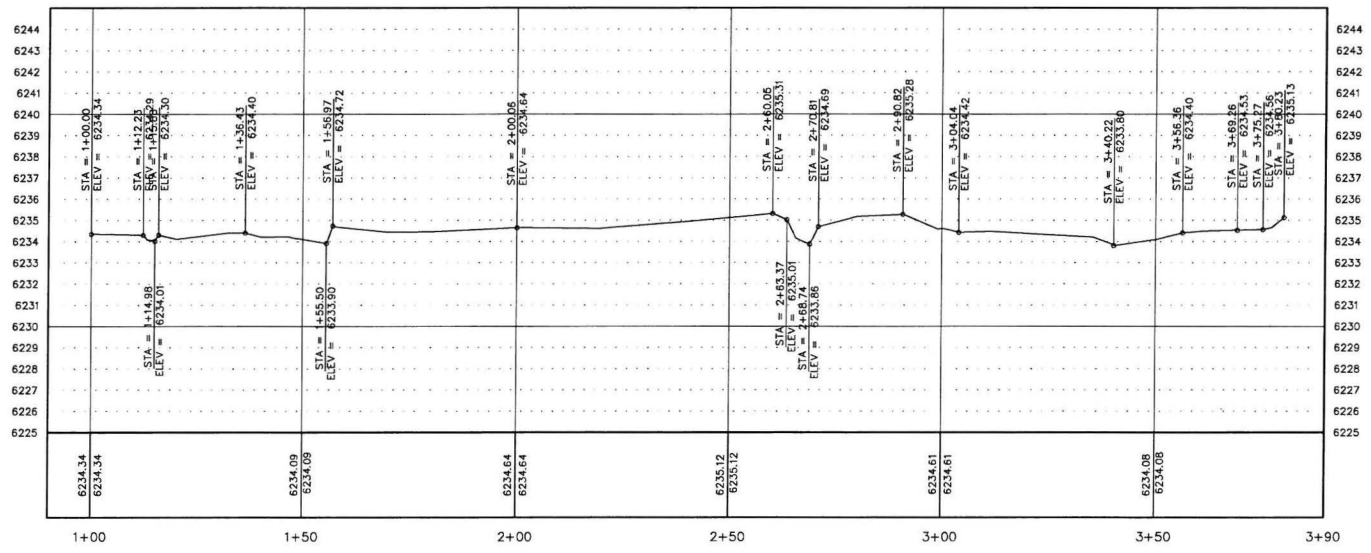
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

CTC X-SECTION 11 - STA: 0+90 TO STA: 4+00



SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 5 - STA: 0+90 TO STA: 3+90



SCALE:
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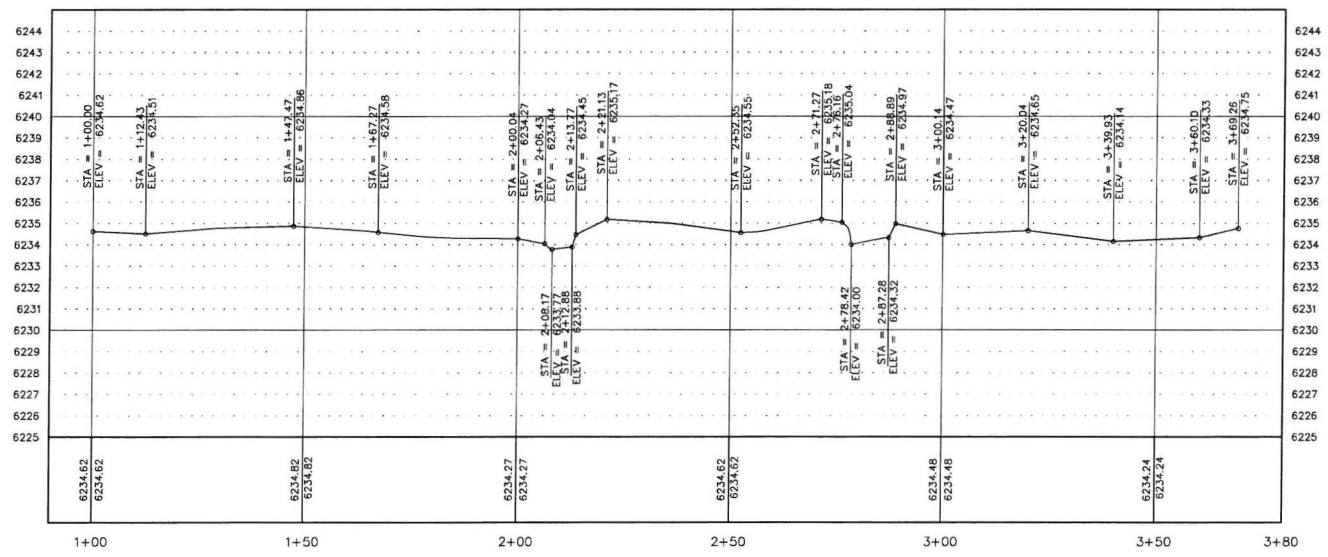
CTC X-SECTION 10 - STA: 0+90 TO STA: 3+80



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SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - BELLEVUE AREA

A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

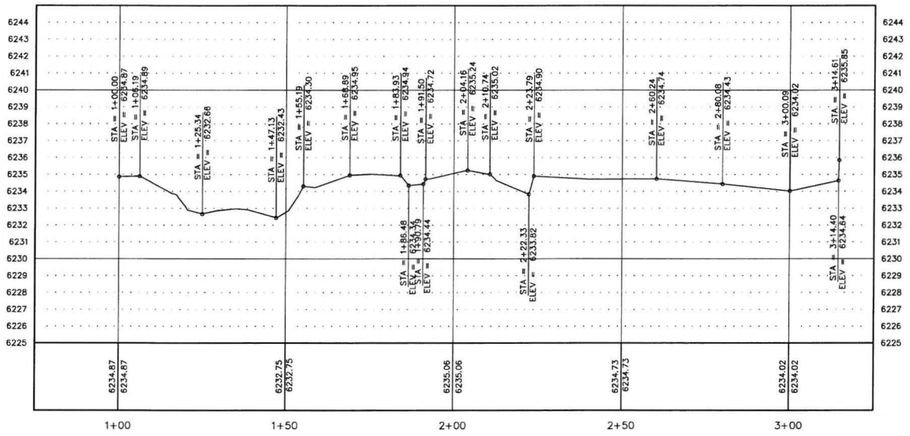
B3

DATE: JANUARY 2015
DRAWN BY: KLN
DESIGNED BY: GP
CHECKED BY: GP
JOB NO.: 8688.000

L:\LAPro\8688.000 - Upper Truckee Marsh\Survey\DWG\8688000 Upper Truckee Marsh profiles.dwg,B3 PROFILES, 01/06/2015 01:36 pm khunes

SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 6 – STA: 0+75 TO STA: 3+25



SCALE:
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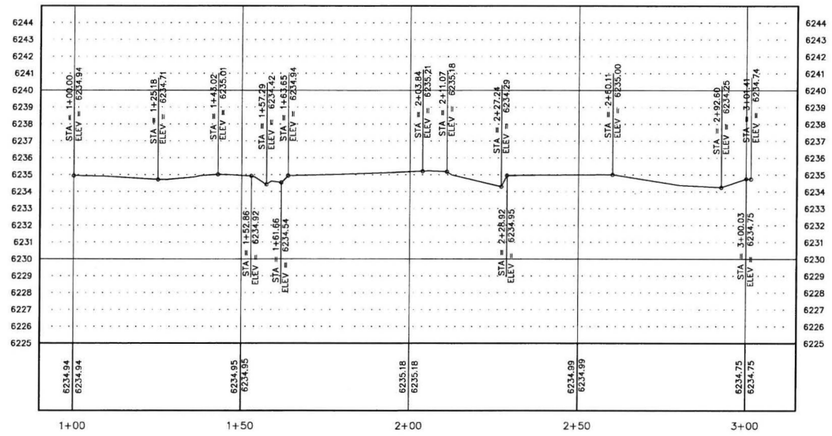
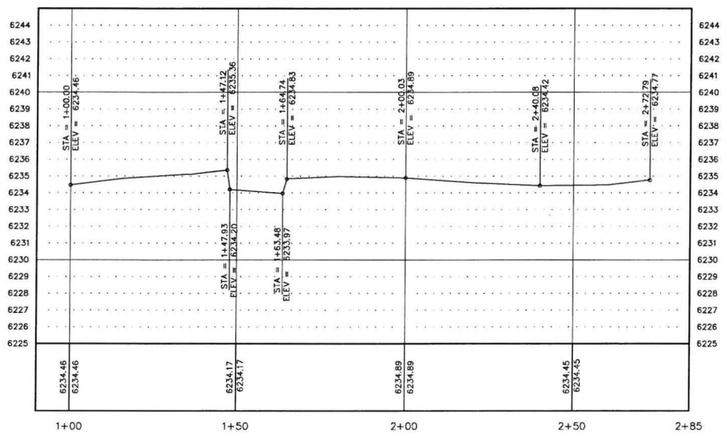
CTC X–SECTION 9 – STA: 0+90 TO STA: 3+15



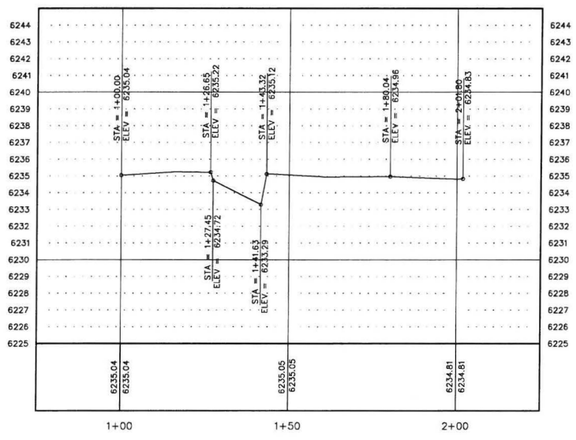
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 7 – STA: 0+90 TO STA: 2+85



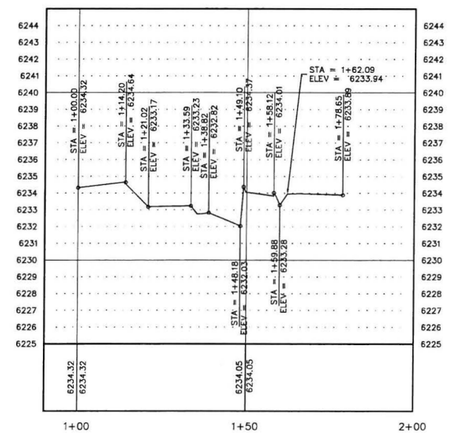
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

CTC X–SECTION 8 – STA: 0+75 TO STA: 2+25



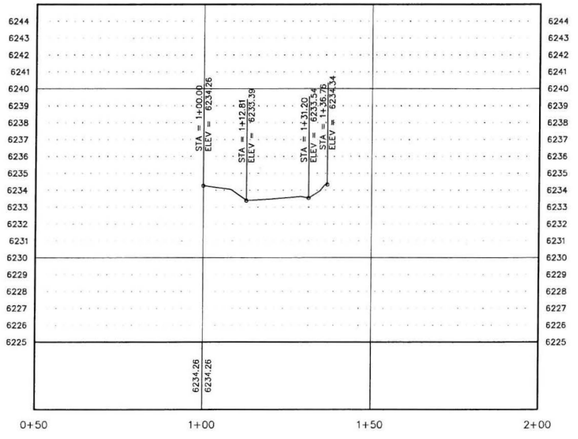
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 8 – STA: 0+90 TO STA: 2+00



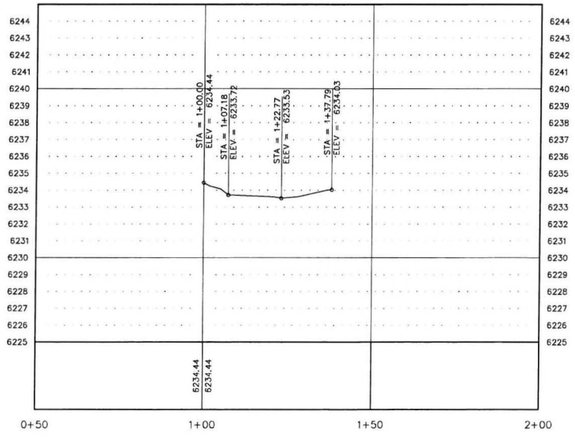
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 9 – STA: 0+50 TO STA: 2+00



SCALE:
HORIZ. 1"=20', VERT. 1"=2'

TRANSECT STPUD 10 – STA: 0+50 TO STA: 2+00



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UPPER TRUCKEE MARSH - BELLEVUE AREA

A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

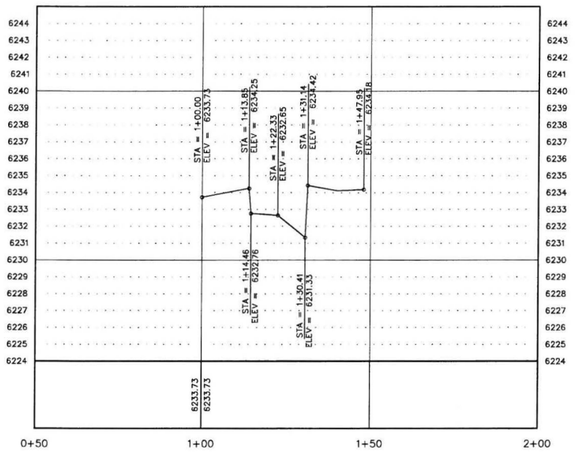
B4

DATE:	JANUARY 2015
DRAWN BY:	KLN
DESIGNED BY:	GP
CHECKED BY:	GP
JOB NO.:	8688.000

L:\LAPro\8688.000 – Upper Truckee Marsh\Survey\DWG\8688000 Upper Truckee Marsh profiles.dwg,B4 PROFILES, 01/08/2015 01:36 pm kmunes

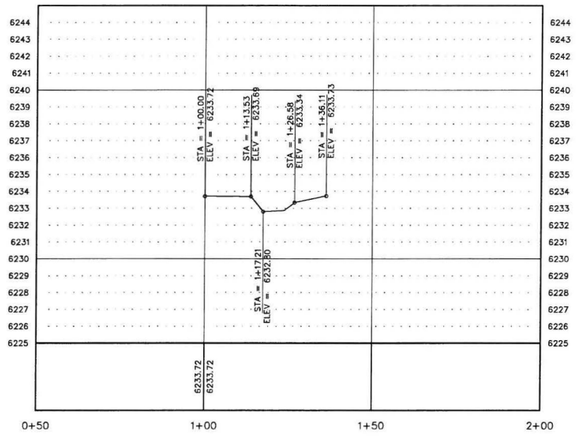
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

CTC X-SECTION 12 – STA: 0+50 TO STA: 2+00



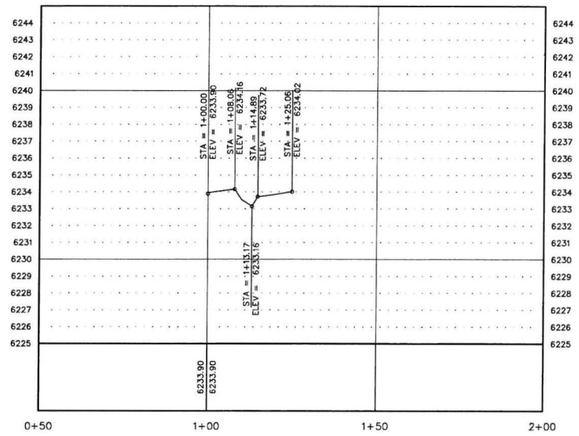
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS1 – STA: 0+50 TO STA: 2+00



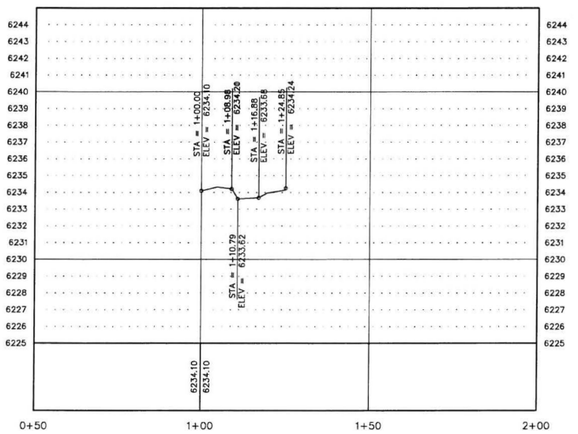
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS2 – STA: 0+50 TO STA: 2+00



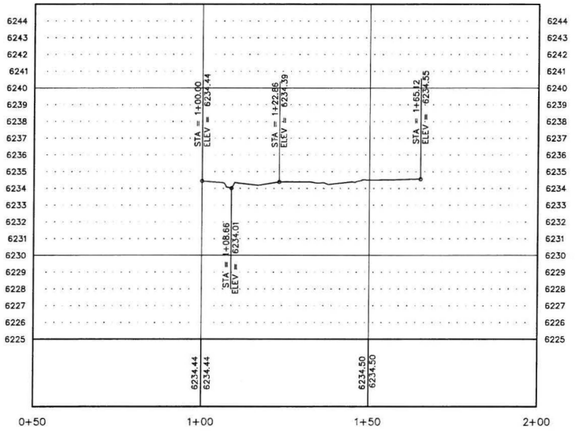
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS4 – STA: 0+50 TO STA: 2+00



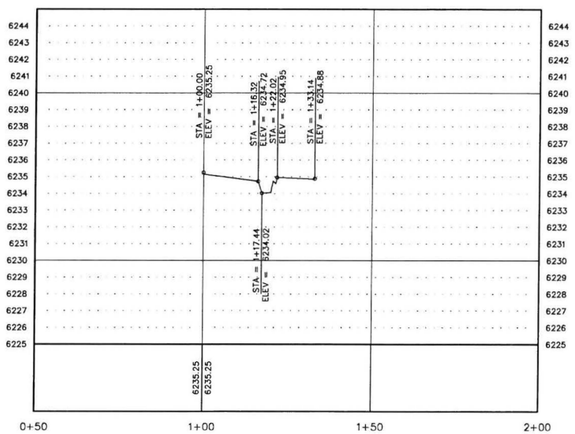
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS5 – STA: 0+50 TO STA: 2+00



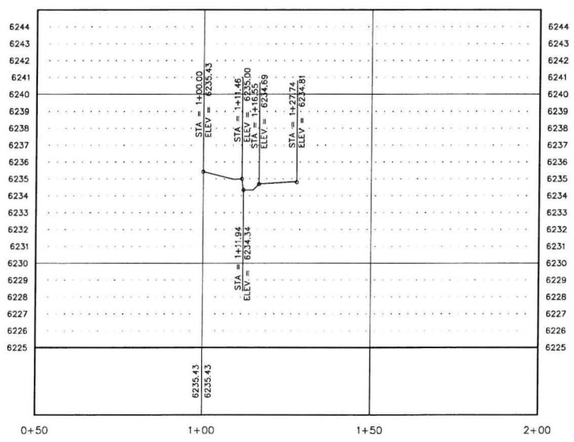
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS3 – STA: 0+50 TO STA: 2+00



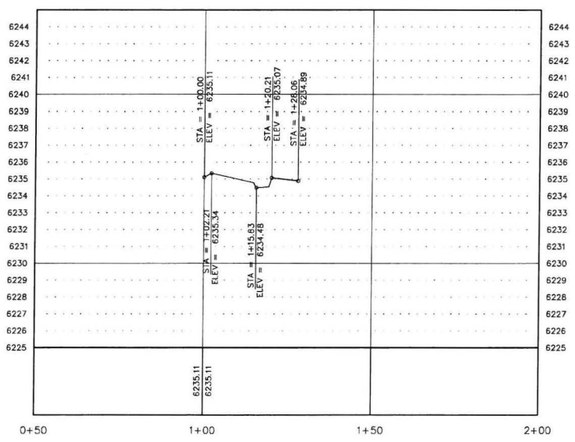
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS6 – STA: 0+50 TO STA: 2+00



SCALE:
HORIZ. 1"=20', VERT. 1"=2'

PC XS7 – STA: 0+50 TO STA: 2+00



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SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - BELLEVUE AREA

