

DS #:

4854

APN:

126-23.000-001

PROJECT:

3090 Zone North Interim Tank

SUBMITTAL:

2nd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: April 27, 2017
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Drainage Study for: 3090 Zone North Interim Tank		COPIES TO: Slater Hanifan Group
Cross Streets:	NWC of Centennial Parkway and Puli Road	Ninety-Five Management, LLC
File Number:	F:\Depot\DSMemos\DS4854B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	126-23-000-001	
Zoning Action:	SDR-xxxxx	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/15/2016	1/3/2017	Not Approved	\$400.00	467949: \$400
2 nd Submittal	4/13/2017	4/27/2017	See Comments Below	\$400.00	481745: \$400
			TOTAL FEES (LDDRS):	\$800.00	----

REMARKS:

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

- The project proposes to build a temporary drainage swale in *Centennial Parkway* between the proposed water tank and *Puli Road* alignment. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (off-site berms or channels) and post a minimum maintenance bond of \$25,000 or 25-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facility and an 8.5-inch by 11-inch exhibit that adequately shows the location and limits of the drainage facility to *Flood Control* for approval. Once the drainage study is conditionally approved, the engineer should contact the City's Land Development Section (229-6371) to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update / letter will be required to justify that the offsite berms / channels are no longer necessary and can be removed.

- Provide riprap sizing calculation for the access roadside channel in *Centennial Parkway* to Flood Control Section prior to the final approval of the improvement plans.
- In *Section Detail A/CD5*, provide a layer of geo-filter fabric beneath the proposed riprap over compacted base for erosion protection.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

END OF REMARKS

ays

T/R/S: T19S/R59E/23

AREA F-23

TRANSMITTAL

To: Albert Sung, P.E. Date: April 13, 2016
City of Las Vegas Project No.: OLY1606-000
333 N. Rancho Drive
Las Vegas, NV 89106

From: Jonathan S Rocha, E.I.

Subject: Response to Comments for Technical Drainage Study for 3090 Zone North Interim Tank (DS-4854)

CC: Fred Retzlaff, SHG CC: Chelsea Jensen, SHG
CC: David Haile, SHG CC: Mark Failla, SHG
CC: Jerry Slater, SHG CC: _____

Transmitting Via:

- ☐ Mail
☒ Messenger / MDS
☐ Federal Express
☐ Pickup

For:

- ☒ Review & Comment
☐ Per your Request
☐ Information/File

Acknowledgement of Receipt:

- ☐ Not Required
☒ Acknowledgement Required

Received By: _____

Date: _____ Time: _____

Copies	Description
1	Subject Study
1	Stamped and Signed Standard Form 1
1	\$400 Submittal Fee (Check#1321)
1	CD containing PDF of submittal documents

Comments:

Please contact us if there are any questions at 702-284-5300. Thanks.

Signed: _____
Jonathan S Rocha, E.I.
Flood Control Division

Please, notify us at (702) 284-5300 if there are any problems receiving this transmission.



Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

Drainage Study Approval Letter

Date: December 7, 2016
Firm: Slater Hanifan Group
Engineer: Fred Retzlaff, P.E.
Address: 5740 South Arville, # 216, Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5399
E-mail: fretzlaff@shg-inc.com

Subject: Technical Drainage Study for 3090 Zone North Interim Tank
Location: NWC West Centennial Parkway and North Shaumber Road
APN: 126-23-000-001
Sec, Township, Range: S23, T19S, R59E
Flood Zone & Panel: Zone X (and Zone A), 1750E, Dated September 27, 2002
Application Number: 16-49921

Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Technical	11/04/2016	12/07/2016	PR	

Concurrence Required: (Must be obtained prior to permit issuance)		Reason Concurrence is Required
	Boulder City	Adjacent to or Impacts Jurisdiction
	City of Mesquite	Adjacent to or Impacts Jurisdiction
	City of Henderson	Adjacent to or Impacts Jurisdiction
X	City of Las Vegas	Adjacent to or Impacts Jurisdiction
	City of North Las Vegas	Adjacent to or Impacts Jurisdiction
	Nevada Department of Transportation	Adjacent to or Impacts NDOT Facility
	Union Pacific Rail Road	Adjacent to or Impacts a UPRR Facility
	US Army Corps of Engineers	Impacts a USACE Facility
X	Clark County Regional Flood Control District	Regional Significance, Adjacent to or Impacts CCRFCD MPU Facility or in a SFHA

The referenced **Technical Drainage Study** has been reviewed and is accepted as complying with minimum improvement standards. As set forth in the subject drainage study, the following measures will be taken to mitigate flood hazards.

The site shall be graded with respect to drainage as shown on "**3090 Zone North Interim Tank**", grading plan sheets G1, G3, C1 and CD1, signed and sealed by David B. Haile, P.E., on November 3, 2016.

Check appropriate conditions

	Retaining/screen wall combination may be in excess of current Clark County Unified Development Code, Chapter 30.64.050.
	A FEMA Elevation Certificate, completed by a licensed surveyor, must be submitted to and approved by CCPW Development Review Plan Check prior to the issuance of Certificates of Occupancy for those structures.
X	Mylars of the grading plan must be submitted to the CCPW Development Review Plan Check for approval signatures prior to map recordation (residential) or permit issuance (commercial).
	An administrative variance to allow the finished floor elevation(s) to be set below the current Clark County criteria must be approved. The finished floor variance must be submitted to CCPW Development Review front counter after drainage study approval and prior to offsite final review.
X	The grading plan will be reviewed by the Building Office Operations Division to ensure compliance with the ADA access requirements. Revisions to the grading plan may be required if the site accessibility design does not comply with the requirements set forth in the Accessibility Chapter of the Clark County Building Code.
	The plans show work is proposed on another property. Notarized written permission must be obtained prior to plan approval. A grading permit must be obtained from Building Dept prior to grading.
X	Right-of-way dedication must be verified.
	Any previously approved drainage easements that are not being used must be vacated.
	Per <i>Regional Flood Control District policies and Procedures manual, Section VIII. D. 13. Uniform Regulations for the Control of Drainage</i> , the Engineer of Record shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have regional flood control significance.
	Structural calculations are required. The structural calculations, plans, and details must be approved prior to "Offsite" submittal and prior to CCRFCD submittal, if applicable.
X	Plan revisions can be found on the red-lined plans and must be addressed.
	Prepare drainage easement documents as shown on the grading plans.

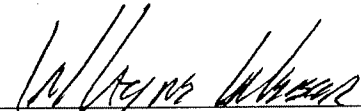
Additional Conditions:

1. While the vicinity map shows the tank location offset from the east property line of parcel 126-23-000-001, no specific dimensions are provided to what is assumed to be a BLM easement line, currently labeled as "Property Line" on the grading plan. Exhibit E shows the existing Gowan Channel approximately 380 feet from the project site; provide that information and the distance to the east property line on the grading plan.
2. Any improvements not depicted on the above mentioned grading plans may require an Update to this Technical Drainage Study.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.



Patrick Robinson, P.E.
Associate Engineer
Development Review
Patrick.Robinson@ClarkCountyNV.gov



W. Layne Weber, P.E., CFM
Principal Engineer
Development Review
wlweber@ClarkCountyNV.gov

TECHNICAL DRAINAGE STUDY
(Response to CLV Comments)

3090 Zone North Interim Tank

Unincorporated Clark County, Nevada

Job No.: OLY1606.000

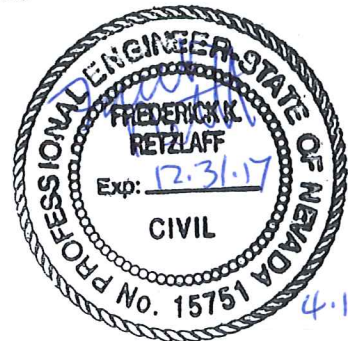
Date: April 2017

Prepared By:

Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 • Fax: 702-284-5399

Prepared For:

Ninety-Five Management, LLC
11411 Southern Highlands Parkway, Suite 300
Las Vegas, NV 89141
Phone: 702-220-6565 • Fax: 702-220-6566



Fred Retzlaff, P.E.
NV Professional Engineer No. 15751

Assisted by: Jonathan S Rocha, E.I.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: 3090 Zone North Interim Tank Date: April 2017
 Location of Development: a) Descriptive (Cross Streets): North/South: Shaumber Road
East/West: Centennial Parkway
 b) Section: 23 Township: 19 South Range: 59 East
 c) APN: Portion of 126-23-000-001

Name of Owner: Ninety-Five Management, LLC
 Telephone No.: 702-220-6565 Fax No.: 702-220-6566 E-mail Address: mbolduc@olympiacompanies.com
 Address: 11411 Southern Highlands Parkway, Suite 300 Las Vegas NV 89141

Contact Person – Name: Fred Retzlaff, P.E. Telephone No.: (702) 284-5300
 *E-mail Address: fretzlaff@shg-inc.com Fax No.: (702) 284-5399
 Firm: Slater Hanifan Group
 Address: 5740 S. Arville #216 Las Vegas NV 89118

Type of Land Development/Land Disturbance Process:

☐ Rezoning	☐ Subdivision Map	☐ Clearing and grading Only
☐ Parcel Map	☐ Planned Unit Development	☐ Other (Please specify below)
☐ Large Parcel Map	☒ Building Permit	☐

1. Total Owned Land Area: At Site: +/- 10 Acres Being Developed/Disturbed: +/- 3 Acres

2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No

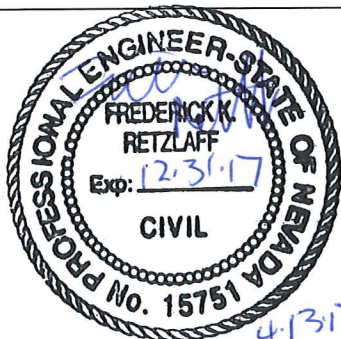
4. Proposed type of development (Residential, Commercial, Etc.): Reservoir

5. Approximate upstream land area which drains to the subject site: +/- 6 Acres

6. Has the site drainage been evaluated in the past? ☐ Yes** ☒ No If yes, please identify documentation: _____

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Southeast of site towards undeveloped land.

8. Briefly describe your proposed schedule for the subject project: 1 Phase, ASAP



Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over The subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

***Newly Required Field**

****Review and concurrence of the Clark County Regional Flood Control District is required**

Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

OLY1606.000

April 13, 2017

Albert Sung, P.E.
Flood Control Project Engineer
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Subject: Response to CLV Comments to the Technical Drainage Study for 3090 Zone North Interim Tank (DS-4854)

Dear Mr. Sung:

This letter is submitted in response to comments contained in the January 3, 2017 review memorandum, regarding the above referenced project. A copy of the City of Las Vegas (CLV) Department of Public Works comment letter has been provided in Appendix A.

Revisions from Previous Submittal

The size of the water tank has been increased in size from a 200 foot radius to a 210 foot radius. From the increased tank size, the slopes of the previously approved recommended drainage facilities has been revised. The incurred changes are minor and has had no general effect on the site's original flow pattern or flow rate.

- **Hydraulic Sections**

The grading for the drainage facilities has not caused any changes in drainage patterns or flow rates. The hydraulic sections have been updated to include the changes in slopes for the proposed drainage facilities. The table below lists the hydraulic changes with strikeouts for the previously submitted data and revised data shown for comparison. Revised computations for the drainage facilities have been included in Appendix B.