A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

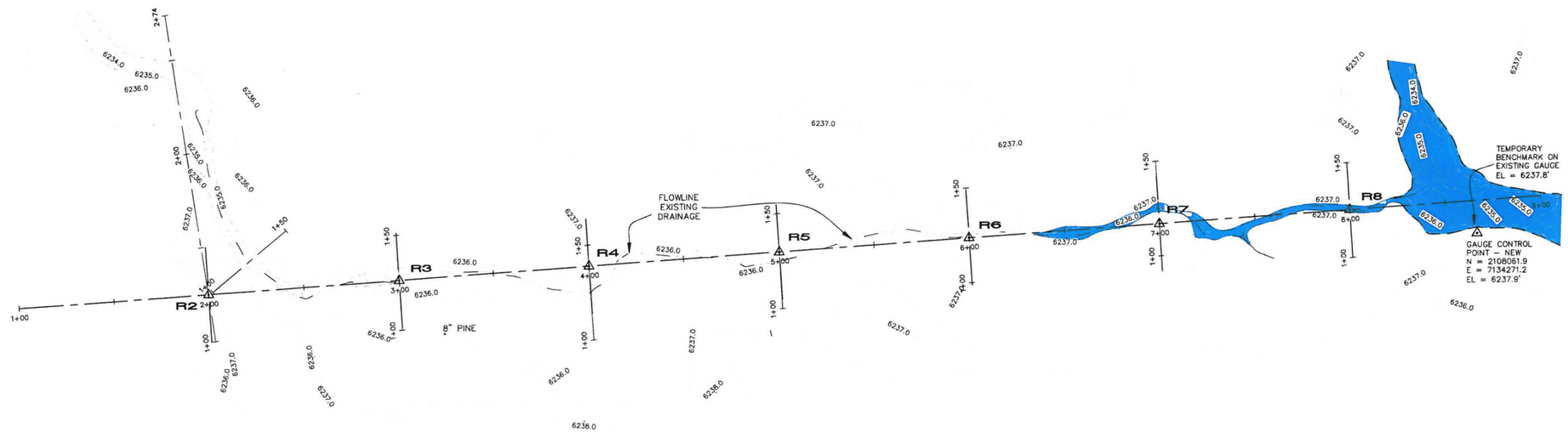
B5

DATE: JANUARY 2015
DRAWN BY: KLN
DESIGNED BY: GP
CHECKED BY: GP
JOB NO.: 8888.000

L:\VLAPro\8588.000 - Upper Truckee Marsh\Survey\DWG\8588000 Upper Truckee Marsh profiles.dwg,B5 PROFILES, 01/06/2015 01:36 pm knumes

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT FOR SOUTH TAHOE PUBLIC UTILITY DISTRICT

GRAPHIC SCALE
SCALE IN FEET
30 0 30 60
SCALE: 1"=30'



NEW CONTROL PER THIS SURVEY

MONUMENT NAME	LATITUDE NAD83	LONGITUDE NAD83	NORTHING SPC GRID	EASTING SPC GRID	ELEV. NAVD88	ELEV. NGVD29
R2	38.933290737°N	119.989152495°W	2108036.0	7133605.9	6236.7	6232.7
R3	38.933302389°N	119.988801138°W	2108042.5	7133705.8	6235.1	6231.1
R4	38.933314115°N	119.988450170°W	2108049.0	7133805.5	6236.2	6232.3
R5	38.933325686°N	119.988098854°W	2108055.4	7133905.3	6236.4	6232.4
R6	38.933337426°N	119.987747632°W	2108061.9	7134005.1	6236.5	6232.5
R7	38.933349104°N	119.987396289°W	2108068.3	7134104.9	6237.8	6233.8
R8	38.933360888°N	119.987045069°W	2108074.8	7134204.7	6236.7	6232.7
RUBICON GAUGE	38.933321287°N	119.986812431°W	2108061.9	7134271.2	6237.9	6234.0

DATUM

HORIZONTAL: NAD 83(2011) EPOCH 2010.00 CALIFORNIA ZONE 2

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET– GRID
E 7136557.88

NGS RICHARDSON
N 2103848.87 US SURVEY FEET – GRID
E 7123525.92 GRID

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL = 6248.20

PER CONTROL SURVEY PROVIDED BY S.T.P.U.D., PREPARED BY TRI STATE SURVEYING, LTD., DATED 11–05–13

LEGEND:

- ⚠ SET 5/8" REBAR AND CAP "LUMOS CONTROL"
- △ FOUND 5/8" REBAR AND CAP "TR–STATE CONTROL" – UNLESS OTHERWISE NOTED
- ○ FOUND 1/2" REBAR W/ NO CAP (CTC)

NOTE:

FIELD SURVEY CONDUCTED BETWEEN 11/25/14 AND 12/09/14.

01/10/2015 10:33 am gphillips

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PROFESSIONAL LAND SURVEYOR
GREGORY S. PHILLIPS
NO. 7936
EXP. 12/31/15
STATE OF CALIFORNIA

SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - RUBICON TRAIL AREA
A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M, A.P.N. 026-200-11

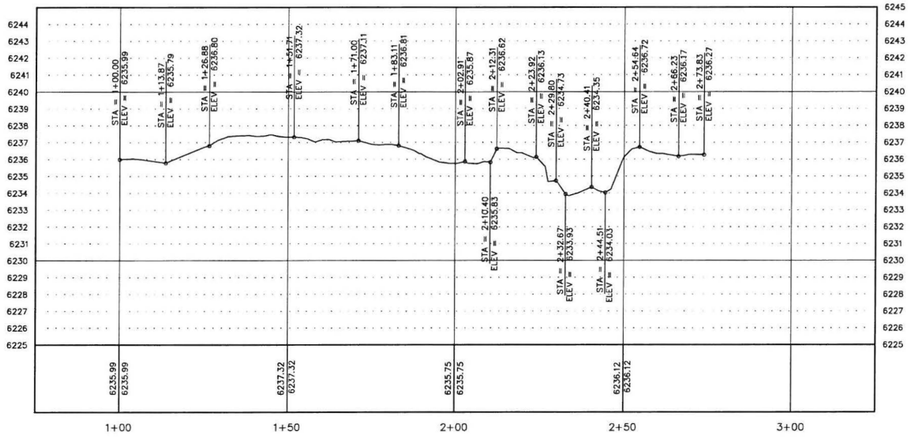
REV	DATE	DESCRIPTION	BY

R1

DATE: JANUARY 20
DRAWN BY: K
DESIGNED BY:
CHECKED BY:
JOB NO.: 8688.0

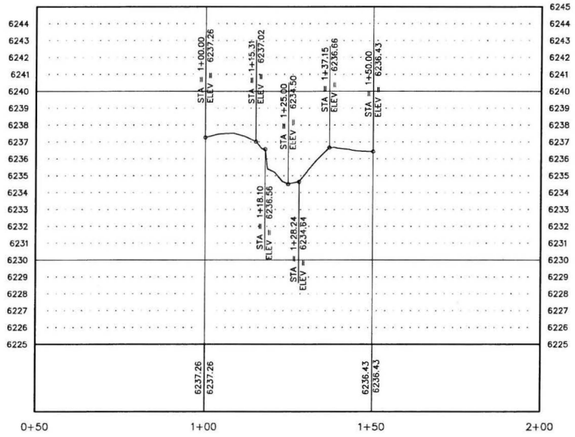
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 2+00 – STA: 0+75 TO STA: 3+25



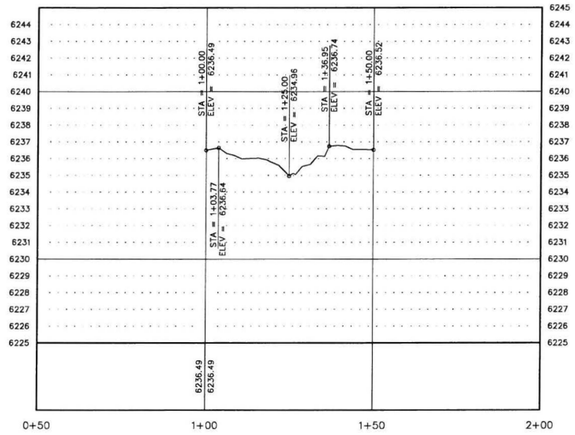
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 2+25 – STA: 0+50 TO STA: 2+00



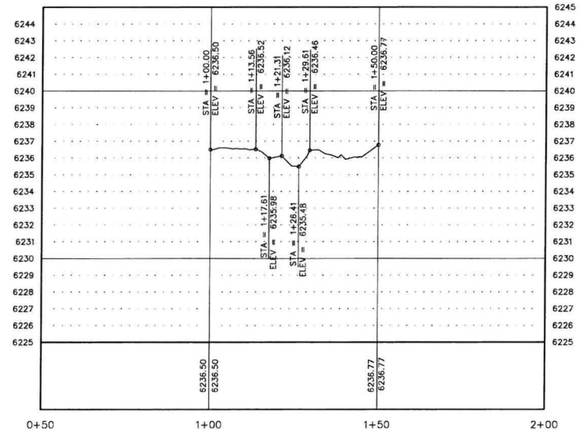
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 3+00 – STA: 0+50 TO STA: 2+00



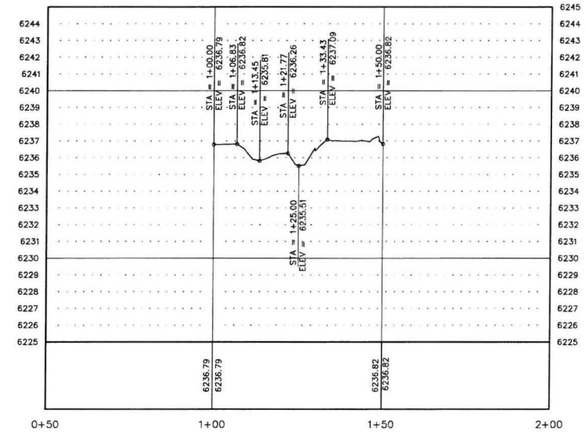
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 4+00 – STA: 0+50 TO STA: 2+00



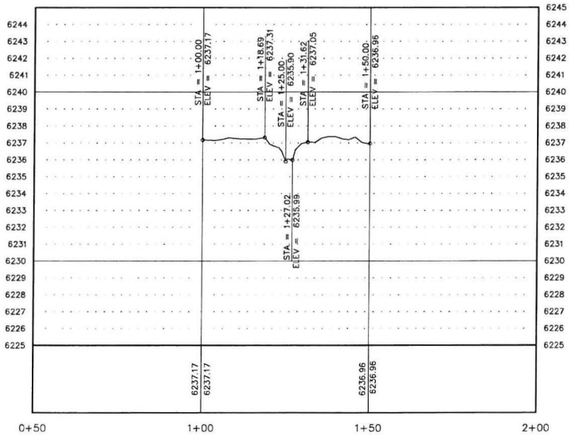
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 5+00 – STA: 0+50 TO STA: 2+00



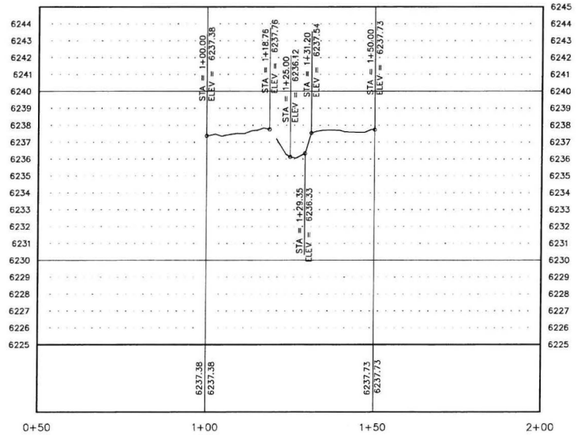
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 6+00 – STA: 0+50 TO STA: 2+00



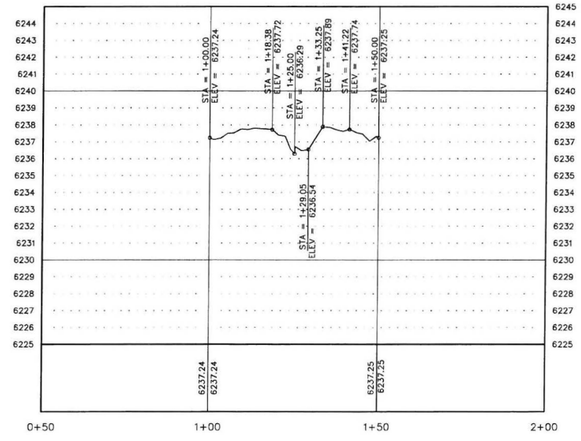
SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 7+00 – STA: 0+50 TO STA: 2+00



SCALE:
HORIZ. 1"=20', VERT. 1"=2'

RUBICON 8+00 – STA: 0+50 TO STA: 2+00



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EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

R2

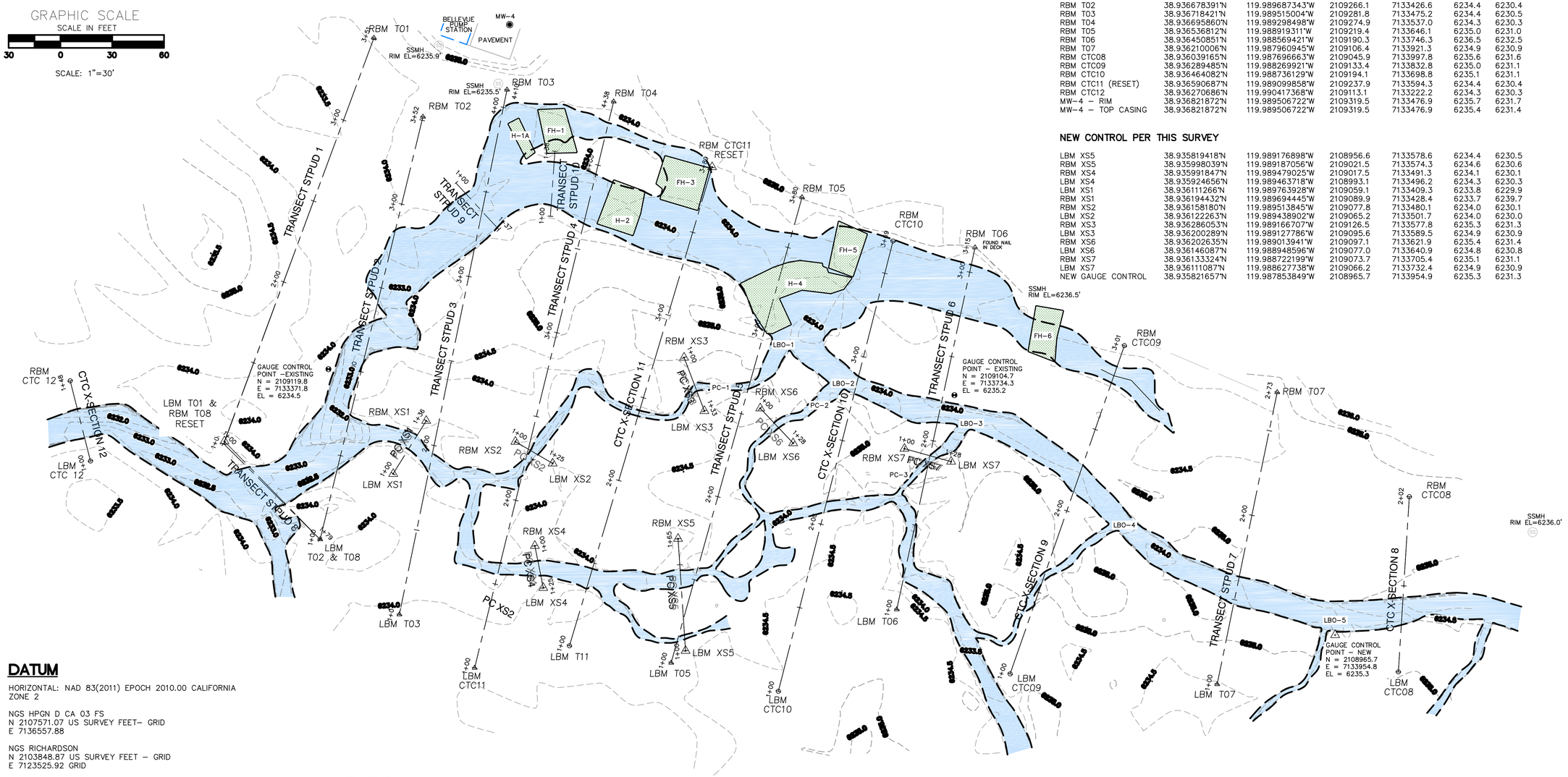
DATE: JANUARY 2015
DRAWN BY: KLN
DESIGNED BY: GP
CHECKED BY: GP
JOB NO.: 8688.000

L:\AP's\8688.000 – Upper Truckee Marsh\Survey\DWG\8688000 Upper Truckee Marsh profiles.dwg,R2 PROFILES,
01/06/2015 01:37 pm knunes

TRUCKEE MARSH SEWER FACILITIES PROTECTION PROJECT - AS BUILT FOR SOUTH TAHOE PUBLIC UTILITY DISTRICT

Comparison of Baseline and 2014 Cross Sections, Sheets 2-5

GRAPHIC SCALE
SCALE IN FEET
30 0 30 60
SCALE: 1"=30'



DATUM

HORIZONTAL: NAD 83(2011) EPOCH 2010.00 CALIFORNIA ZONE 2

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET- GRID
E 7136557.88

NGS RICHARDSON
N 2103848.87 US SURVEY FEET - GRID
E 7123525.92 GRID

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL = 6248.20

PER CONTROL SURVEY PROVIDED BY S.T.P.U.D., PREPARED BY TRI STATE SURVEYING, LTD., DATED 11-05-13

LEGEND:

- ⚠ SET 5/8" REBAR AND CAP "LUMOS CONTROL"
- △ FOUND 5/8" REBAR AND CAP "TR-STATE CONTROL" - UNLESS OTHERWISE NOTED
- ○ FOUND 1/2" REBAR W/ NO CAP (CTC)

NOTE:

FIELD SURVEY CONDUCTED ON NOVEMBER 25 & 26, 2014.

EXISTING CONTROL PROVIDED BY S.T.P.U.D.