Onsite Hydraulic Section Summary					
Section ID	Description	Q ₁₀₀ (cfs)	Min/Max Slope (%)	Depth (ft)	Velocity (fps)
Section 1 (Q = OFF1)	Earthen Trap 3:1 SS 10' Bottom Width	13	1.50 0.50	0.33 0.47	3.84 2.73
			2.59	0.28	4.54
Section 2 (Q = ON1)	Earthen V-Ditch 3:1 SS	4	0.50	0.75	2.39
			1.76 2.46	0.59 0.55	3.83 4.34
Section 3 (Q = ON2)	Earthen V-Ditch 3:1 SS	4	0.50	0.75	2.39
			1.34	0.62	3.46
Section 4 (Q = OFF2)	Natural Earthen Trap 18' Bottom Width	10	2.60	0.17	3.14
Section 5 (Q = CP2)	Riprap Lined V-Ditch 3:1 SS	14	0.81	0.84 1.37	3.38 2.50
Section 6 (Q = ON1(a))	Earthen V-Ditch 3:1 SS	1	0.50	0.44	1.69
Section 7 (Q = OFF2)	Earthen Trap 3:1 SS 10' Bottom Width	10	1.46	0.29	3.44
			4.67	0.20	4.91
Section 8 (Q = CP2)	Maintenance Road	14	2.00	0.28	3.29
Section 9 (Q = OFF1)	Rip-rap Lined Trap 3:1 SS 10' Bottom Width	13	5.50	0.31	4.16
			6.58 6.68	0.29 0.29	4.39 4.41
Section 10 (Q = OFF2)	Rip-rap Lined Trap 3:1 SS 10' Bottom Width	10	7.04 7.02	0.24 0.24	4.05 4.05
Section 11 (Q = CP3 + Tank Discharge)	Riprap Lined V-Ditch 3:1 SS	76	3.10	2.00	6.32
			10.54	1.59	10.00

Strikethrough indicates hydraulic sections presented in the TDS.

The access road drainage facilities include the drainage facilities inside of the perimeter wall:

- Section 2 has been revised for the maximum slope to ensure the velocity is adequate for the earthen swale. The minimum slope has not been revised as the previous computations remains conservative for the analysis.
- Section 3 has had no revision to the section.
- Section 6 has had no revision to the section.

The perimeter ditch drainage facilities include the drainage facilities located on the exterior of the perimeter wall:

- Section 1 has been revised for the minimum slope for a higher flow depth and the flow depth remains contained in the section. The maximum slope has not been revised as the previous computations remains conservative for the analysis.
- Section 4 has had no revision to the section.
- Section 7 has not been revised as the incurred slope changes remain within the minimum and maximum grade range of the approved study, thus remains conservative for the analysis.
- Section 9 has been revised for the maximum slope to ensure the velocity is adequate for the earthen swale. The minimum slope has not been revised as the previous computations remains conservative for the analysis.
- Section 10 has been revised for the slight change in grade, which has had no impact in flow depth or velocity for the section.

The tank road ditch facilities include the entry road section and downstream channel with rip-rap:

- Section 5 has changed from a v-ditch to a trapezoidal channel. The grade for the section has not changed. The facility description, flow depth and velocity for the channel has been updated.
- Section 8 has had no revision to the entry road.

Please note that Section 11 was not previously analyzed but has been included in the table for relevance to the response to Comment #1 which will be discussed further in this letter.

- **Finish Floors**

The finish floors for the tank has not been revised and remains at the elevation of 3070.5 feet. The drainage swales adjacent to the tank have not generated a higher flow depth and thus not require any updates to the finish floor elevation.

The comments in the review memorandum have been individually addressed as follows:

1. **Comment:** *The proposed water reservoir outfall/discharge pipe is not connected to the permanent storm drain facility. Please connect the outfall pipe to the existing storm drain facility in Centennial Parkway at Puli Road alignment.*

Response: A discharge channel has been graded adjacent to the Centennial Parkway access road, this channel will allow conveyance of the reservoir discharge (approximately 20 cfs) and 100-year storm event runoff into the storm drain facility along Puli Road and Centennial Parkway intersection. The channel has extended the watershed analysis in the proposed and ultimate conditions. Relevant hydrologic calculations for the extended watershed has been provided in Appendix B.

The section is representative of the minimum and maximum slope along the channel; the utilized flowrate for the channel is concentration point CP3 in the ultimate condition and the tank discharge which generates the worst case flowrate. A summary of the section analysis has been provided in the table above. Hydraulic calculations for the channel has been provided in Appendix C and refer to revised Exhibit G in Appendix B for location of the hydraulic section.

2. **Comment:** *Please coordinate with Greg McDermott with City of Las Vegas Roadway Planning Department at 702-229-2143 regarding the location of the reservoir and outfall pipe.*

Response: Acknowledged. SHG has coordinated with Greg McDermott of CLV for the project site's reservoir and outfall channel and no further comments have been made regarding the locations.

The revised plan, profile and detail sheets adopting the revisions addressed in this letter have been included in Appendix E. If you have any questions or require additional information, please do not hesitate to contact us at 284-5300.

Respectfully Submitted,

SLATER HANIFAN GROUP

Jonathan S Rocha, E.I.
Flood Control Division

cc: Mark Failla, P.E., CFM – SHG
Fred Retzlaff, P.E. - SHG
David Haile, P.E. – SHG

APPENDIX

Appendix A CLV Comment Letter

Appendix B Revised Drainage Exhibits

Appendix C Revised Hydrologic Computations

- Curve Number Computations
- Standard Form 4 Computations
- Proposed Condition HEC-1 Analysis
- Ultimate Condition HEC-1 Analysis

Appendix D Revised Hydraulic Computations

- Access Road Flow Computations
- Perimeter Ditch Flow Calculations
- Tank Road Ditch Calculations
- Outlet Channel Calculations

Appendix E Revised Grading, Profile & Detail Sheets

APPENDIX A

CLV Comment Letter

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		January 3, 2017
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	3090 Zone North Interim Tank	
Cross Streets:	NWC of Centennial Parkway and Puli Road	COPIES TO:
File Number:	F:\Depot\DSMemos\DS4854A.doc	Slater Hanifan Group
Parcel Number:	126-23-000-001	Ninety-Five Management, LLC
Zoning Action:	SDR-xxxxx	Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	NO
		X
Proposed Storm Drain	YES	NO
		X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/15/2016	01/03/2017	See Comments Below	\$400.00	467949: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

The Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

1. The proposed water reservoir outfall/discharge pipe is not connected to the permanent storm drain facility. Please connect the outfall pipe to the existing storm drain facility in Centennial Parkway at Puli Road alignment.
2. Please coordinate with Greg McDermott with City of Las Vegas Roadway Planning Department at 702-229-2143 regarding the location of the reservoir and outfall pipe.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

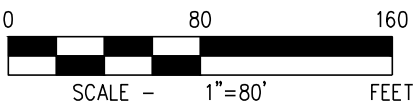
END OF REMARKS

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T/R/S: T19S/R59E/23
AREA F-23

APPENDIX B

Revised Drainage Exhibits



Proposed Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ac)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)
OFF1	3.4	9	4
OFF2	2.7	7	3
OFF3	7.2	20	8
ON1	1.2	4	2
ON2	1.2	4	2
CP1 Q = OFF1 + ON1	4.6	13	6
CP2 Q = OFF2 + ON2	3.9	12	5
CP3 Q = CP1 + CP2 + OFF3	5.8	45	19

S-I-G
SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

[illegible]

CITY OF LAS VEGAS, NV

OLYMPIA COMPANIES, LLC

**3090 ZONE NORTH INTERIM TANK
PROPOSED CONDITION DRAINAGE MAP**

S 23
T 19S
R 59E

DATE: APR 2017

DRAFTER: JSR

DESIGNER: JSR

CHECKED: FR

PROJECT NO.
OLY1606-000

EXHIBIT F

SHEET 1 OF 1

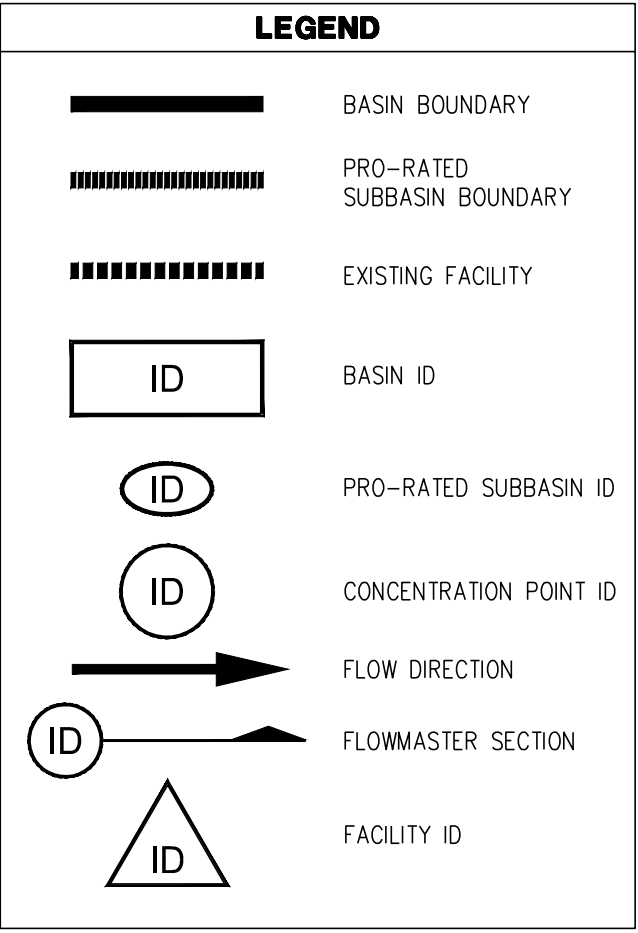
Ultimate Condition Flow Rate Summary			
Basin/Concentration Point ID	Area (ac)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)
OFF1	3.4	13	6
OFF2	2.7	10	5
OFF3	7.2	25	12
ON1	1.2	4	2
ON2	1.2	4	2
CP1			
Q = OFF1 + ON1	4.6	17	8
CP2			
Q = OFF2 + ON2	3.9	14	7
CP3			
Q = CP1 + CP2 + OFF3	5.8	56	27

Prorated Flow Summary			
Basin	Q ₁₀₀ (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
ON1	4	1.17	3.4
Subbasin	Q ₁₀₀ (cfs)	Area (acres)	100-yr Unit Flow (cfs/acre)
ON1 (a)	1	0.39	3.4
ON1 (b)	3	0.78	3.4
TOTAL	4	1.17	

Recommended Flood Control Facility Summary				
Facility ID	Facility Description	Total/Approaching Flow (cfs) Q ₁₀₀	Facility Flow (cfs) Q ₁₀₀	Notes
1	Proposed 16" X 48" Block Wall Opening	4	4	Q = ON1