MONUMENT NAME	LATITUDE NAD83	LONGITUDE NAD83	NORTHING SPC GRID	EASTING SPC GRID	ELEV. NAVD88	ELEV. NGVD29
LBM T01 & RBM T08 (RESET)	38.936168894"N	119.990106"W	2109078.0	7133311.6	6234.3	6230.3
LBM T02 & LBM T08	38.936009520"N	119.989915687"W	2109021.1	7133367.0	6233.9	6229.9
LBM T0	38.935887231"N	119.989757770"W	2108977.6	7133412.9	6234.2	6230.2
LBM T04	38.935799724"N	119.989607047"W	2108946.7	7133456.5	6234.4	6230.5
LBM T05	38.93580843"N	119.989206809"W	2108949.6	7133570.3	6234.2	6230.3
LBM T06	38.935877770"N	119.988745105"W	2108980.5	7133700.9	6234.6	6230.6
LBM T07	38.935747492"N	119.988096356"W	2108937.2	7133886.5	6234.5	6230.5
LBM CTC08	38.935760651"N	119.987726877"W	2108944.3	7133991.4	6234.9	6231.0
LBM CTC09	38.935771271"N	119.988517241"W	2108943.2	7133766.6	6235.2	6231.2
LBM CTC10	38.935751784"N	119.989889853"W	2108933.1	7133632.4	6234.6	6230.6
LBM CTC11	38.935831478"N	119.989412956"W	2108959.5	7133511.4	6234.4	6230.4
LBM CTC12	38.93614234 5"N	119.990379722"W	2109066.6	7133234.0	6233.9	6229.9
RBM T01	38.936805560"N	119.989783506"W	2109311.8	7133398.2	6234.3	6230.3
RBM T02	38.936678391"N	119.989687343"W	2109266.1	7133426.6	6234.4	6230.4
RBM T03	38.936718421"N	119.989515004"W	2109281.8	7133475.2	6234.4	6230.5
RBM T04	38.936695860"N	119.989298498"W	2109274.9	7133537.0	6234.3	6230.3
RBM T05	38.936536812"N	119.988919311"W	2109219.4	7133646.1	6235.0	6231.0
RBM T06	38.936450851"N	119.988569421"W	2109190.3	7133746.3	6236.5	6232.5
RBM T07	38.936210006"N	119.987969045"W	2109106.4	7133921.3	6234.9	6230.9
RBM CTC08	38.936039165"N	119.987696663"W	2109045.9	7133997.8	6235.6	6231.6
RBM CTC09	38.936289485"N	119.988269921"W	2109133.4	7133832.8	6235.0	6231.1
RBM CTC10	38.936464082"N	119.988736129"W	2109194.1	7133698.8	6235.1	6231.1
RBM CTC11 (RESET)	38.936590687"N	119.989099858"W	2109237.9	7133594.3	6234.4	6230.4
RBM CTC12	38.936270686"N	119.990417368"W	2109113.1	7133222.2	6234.3	6230.3
MW-4 - RIM	38.936821872"N	119.989506722"W	2109319.5	7133476.9	6235.7	6231.7
MW-4 - TOP CASING	38.936821872"N	119.989506722"W	2109319.5	7133476.9	6235.4	6231.4

NEW CONTROL PER THIS SURVEY

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RBM XS5	38.935998039"N	119.989187056"W	2109021.5	7133574.3	6234.6	6230.6
LBM XS4	38.935991847"N	119.989479025"W	2109017.5	7133491.3	6234.1	6230.1
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LBM XS1	38.936111266"N	119.989763928"W	2109059.1	7133409.3	6233.8	6229.9
RBM XS1	38.936194432"N	119.989694445"W	2109089.9	7133428.4	6233.7	6239.7
RBM XS2	38.936158180"N	119.989513845"W	2109077.8	7133480.1	6234.0	6230.1
LBM XS2	38.936122263"N	119.989438902"W	2109065.2	7133501.7	6234.0	6230.0
RBM XS3	38.936286053"N	119.989166707"W	2109126.5	7133577.8	6235.3	6231.3
LBM XS3	38.936200289"N	119.989127786"W	2109095.6	7133589.5	6234.9	6230.9
RBM XS6	38.936202635"N	119.989013941"W	2109097.1	7133621.9	6235.4	6231.4
LBM XS6	38.936146087"N	119.988948596"W	2109077.0	7133640.9	6234.8	6230.8
RBM XS7	38.936133324"N	119.988722199"W	2109073.7	7133705.4	6235.1	6231.1
LBM XS7	38.936111087"N	119.988627738"W	2109066.2	7133732.4	6234.9	6230.9
NEW GAUGE CONTROL	38.935821657"N	119.987853849"W	2108965.7	7133954.9	6235.3	6231.3

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WWW.LUMOSENGINEERING.COM
CIVIL ENGINEERING
GEOTECHNICAL ENGINEERING
PLANNING
LANDSCAPE ARCHITECTURE
SURVEYING / GIS
CONSTRUCTION SERVICES
MATERIALS TESTING

SOUTH TAHOE PUBLIC UTILITY DISTRICT

UPPER TRUCKEE MARSH - BELLEVUE AREA
A PORTION OF THE NORTH 1/2 OF
SECTION 4, T.12N., R18E., M.D.M., A.P.N. 026-200-11

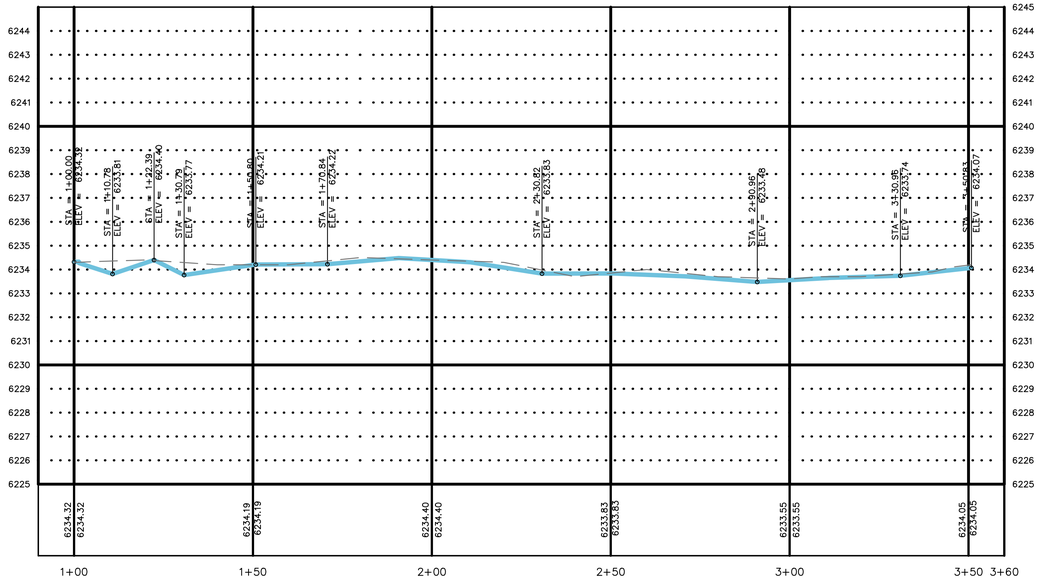
EL DORADO COUNTY CALIFORNIA

REV	DATE	DESCRIPTION	BY

B1

DATE:	JANUARY 2015
DRAWN BY:	KLN
DESIGNED BY:	GP
CHECKED BY:	GP
JOB NO.:	8688.000

TRANSECT STPUD 1 – STA: 0+90 TO STA: 3+60



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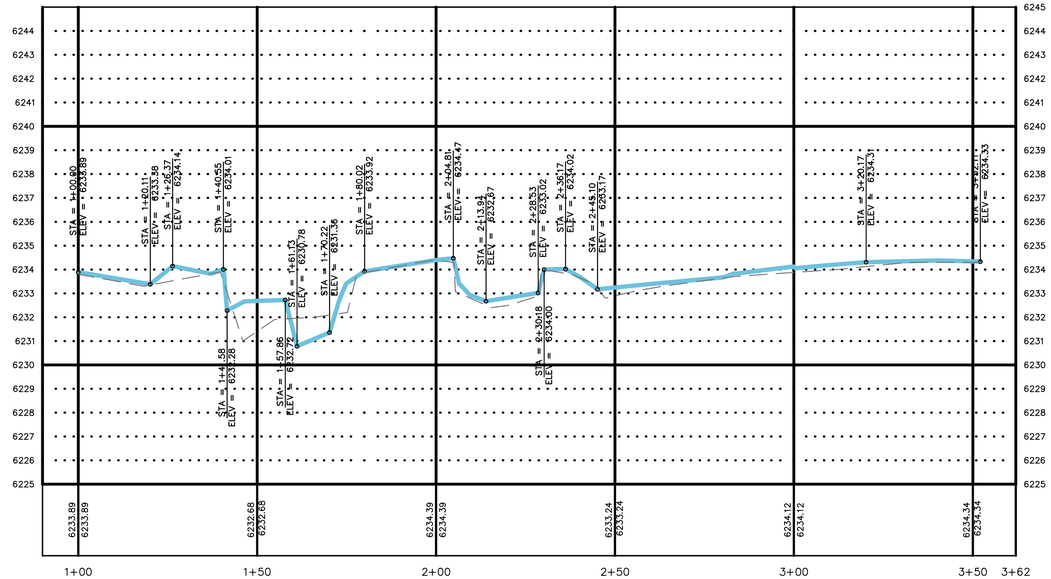

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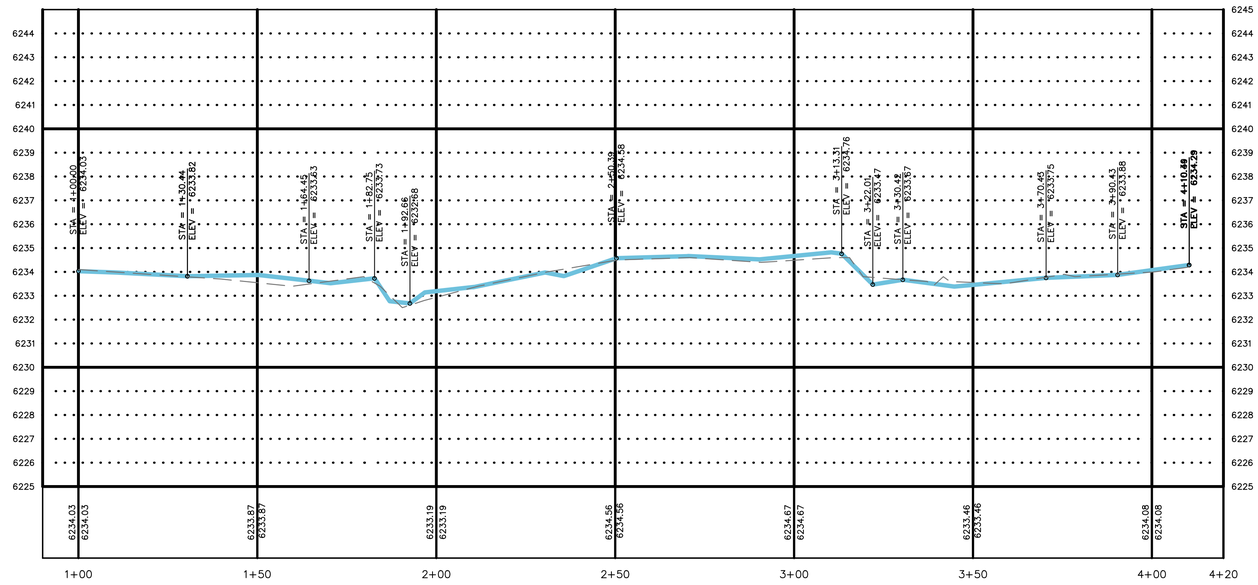

Baseline survey represented by dashed lines.
2014 resurvey represented by blue lines.

SCALE H:1"=20 V:1"=3'

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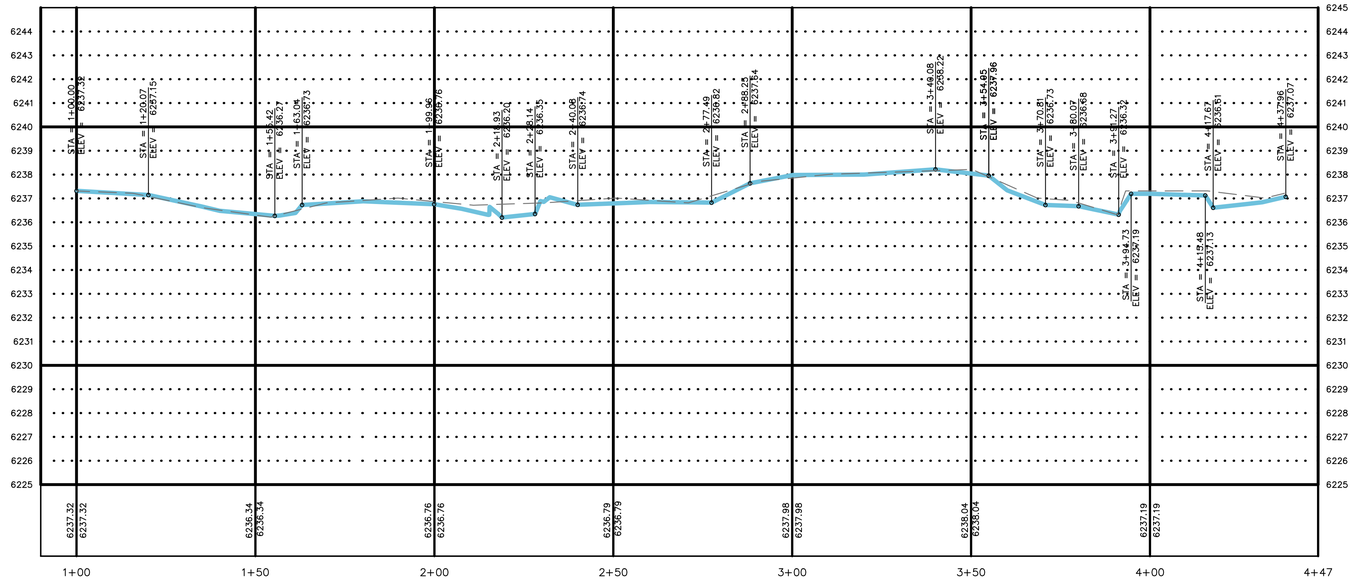

SCALE H: 1"=20 V: 1"=3'

Baseline survey represented by dashed lines.
2014 resurvey represented by blue lines.

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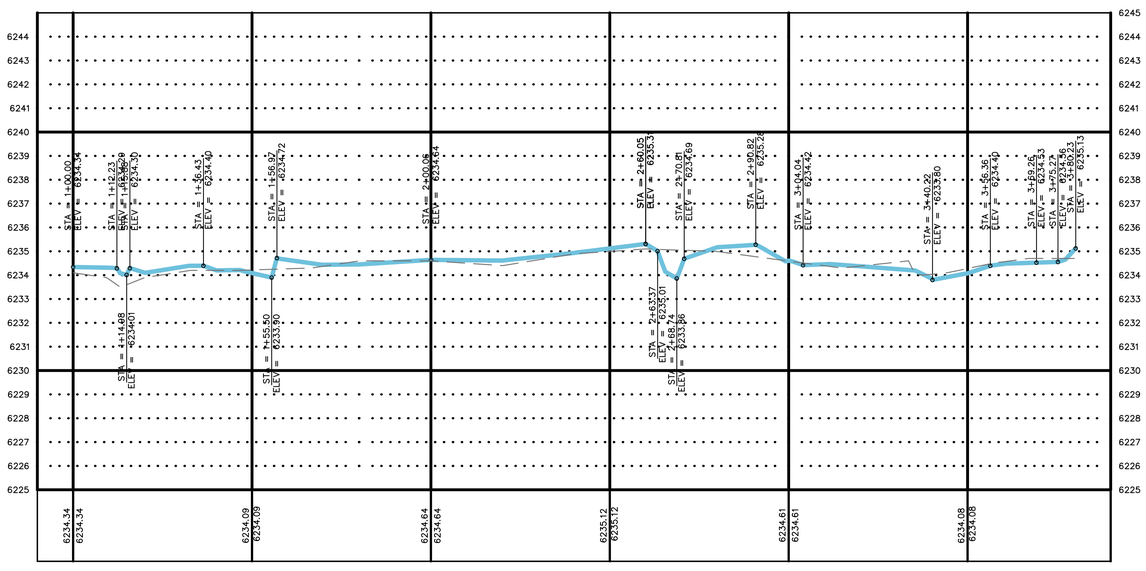

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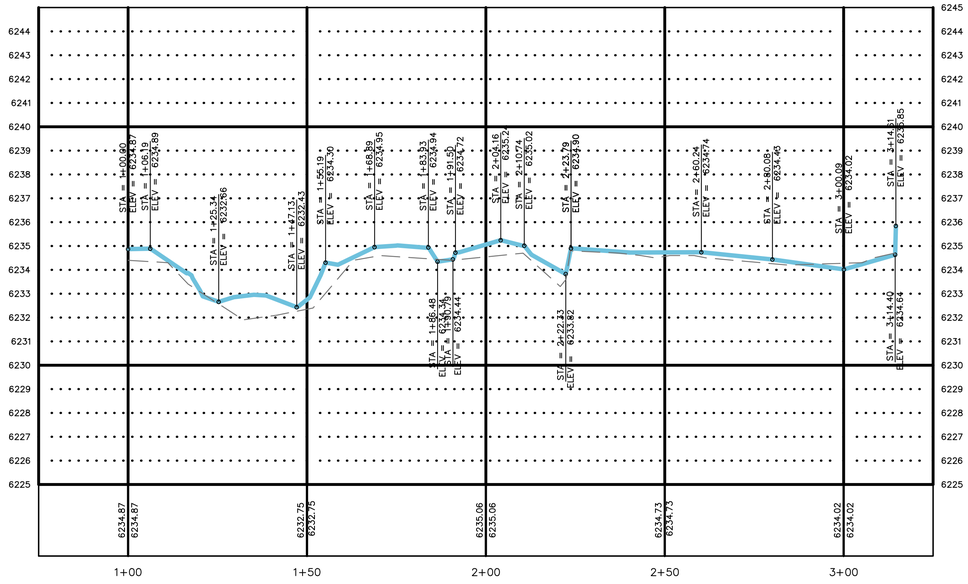

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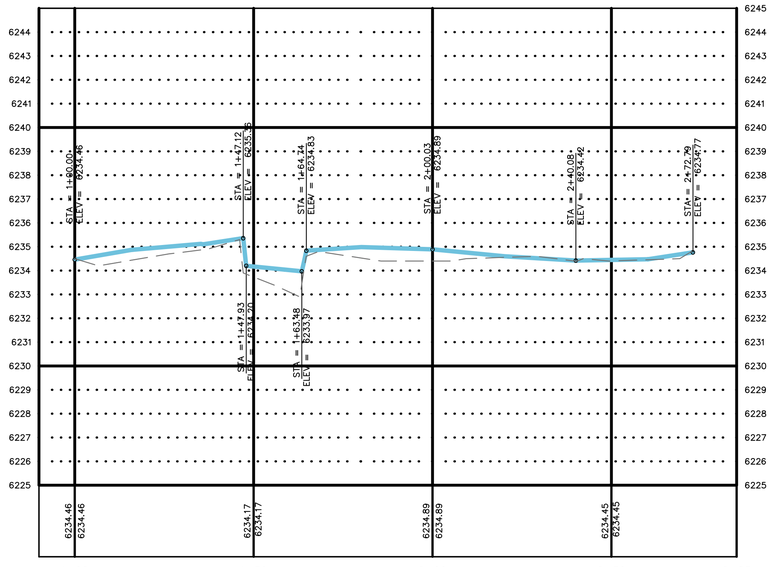
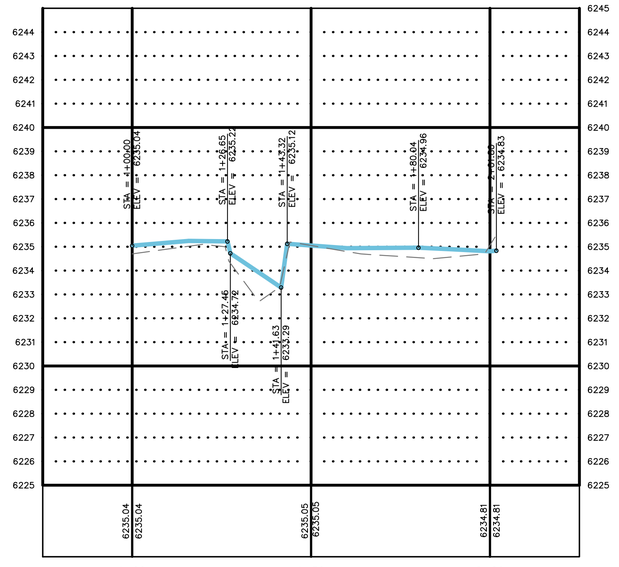


CTC X–SECTION 8 – STA: 0+75 TO STA: 2+25



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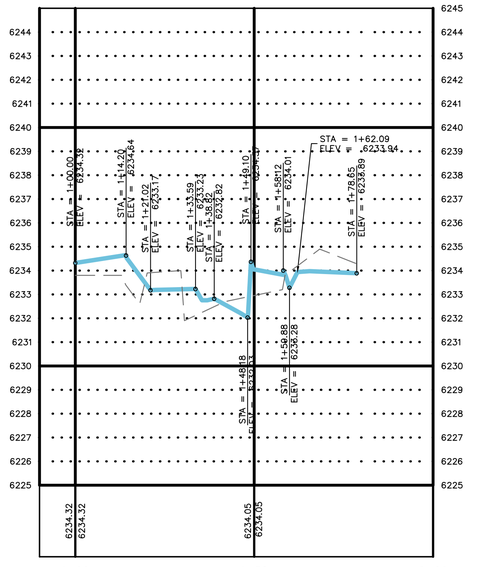

SCALE H:1"=20 V:1"=3'

Baseline survey represented by dashed lines.
2014 resurvey represented by blue lines.