Onsite Hydraulic Section Summary					
Section ID	Description	Q ₁₀₀ (cfs)	Min/Max Slope (%)	Depth (ft)	Velocity (fps)
Section 1 (Q = OFF1)	Earthen Trap 3:1 SS 10' Bottom Width	13	1.50 0.50	0.33 0.47	3.84 2.73
			2.59	0.28	4.54
Section 2 (Q = ON1)	Earthen V-Ditch 3:1 SS	4	0.50 1.76	0.75 0.59	2.39 3.83
			2.48	0.55	4.34
Section 3 (Q = ON2)	Earthen V-Ditch 3:1 SS	4	0.50 1.34	0.75 0.62	2.39 3.46
Section 4 (Q = OFF2)	Natural Earthen Trap 18' Bottom Width	10	2.60	0.17	3.14
Section 5 (Q = CP2)	Riprap Lined V-Ditch 3:1 SS	14	0.81 1.37	0.84 1.37	3.38 2.50
Section 6 (Q = ON1(a))	Earthen V-Ditch 3:1 SS	1	0.50	0.44	1.69
Section 7 (Q = OFF2)	Earthen Trap 3:1 SS 10' Bottom Width	10	1.46 4.67	0.29 0.20	3.44 4.91
Section 8 (Q = CP2)	Maintenance Road	14	2.00	0.28	3.29
Section 9 (Q = OFF1)	Rip-rap Lined Trap 3:1 SS 10' Bottom Width	13	5.50 6.58	0.31 0.29	4.16 4.39
			6.69	0.29	4.41
Section 10 (Q = OFF2)	Rip-rap Lined Trap 3:1 SS 10' Bottom Width	10	7.04 7.02	0.24 0.24	4.06 4.05
Section 11 (Q = CP3 + Tank Discharge)	Riprap Lined V-Ditch 3:1 SS	76	3.10 10.54	2.00 1.59	6.32 10.00

Strikethrough indicates hydraulic sections presented in the TDS.



SLATER
HANIFAN
GROUP

CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118

PHONE (702) 284-5300 FAX (702) 284-5399

CITY OF LAS VEGAS, NV

OLYMPIA COMPANIES, LLC

3090 ZONE NORTH INTERIM TANK

ULTIMATE CONDITION DRAINAGE MAP

DATE: APR 2017

DRAFTER: JSR

DESIGNER: JSR

CHECKED: FR

PROJECT NO. OLY1606-000

EXHIBIT G

SHEET 1 OF 1

APPENDIX C

Revised Hydrologic Computations

Curve Number Computations

Soil Data & Curve Number Computation

Project Name: 3090 Zone North Interim Tank

Date: 4/12/2017

File Name: OLY1606 RTC Curve Number Calcs.xlsx

By: JSR

Data:

Reference:

Exhibit D
NRCS Soil Data

Soil Type - Soil Survey Area & Version, Soil Description				A	B	C	D
LV	400	Las Vegas Valley 2014	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	0%	0%	0%	100%

Land Use	A	B	C	D
Desert Shrub (poor)	63	77	85	88
Industrial	81	88	91	93
Newly Graded	77	86	91	94

EXISTING CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF1	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	3.42	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									3.42	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF2	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	2.70	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									2.70	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
EX1	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	1.21	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.21	88.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
EX2	LV	400	100.0%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	1.20	88.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.20	88.0

PROPOSED CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF3	LV	400	94.6%	Desert Shrub (poor)	0%	0%	0%	100%	63	77	85	88	6.77	83.21
	LV	400	5.4%	Newly Graded	0%	0%	0%	100%	77	86	91	94	0.39	5.12
TOTAL PERCENT			94.6%	TOTAL AREA & COMPOSITE CURVE NUMBER:									7.16	88.3

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
ON1	LV	400	100.0%	Industrial	0%	0%	0%	100%	81	88	91	93	1.17	93.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.17	93.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
ON2	LV	400	100.0%	Industrial	0%	0%	0%	100%	81	88	91	93	1.24	93.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									1.24	93.0

ULTIMATE CONDITION

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF1	LV	400	100.0%	Industrial	0%	0%	0%	100%	81	88	91	93	3.42	93.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									3.42	93.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF2	LV	400	100.0%	Industrial	0%	0%	0%	100%	81	88	91	93	2.70	93.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									2.70	93.0

BASIN ID	SURVEY AREA	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CURVE NUMBER
					A	B	C	D	A	B	C	D		
OFF3	LV	400	100.0%	Industrial	0%	0%	0%	100%	81	88	91	93	7.16	93.00
TOTAL PERCENT			100.0%	TOTAL AREA & COMPOSITE CURVE NUMBER:									7.16	93.0

Standard Form 4 Computations

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Project Name: 3090 Zone North Interim Tank
 Description: Standard Form 4
 File Name: OLY1606 RTC Lag Time Standard Form 4.xls
 By: JSR
 Date: 4/12/2017

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check		Flag		
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	VELOCITY FPS	V1	VELOCITY FPS	V2	Tt Min	Tc Calc.	Total Length Feet	Tc Check	Flag
					[2]			[3]				[4]	[5]		[6]	[7]	[8]	[9]	[10]
EXISTING CONDITION																			
OFF1	E	88.0	0.772	3.42	0.0053	145	11.03	3.20	475	6.95	3.90	7.75	2.03	5.23					0.100
OFF2	E	88.0	0.772	2.70	0.0042	125	7.20	3.42	395	6.08	3.65	7.25	1.80	5.23					0.100
EX1	E	88.0	0.772	1.21	0.0019	170	7.06	4.02	380	5.00	3.31	6.57	1.91	5.93					0.100
EX2	E	88.0	0.772	1.20	0.0019	75	8.00	2.56	480	4.99	3.31	6.57	2.42	4.98					0.100
PROPOSED CONDITION																			
OFF3	E	88.3	0.776	7.16	0.0112	100	6.00	3.21	1500	5.70	3.53	7.02	4.73	7.95					0.100
ON1	D	93.0	0.838	1.17	0.0018	60	25.00	1.25	420	0.50	1.43	2.16	4.90	6.15			480	12.667	0.062
ON2	D	93.0	0.838	1.24	0.0019	75	25.33	1.39	450	0.50	1.43	2.16	5.25	6.64			525	12.917	0.066
ULTIMATE CONDITION																			
OFF1	D	93.0	0.838	3.42	0.0053	145	11.03	2.55	915	5.46	4.72	7.15	2.73	5.29			1060	15.889	0.053
OFF2	D	93.0	0.838	2.70	0.0042	125	7.20	2.73	900	5.33	4.66	7.07	2.73	5.46			1025	15.694	0.055
OFF3	D	93.0	0.838	7.16	0.0112	150	5.00	3.38	1485	5.30	4.65	7.04	4.12	7.51			1635	19.083	0.075

[1] $K = 0.0132 (CN) - 0.39$ [5] For Existing Conditions: $V2 = 29.4 * (S/100)^{0.5}$ [9] $Tc = (L/180) + 10$
 [2] $A = \text{Area}/640$ For Developed Conditions: $V2 = 30.6 * (S/100)^{0.5}$ [10] $\text{Flag} = (0.6 * Tc)/60$
 [3] $Ti = (1.8 * (1-K) * L^{0.5}) / S^{0.33}$ [6] $Tt = L / (60 * V)$ [11] $\text{Min Flag} = 0.05$
 [4] For Existing Conditions: $V1 = 14.8 * (S/100)^{0.5}$ Note: For Travel Time Calcs: V1 applies to first
 For Developed Conditions: $V1 = 20.2 * (S/100)^{0.5}$ 500 feet and V2 applies to remaining distance.
 REFERENCE :

Proposed Condition HEC-1 Analysis


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 07APR17 TIME 12:15:51
*
*****

```

PRO.OUT

```

*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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X X XXXXXX XXXX X
X X X X XX
X X X X X
XXXXXX XXXX X XXXX
X X X X X
X X X X X
X X XXXXXX XXXX XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

*DIAGRAM
1 ID SLATER HANIFAN GROUP
2 ID 3090 ZONE NORTH INTERIM TANK
3 ID TECHNICAL DRAINAGE STUDY (RTC TO CLV)
4 ID APRIL 2017
5 ID PROPOSED DRAINAGE CONDITION
6 ID
7 ID RETURN PERIOD ----- 100 & 10-YEAR
8 ID DISTRIBUTION ----- 6-HOUR SDN3
9 ID PROJECT NO. ----- OLY1606.000
10 ID FILENAME ----- PRO.H1
11 ID DATE ----- 04/07/17
12 ID MODELED BY ----- JSR
13 ID
14 ID PRECIPITATION STORM EVENT RATIOS
15 ID STORM EVENT RATIO
16 ID 100-YR 1.00
17 ID 10-YR 0.55
18 ID
19 IT 5 0 0 300
20 IO 5 0 0
21 IN 5 0 0
22 JR PREC 1.00 0.55

23 KK OFF1
24 KM EXISTING OFFSITE BASIN
25 BA .0053
26 PB 3.15
27 PC 0 0.020 0.057 0.070 0.087 0.108 0.124 0.130 0.130 0.130
28 PC 0.130 0.130 0.130 0.133 0.140 0.142 0.148 0.158 0.172 0.181
29 PC 0.190 0.197 0.199 0.200 0.201 0.204 0.214 0.229 0.241 0.249
30 PC 0.251 0.256 0.270 0.278 0.281 0.283 0.295 0.322 0.352 0.409
31 PC 0.499 0.590 0.710 0.744 0.781 0.812 0.819 0.835 0.851 0.856
32 PC 0.860 0.868 0.876 0.888 0.910 0.926 0.937 0.950 0.970 0.976
33 PC 0.982 0.985 0.987 0.989 0.990 0.993 0.993 0.994 0.995 0.998
34 PC 0.998 0.999 1
35 LS 0 88.0
36 UD 0.100
*

37 KK ON1
38 KM PROPOSED ONSITE BASIN
39 BA .0018
40 LS 0 93.0
41 UD 0.062
*

42 KK CP1
43 HC 2
*

```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

44 KK OFF2
45 KM EXISTING OFFSITE BASIN
46 BA .0042
47 LS 0 88.0
48 UD 0.100
*

49 KK ON2
50 KM PROPOSED ONSITE BASIN
51 BA .0019
52 LS 0 93.0
53 UD 0.066

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61	KK	CP3	
62	HC		3
	*		
63	ZZ		

SCHEMATIC DIAGRAM OF STREAM NETWORK

23 OFF1

Figure 1 is a schematic diagram of the experimental setup. It shows a vertical dashed line representing the center of the arena. A horizontal dashed line represents the starting position. The arena is divided into three sections by vertical dashed lines. The sections are labeled ON1, OFF2, and ON2. The sections are also labeled CP1, CP2, and CP3. The sections are also labeled OFF3. The sections are also labeled ON3.

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****
*
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
*   RUN DATE   07APR17   TIME   12:15:51
*
*****
```

*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *

```

RETURN PERIOD ----- 100 & 10-YEAR
DISTRIBUTION ----- 6-HOUR SDN3
PROJECT NO. ----- OLY1606.000
FILENAME ----- PRO.H1
DATE ----- 04/07/17
MODELED BY ----- JSR

```

PRECIPITATION STORM EVENT	RATIOS
100-YR	1.00
10-YR	0.55

20 IO	OUTPUT CONTROL VARIABLES		5	PRINT CONTROL
		IPRNT	0	PLOT CONTROL
		IPLST	0	HYDROGRAPH PLOT SCALE
		QSCAL	0.	
IT	HYDROGRAPH TIME DATA		5	MINUTES IN COMPUTATION INTERVAL
		NMIN	0	STARTING DATE
		IDATE	1 0	STARTING TIME
		ITIME	0000	NUMBER OF HYDROGRAPH ORDINATES
		NQ	300	ENDING DATE
		NDDATE	2 0	ENDING TIME
		NDTIME	0055	CENTURY MARK
		ICENT	19	
	COMPUTATION INTERVAL		.08	HOURS
	TOTAL TIME BASE		24.92	HOURS

ENGLISH UNITS	
DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FeET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

PRO.OUT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .55

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1 1.00	RATIO 2 .55
HYDROGRAPH AT +	OFF1	.01	1 FLOW TIME	9. 3.50	4. 3.50
HYDROGRAPH AT +	ON1	.00	1 FLOW TIME	4. 3.50	2. 3.50
2 COMBINED AT +	CP1	.01	1 FLOW TIME	13. 3.50	6. 3.50
HYDROGRAPH AT +	OFF2	.00	1 FLOW TIME	7. 3.50	3. 3.50
HYDROGRAPH AT +	ON2	.00	1 FLOW TIME	4. 3.50	2. 3.50
2 COMBINED AT +	CP2	.01	1 FLOW TIME	12. 3.50	5. 3.50
HYDROGRAPH AT +	OFF3	.01	1 FLOW TIME	20. 3.50	8. 3.50
3 COMBINED AT +	CP3	.02	1 FLOW TIME	45. 3.50	19. 3.50

*** NORMAL END OF HEC-1 ***

Ultimate Condition HEC-1 Analysis

ULT.OUT

 *
 * FLOOD HYDROGRAPH PACKAGE (HEC-1)
 * JUN 1998
 * VERSION 4.1
 *
 * RUN DATE 07APR17 TIME 12:16:18
 *

 *
 * U.S. ARMY CORPS OF ENGINEERS
 * HYDROLOGIC ENGINEERING CENTER
 * 609 SECOND STREET
 * DAVIS, CALIFORNIA 95616
 * (916) 756-1104
 *

```

X   X   XXXXXX   XXXX   X
X   X   X       X   X   XX
X   X   X       X       X
XXXXXXX XXXX   X   XXXX   X
X   X   X       X       X
X   X   X       X   X   X
X   X   XXXXXX   XXXX   XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT

PAGE 1

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1          *DIAGRAM
2          ID      SLATER HANIFAN GROUP
3          ID      3090 ZONE NORTH INTERIM TANK
4          ID      TECHNICAL DRAINAGE STUDY (RTC TO CLV)
5          ID      APRIL 2017
6          ID      ULTIMATE DRAINAGE CONDITION
7          ID      RETURN PERIOD ----- 100 & 10-YEAR
8          ID      DISTRIBUTION ----- 6-HOUR SDN3
9          ID      PROJECT NO. ----- OLY1606.000
10         ID      FILENAME ----- ULT.H1
11         ID      DATE ----- 04/07/17
12         ID      MODELED BY ----- JSR
13         ID
14         ID      PRECIPITATION STORM EVENT RATIOS
15         ID      STORM EVENT          RATIO
16         ID      100-YR                1.00
17         ID      10-YR                 0.55
18         ID
19         IT      5      0      0      300
20         IO      5      0      0
21         IN      5      0      0
22         JR      PREC      1.00      0.55
23         *
24         KK      OFF1
25         KM      DEVELOPED OFFSITE BASIN
26         BA      .0053
27         PB      3.15
28         PC      0      0.020      0.057      0.070      0.087      0.108      0.124      0.130      0.130      0.130
29         PC      0.130      0.130      0.130      0.133      0.140      0.142      0.148      0.158      0.172      0.181
30         PC      0.190      0.197      0.199      0.200      0.201      0.204      0.214      0.229      0.241      0.249
31         PC      0.251      0.256      0.270      0.278      0.281      0.283      0.295      0.322      0.352      0.409
32         PC      0.499      0.590      0.710      0.744      0.781      0.812      0.819      0.835      0.851      0.856
33         PC      0.860      0.868      0.876      0.888      0.910      0.926      0.937      0.950      0.970      0.976
34         PC      0.982      0.985      0.987      0.989      0.990      0.993      0.993      0.994      0.995      0.998
35         PC      0.998      0.999      1
36         LS      0      93.0
37         UD      0.053
38         *
39         KK      ON1
40         KM      PROPOSED ONSITE BASIN
41         BA      .0018
42         LS      0      93.0
43         UD      0.062
44         *
45         KK      CP1
46         HC      2
47         *

```

1

HEC-1 INPUT

PAGE 2

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

44         KK      OFF2
45         KM      DEVELOPED OFFSITE BASIN
46         BA      .0042
47         LS      0      93.0
48         UD      0.055
49         *
50         KK      ON2
51         KM      PROPOSED ONSITE BASIN
52         BA      .0019
53         LS      0      93.0
54         UD      0.066

```

✻

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****
*
*      U.S. ARMY CORPS OF ENGINEERS
*      HYDROLOGIC ENGINEERING CENTER
*      609 SECOND STREET
*      DAVIS, CALIFORNIA 95616
*      (916) 756-1104
*
*****
```

```

RETURN PERIOD ----- 100 & 10-YEAR
DISTRIBUTION ----- 6-HOUR SDN3
PROJECT NO. ----- OLY1606.000
FILENAME ----- ULT.H1
DATE ----- 04/07/17
MODELED BY ----- JSR

```

20	IO	OUTPUT CONTROL VARIABLES		5	PRINT CONTROL
			IPRNT	0	PLOT CONTROL
			IPLOT	0	HYDROGRAPH PLOT SCALE
			QSCAL	0.	
IT		HYDROGRAPH TIME DATA		5	MINUTES IN COMPUTATION INTERVAL
			NMIN	0	STARTING DATE
			IDATE	1	STARTING TIME
			ITIME	0000	NUMBER OF HYDROGRAPH ORDINATES
			NQ	300	ENDING DATE
			NDDATE	2	ENDING TIME
			NDTIME	0055	CENTURY MARK
			ICENT	19	
		COMPUTATION INTERVAL		.08	HOURS
		TOTAL TIME BASE		24.92	HOURS

Page 2

ULT.OUT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .55

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION	
					RATIO 1 1.00	RATIO 2 .55
HYDROGRAPH AT						
+	OFF1	.01	1	FLOW TIME	13. 3.50	6. 3.50
HYDROGRAPH AT						
+	ON1	.00	1	FLOW TIME	4. 3.50	2. 3.50
2 COMBINED AT						
+	CP1	.01	1	FLOW TIME	17. 3.50	8. 3.50
HYDROGRAPH AT						
+	OFF2	.00	1	FLOW TIME	10. 3.50	5. 3.50
HYDROGRAPH AT						
+	ON2	.00	1	FLOW TIME	4. 3.50	2. 3.50
2 COMBINED AT						
+	CP2	.01	1	FLOW TIME	14. 3.50	7. 3.50
HYDROGRAPH AT						
+	OFF3	.01	1	FLOW TIME	25. 3.50	12. 3.50
3 COMBINED AT						
+	CP3	.02	1	FLOW TIME	56. 3.50	27. 3.50

*** NORMAL END OF HEC-1 ***

APPENDIX D

Revised Hydraulic Computations

Access Road Flow Computations

Worksheet for Section 2 Max% @ ON1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022
Channel Slope	2.46 %
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	4.00 ft³/s

Results

Normal Depth	0.55 ft
Flow Area	0.92 ft²
Wetted Perimeter	3.50 ft
Hydraulic Radius	0.26 ft
Top Width	3.32 ft
Critical Depth	0.64 ft
Critical Slope	1.10390 %
Velocity	4.34 ft/s
Velocity Head	0.29 ft
Specific Energy	0.85 ft
Froude Number	1.45
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.55 ft
Critical Depth	0.64 ft
Channel Slope	2.46 %
Critical Slope	1.10390 %

Cross Section for Section 2 Max% @ ON1

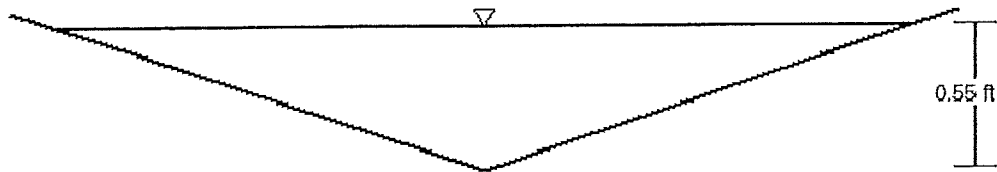
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.022
Channel Slope	2.46 %
Normal Depth	0.55 ft
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	4.00 ft ³ /s

Cross Section Image



V: 1
H: 1

Perimeter Ditch Flow Calculations

Section 1 Min% @ OFF1

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.50 %
Discharge 13.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	3.00
0+01.00	0.00
0+11.00	0.00
0+12.00	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 3.00)	(0+12.00, 3.00)	0.022

Options

Current Roughness weighted Improved Lotter's Method
Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Results

Normal Depth 0.47 ft
Elevation Range 0.00 to 3.00 ft
Flow Area 4.76 ft²
Wetted Perimeter 10.99 ft
Hydraulic Radius 0.43 ft
Top Width 10.31 ft
Normal Depth 0.47 ft
Critical Depth 0.37 ft
Critical Slope 1.05323 %

Section 1 Min% @ OFF1

Results

Velocity	2.73	ft/s
Velocity Head	0.12	ft
Specific Energy	0.58	ft
Froude Number	0.71	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.47	ft
Critical Depth	0.37	ft
Channel Slope	0.50	%
Critical Slope	1.05323	%

Messages

Notes

Cross Section for Section 1 Min% @ OFF1

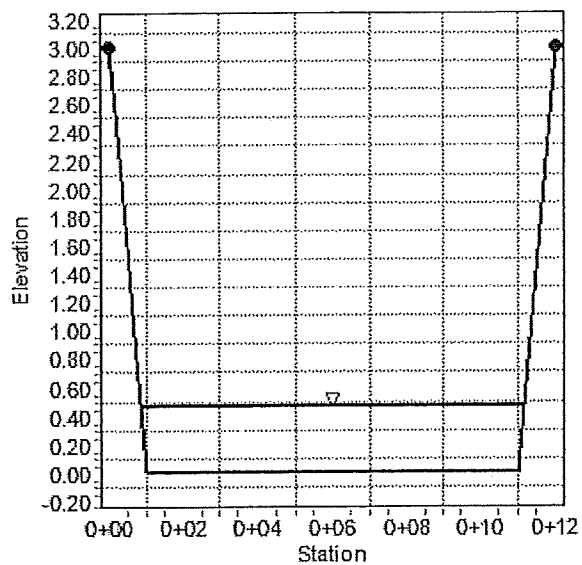
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.50 %
Normal Depth 0.47 ft
Discharge 13.00 ft³/s

Cross Section Image



Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.68	%
Discharge	13.00	ft ³ /s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	3.00
0+01.00	0.00
0+11.00	0.00
0+12.00	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 3.00)	(0+12.00, 3.00)	0.037