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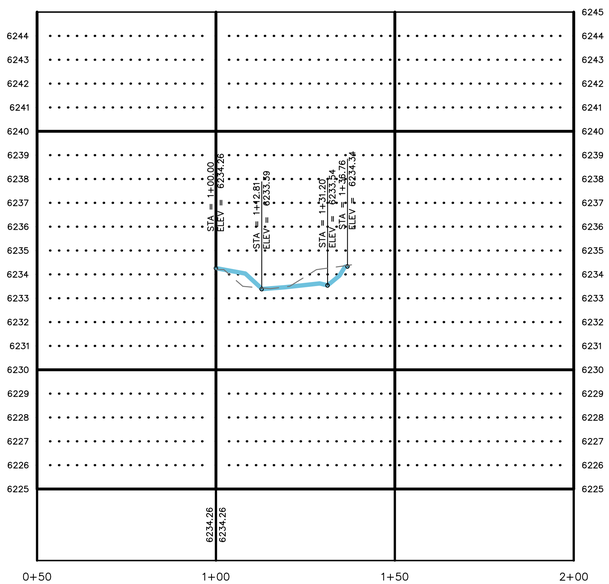

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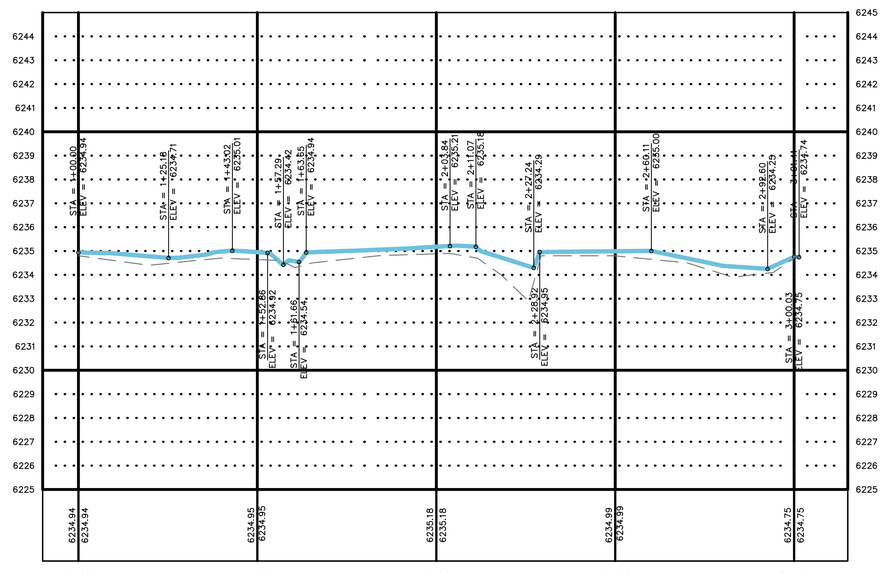
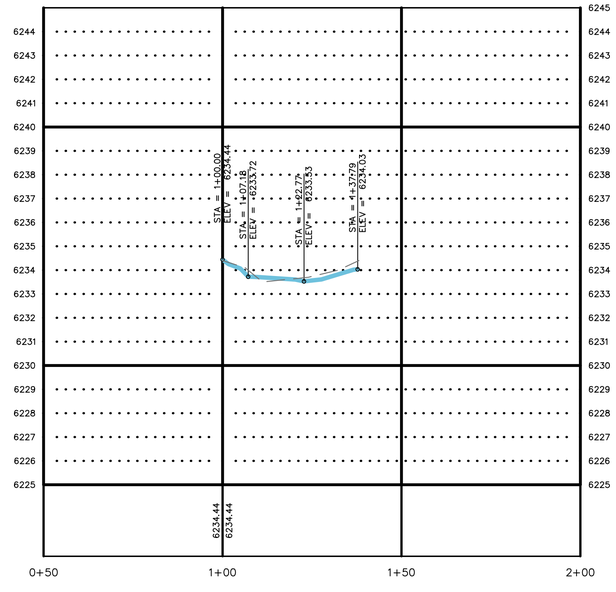
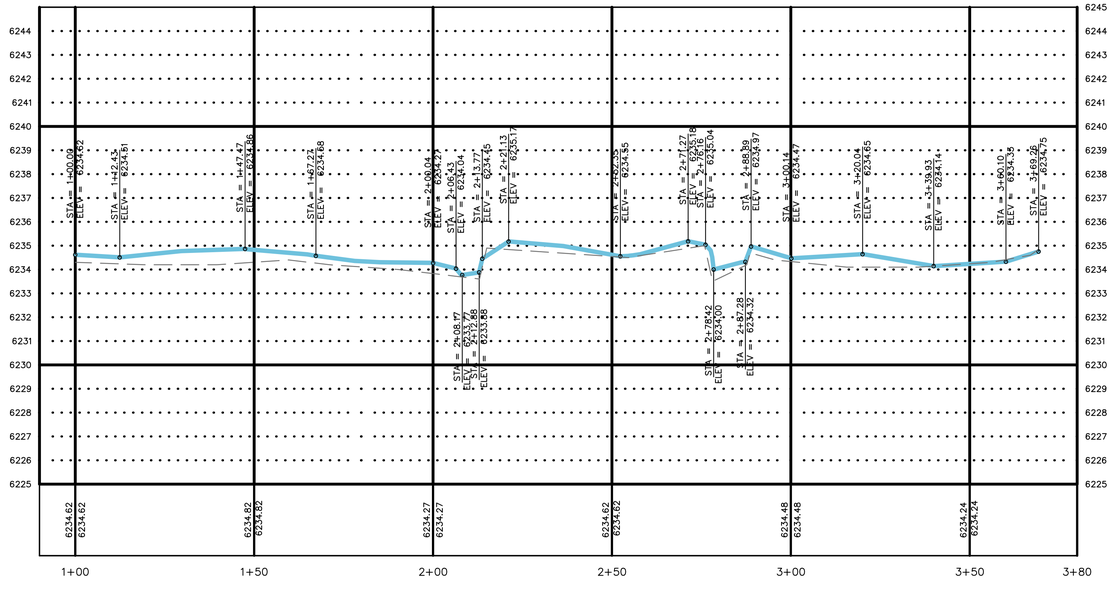


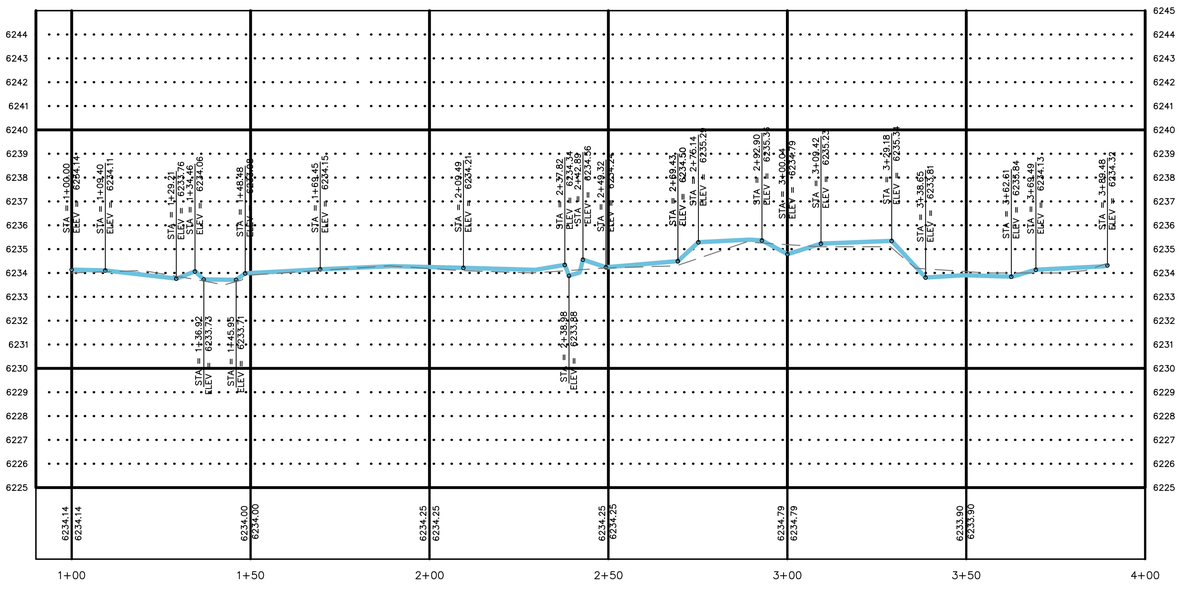
TRANSECT STPUD 10 – STA: 0+50 TO STA: 2+00



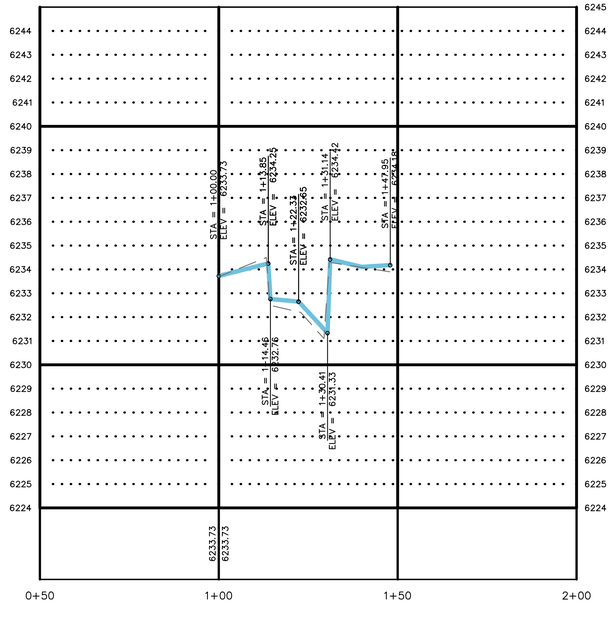
CTC X–SECTION 10 – STA: 0+90 TO STA: 3+80



CTC X–SECTION 11 – STA: 0+90 TO STA: 4+00



CTC X–SECTION 12 – STA: 0+50 TO STA: 2+00



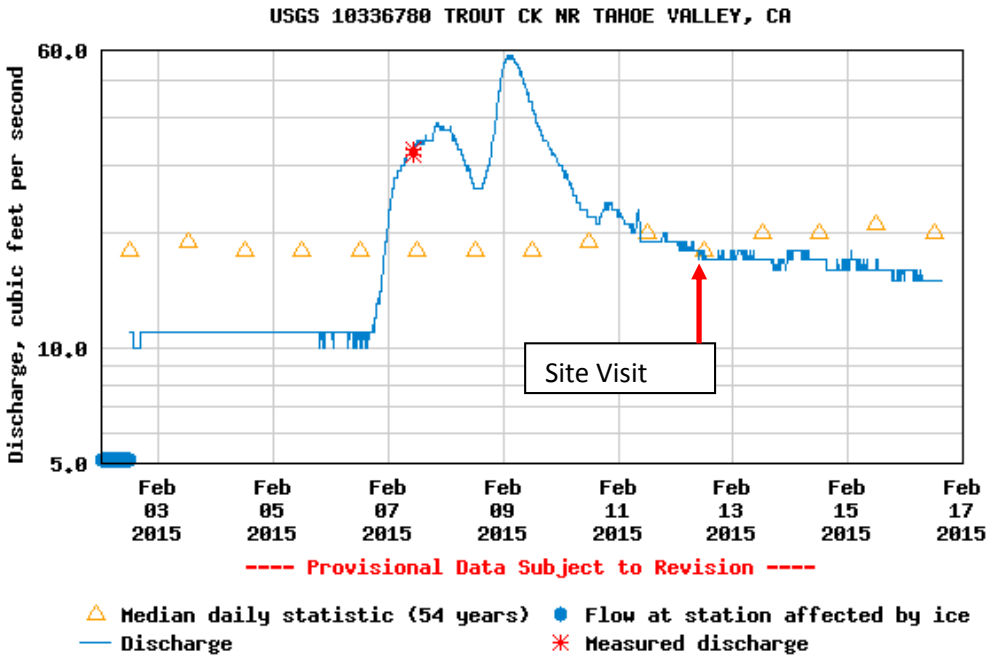
SCALE H:1"=20 V:1"=3'

Baseline survey represented by dashed lines.
2014 resurvey represented by blue lines.

STPUD Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
NHC Observations from 12 February Site Visit

Ivo Bergsohn, STPUD
Scott Carroll, CTC
Toby Hanes, NHC
Ed Wallace, NHC

Discharge at USGS Gage at Tahoe Valley



Measurements from 2 Feb 2015 (lower discharge) indicated essentially all flow through Pilot Channels

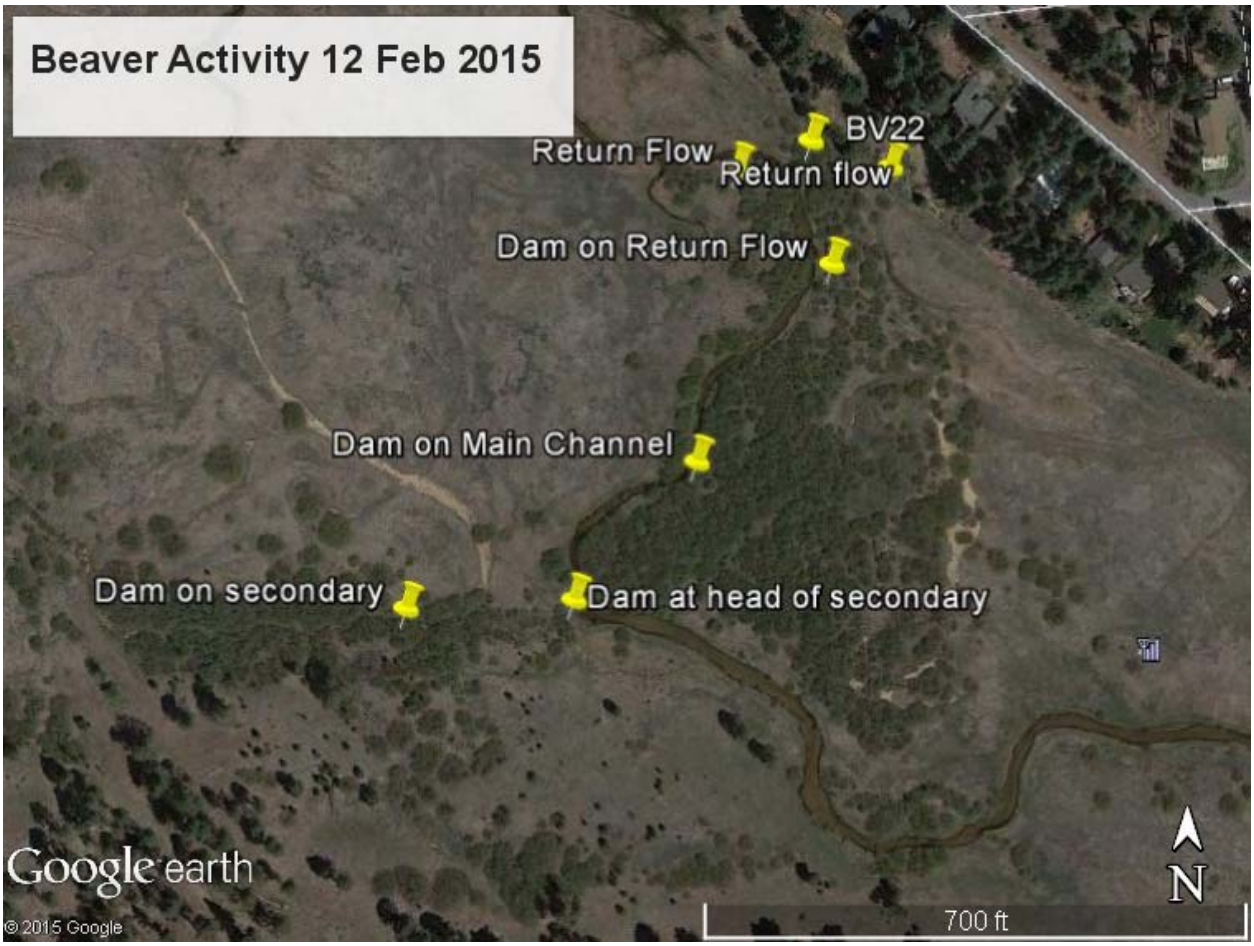
Location	Q cfs	W ft	A ft^2	T deg F	Start	End	Notes
US turbidimeter	8.47	12	17	35.4		11:48	
PC XS7	2.78	4.5	2.5	36.1		12:20	
PC XS6	2.14	5	2.66	36.4		12:36	
PC XS2	1.93	5	3.2	37.1		12:56	
PC XS5			Too shallow and no concise channel				
PC XS4	5.39	8.5	4.35	38.2		13:48	
PC XS3	2.84	2.5	1.7	37.5		13:28	
PC XS1	8.49	10	6	38.7		14:07	
DS turbidimeter	8.18	15	9.2	39		14:27	

12 Feb 2015 Observations (receding flows, no snow in marsh)

- Easement had shallow flow in and around the constructed marsh mats – approximate flow split 70/30 or 80/20 through pilot channels/right overbank and easement
- Mats do not appear to be substantially different than immediately after construction
- The most downstream mat in the main overbank flow path (Hummock 2) has a drop in water surface at the downstream end and this could develop into a stability problem
- Pilot channels were operating as designed, with velocities of 2-4 fps in many areas
- Hydraulic drop at downstream end of the pilot channel system (back into main channel) may have moderated (or tailwater may have increased)
- A lateral bar has formed at the downstream end of the pilot channels at the confluence with the main channel that partially fills the previous main channel upstream
- Pilot channels show limited evidence of evolution since construction – the area near the confluence of PC2 and PC3 and PC3 show some bedform development and scour through the organic/cohesive layer; in other locations channel development is generally being resisted by the remaining roots and cohesive material.
- Flow splits between the pilot channels and the right overbank are primarily being controlled by the relative capacity of the pilot channel openings and the upstream edge of Hummock 4 and Fill Hummock 5; this edge is functioning as a long weir.
- There is standing water upstream of Fill Hummock 5 on the right overbank, but constructed fill plugs appear to be doing a good job at this discharge of preventing flow into the right overbank; a very small amount of flow may be conveyed from upstream along the far right edge of the meadow, which extends to the north of the STPUD easement.
- Beaver activity in the main channel has completed blocked the flow in the section of channel that runs north-south in the center of the meadow.
- Beaver dams are also located at the head of the secondary channel, a short distance downstream on the secondary channel, and on the right bank return flow; additional dams may be located upstream on the main channel (currently being investigated/mapped).
- There is inundation of both the left and right overbanks along this section of the channel that has never been previously observed at low flow by the CTC, NHC, or STPUD personnel present at the site visit.
- The right bank overflow from the beaver dam(s), and in particular the dam blocking the right bank return flow, are flooding the STPUD easement in the vicinity of manholes BV22 and BV21; the majority of this flow is returning to the main channel downstream of BV22, but a small amount is flowing down the easement along a foot path.
- BV22 has about a foot of water around it and the concrete in the grade rings do not appear to be in good condition.
- The secondary channel has received flow since completion of Year 1 construction is wet for several hundred feet downstream of the head of the channel; minimal obstructions to flow appear to be present, except for the beaver dams; some loose cut or beaver-cut willow material was observed along the channel cleared in Year 1

Photos on the project Alfresco site at:

http://docs.nhc-sac.com:8080/share/page/site/600035-tmsfpp/documentlibrary#filter=path%7C%2FImages%2F12Feb2015%7C&page=1

- 

REVEGETATION MONITORING MEMORANDUM

UPPER TRUCKEE MARSH SEWER FACILITIES

SOUTH LAKE TAHOE, CA

Prepared for:

nhc
80 South Lake Avenue, Suite 800
Pasadena, California 91101

October 2, 2015

Western Botanical Services, Inc.
5859 Mt. Rose Highway / Reno, NV 89511

Table of Contents

Appendices

1 Introduction

This report evaluates revegetation conditions at the Upper Truckee Marsh Sewer Facilities site in South Lake Tahoe, CA. It also presents the results of the revegetation monitoring surveys conducted by Western Botanical Services, Inc. (WBS) within two distinct plant communities that were disturbed during the course of the project in the road fill and hummocks. The survey was conducted on July 14 and 30, 2015.

The survey results compare revegetation success to reference conditions in 2014 to measure progress toward meeting performance criteria goals. The goals were established in the "Upper Truckee Marsh Sewer Facilities Adaptive Management Plan" (Plan), (Section 32 90 00 Restoration, Revegetation, and Erosion Control 3.03), and are as follows:

- "Planted wetland herbaceous vegetation and sod established at 80 percent of baseline cover after 1 year and 85 percent of baseline cover after 2 years and exhibiting good vigor. Native species established at 90 percent of baseline after 1 year and 95 percent of baseline after 2 years. Wetland species, combining obligate and facultative species, established equal to or exceeding baseline after 2 years. Planted woody vegetation established at 80 percent survival and exhibit good vigor."

- "Survival 80% of willow stakes and willow transplants, and minimum of two sprouts per lineal foot of willow wattles, one year following the completion date of the work. If contractor fails to meet the warranty requirements the warranty period will be extended by a year until they are met."

2 Methodology

2.1 Vegetation Cover

Cover was determined using the point-intercept sampling method. All plants intercepted along transects were identified to the lowest possible taxonomic level. One hundred 'hits' were obtained per transect, taken every foot. This methodology measures absolute and species-specific foliar cover. A laser point sampler device (Synergy Resource Solutions, Inc., www.countgrass.com) was lined up with the tape at a level 90-degree angle at each foot along the tape. All plant species and non-plant elements (bare ground, rock, litter) intercepted by the projected laser 'dot' were recorded.

Although this sampling technique does not in itself evaluate root type or degree of plant or community development, the data has been organized by growth form (annual, perennial forb, grass, etc.), which in turn gives an indication of plant succession and community structure. Data were also organized by native status. A broader species list was developed for the project area to identify those species not intercepted by transects. This list is included in Appendix A.

Percent litter, rock, water, erosion control mat, and bare areas are calculated separately. Total cover includes vegetation, standing dead, fine gravel (4–8 mm), coarse gravel (8-32 mm), rock

(>32 mm) and litter. Litter refers to material detached from growing vegetation older than one year and includes decomposing vegetation, animal waste, and garbage. Total vegetative cover refers only to live vegetation. Frequency was calculated by determining the number transects in which a species was intercepted.

Three consecutive 100-ft. transects were surveyed in the road fill area. Three hummocks were surveyed with transects of varying lengths, but totaling 100 ft. per hummock. Each transect was sampled for quantitative cover data using the point-intercept method. All vegetation was identified to the lowest taxonomic group possible. The Theodolite iPad app was used to record the location of each transect (Appendix B).

2.2 Willow Survival

The numbers of dead and live willow stakes were counted in each of the willow wattles and the willow sausal.

2.3 Vigor of Herbaceous Vegetation and Willows

Vigor is a qualitative observation that can vary among observers but should be consistent on a project basis. It refers to the relative size and health of the individual without reference to its reproductive success (vitality). It is usually determined in a scale of 1-5 plant and as a function of both typical growth for the species in question as well as favorableness and suitability of the environment with 1=poor, 2=fair, 3=good, 4=very good, and 5=excellent.

3 Results and Discussion

3.1 Road Fill Plant Community Cover and Vigor

2014 reference data for total cover, vegetative cover, and dominance by natives are presented in Table 1. 2015 revegetation cover data for the same transects are presented in Table 2. Detailed cover calculations are included in Appendix C.

Total cover in the road fill community averaged 100%, while total vegetative cover averaged 96% with a range between 95% (Transect 3) and 97% (Transects 1, 2). Relative cover by native species averaged 90% with a range between 88% (Transect 3) and 92% (Transect 1.) Vegetative cover was dominated by native perennial graminoids.

The performance criteria established in the Plan was 80% of baseline vegetative cover after one year. The average vegetative cover was 96%, therefore the performance criteria is met for year one post construction. The performance criteria established in the Plan was 90% of native species baseline cover after one year. The average cover by native species was 90%, therefore the performance criteria is met for year one post construction.

Fill removal and lowering the elevation to match the surrounding meadow and hydrology was most likely the cause for an increase in vegetative cover.

Table 1. 2014 Road Fill Reference Cover Summary

Cover Type	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	100%	100%	100%	100%
Total Vegetative Cover	88%	98%	84%	90%
Vegetative Cover By Native Species	84%	90%	83%	86%

Table 2. 2015 Road Fill Revegetation Cover Summary

Cover Type	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	100%	100%	100%	100%
Total Vegetative Cover	97%	97%	95%	96%
Vegetative Cover By Native Species	92%	89%	88%	90%

Vigor for this pant community was rated 5. It has responded to improved hydrology, and the dominant species blend into the surrounding mature sedge-dominated plant community. Younger plants also tend to be more vigorous compared to well established climax plant communities.

3.2 Hummock Plant Community Cover and Vigor

2014 reference data for total cover, vegetative cover, and dominance by natives are presented in Table 3. 2015 revegetation cover data for the same transects are presented in Table 4. Detailed cover calculations are included in Appendix C.

Total cover in the hummock community averaged 83.7%, while total vegetative cover averaged 80.3% with a range between 58% (Transect 2) and 95% (Transect 1). Relative cover by native species averaged 79.7% with a range between 58% (Transect 2) and 93% (Transect 1).

The performance criteria established in the Plan was 80% of baseline vegetative cover after one year, which would be 64%. The average vegetative cover was 34%, therefore the performance criteria was not met for year one post construction. The performance criteria established in the Plan was 90% of native species baseline cover after one year, which would be 72%. The average cover by native species was 34%, therefore the performance criteria is not met for year one post construction.

However, the hummocks, (with perhaps the exception of Hummock 1 on the south end which is largely under water), are performing as designed. The hummocks were installed late in the season and have had less than one growing season. They are expected to fill in over the next few years and should ultimately meet the design criteria.

Table 3. 2014 Hummock Reference Cover Summary

Cover Type	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	100%	61%	90%	84%
Total Vegetative Cover	95%	58%	88%	80%
Vegetative Cover By Native Species	93%	58%	88%	80%

Table 4. 2015 Hummock Revegetation Cover Summary

Cover Type	Transect 1	Transect 2	Transect 3	Average
Total Cover (including litter, gravel, and rock)	68%	85%	62%	72%
Total Vegetative Cover	37%	35%	31%	34%
Vegetative Cover By Native Species	36%	35%	31%	34%

Vigor for these plants was rated 3.5 - 4, based on a comparison to the vigorous growth of the surrounding mature plant community. Plants established last year are more vigorous that the younger plants, as anticipated, and as reflected in the cover photo. Species composition and vigor, however, will change with hydrology now that the ROW is substantially drier, with no surface flow. This response should also manifest in the adjacent community.

3.3 Willow Survival and Vigor

The results of the willow stake count is presented in Table 5. The performance criteria established in the Plan was 80% willow stake survival for both treatment types. Willow stake survival was 40% for the wattles and 13% for the sausal. Therefore, the performance criteria are not met.

Willows in the sausal was not done to spec, with many of the stakes branched (Photo 1), and not planted to the optimum depth. However, the three live stakes are coincidentally located in strategic areas and if they continue to grow, as expected, they should serve their purpose (Photo 2). Similarly, although the willow brush fence did not meet the performance criteria, the surviving stakes, along with the coir log, will serve as intended (Photos 3, 4).

Table 5. 2015 Willow Survival Count

Willow Structure	Live	Dead	Survival %
Willow Brush Fence	587	866	40
Sausal	3	20	13

Photo 1. Improper material used for sausal.

Photo 2. Surviving stake in sausal.

Vigor was considered 2.5, based on the substandard material and methods used. However, once the willows become well established, vigor and growth are expected to improve. Increased flows into Trout Creek in the vicinity of the willow work should result in more rapid growth as they respond to the improved growing conditions.

4 Recommendations

The new hummock should be installed as soon as possible to maximize growth for this year. Additional willows are not necessary are the present time.

Photo 3. Willow brush fence

Photo 4. Willow brush fence

5 References

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Appendix A

Species List

Upper Truckee Marsh Species List

FAMILY	SCIENTIFIC NAME	COMMON NAME	HYD STATUS[1]
ASTERACEAE	*Achillea millefolium*	Yarrow	FACU
	Arnica chamissonis	Chamisso arnica	FACW
	Solidago Canadensis	Canada goldenrod	FACU
	Symphyotrichum spathulatum var yosemitanum	Western aster	FAC
CYPERACEAE	*Carex aqualtilis*	Water sedge	OBL
	Carex athrostachya	Slenderbeak sedge	FACW
	Carex lanuginosa	Wooly sedge	OBL
	Carex nebrascensis	Nebraska sedge	OBL
	Carex utriculata	Beaked sedge	OBL
	Scirpus microcarpus	Panicled bulrush	OBL
FABACEAE	*Lupinus polyphyllus*	Tahoe lupine	FAC
HIPPURIDACEAE	*Hippuris vulgaris*	Mare's tail	OBL
IRIDACEAE	*Iris missouriensis*	Rocky mtn. Iris	FACW
JUNCACEAE	*Juncus balticus*	Baltic rush	FACW
	Juncus ensifolius	Equitant rush	OBL
	Juncus nevadensis	Nevada rush	FACW
LAMIACEAE	*Mentha arvensis*	Wild mint	FACW
MALVACEAE	*Sidalcea oregana*	Oregon checkerbloom	FACW
ONAGRACEAE	*Eplilobium ciliatum*	Fringed willowherb	FACW
POACEAE	*Alopecurus aequalis*	Shortawn foxtail	OBL
	Alopecurus pratensis	Meadow foxtail	FAC

FAMILY	SCIENTIFIC NAME	COMMON NAME	HYD STATUS[1]
	Agrostis exarata	Spike bentgrass	FACW
	Agrostis scabra	Rough bentgrass	FAC
	Agrosits stolonifera	Creeping bentgrass	FAC
	Deschampsia danthonoides	Annual hairgrass	FACW
	Phleum pratense	Timothy	FAC
	Poa palustris	Fowl bluegrass	FAC
	Poa pratensis	Kentucky bluegrass	FAC
	Torreyochloa pallida	Pale false mannagrass	OBL
POLYGONACEAE	*Rumex acetosella*	Common sheep sorrel	FACU
	Rumex crispus	Curly dock	FAC
ROSACEAE	*Fragaria virginiana*	Strawberry	FACU
	Geum macrophyllum	Big-leaved avens	FAC
	Potentilla glandulosa	Sticky cinquefoil	FACU
	Potentilla gracilis	Cinquefoil	FAC
RUBAIACEAE	*Galium trifidum*	Bedstraw	FACW
SALICACEAE	*Salix exigua*	Sandbar willow	OBL
	Salix lemmonii	Lemmon's willow	OBL
	Salix lucida ssp lasiandra	Pacific willow	FACW
SCROPHULAREACEAE	*Veronica anagallis-aquatica*	Water speedwell	OBL
	Mimulus guttatus	Seep monkeyflower	OBL
	Mimulus primuloides	Primrose monkeyflower	OBL
	Veronica americana	America brooklime	OBL

FAMILY	SCIENTIFIC NAME	COMMON NAME	HYD STATUS[1]
SPARGANIACEAE	*Sparganium angustifolium*	Bur-reed	OBL

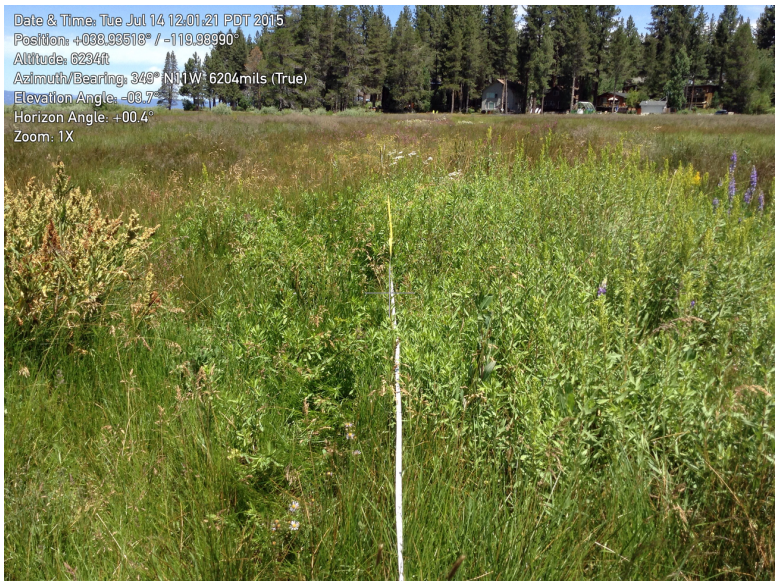
[1] Army Corps of Engineers; Western Mountains, Valleys, and Coast

N/A = Not Applicable
OBL = Obligate
FACW = Facultative Wetland
FAC = Facultative
FACU = Facultative Upland

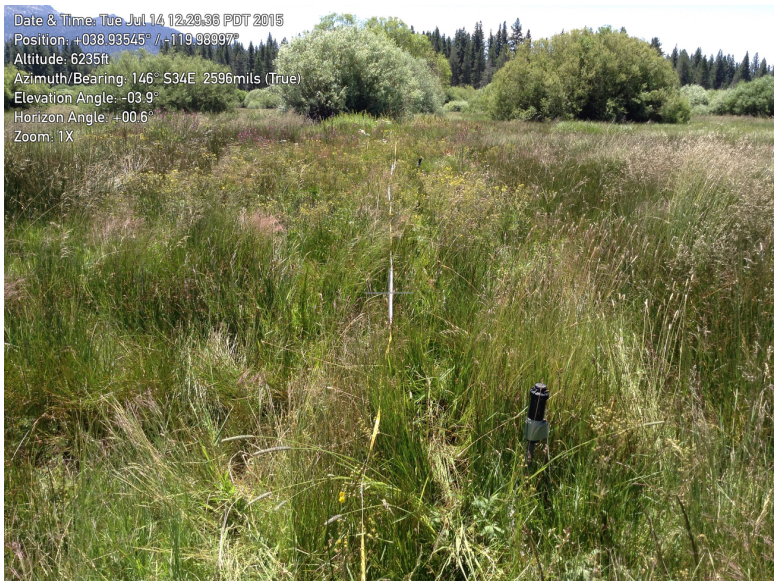
* = Non-native species

Appendix B

Transect Photos



Road Fill 1 Begin



Road Fill 1 End

Road Fill 2 Begin

Road Fill 2 End

Road Fill 3 Begin

Road Fill 3 End

Hummock 1

Hummock 1

Hummock 2

Hummock 2

Hummock 3

Hummock 3

Appendix C

Point-Intercept Cover Data Calculations

POINT INTERCEPT COVER DATA ANALYSIS
Revegetation Monitoring 2015

SAMPLING AREA: Hummock Transects

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
Native Perennial Forbs						
Mimulus guttatus (Seep monkeyflower)	0	0	1	33%	1.0%	0.5%
Epilobium ciliatum (fringed willowherb)	0	1	1	66%	1.9%	0.9%
Plagiobothrhys sp. (popcornflower)	0	0	2	33%		
Rorippa curvisiliqua (curvepod yellow cress)	0	1	0	33%	1.0%	0.5%
Veronica anagallis-aquatica (water speedwell)	1	1	4	33%	5.8%	2.8%
Arnica chamissonis (Chamiso arnica)	0	1	0	33%	1.0%	0.5%
Total Native Perennial Forbs	1	4	8	100%	12.6%	6.0%
Introduced Perennial Grasses						
Agrostis stolonifera (creeping bentgrass)	1	0	0	33%	1.0%	0.5%
Total Intro. Perennial Grasses	1	0	0	33%	1.0%	0.5%
Native Perennial Graminoids						
Carex nebrascensis (Nebraska sedge)	6	9	10	100%	24.3%	11.6%
Juncus balticus (Baltic rush)	7	3	1	100%	10.7%	5.1%
Deschampsia caespitosa (hairgrass)	1	0	0	33%	1.0%	0.5%
Scirpus microcarpus (panicled bulrush)	3	5	4	100%	11.7%	5.6%
Eleocharis macrostachya (creeping spikerush)	4	5	0	66%	8.7%	4.2%
Agrostis scabra (rough bentgrass)	0	0	1	33%	1.0%	0.5%
Glyceria elata (fowl mannagrass)	13	9	5	100%	26.2%	12.6%
Alopecurus aequalis (shortawn foxtail)	0	0	1	33%	1.0%	0.5%
Carex athrostachya (beaked sedge)	1	0	0	33%	1.0%	0.5%
Carex utriculata (beaked sedge)	0	0	1	33%	1.0%	0.5%
Total Native Perennial Grasses	35	31	23	100%	86.4%	41.4%
NATIVE VEGETATIVE COVER	**36**	**35**	**31**	**n/a**	**99.0%**	**47.4%**
NON-NATIVE VEGETATIVE COVER	**1**	**0**	**0**	**n/a**	**1.0%**	**0.5%**
TOTAL VEGETATIVE COVER	**37**	**35**	**31**	**n/a**	**100.0%**	**47.9%**
Water	32	15	38	100%	n/a	n/a
Erosion Control Mat	30	50	30	100%	n/a	51.2%
Litter	1	0	1	66%	n/a	0.9%
TOTAL COVER	**68**	**85**	**62**	**n/a**	**n/a**	**100.0%**
TOTAL OVER ALL (300) SAMPLING POINTS		**ALL COVER:**	**71.7%**	**NON-NATIVE:**	**0.3%**	
		VEGETATIVE COVER:	**34.3%**	**NATIVE:**	**34.0%**	

POINT INTERCEPT COVER DATA ANALYSIS
Revegetation Monitoring 2015

SAMPLING AREA: Road Fill Transects

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
Native Annual & Biennial Forbs						
Galium odoratum (bedstraw)	1	0	0	33.0%	0.3%	0.3%
Lotus purshianus (bird's foot trefoil)	1	0	0	33.0%	0.3%	0.3%
Total Native Ann. & Bien. Forbs	2	0	0	33.0%	0.7%	0.7%
Native Perennial Forbs						
Solidago canadensis (Canada goldenrod)	10	0	0	33.0%	3.5%	3.3%
Fragaria virginiana (Virginia strawberry)	3	2	2	100.0%	2.4%	2.3%
Epilobium ciliatum (fringed willowherb)	2	2	1	100.0%	1.7%	1.7%
Arnica chamissonis (Chamiso arnica)	0	0	1	33.0%	0.3%	0.3%
Mentha arvensis (American wild mint)	0	0	2	33.0%	0.7%	0.7%
Lupinus polyphyllus (big leaf lupine)	0	0	4	33.0%	1.4%	1.3%
Penstemon rydbergii (Rydberg's pentstemon)	0	0	1	33.0%	0.3%	0.3%
Plagiobothrhys sp. (popcornflower)	0	0	1	33.0%	0.3%	0.3%
Veronica americana (American speedwell)	0	2	6	66.0%	2.8%	2.7%
Achillea millefolium (yarrow)	2	3	1	100.0%	2.1%	2.0%
Stellaria longipes (chickweed)	1	0	0	33.0%	0.3%	0.3%
Symphyotrichumspathulatum (western mountain aster)	7	5	1	100.0%	4.5%	4.3%
Sidalcea oregana (Oregon checkerbloom)	1	4	0	66.0%	1.7%	1.7%
Potentilla gracilis (cinquefoil)	9	4	0	66.0%	4.5%	4.3%
Total Native Perennial Forbs	35	22	20	100.0%	26.6%	25.7%
Introduced Perennial Forbs						
Taraxacum officinale (common dandelion)	1	0	0	33.0%	0.3%	0.3%
Rumex acetosella (sheep sorrel)	1	3	4	100.0%	2.8%	2.7%
Rumes crispus (curly dock)	1	1	0	66.0%	0.7%	0.7%
Total Intro. Perennial Forbs	3	4	4	66.0%	3.8%	3.7%
Introduced Perennial Grasses						
Festuca rubra (red fescue)	2	0	0	33.0%	0.7%	0.7%
Agrostis stolonifera (creeping bentgrass)	0	4	3	66.0%	2.4%	2.3%
Total Intro. Perennial Grasses	2	4	3	33.0%	3.1%	3.0%

POINT INTERCEPT COVER DATA ANALYSIS
Revegetation Monitoring 2015

COVER TYPE	POINT HITS (#) BY TRANSECT NUMBER			FREQUENCY	VEGETATIVE COVER	TOTAL COVER
	1	2	3			
Native Perennial Graminoids						
Carex nebrascensis (Nebraska sedge)	0	10	0	33.0%	3.5%	3.3%
Carex utriculata (beaked sedge)	0	0	9	33.0%		
Juncus balticus (Baltic rush)	21	25	8	100.0%	18.7%	18.0%
Juncus encifolius (sword leaved rush)	0	2	0	33.0%		
Eleocharis macrostachya (creeping spikerush)	0	1	0	33.0%		
Deschampsia cespitosa (Calfornia hairgrass)	0	6	12	66.0%		
Hordeum brachyantherum (meadow barley)	3	0	2	66.0%	1.7%	1.7%
Poa pratensis (Kentucky bluegrass)	23	9	9	100.0%	14.2%	13.7%
Alopecurus aequalis (short-awned foxtail)	1	1	3	100.0%	1.7%	1.7%
Agrostis scabra (rough bentgrass)	7	13	25	100.0%	15.6%	15.0%
Total Native Perennial Grasses	55	67	68	100.0%	65.7%	63.3%
NATIVE VEGETATIVE COVER	**92**	**89**	**88**	**n/a**	**93.1%**	**89.7%**
NON-NATIVE VEGETATIVE COVER	**5**	**8**	**7**	**n/a**	**6.9%**	**6.7%**
TOTAL VEGETATIVE COVER	**97**	**97**	**95**	**n/a**	**100.0%**	**96.3%**
Litter	3	3	5	n/a	n/a	3.7%
TOTAL COVER	**100**	**100**	**100**	**n/a**	**n/a**	**100.0%**
TOTAL OVER ALL (300) SAMPLING POINTS			**ALL COVER:** **100.0%**	**NON-NATIVE:**	**6.7%**	
			VEGETATIVE COVER: **96.3%**	**NATIVE:**	**89.7%**	

PP#1_10 24 2014.JPG: Photo Point #1, View looking west across right overbank; LBO-5 at Trout Creek, lower left.

PP#2_10 24 2014.JPG: Photo Point #2, View looking west across right overbank.

PP#3_10 24 2014.JPG: Photo Point #3, View looking west across avulsed channel, right overbank area; LBO-1 at middle far right of view.

PP#4_10 24 2014.JPG: Photo Point #4, View looking west across avulsed channel, right overbank area; FH-3 at lower right of view.