Options

Current Kougness vweigted Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results

Normal Depth		0.29	ft
Elevation Range	0.00 to 3.00 ft		
Flow Area		2.94	ft²
Wetted Perimeter		10.61	ft
Hydraulic Radius		0.28	ft
Top Width		10.19	ft
Normal Depth		0.29	ft
Critical Depth		0.37	ft
Critical Slope		2.97893	%

Worksheet for Section 9 Max% @ OFF1

Results

Velocity	4.41	ft/s
Velocity Head	0.30	ft
Specific Energy	0.59	ft
Froude Number	1.45	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.37	ft
Channel Slope	6.68	%
Critical Slope	2.97893	%

Cross Section for Section 9 Max% @ OFF1

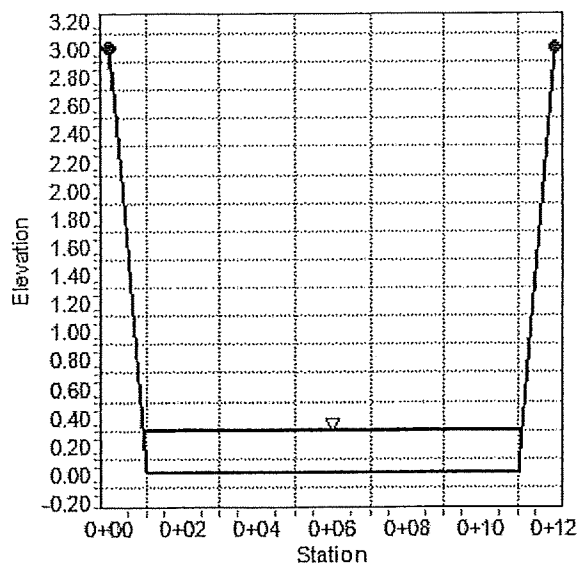
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.68	%
Normal Depth	0.29	ft
Discharge	13.00	ft ³ /s

Cross Section Image



Worksheet for Section 10 @ OFF2

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 7.02 %
Discharge 10.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	3.00
0+01.00	0.00
0+11.00	0.00
0+12.00	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 3.00)	(0+12.00, 3.00)	0.037

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Results

Normal Depth 0.24 ft
Elevation Range 0.00 to 3.00 ft
Flow Area 2.47 ft²
Wetted Perimeter 10.52 ft
Hydraulic Radius 0.23 ft
Top Width 10.16 ft
Normal Depth 0.24 ft
Critical Depth 0.31 ft
Critical Slope 3.12225 %

Worksheet for Section 10 @ OFF2

Results

Velocity	4.05	ft/s
Velocity Head	0.25	ft
Specific Energy	0.50	ft
Froude Number	1.45	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.31	ft
Channel Slope	7.02	%
Critical Slope	3.12225	%

Cross Section for Section 10 @ OFF2

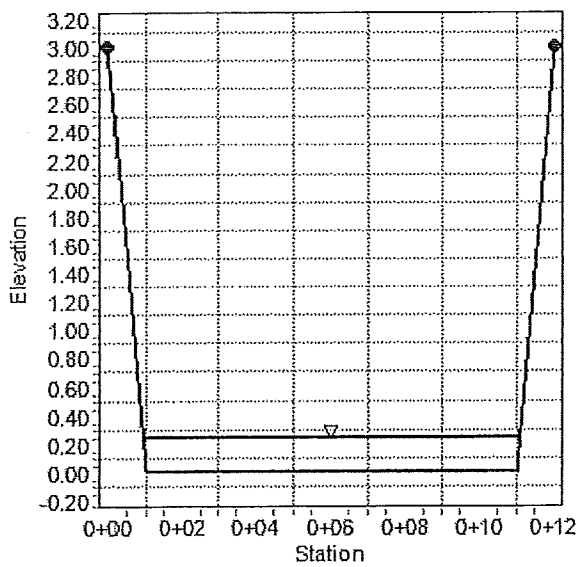
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.02 %
Normal Depth	0.24 ft
Discharge	10.00 ft ³ /s

Cross Section Image



Tank Road Ditch Calculations

Worksheet for Section 5 @ CP2 Discharge

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	0.81	%
Left Side Slope	3.00	H:V
Right Side Slope	3.00	H:V
Discharge	14.00	ft³/s

Results

Normal Depth	1.37	ft
Flow Area	5.59	ft²
Wetted Perimeter	8.64	ft
Hydraulic Radius	0.65	ft
Top Width	8.19	ft
Critical Depth	1.06	ft
Critical Slope	3.08807	%
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energy	1.46	ft
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.37	ft
Critical Depth	1.06	ft
Channel Slope	0.81	%
Critical Slope	3.08807	%

Cross Section for Section 5 @ CP2 Discharge

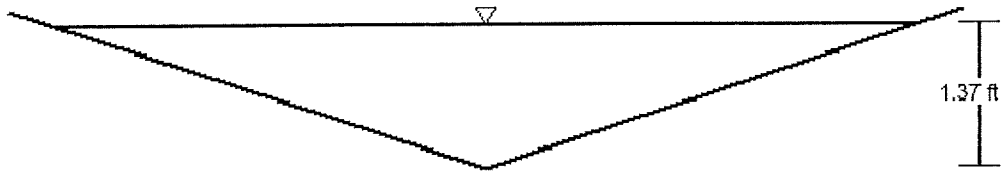
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	0.81 %
Normal Depth	1.37 ft
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	14.00 ft ³ /s

Cross Section Image



V: 1
H: 1

Outlet Channel Calculations

Worksheet for Section 11 Min% @ CP3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	3.10	%
Left Side Slope	3.00	H:V
Right Side Slope	3.00	H:V
Discharge	76.00	ft³/s

Results

Normal Depth	2.00	ft
Flow Area	12.03	ft²
Wetted Perimeter	12.66	ft
Hydraulic Radius	0.95	ft
Top Width	12.01	ft
Critical Depth	2.09	ft
Critical Slope	2.46464	%
Velocity	6.32	ft/s
Velocity Head	0.62	ft
Specific Energy	2.62	ft
Froude Number	1.11	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	2.09	ft
Channel Slope	3.10	%
Critical Slope	2.46464	%

Cross Section for Section 11 Min% @ CP3

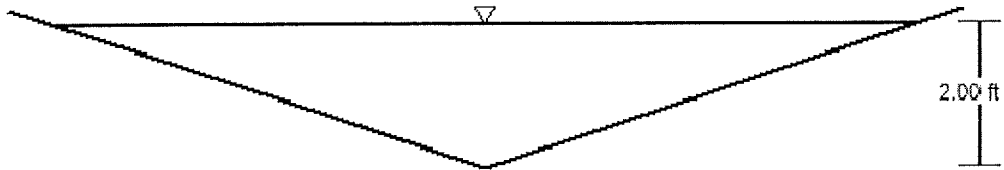
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	3.10 %
Normal Depth	2.00 ft
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	76.00 ft ³ /s

Cross Section Image



V: 1
H: 1

Worksheet for Section 11 Max% @ CP3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040	
Channel Slope	10.54	%
Left Side Slope	3.00	H:V
Right Side Slope	3.00	H:V
Discharge	76.00	ft³/s

Results

Normal Depth	1.59	ft
Flow Area	7.60	ft²
Wetted Perimeter	10.07	ft
Hydraulic Radius	0.75	ft
Top Width	9.55	ft
Critical Depth	2.09	ft
Critical Slope	2.46463	%
Velocity	10.00	ft/s
Velocity Head	1.55	ft
Specific Energy	3.15	ft
Froude Number	1.98	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.59	ft
Critical Depth	2.09	ft
Channel Slope	10.54	%
Critical Slope	2.46463	%

Cross Section for Section 11 Max% @ CP3

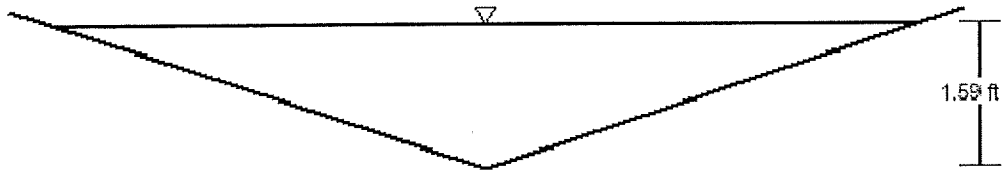
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	10.54 %
Normal Depth	1.59 ft
Left Side Slope	3.00 H:V
Right Side Slope	3.00 H:V
Discharge	76.00 ft ³ /s

Cross Section Image



V: 1
H: 1

APPENDIX E

Revised Grading, Profile & Detail Sheets

SOUTH 89°00'28" WEST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 24, TOWNSHIP 19 SOUTH, RANGE 59 EAST, MOUNT DIABLO MAERIDAN, CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF ON FILE IN BOOK 144, PAGE 77 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

AVOID HITTING OVERHEAD
POWER LINES. IT'S
COSTLY.