PP#5_10 24 2014.JPG: Photo Point #5, View looking west at downstream end of avulsed channel.

PP#6_10 24 2014.JPG: Photo Point #6, View looking west across marsh toward Trout Creek, near downstream end of Bellevue project area.

TMSFPP_027.JPG: Planted Coir Log - Downstream of Hummock 1A

TMSFPP_028.JPG: Fill Hummock (FH) 1; Wood Rose (WR), Hummock (H) 1A, Planted Coir Log (PCL)

TMSFPP_029.JPG: Fill Hummock 1; Wood Rose, Hummock 1A, Planted Coir Log

TMSFPP_030.JPG: Hummock 1A

TMSFPP_031.JPG: Hummock 1a and Fill Hummock 1

TMSFPP_032.JPG: Hummock 1a and Fill Hummock 1

TMSFPP_033.JPG: Fill Hummock 1

TMSFPP_034.JPG: Fill Hummock 1

TMSFPP_035.JPG: Wood Rose Planting, upstream of Fill Hummock 1

TMSFPP_036.JPG: Wood Rose Planting - Avulsed Channel Bar

TMSFPP_037.JPG: Hummock 2; Avulsed Channel

TMSFPP_038.JPG: Hummock 2; Coir Log Perimeter

TMSFPP_039.JPG: Fill Hummock 3

TMSFPP_040.JPG: Avulsed Channel; Fill Hummock 3

TMSFPP_041.JPG: Avulsed Channel

TMSFPP_042.JPG: Wood Rose Plantings, south of Fill Hummock 3

TMSFPP_043.JPG: Wood Rose; Coir Log -4, -5

TMSFPP_044.JPG: Coir Log 4; Hummock 4

TMSFPP_045.JPG: Coir Log (CL) - 4,-5; Hummock 4

TMSFPP_046.JPG: Hummock (H) 4

TMSFPP_047.JPG: Hummock 4

TMSFPP_048.JPG: Hummock 4

TMSFPP_049.JPG: Hummock 4

TMSFPP_050.JPG: Planted Coir Log (PCL) – 1

TMSFPP_051.JPG: Left Bank Opening (LBO)-1

TMSFPP_052.JPG: LBO-1

TMSFPP_053.JPG: PCL-2; LBO-2

TMSFPP_054.JPG: LBO-2; Pilot Channel (PC)-2

TMSFPP_055.JPG: LBO-2; LBO-1; Trout Creek

TMSFPP_056.JPG: LBO-2; Trout Creek

TMSFPP_057.JPG: LBO-2; PC-2

TMSFPP_058.JPG: PC-2

TMSFPP_059.JPG: PCL-3

TMSFPP_060.JPG: PCL-3

TMSFPP_061.JPG: LBO-3; Trout Creek

TMSFPP_062.JPG: LBO-3

TMSFPP_063.JPG: LBO-3

TMSFPP_065.JPG: PC-3

TMSFPP_066.JPG: PC-3

TMSFPP_067.JPG: PC-3

TMSFPP_068.JPG: PCL-4

TMSFPP_069.JPG: LBO-4

TMSFPP_070.JPG: PCL-4

TMSFPP_071.JPG: LBO-4; Trout Creek

TMSFPP_072.JPG: LBO-4

TMSFPP_073.JPG: LBO-4; PCL-4

TMSFPP_074.JPG: PC-4

TMSFPP_075.JPG: PC-4

TMSFPP_076.JPG: PC-4

TMSFPP_077.JPG: LBO-5

TMSFPP_078.JPG: LBO-5

TMSFPP_079.JPG: LBO-5

TMSFPP_080.JPG: LBO-5; Trout Creek

TMSFPP_081.JPG: Trout Creek

TMSFPP_082.JPG: Trout Creek

TMSFPP_083.JPG: LBO-5; Trout Creek

TMSFPP_084.JPG: LBO-5

TMSFPP_085.JPG: LBO-5

TMSFPP_086.JPG: LBO-6

TMSFPP_087.JPG: LBO-6

TMSFPP_088.JPG: LBO-6; Trout Creek

TMSFPP_089.JPG: LBO-6; Trout Creek

TMSFPP_090.JPG: LBO-6

TMSFPP_091.JPG: LBO-6 Channel

TMSFPP_092.JPG: LBO-6 Channel

TMSFPP_093.JPG: LBO-6; Trout Creek

TMSFPP_094.JPG: LBO-6 Channel

TMSFPP_095.JPG: LBO-6; Trout Creek

TMSFPP_096.JPG: CMU Block from Fish Net (Trout Creek)

TMSFPP_097.JPG: LBO-1; Trout Creek

TMSFPP_098.JPG: LBO-1; Hummock 4 (H-4)

TMSFPP_099.JPG: Right Bank Opening (RBO) across from LBO-1; Upstream of H-4

TMSFPP_100.JPG: H-4

TMSFPP_107.JPG: S. end, Access Route Area B

TMSFPP_108.JPG: Access Route Area B - Looking North

TMSFPP_109.JPG: Access Route Area C - Looking West

TMSFPP_110.JPG: Temporary Channel Crossing Area

TMSFPP_111.JPG: Temp Irrigation Line, Sprinkler Heads; Road Fill Removal Area; Trout Creek

TMSFPP_112.JPG: Temp Channel Crossing Construction Mat Fingerprint

TMSFPP_114.JPG: Road Fill Removal Area

TMSFPP_115.JPG: Temp Irrigation; Road Fill Removal Area

TMSFPP_116.JPG: Temp Irrigation; Fill Plug

TMSFPP_117.JPG: Temp Irrigation; Road Fill Removal Area

TMSFPP_118.JPG: Temp Irrigation; Fill Plug

TMSFPP_119.JPG: Temp Irrigation Line; Fill Removal Area; Trout Creek

TMSFPP_120.JPG: Temp. Irrigation Line; Trout Creek

TMSFPP_121.JPG: Temp Irrigation Line; Road Fill Removal Area; Fill Plug

TMSFPP_122.JPG: Temp Irrigation Line; Road Fill Removal Area; Fill Plug

TMSFPP_123.JPG: Trout Creek; Mouth Main PC

TMSFPP_124.JPG: Temp Irrigation Line; Temp Channel Crossing Area

TMSFPP_125.JPG: Mouth Main PC; Trout Creek

TMSFPP_126.JPG: Mouth Main PC; Trout Creek

TMSFPP_127.JPG: Main PC (view south); Trout Creek

TMSFPP_128.JPG: Main PC (view north) toward Trout Creek

TMSFPP_129.JPG: ?

TMSFPP_130.JPG: Wood chips thin spread near PP#5

UPPER TRUCKEE MARSH SEWER FACILITIES AMP
YEAR 1 IMPROVEMENTS
PHOTO LOG (October 24, 2014)

Abbreviations

PP#x Photo Point
H-x Hummock
FH-x Fill Hummock
PC-x Pilot Channel
LBO-x Left Bank Opening
PCL-x Planted Coir Log
RBP-x Right Bank Plug

Left and Right are referenced looking downstream
See As-Built Feature Map for locations

PP#1_10 24 2014.JPG: Photo Point #1, View looking SW across right overbank; LBO-5 at Trout Creek, center left.
PP#2_10 24 2014.JPG: Photo Point #2, View looking SW across right overbank.

PP#3_10 24 2014.JPG: Photo Point #3, View looking SW across right overbank in avulsion area; LBO-1 at middle far right of view.

PP#4_10 24 2014.JPG: Photo Point #4, View looking SW across right overbank in avulsion area; FH-3 at lower right of view.

PP#5_10 24 2014.JPG: Photo Point #5, View looking SW across right overbank at downstream end of avulsion area.

PP#6_10 24 2014.JPG: Photo Point #6, View looking SW across marsh toward Trout Creek, near downstream end of project area near Bellevue Avenue.

TMSFPP_027.JPG: Planted Coir Log – Right overbank downstream of H-1A, looking S

TMSFPP_028.JPG: Right overbank at FH-1; Wood Rose planting, H-1A, Planted Coir Log; looking S

TMSFPP_029.JPG: Right overbank at FH-1; Wood Rose planting, H-1A, Planted Coir Log; looking S

TMSFPP_030.JPG: Right overbank at H-1A; looking S

TMSFPP_031.JPG: Right overbank at H-1a and FH-1; looking N

TMSFPP_032.JPG: Right overbank at H-1a and FH-1; looking N

TMSFPP_033.JPG: Right overbank at FH-1; looking N

TMSFPP_034.JPG: Right Overbank at FH-1; looking N

TMSFPP_035.JPG: Right overbank upstream of FH-1; Woods Rose planting; looking NE

TMSFPP_036.JPG: Right overbank Wood Rose planting on bar near downstream end of avulsion area; looking W

TMSFPP_037.JPG: Right overbank in avulsion area at H-2; looking N

TMSFPP_038.JPG: Right overbank in avulsion area at H-2; coir log perimeter; looking W

TMSFPP_039.JPG: Right overbank at FH-3; looking N

TMSFPP_040.JPG: Right overbank in avulsion area at FH-3; looking N

TMSFPP_041.JPG: Right overbank in avulsion area; looking NW

TMSFPP_042.JPG: Wood Rose plantings in right overbank, SE of FH-3; looking N

TMSFPP_043.JPG: Wood Rose plantings in right overbank; Coir Logs 4 and 5; looking N

TMSFPP_044.JPG: Right overbank at Coir Log 4; H-4; looking NE

TMSFPP_045.JPG: Right overbank at Coir Logs –4 and 5, H-4; looking NE

TMSFPP_046.JPG: Right overbank at H-4; looking NE

TMSFPP_047.JPG: Right overbank at H-4; looking SE along SW edge of hummock; PC-1 exiting to right at center right

TMSFPP_048.JPG: Right overbank at H-4; looking NE toward FH-5

TMSFPP_049.JPG: Right overbank at H-4; looking NE from near LBO-1

TMSFPP_050.JPG: PCL-1at LBO-1; looking SW

TMSFPP_051.JPG: LBO-1; looking SW across Trout Creek channel

TMSFPP_052.JPG: LBO-1 looking SW across Trout Creek channel

TMSFPP_053.JPG: PCL-2 and LBO-2; looking NE

TMSFPP_054.JPG: LBO-2 and PC-2; looking NE

TMSFPP_055.JPG: LBO-2, LBO-1, and Trout Creek channel; looking NW

TMSFPP_056.JPG: LBO-2 and Trout Creek channel; looking NW

TMSFPP_057.JPG: LBO-2 and PC-2; looking W

TMSFPP_058.JPG: PC-2 looking W

TMSFPP_059.JPG: PCL-3 at head of PC-3; looking NE

TMSFPP_060.JPG: PCL-3 at head of PC-3; looking NE

TMSFPP_061.JPG: LBO-3 and Trout Creek channel; looking NW

TMSFPP_062.JPG: LBO-3 and Trout Creek channel; looking N

TMSFPP_063.JPG: LBO-3 and Trout Creek channel; looking N

TMSFPP_064: PCL-3 at LBO-3; looking N

TMSFPP_065.JPG: PC-3 near head; looking NW

TMSFPP_066.JPG: PC-3 near head; looking NW

TMSFPP_067.JPG: PC-3 near downstream end; looking W

TMSFPP_068.JPG: PCL-4 and LBO-4; looking NE

TMSFPP_069.JPG: LBO-4; looking NE

TMSFPP_070.JPG: PCL-4; looking NE

TMSFPP_071.JPG: LBO-4 and Trout Creek channel; looking NW

TMSFPP_072.JPG: LBO-4 and Trout Creek channel; looking NW

TMSFPP_073.JPG: LBO-4 and PCL-4; looking NW

TMSFPP_074.JPG: PC-4 and LBO-4; looking W

TMSFPP_075.JPG: LBO-4; looking W

TMSFPP_076.JPG: LBO-4; looking SW

TMSFPP_077.JPG: LBO-5 and Trout Creek channel; looking W

TMSFPP_078.JPG: LBO-5 and Trout Creek channel; looking NE

TMSFPP_079.JPG: LBO-5, Trout Creek channel, and relocated stream stage gage; looking NE

TMSFPP_080.JPG: LBO-5 and Trout Creek channel; looking NW

TMSFPP_081.JPG: Trout Creek channel at LBO-5; looking NW

TMSFPP_082.JPG: Trout Creek channel near LBO-5; looking NW

TMSFPP_083.JPG: LBO-5, Trout Creek channel, and relocated stream stage gage; looking W

TMSFPP_084.JPG: LBO-5; looking W

TMSFPP_085.JPG: LBO-5; looking SW

TMSFPP_086.JPG: LBO-6; looking NE

TMSFPP_087.JPG: LBO-6; looking NE

TMSFPP_088.JPG: LBO-6 and Trout Creek channel; looking N

TMSFPP_089.JPG: LBO-6 and Trout Creek channel; looking N

TMSFPP_090.JPG: LBO-6; looking NW

TMSFPP_091.JPG: LBO-6 and extended channel; looking W

TMSFPP_092.JPG: LBO-6 and extended channel; looking W

TMSFPP_093.JPG: LBO-6 and Trout Creek channel; looking N

TMSFPP_094.JPG: LBO-6 extended channel; looking SW

TMSFPP_095.JPG: LBO-6 and Trout Creek channel; looking N

TMSFPP_096.JPG: CMU Block from Fish Net in Trout Creek; looking N

TMSFPP_097.JPG: LBO-1 and Trout Creek channel; looking SE

TMSFPP_098.JPG: LBO-1 and H-; looking NW

TMSFPP_099.JPG: Right overbank across from LBO-1 andupstream of H-4; looking NE

TMSFPP_100.JPG: H-4; looking NE

TMSFPP_107.JPG: E end Access Route Area B; looking W

TMSFPP_108.JPG: Access Route Area B; looking NW

TMSFPP_109.JPG: Access Route Area C; looking S

TMSFPP_110.JPG: Temporary Channel Crossing Area; looking S

TMSFPP_111.JPG: Temp Irrigation Line, Sprinkler Heads in Road Fill Removal Area, Trout Creek channel; looking S

TMSFPP_112.JPG: Temp Channel Crossing construction mat fingerprint; looking S

TMSFPP_114.JPG: Temp Irrigation and Road Fill Removal Area; looking N

TMSFPP_115.JPG: Temp Irrigation and Road Fill Removal Area; looking N

TMSFPP_116.JPG: Temp Irrigation and Fill Plug in Erosional Channel; looking N

TMSFPP_117.JPG: Temp Irrigation and Road Fill Removal Area; looking NW

TMSFPP_118.JPG: Temp Irrigation; Fill Plug in Erosional Channel; looking N

TMSFPP_119.JPG: Temp Irrigation Line, Road Fill Removal Area, Trout Creek channel; looking NW

TMSFPP_120.JPG: Temp Irrigation Line and Trout Creek channel; looking N

TMSFPP_121.JPG: Temp Irrigation Line, Road Fill Removal Area, and Fill Plug in Erosional Channel; looking S

TMSFPP_122.JPG: Temp Irrigation Line, Road Fill Removal Area, and Fill Plug in Erosional Channel; looking S

TMSFPP_123.JPG: Trout Creek and mouth combined PCs in upper left; looking NE

TMSFPP_124.JPG: Temp Irrigation Line and Temp Channel Crossing Area; looking NE

TMSFPP_125.JPG: Mouth combinedPCs at Trout Creek channel; looking NE

TMSFPP_126.JPG: Mouth combined PCs at Trout Creek channel; looking NE

TMSFPP_127.JPG: Combined PCs at Trout Creek channel; looking SE

TMSFPP_128.JPG: Remnant Trout Creek channel N of PC outlet; looking N

TMSFPP_129.JPG: Wood chips thin spread near PP#5; looking N

TMSFPP_130.JPG: Wood chips thin spread near PP#5; looking N

PP#1_10 24 2014.JPG: Photo Point #1, View looking SW across right overbank; LBO-5 at Trout Creek, center left.

PP#2_10 24 2014.JPG: Photo Point #2, View looking SW across right overbank.

PP#3_10 24 2014.JPG: Photo Point #3, View looking SW across right overbank in avulsion area; LBO-1 at middle far right of view.

PP#4_10 24 2014.JPG: Photo Point #4, View looking SW across right overbank in avulsion area; FH-3 at lower right of view.

PP#5_10 24 2014.JPG: Photo Point #5, View looking SW across right overbank at downstream end of avulsion area.

PP#6_10 24 2014.JPG: Photo Point #6, View looking SW across marsh toward Trout Creek, near downstream end of project area near Bellevue Avenue.

APPENDIX D

Year 2 Plans

2015 ANNUAL REPORT

APPENDIX D – YEAR 2 INFORMATION

LIST OF CONTENTS

SHEET INDEX

South Tahoe Public Utility District

CONSTRUCTION PLANS FOR

Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan - Year 2 Improvements

JULY 2015

PROJECT MANAGER

Ivo Bergsohn, Hydrogeologist
South Tahoe Public Utility District
1275 Meadow Crest Road
South Lake Tahoe, California 96150

APPROVED BY:

Shannon Cotulla, PE, Assistant General Manager *(date)*
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Reno, Nevada 89511
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Exp: 12/31/16
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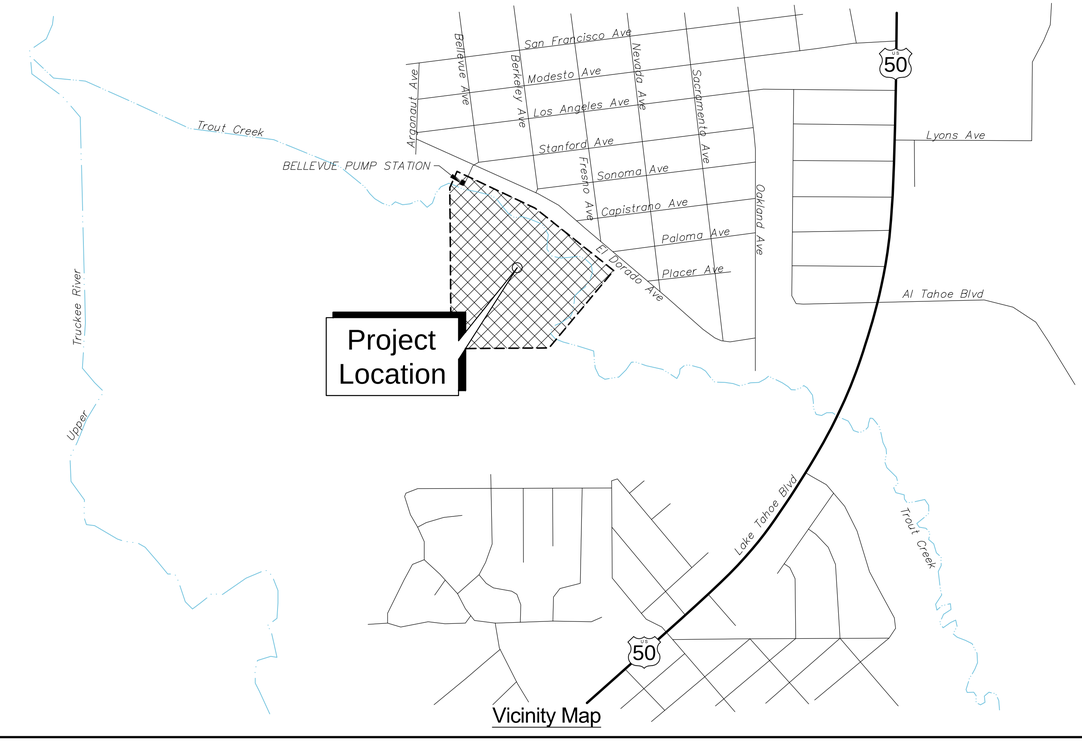
STATE OF CALIFORNIA

Edward E. Wallace 08 JULY 2015
Edward E. Wallace *(date)*
CALIFORNIA REGISTERED
PROFESSIONAL ENGINEER NO. # 32301
northwest hydraulic consultants



Vicinity Map

Project Location Map

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Drawing Status Final	Designer tvs	Drafter tvs	Checked eew	Job Number 6000145
Sheet 1 of 8				Sheet Number T1

GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING UTILITY COMPANIES TO DETERMINE THE LOCATION OF UNDERGROUND FACILITIES. THE LOCATION OF KNOWN EXISTING FACILITIES IN THE WORK AREA ARE SHOWN, BUT NO GUARANTEE IS MADE AS TO THE ACCURACY OF THIS INFORMATION.
2. THE CONTRACTOR SHALL PROTECT EXISTING SURVEY CONTROL POINTS AND SHALL BE RESPONSIBLE FOR CONSTRUCTION STAKING. IF EXISTING MONUMENT(S) MUST BE DISTURBED TO PERFORM THE WORK, THE CONTRACTOR SHALL NOTIFY THE DISTRICT FOR RELOCATION OF THE MONUMENT PRIOR TO BEGINNING TO WORK.
3. THE ENGINEER MAY MAKE MINOR CHANGES TO THE CONFIGURATION AND DESIGN GRADES OF PROJECT FEATURES AND TO REVEGETATION LAYOUTS TO SUIT FIELD CONDITIONS.
4. THE CONTRACTOR SHALL CONTACT THE DISTRICT IMMEDIATELY IF FIELD CONDITIONS ARE FOUND THAT CONFLICT WITH THESE PLANS. FIELD ADJUSTMENTS MUST BE APPROVED BY THE DISTRICT PRIOR TO CONSTRUCTION.
5. IF ANY ARTIFACTS OR OTHER MATERIALS ARE FOUND INDICATING POTENTIAL ARCHAEOLOGICAL OR HISTORICAL RESOURCES, WORK SHALL BE HALTED IMMEDIATELY AND THE CONTRACTOR SHALL CONTACT THE DISTRICT.
6. NO TREES ARE DESIGNATED FOR REMOVAL. IF FIELD CONDITIONS INDICATE THE NEED FOR TREE REMOVAL, PRIOR APPROVAL FROM THE DISTRICT AND TRPA IS REQUIRED.
7. NO GRADING SHALL OCCUR PRIOR TO INSTALLATION OF CONSTRUCTION BMPs AND APPROVAL BY TRPA AT A PRE-GRADE INSPECTION. BMPs TO BE INSTALLED PRIOR TO EQUIPMENT OR TRUCK USE OF ACCESS ROUTES IN PROJECT AREA.
8. WORK TO BE PERFORMED IS PART OF A MULTI-YEAR ADAPTIVE MANAGEMENT PLAN(AMP). PERMIT CONDITIONS FOR THE AMP APPLY TO THE PROJECT.
9. ON-SITE WORK SHALL BE PERFORMED FROM 8AM TO 6PM, MONDAY THROUGH FRIDAY. WORK OUTSIDE THESE HOURS MUST BE APPROVED BY THE DISTRICT A MINIMUM OF 48 HOURS BEFORE THE ABNORMAL WORKING HOURS ARE SCHEDULED TO BEGIN.
10. EXCESS MATERIAL SHALL BE DISPOSED OF OFFSITE AT A LOCATION APPROVED BY THE DISTRICT.

AREAS & QUANTITIES - YEAR 2 IMPROVEMENTS

DISTURBANCE AREAS AND APPROXIMATE CUT/FILL QUANTITIES

COMPONENT	SURFACE AREA, SF	CUT (-)/FILL(+) CY
ACCESS ROUTES	28183.0	
PILOT CHANNELS	300.0	-7
PILOT CHANNEL DEEPENING	540.0	-15
HUMMOCKS (FILL)	600.0	10
RIGHT BANK PLUGS	120.0	3
PLANTED COIR LOGS	80.0	-3
WETLAND PLUG PLANTING	180.0	0
TOTALS	30,003	-12

[1]EXCLUDES AREAS WHERE ONLY PLANTING OCCURS

SEQUENCE OF WORK

1. INSTALL BMPs AND ACCESS ROUTES
2. DEWATER AND CONSTRUCT PILOT CHANNEL ON SECONDARY CHANNEL; INSTALL FLOW CONTROL BARRIER AT HEAD OF CHANNEL; OPEN CHANNEL TO FLOW
3. DEWATER PILOT CHANNEL PC-3 IN BELLEVUE AREA AND DEEPEN PILOT CHANNEL; OPEN TO FLOW
4. IF DETERMINED NEEDED BY DISTRICT, DEWATER PILOT CHANNEL PC-1 AND DEEPEN PILOT CHANNEL; OPEN TO FLOW
5. INSTALL DEWATERING BARRIERS 8 & 9. IF NEEDED TO PREVENT FLOW IN OVERBANK DOWNSTREAM OF PC-1. PUMP, IF NEEDED TO DEWATER FILL HUMMOCK 5A WORK AREA.
6. INSTALL FILL HUMMOCK 5A, PLANTED COIR LOGS, RIGHT OVERBANK PLUG, AND WETLAND PLUG PLANTINGS.
7. MANAGE FLOWS AT SECONDARY CHANNEL TO PROVIDE MAXIMUM FLOW IN PC-1 AND PC-3 WITHOUT OVERBANK FLOW
8. DECOMMISSION ACCESS ROUTES
9. CONDUCT VEGETATION MAINTENANCE AND IRRIGATION

MONUMENT LOCATIONS

NAME	LATITUDE (NAD83)	LONGITUDE (NAD83)	NORTHING (GRID)	EASTING (GRID)	ELEVATION (NAVD88)
RBM T01	38.936805560'N	119.989783506'W	2109311.8	71333398.2	6234.3
RBM T02	38.936678391'N	119.989687343'W	2109266.1	71333426.6	6234.4
RBM T04	38.936695860'N	119.989298498'W	2109274.9	71335370	6234.3
RBM T05	38.936536812'N	119.988919311'W	2109219.4	71336461	6235.0
RBM T07	38.936210006'N	119.987960945'W	2109106.4	71339213	6234.9

LEGEND

- EXISTING TREES
- EXISTING EDGE OF PAVED ROAD
- EXISTING TRAIL
- EXISTING CONTOURS (MAJOR) — 60
- EXISTING CONTOURS (MINOR) — 61
- EXISTING FENCE
- EXISTING EDGE OF WATER (10/25/13)
- EXISTING BUILDINGS & STRUCTURES
- SURVEY CONTROL POINT
- PROPOSED SLOPE
- CONSTRUCTION BASELINE — 1+00
- SILT BARRIER
- SAFETY PRESERVATION FENCE WITH SILT BARRIER
- PROPOSED CONTOURS (MAJOR) — 80
- PROPOSED CONTOURS (MINOR) — 79
- PROPOSED SPOT ELEVATIONS — 83.2
- HUMMOCK
- DIVERSION DAM
- STAGING AREA

SURVEY
TOPOGRAPHY BASED ON FIELD SURVEY, 25 & 26 NOVEMBER 2014, BY LUMOS & ASSOCIATES.

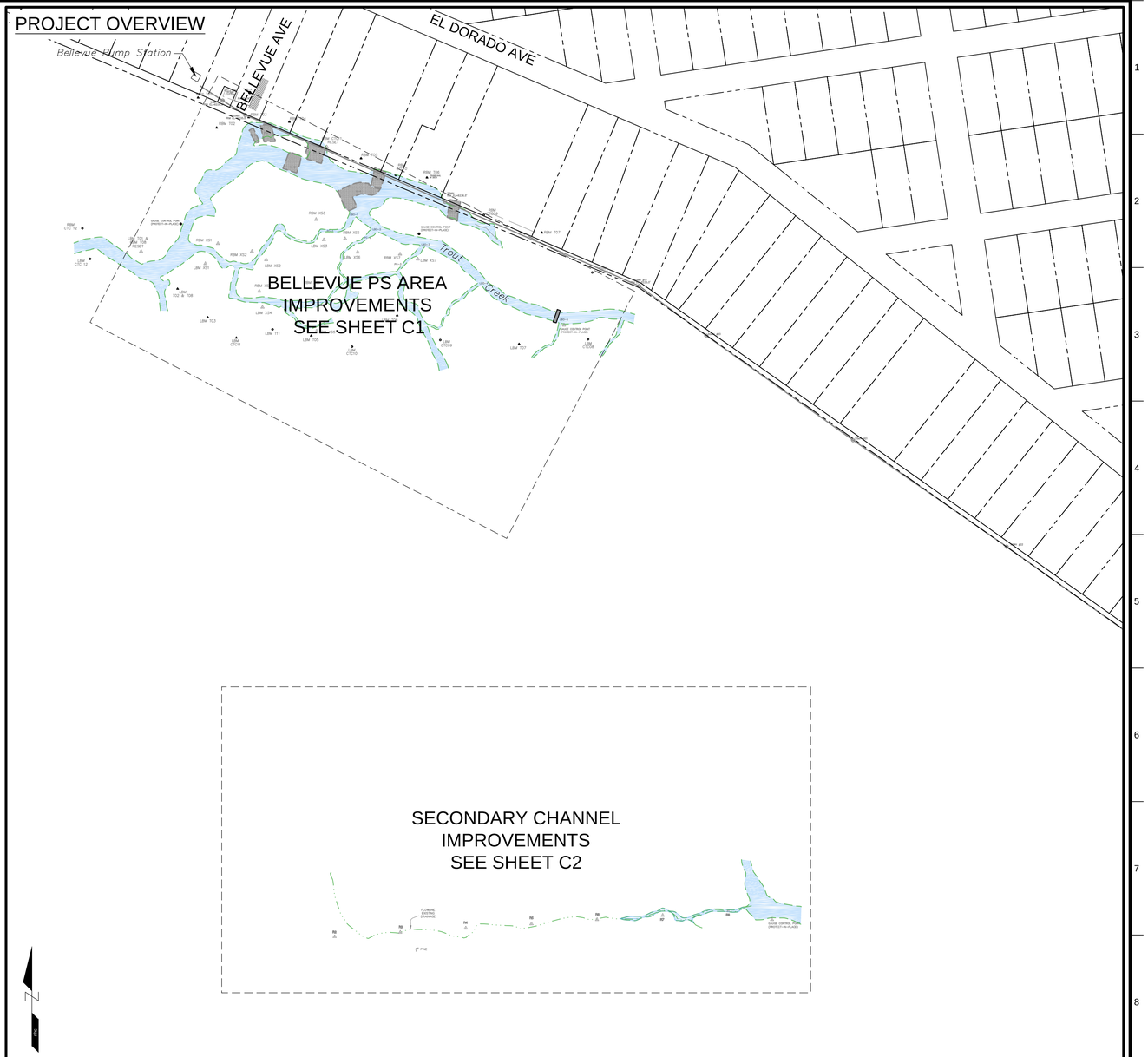
HORIZONTAL: NAD 83(2011) EPOCH 2010.00 CALIFORNIA ZONE 2

NGS HPGN D CA 03 FS
N 2107571.07 US SURVEY FEET- GRID
E 7136557.88

NGS RICHARDSON
N 2103848.87 US SURVEY FEET - GRID
E 7123525.92 GRID

VERTICAL: NAVD88
NGS HPGN D CA 03 FS
EL = 6248.20

PROJECT OVERVIEW



PROJECT OVERVIEW
SCALE: 1"=100'

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Revisions

No.	Date	Description

Drawing Information

Date	8 July 2015 (02:03)
Status	Final
Designer	tvs
Drafter	tvs
Checked	eew
File Name	UT MARSH YR2 COVER
Plotted Scale	0 1/2 1

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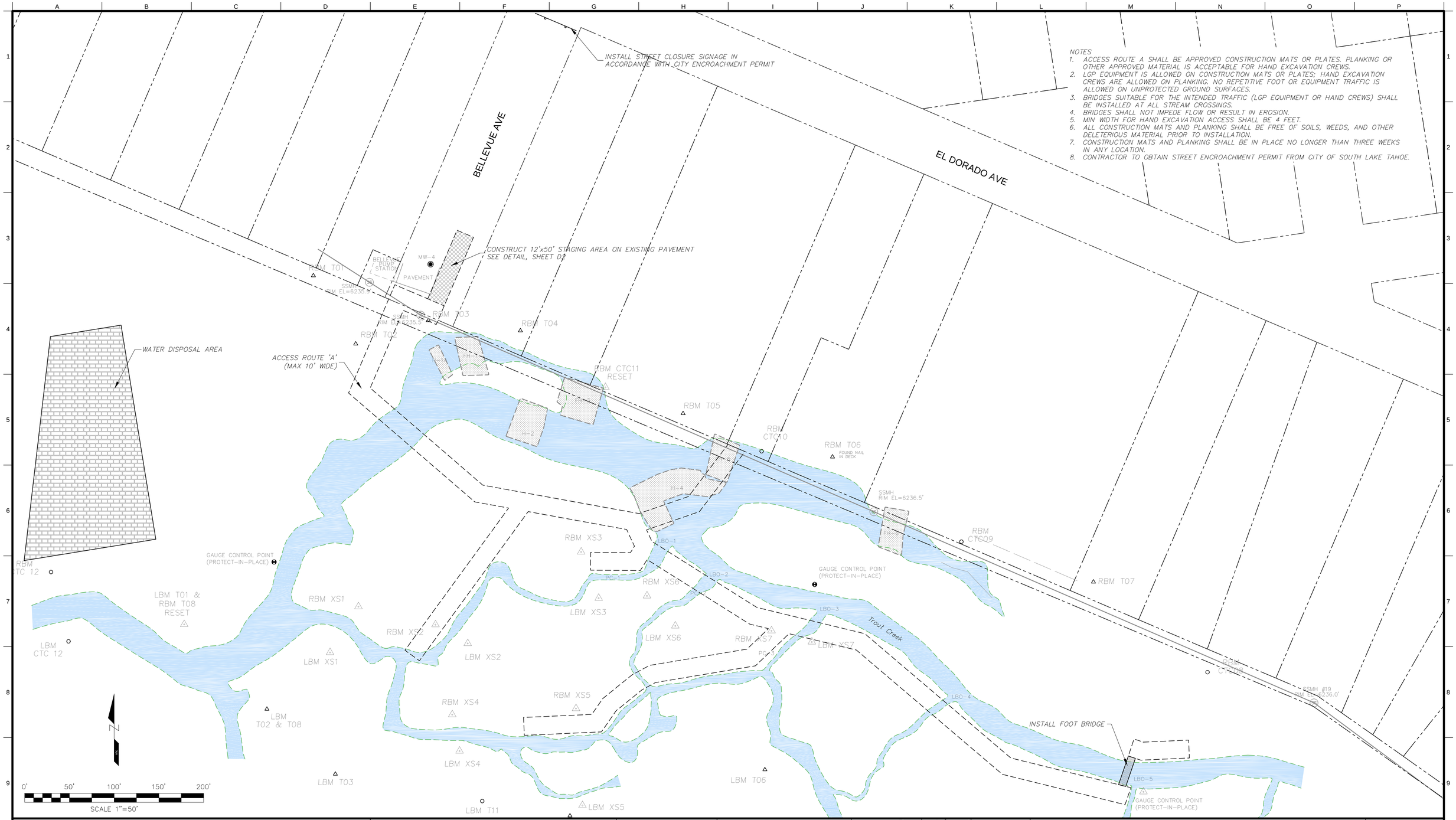
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 2 Improvements
Legend & Notes Sheet

Job Number 6000145

Sheet Number

G1

Sheet 2 of 8



NOTES
1. ACCESS ROUTE A SHALL BE APPROVED CONSTRUCTION MATS OR PLATES. PLANKING OR OTHER APPROVED MATERIAL IS ACCEPTABLE FOR HAND EXCAVATION CREWS.
2. LGP EQUIPMENT IS ALLOWED ON CONSTRUCTION MATS OR PLATES; HAND EXCAVATION CREWS ARE ALLOWED ON PLANKING. NO REPETITIVE FOOT OR EQUIPMENT TRAFFIC IS ALLOWED ON UNPROTECTED GROUND SURFACES.
3. BRIDGES SUITABLE FOR THE INTENDED TRAFFIC (LGP EQUIPMENT OR HAND CREWS) SHALL BE INSTALLED AT ALL STREAM CROSSINGS.
4. BRIDGES SHALL NOT IMPEDE FLOW OR RESULT IN EROSION.
5. MIN WIDTH FOR HAND EXCAVATION ACCESS SHALL BE 4 FEET.
6. ALL CONSTRUCTION MATS AND PLANKING SHALL BE FREE OF SOILS, WEEDS, AND OTHER DELETERIOUS MATERIAL PRIOR TO INSTALLATION.
7. CONSTRUCTION MATS AND PLANKING SHALL BE IN PLACE NO LONGER THAN THREE WEEKS IN ANY LOCATION.
8. CONTRACTOR TO OBTAIN STREET ENCROACHMENT PERMIT FROM CITY OF SOUTH LAKE TAHOE.

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Plotted Scale	0 1/2 1

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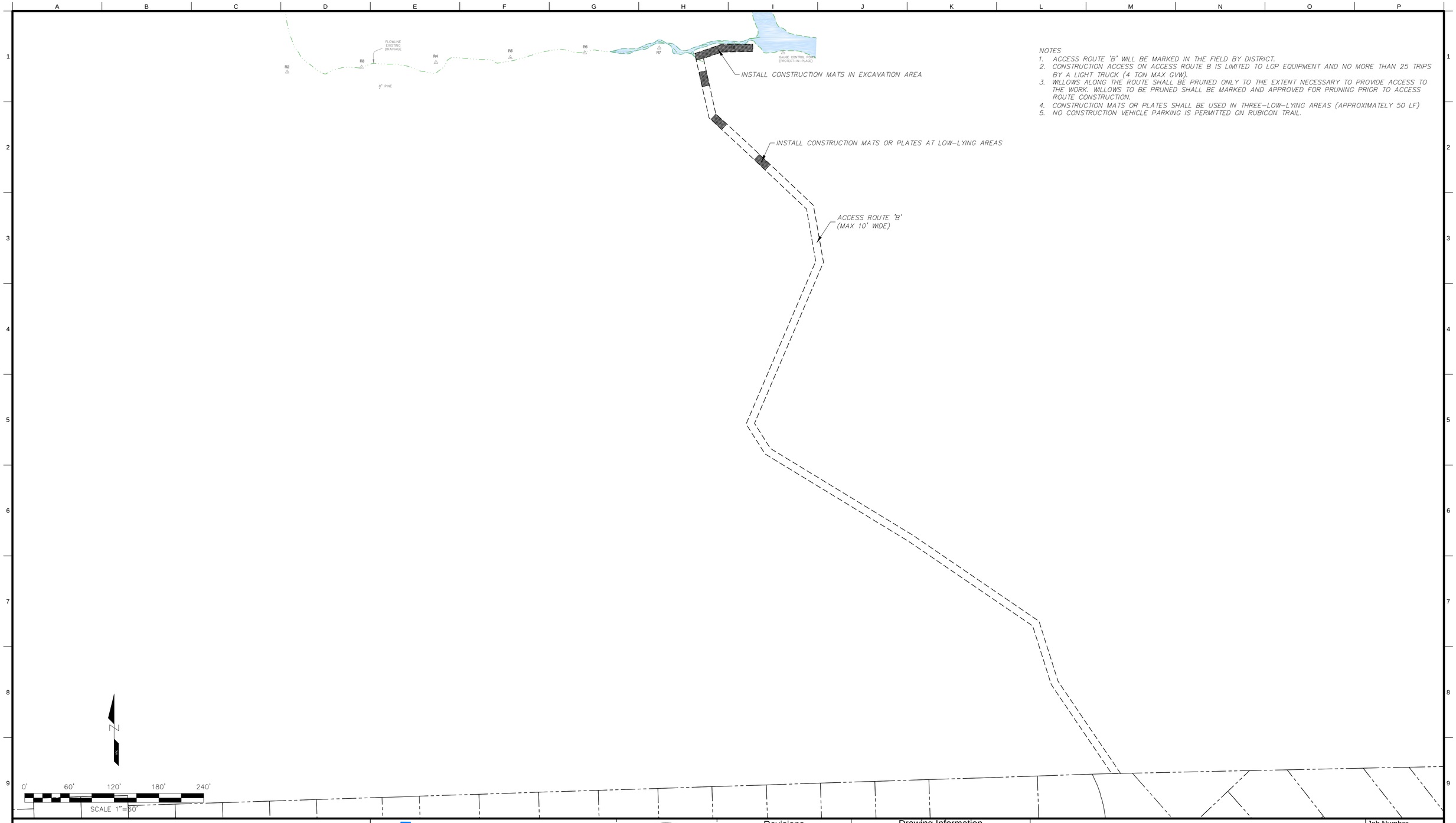
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 2 Improvements
Bellevue PS Area Improvements
Access Sheet

Job Number 6000145

Sheet Number G2



NOTES
1. ACCESS ROUTE 'B' WILL BE MARKED IN THE FIELD BY DISTRICT.
2. CONSTRUCTION ACCESS ON ACCESS ROUTE B IS LIMITED TO LGP EQUIPMENT AND NO MORE THAN 25 TRIPS BY A LIGHT TRUCK (4 TON MAX GVW).
3. WILLOWS ALONG THE ROUTE SHALL BE PRUNED ONLY TO THE EXTENT NECESSARY TO PROVIDE ACCESS TO THE WORK. WILLOWS TO BE PRUNED SHALL BE MARKED AND APPROVED FOR PRUNING PRIOR TO ACCESS ROUTE CONSTRUCTION.
4. CONSTRUCTION MATS OR PLATES SHALL BE USED IN THREE-LOW-LYING AREAS (APPROXIMATELY 50 LF)
5. NO CONSTRUCTION VEHICLE PARKING IS PERMITTED ON RUBICON TRAIL.