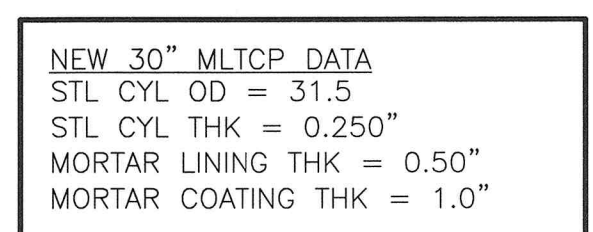
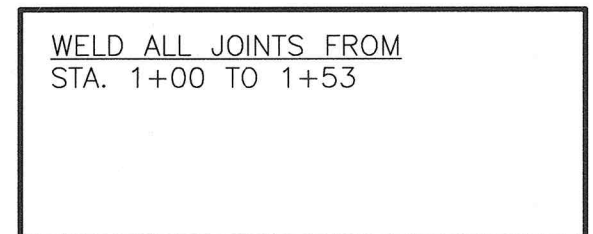
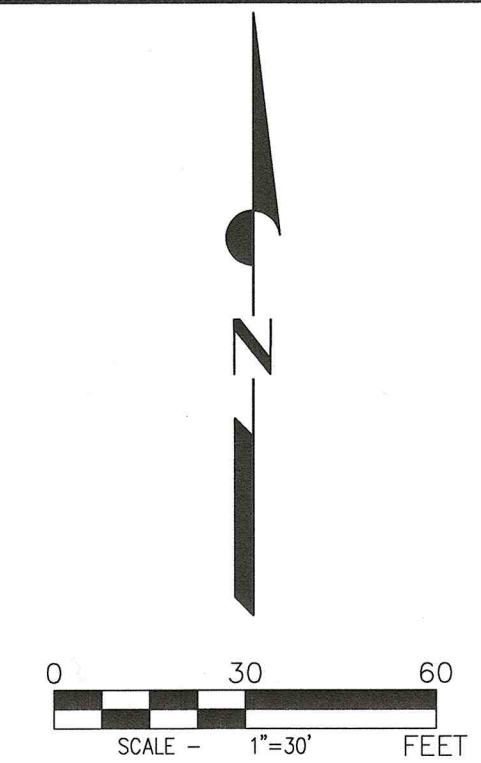
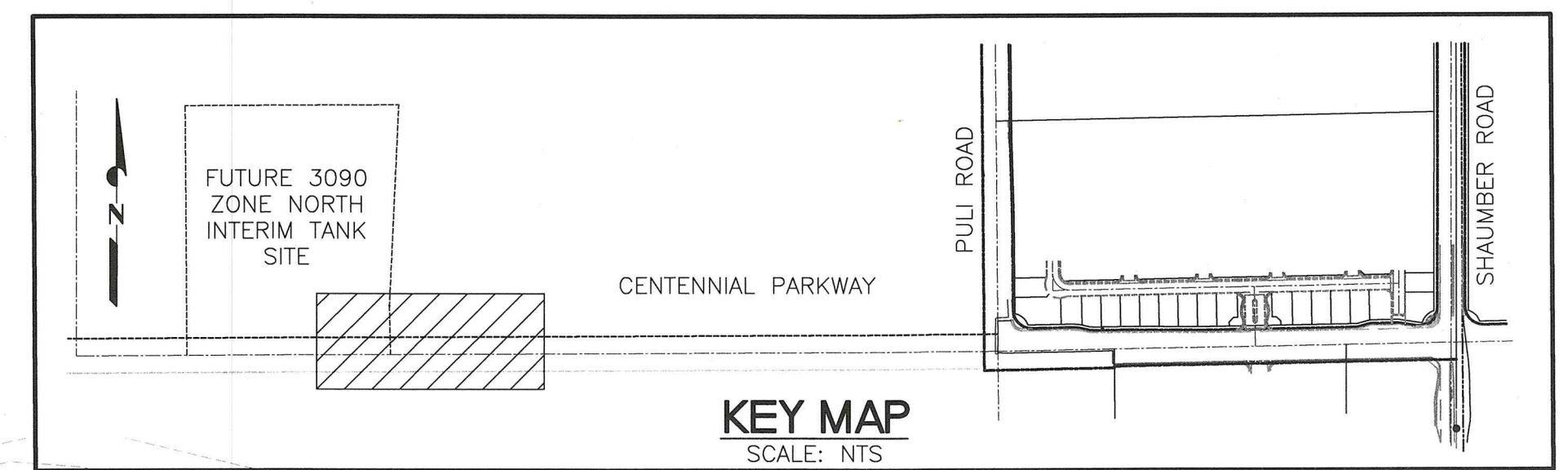
CALL BEFORE
YOU DO
OVERHEAD

1-702-227-2929

CLV DWG # H-

DRAWING NUMBER C1

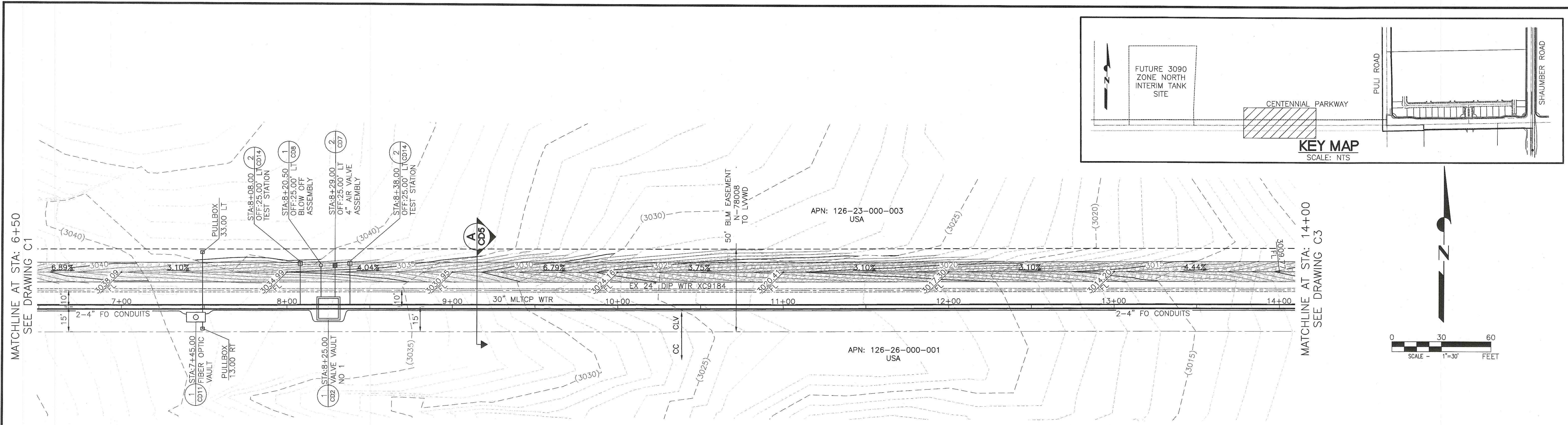
100% SUBMITTAL - NOT FOR CONSTRUCTION



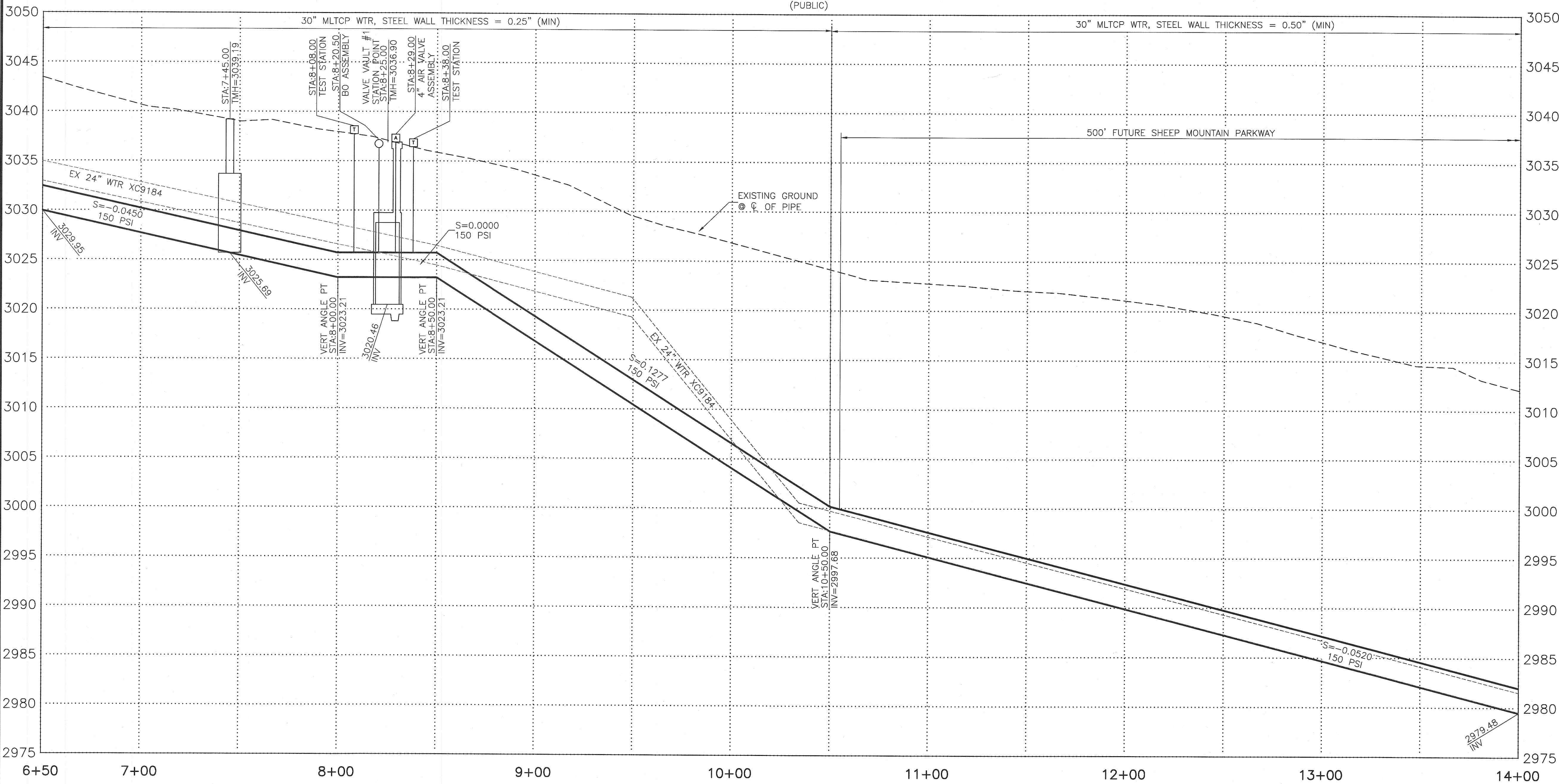
POT HOLE SCHEDULE		
NO.	ELEVATION	DESCRIPTION
①	3061.29	24" DIP WATERLINE
②	2967.06	12" DIP WATERLINE
③	2971.26	4" PE GAS
④	2941.78	12" PVC WATERLINE
⑤	2942.04	14" CONC ENCASEMENT
⑥	2929.02	20" CONC ENCASEMENT
⑦	2927.32	2" PE GAS
⑧	2909.53	4" PE GAS

REVISIONS: 		DRAWN BY: _____ CHECKED BY: _____ DBH _____ 4/13/2017 4/13/2017 RECOMMENDED BY: _____ CHRISTOPHER M. LUQUETTE, P.E. SR. CIVIL ENGINEER DATE _____ ACCEPTED BY: _____ RYAN C. PEARSON, P.E. DESIGN MANAGER DATE _____	3090 ZONE NORTH INTERIM TANK INLET/OUTLET PIPELINE CENTENNIAL PARKWAY PLAN AND PROFILE 1	SCALE: HORIZONTAL SCALE _____ VERTICAL SCALE _____ BAC REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL AS NOTED	VERIFY SCALE 	LAS VEGAS VALLEY WATER DISTRICT S-I-G SLATER HANIFAN GROUP CONSULTING ENGINEERS & PLANNERS 5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118 PHONE (702) 284-5300 FAX (702) 284-5399
	CONTRACT NUMBER C1454 DRAWING NUMBER C1 SHEET 10 OF 28					

100% SUBMITTAL - NOT FOR CONSTRUCTION



CENTENNIAL PARKWAY PLAN VIEW



CENTENNIAL PARKWAY PROFILE VIEW

HORIZ. SCALE: 1"=30'
VERT. SCALE: 1"=6'

STA: 6+50.00 TO STA: 10+50.00
NEW 30" MLTWP DATA
STL CYL OD = 31.5"
STL CYL THK = 0.250"
MORTAR LINING THK = 0.50"
MORTAR COATING THK = 1.0"

STA: 10+50.00 TO STA: 14+00.00
NEW 30" MLTWP DATA
STL CYL OD = 32.0"
STL CYL THK = 0.50"
MORTAR LINING THK = 0.50"
MORTAR COATING THK = 1.0"

WELD ALL JOINTS FROM
STA. 7+59 TO 8+91
STA. 10+50 TO 14+00



LAS VEGAS VALLEY WATER DISTRICT

**SLATER
HANIFAN
GROUP**
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

VERIFY SCALE

1/2" = 1'-0"

BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

3090 ZONE NORTH INTERIM TANK INLET/OUTLET PIPELINE

CENTENNIAL PARKWAY PLAN AND PROFILE II

DRAWN BY: SE

CHECKED BY: DBH

RECOMMENDED BY: CHRISTOPHER M. LUQUETTE, P.E. SR. CIVIL ENGINEER DATE

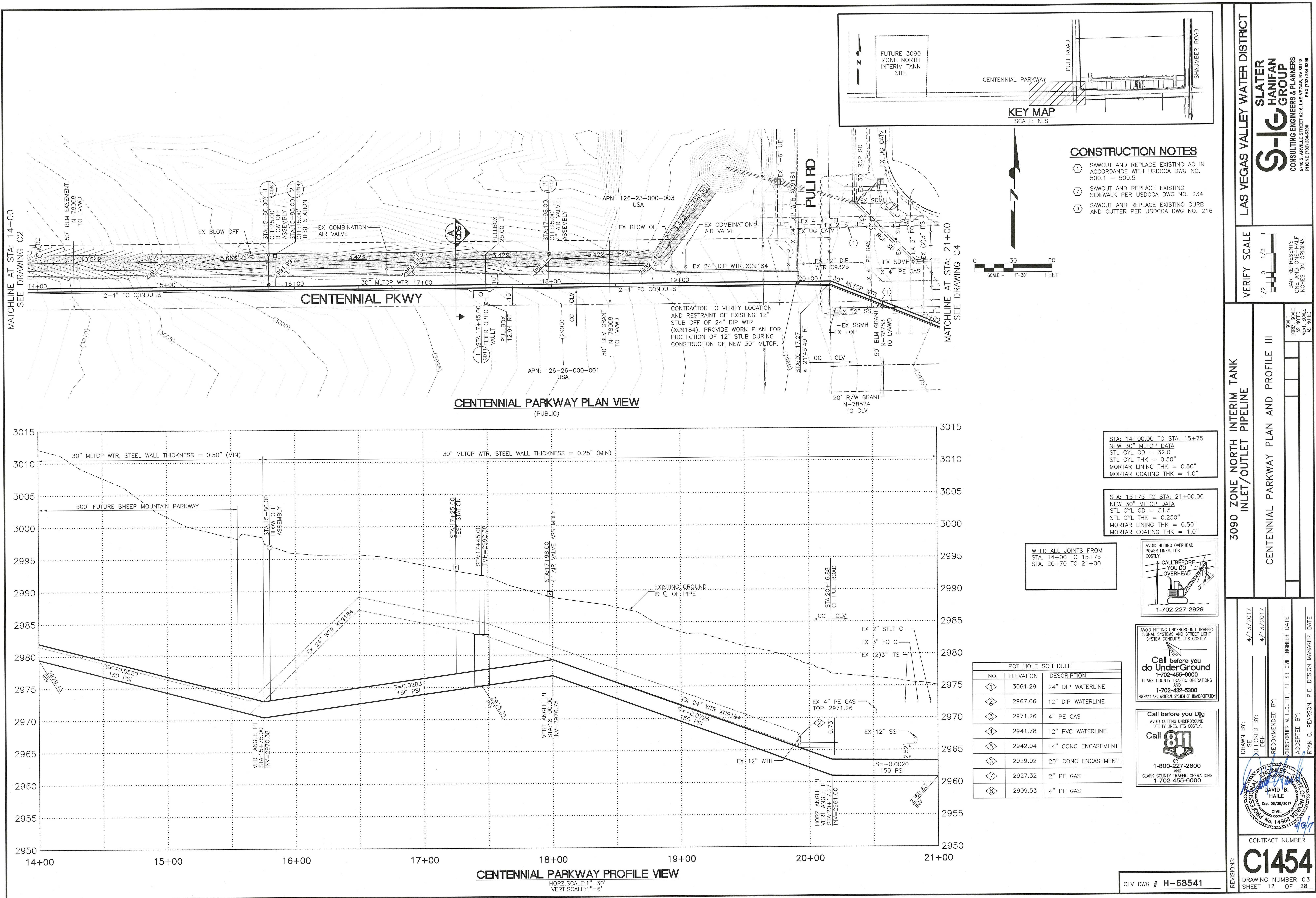
ACCEPTED BY: RYAN C. PEARSON, P.E. DESIGN MANAGER DATE

CONTRACT NUMBER

C1454

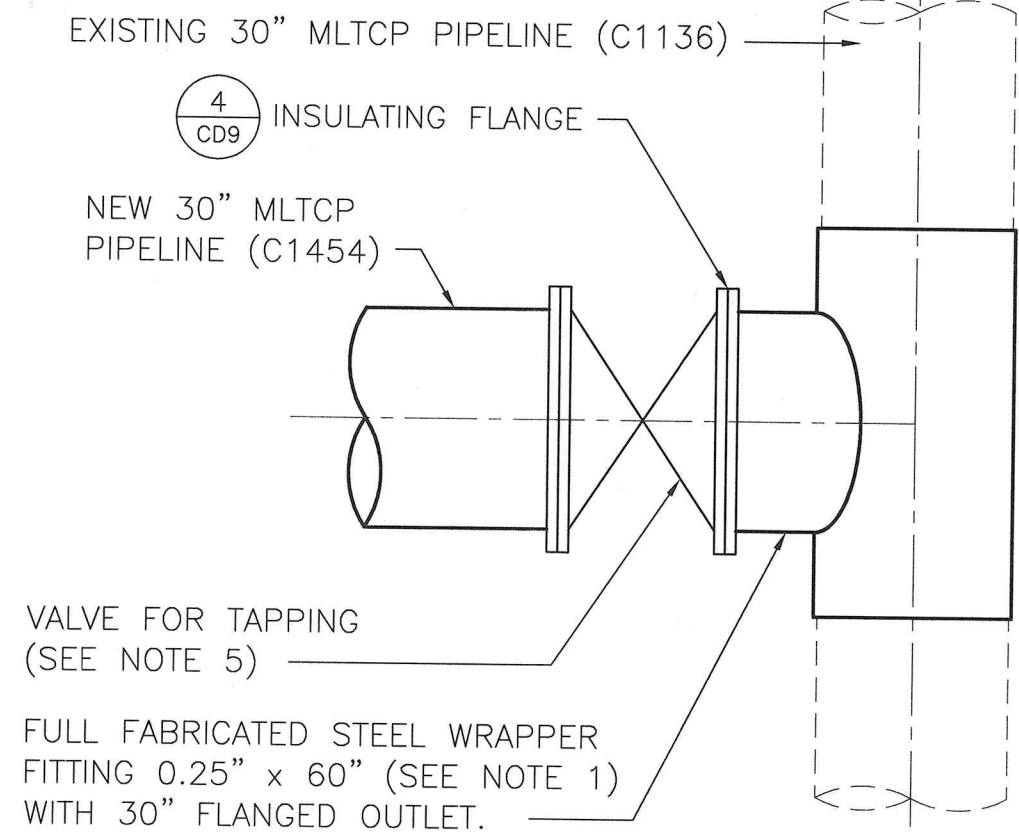
DRAWING NUMBER C2
SHEET 11 OF 28

100% SUBMITTAL - NOT FOR CONSTRUCTION



J:\OLY1606.000 Sky Canyon 3090 Zone North Interim Tank\dwg\Improv\Inlet_Outlet\412/2017 4:58 PM Sergio Elizondo

EXISTING PIPE DATA:
STEEL CYLINDER OD: 31.875"
CYLINDER THICKNESS: 0.1875"
LINING THICKNESS: 0.50"
COATING THICKNESS: 1.00"
ROD THICKNESS: (IF APPLICABLE) N/A



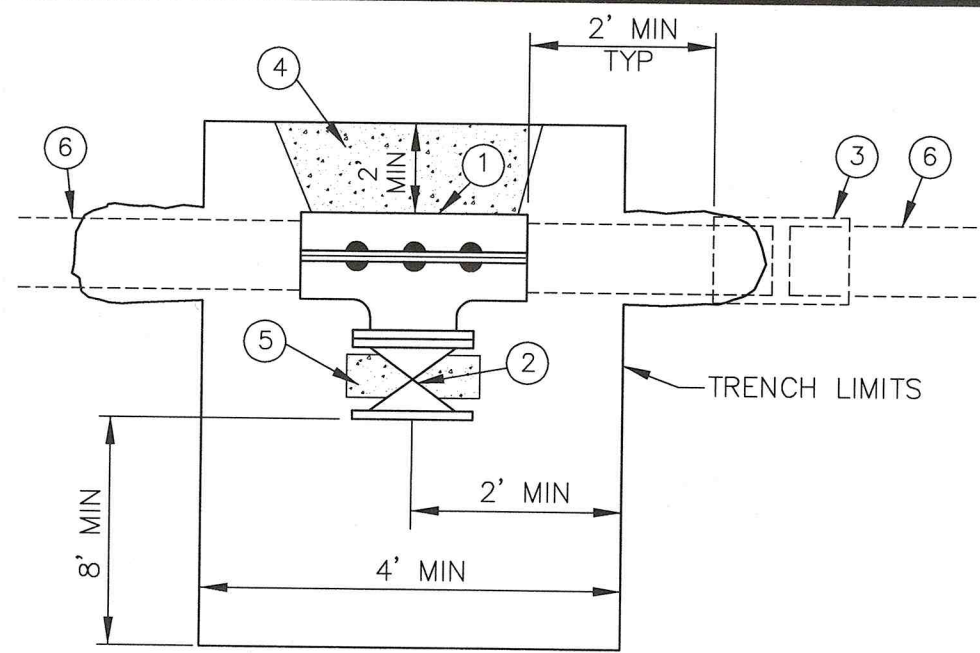
NOTES:

- TAPPING FITTING SHALL BE FULL WRAPPER DESIGN AND DESIGNED IN ACCORDANCE WITH AWWA MANUAL M11.
- DESIGN PRESSURE = 150 PSI
STATIC PRESSURE = 85 PSI
- TEST FABRICATED STEEL TAPPING FITTING PER SPECIFICATIONS SECTION 33 13 02
- ALL FERROUS METALS SHALL BE COATED PER SECTION 09 96 00, PROTECTIVE COATINGS. APPLY REINFORCED MORTAR COATING AFTER COMPLETION.
- TAPPING VALVE TO BE LEFT IN PLACE.
- THE EXISTING PIPE SHALL REMAIN IN SERVICE, WITH WATER FLOWING, DURING ENTIRE TAPPING OPERATION, UNLESS OTHERWISE APPROVED BY LVVWD.
- VERIFY POSITION OF PROPOSED TAP PRIOR TO COMMENCING OPERATION. POSITION TAP AT LEAST 5 FEET FROM JOINT IN EXISTING PIPE.
- VALVE TO BE SUPPORTED DURING THE WET TAP PROCESS.
- CONTRACTOR SHALL VERIFY SIZE, THICKNESS, LINING AND COATING OF EXISTING PIPELINE PRIOR TO COMPLETION OF WET TAP.