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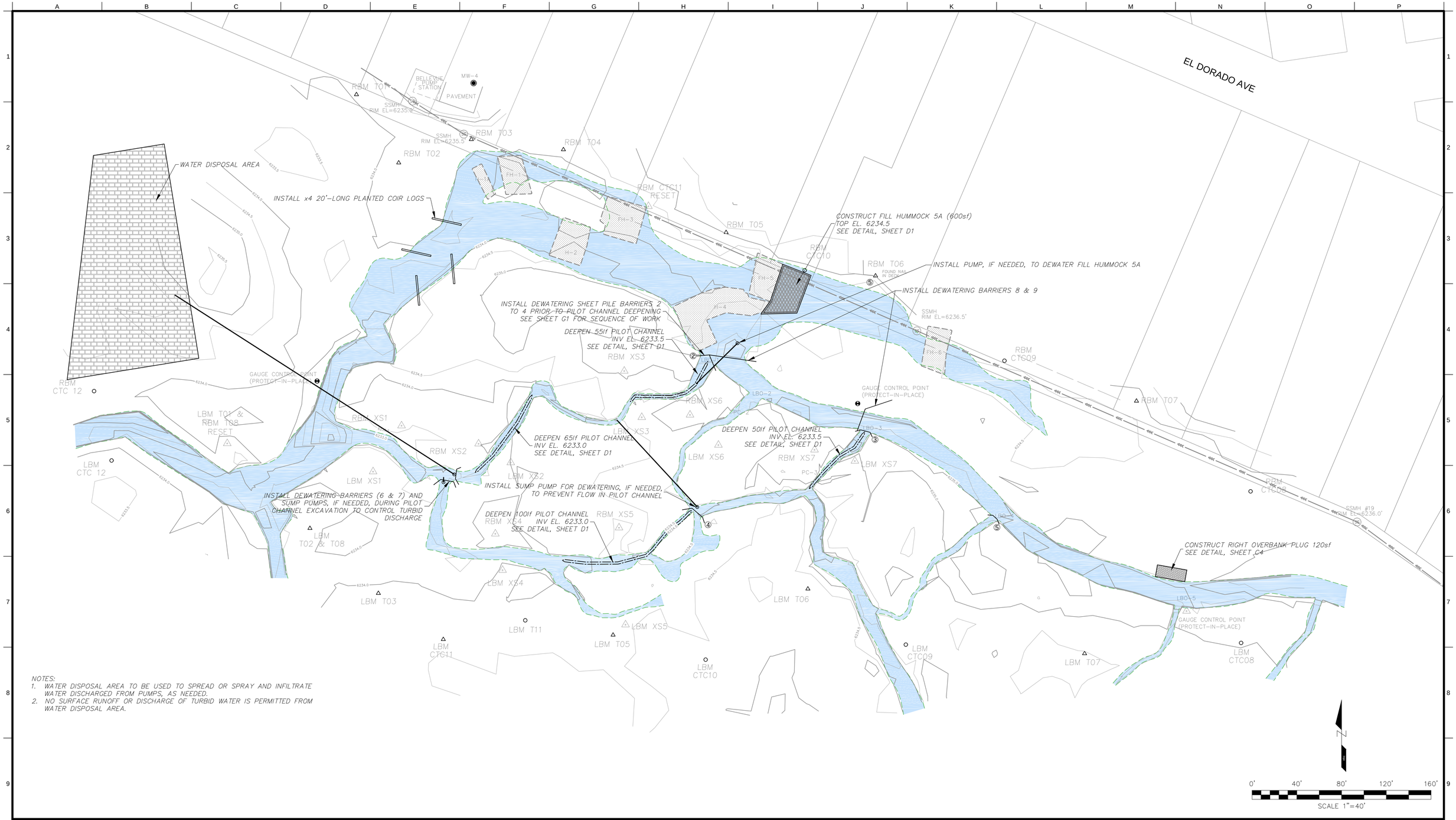
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 2 Improvements
Secondary Channel Improvements
Access Sheet

Job Number 6000145

Sheet Number

G3

Sheet 4 of 8



NOTES:
1. WATER DISPOSAL AREA TO BE USED TO SPREAD OR SPRAY AND INFILTRATE WATER DISCHARGED FROM PUMPS, AS NEEDED.
2. NO SURFACE RUNOFF OR DISCHARGE OF TURBID WATER IS PERMITTED FROM WATER DISPOSAL AREA.

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Date	8 July 2015 (01:51)
Status	Final
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Drafter	tvs
Checked	eew
File Name	UT MARSH YR2
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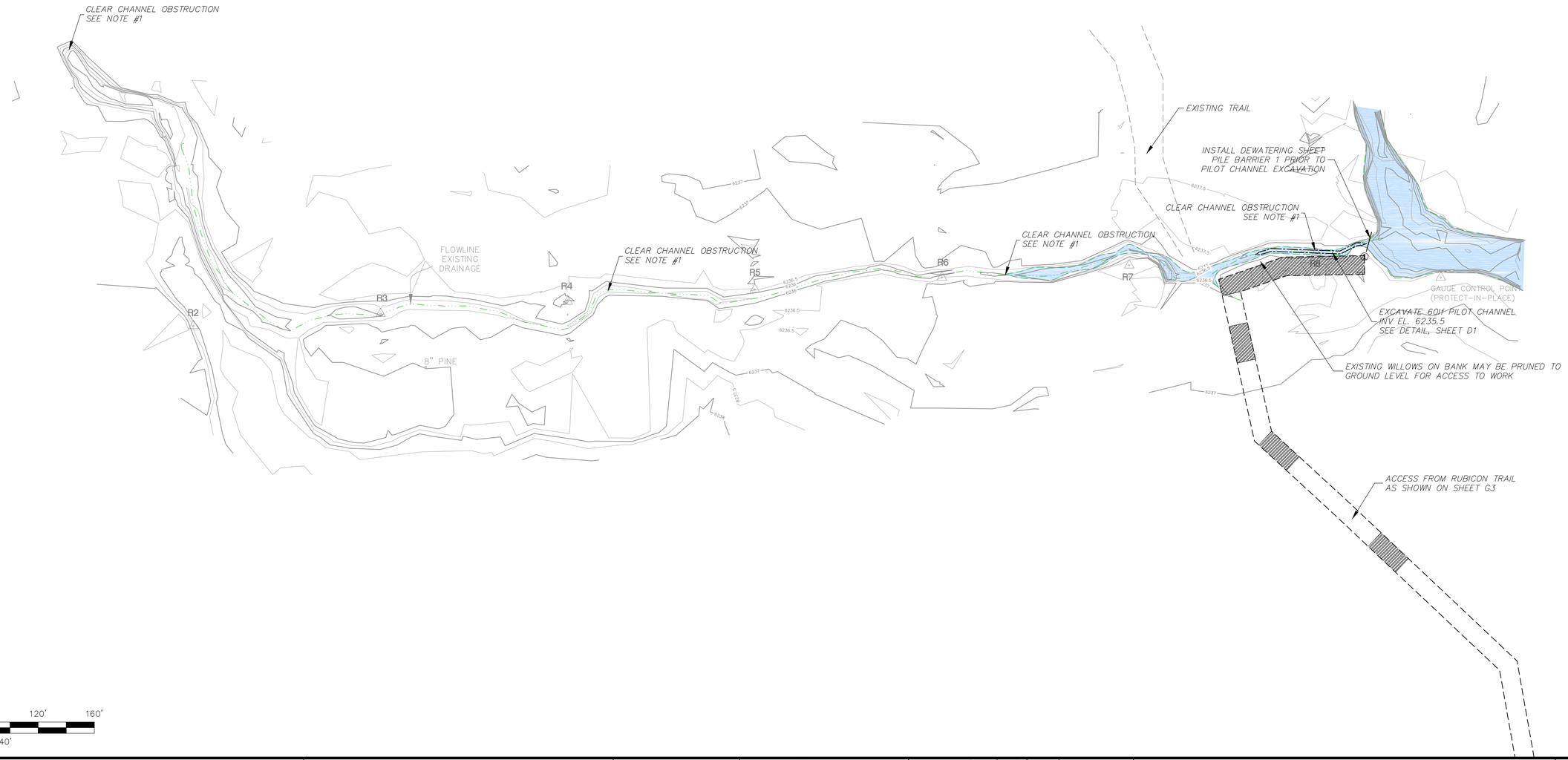
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 2 Improvements
Bellevue PS Area Improvements
Plan Sheet

Job Number 6000145

Sheet Number C1

NOTE:
1. FOUR CHANNEL OBSTRUCTION LOCATIONS, UP TO 1CY OF DEBRIS IN EACH LOCATION. SPECIFIC LOCATION(S) TO BE IDENTIFIED IN FIELD BY ENGINEER. NO MECHANIZED ACCESS.



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Status	Final
Designer	tvs
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Checked	eew
File Name	UT MARSH YR2
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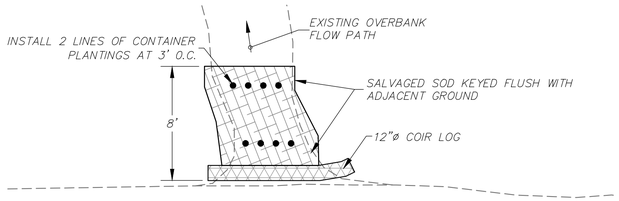
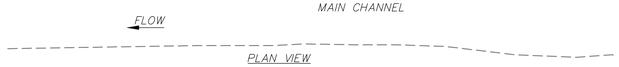
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 2 Improvements
Secondary Channel Improvements
Plan Sheet

Job Number 6000145

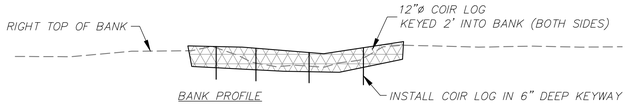
Sheet Number C2



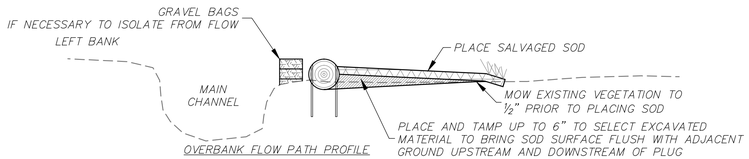
TROUT CREEK
MAIN CHANNEL



PLAN VIEW

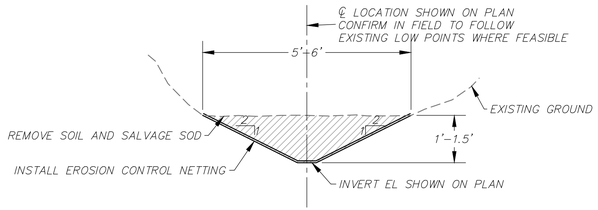


BANK PROFILE

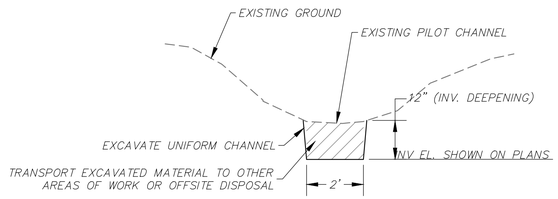


OVERBANK FLOW PATH PROFILE

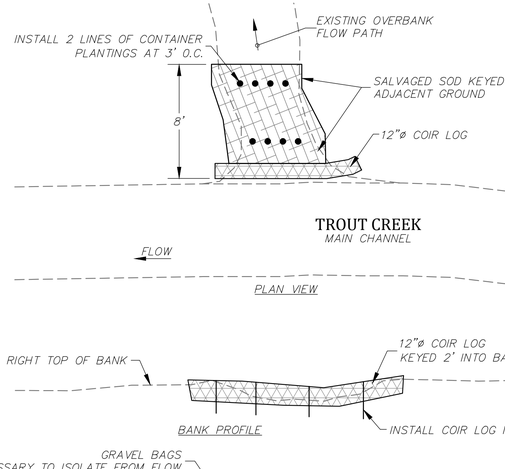
RIGHT OVERBANK PLUG
Not to Scale



PILOT CHANNEL
Not to Scale



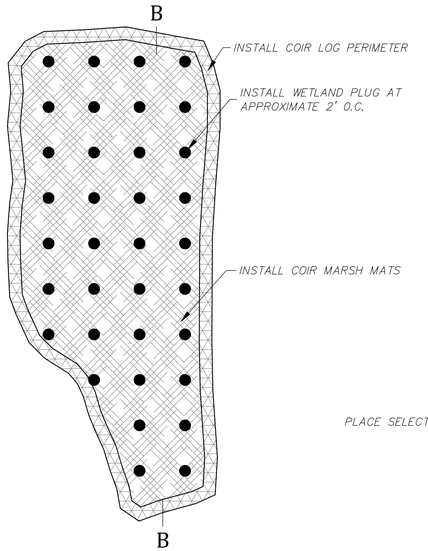
PILOT CHANNEL DEEPENING
Not to Scale



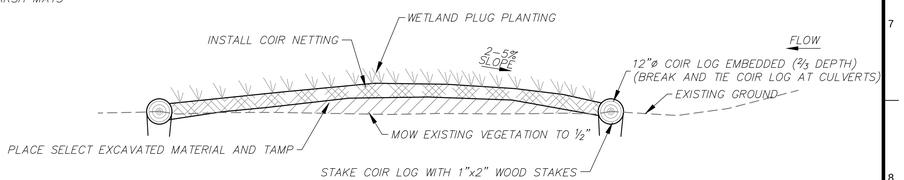
PLAN VIEW

SECTION A–A

HUMMOCK DETAIL
Not to Scale



PLAN VIEW



SECTION B–B

FILL HUMMOCK DETAIL
Not to Scale

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Revisions		
No.	Date	Description

Drawing Information	
Date	8 July 2015 (01:56)
Status	Final
Designer	tvs
Drafter	tvs
Checked	eew
File Name	UT MARSH YR2 DETAILS
Plotted Scale	0 1/2 1 (1:56.02)

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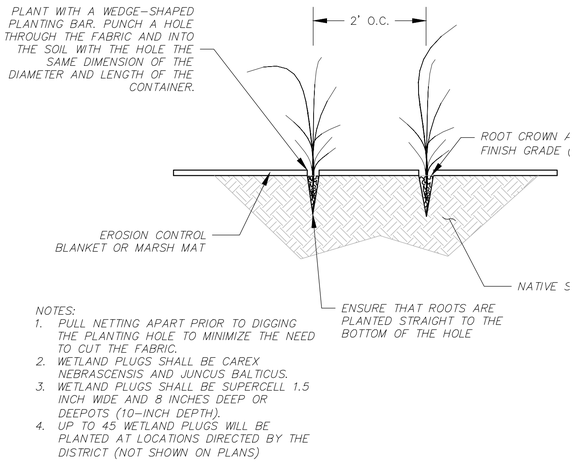
Upper Truckee Marsh Sewer Facilities
Adaptive Management Plan
Year 2 Improvements

Details Sheet

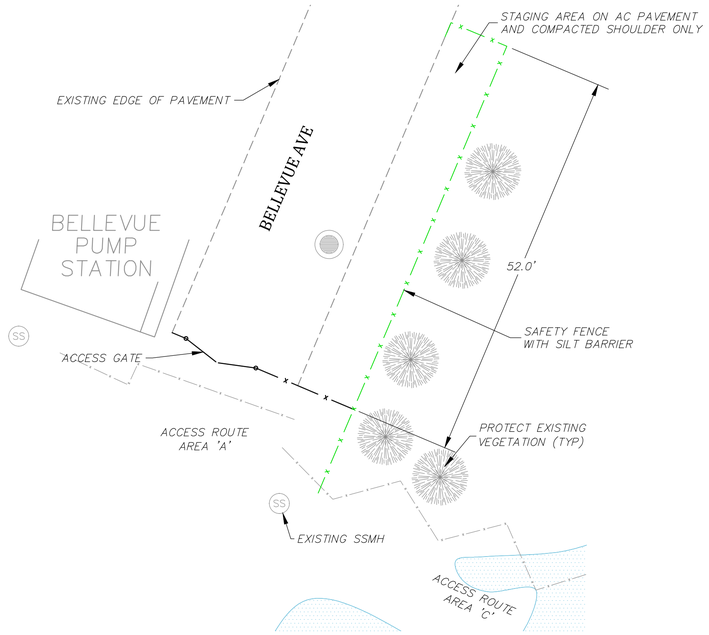
Job Number 6000145

Sheet Number D1



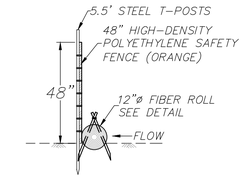
NOTES:
1. PULL NETTING APART PRIOR TO DIGGING THE PLANTING HOLE TO MINIMIZE THE NEED TO CUT THE FABRIC.
2. WETLAND PLUGS SHALL BE CAREX NEBRASCENSIS AND JUNCUS BALTICUS.
3. WETLAND PLUGS SHALL BE SUPERCELL 1.5 INCH WIDE AND 8 INCHES DEEP OR DEEPOTS (10-INCH DEPTH).
4. UP TO 45 WETLAND PLUGS WILL BE PLANTED AT LOCATIONS DIRECTED BY THE DISTRICT (NOT SHOWN ON PLANS)

WETLAND PLUG PLANTING
Not to Scale

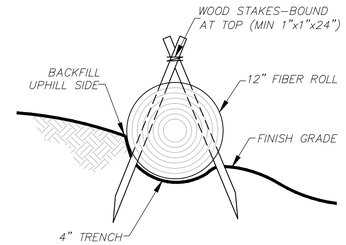


STAGING AREA BMPs
Not to Scale

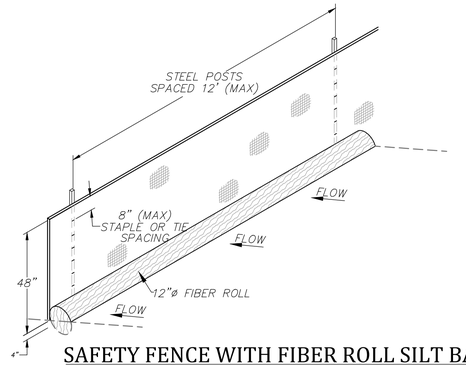
STAGING AREA BMP NOTES:
1. STAGING AREA TO BE MAINTAINED IN A CLEAN CONDITION
.
2. CONTRACTOR IS RESPONSIBLE TO MAINTAIN OR RESTORE EXISTING AC PAVEMENT TO A PRE-PROJECT CONDITION.



SECTION
FIBER ROLL SILT BARRIER AT SAFETY FENCE



FIBER ROLL SILT BARRIER
Not to Scale



SAFETY FENCE WITH FIBER ROLL SILT BARRIER
Not to Scale

NOTES:
1. FIBER ROLL SHALL BE MADE FROM 100% MATTRESS GRADE COCONUT FIBER AND BOUND BY HIGH STRENGTH COIR NETTING, AND HAVE A MINIMUM WEIGHT OF 5 LBS PER LINEAL FOOT.
2. ORANGE SAFETY FENCE SHALL BE HIGH DENSITY POLYETHYLENE WITH A MESH OPENING OF APPROXIMATELY 1 INCH BY 4 INCHES AND A MINIMUM HEIGHT OF 4 FEET.
3. FIBER ROLL SILT BARRIER SHALL BE INSTALLED ALONG CONTOUR AND ON SLOPES 5H:1V OR FLATTER UNLESS OTHERWISE APPROVED BY TRPA.
4. THE INSTALLATION CONFIGURATION SHALL PREVENT RUNOFF FROM LEAVING THE SITE OR ENTERING A WATERCOURSE WITHOUT PASSING THROUGH A SILT BARRIER.
5. THE MAXIMUM LENGTH OF SLOPE DRAINING TO THE SILT BARRIER SHALL BE 100 FEET.
6. FIBER ROLL SHALL BE INSTALLED BY SHAPING A 4 INCH DEEP FURROW TO MATCH THE SHAPE OF THE LOG, SECURING IN FURROW WITH WOOD STAKES, AND TAMPING THE GROUND AROUND THE FIBER ROLL TO FILL VOIDS BETWEEN THE LOG AND THE GROUND.
7. TRPA BMP-517

PLANTED COIR LOG
Not to Scale

COIR LOG INSTALLATION
Scale: 1"=5'

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Upper Truckee Marsh Sewer Facilities Adaptive Management Plan Year 2 Improvements

Details Sheet

Job Number 6000145

Sheet Number D2

Sheet 8 of 8