WET TAP OF EXISTING STEEL MAINS

NOT TO SCALE

1
CD5
C5



ITEM DESCRIPTION

- TAPPING SLEEVE
- GATE VALVE
- EXISTING COUPLING OR COLLAR
- CONCRETE THRUST BLOCK
- SUPPORT VALVE AS REQUIRED
- EXISTING PIPE

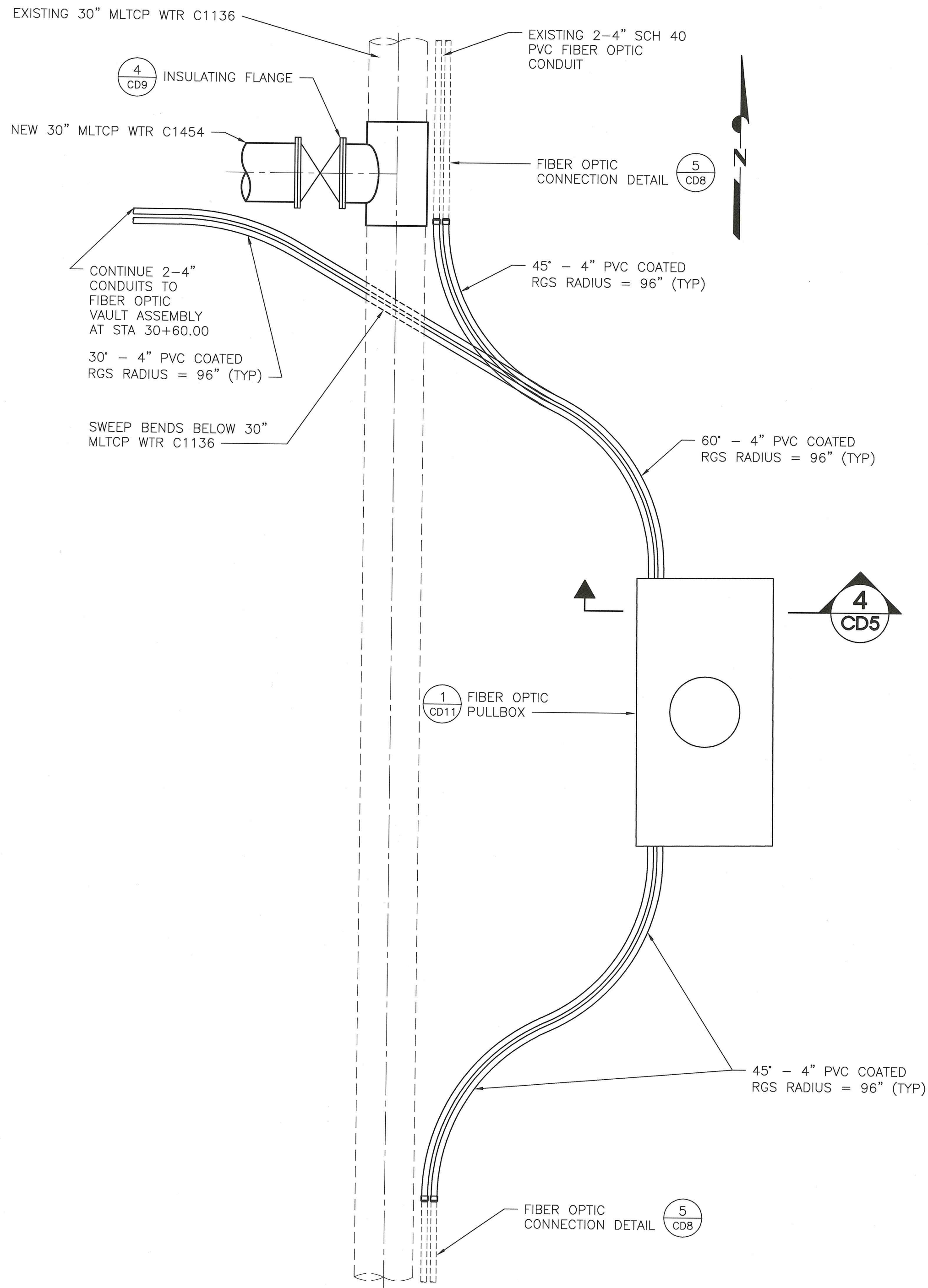
NOTES:

- CLEARANCE FROM A COLLAR OR PIPE JOINT SHALL BE A MINIMUM OF 2 FEET FROM THE EDGE OF TAPPING SLEEVE TO COLLAR OR PIPE JOINT. THE EXISTING PIPE SHALL BE EXPOSED SUFFICIENTLY TO ENSURE THAT SUCH MINIMUM CLEARANCE IS PROVIDED.
- TRENCH SHALL MEET ALL OSHA REQUIREMENTS.
- GATE VALVE TO BE TEMPORARILY SUPPORTED DURING THE WET TAP PROCESS.

EXCAVATION FOR WET TAPS

NOT TO SCALE

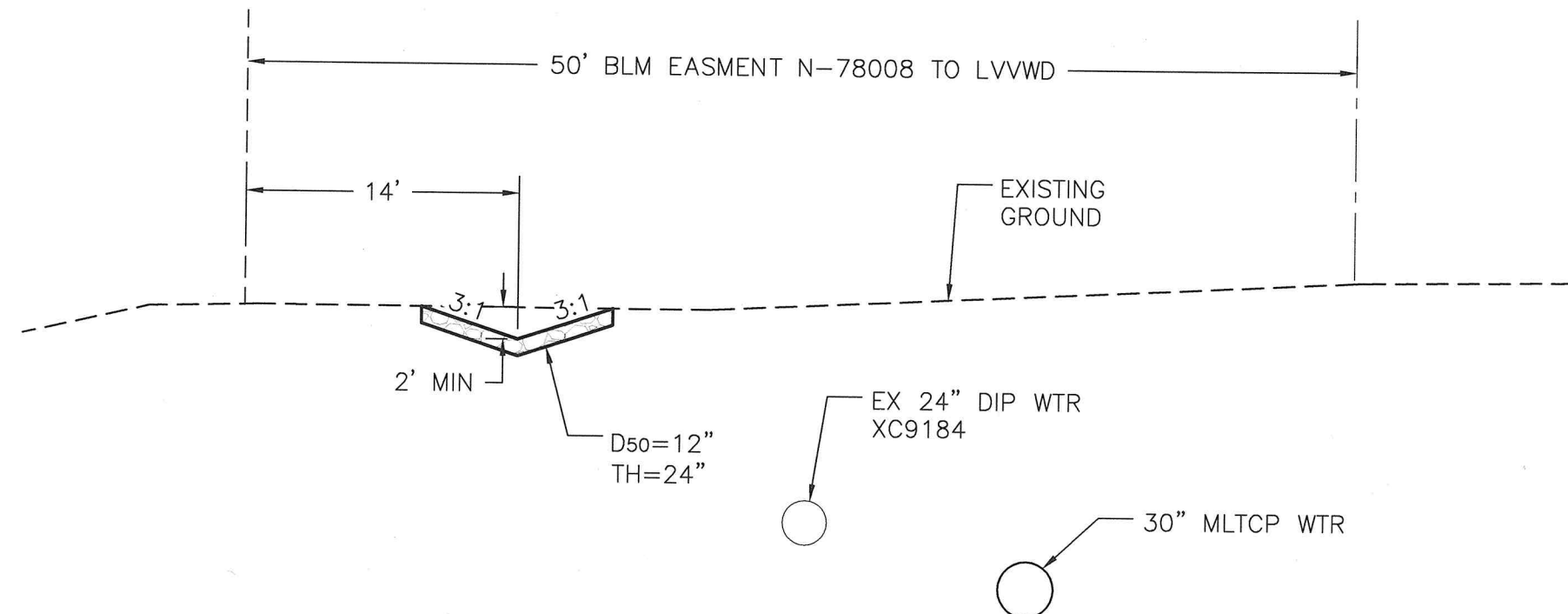
2
CD5



FIBER OPTIC CONNECTION DETAIL C1136 TO C1454

NOT TO SCALE

3
CD5
C5



SECTION

NOT TO SCALE

A
-

TO C1136 SHAUMBER RD
NORTH CONDUITS

TO C1454 PIPELINE
CONDUITS WEST

VAULT WALL END SECTION

NOT TO SCALE

2
CD5

3090 ZONE NORTH INTERIM TANK
INLET/OUTLET PIPELINE

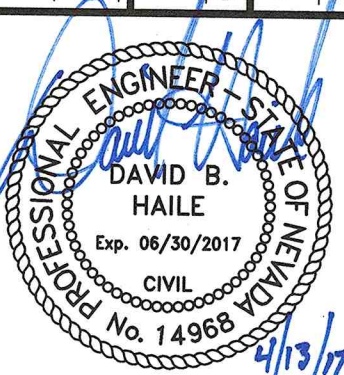
WET TAP AND FIBER OPTIC CONNECTION DETAILS

DRAWN BY: SE 4/12/2017

CHECKED BY: DBH 4/12/2017

RECOMMENDED BY: CHRISTOPHER M. LIQUETTE, P.E. SR. CIVIL ENGINEER DATE

ACCEPTED BY: RYAN G. PEARSON, P.E. DESIGN MANAGER DATE



CONTRACT NUMBER

C1454

DRAWING NUMBER CD 5
SHEET 19 OF 28

100% SUBMITTAL - NOT FOR CONSTRUCTION

REVISIONS:

CLV DWG # H-68541

LAS VEGAS VALLEY WATER DISTRICT

SLATER HANIFAN GROUP

CONSULTING ENGINEERS & PLANNERS

3043 S. RIVINGTON AVE., SUITE #216, LAS VEGAS, NV 89118

PHONE (702) 254-5300 FAX (702) 254-5309

STATUS OF PUBLIC DOMAIN
LAND AND MINERAL TITLES

CLARK COUNTY
LAS VEGAS GR DIST

MT PLAT

[illegible]

FOR ORDERS EFFECTING DISPOSAL OR USE OF UNIDENTIFIED LANDS WITHDRAWN FOR CLASSIFICATION, MINERALS, WATER AND/OR OTHER PUBLIC PURPOSES REFER TO INDEX OF MISCELLANEOUS DOCUMENTS.

Certain lands in Secs 1-3, 6-10, 13, 18, 24, 25 and 36 of this Township are affected by unrecorded public dedications for roads and utilities due to previous small tract classifications. See the historical index for specific lands affected by small tract classifications.

N 46063 R/W HWY Var
Sec 1: Lots 11, 12, N 1/2 SE 1/4 NE 1/4, SE 1/4 NE 1/4 SE 1/4,
NE 1/4 NE 1/4 SE 1/4, W 1/4

N 55696 Kyll Canyon diversion dike, detention basin, and A/R-1
 Sec 1: 5V2S/2SV/2SEV4/W/1
 Sec12: 5V2S/2SV4/5SW4/W/1
 Sec14: NEV4/W/2SEV4/NW1/4EV2SEV4SW4/W/1
 Sec23: EV2SEV4NW1/4/W/2NEV4/NW1/4SW4/4NEV4SW4/W/1

N65071 R/W Dist Lkns 3' (UNGGD)
Sec 7, Lot 12, W/1

N56497 PL103-450 affects

Sec 4-5: All

Sec 6: Portion of

Sec 10- SV2: Portion of

Sec 11: Portion of

Sec 14: Portion of

Sec 15-17: All

Sec 19-28: All

Sec 23: Portion of

Sec 26: Portion of

Sec 28-33: All

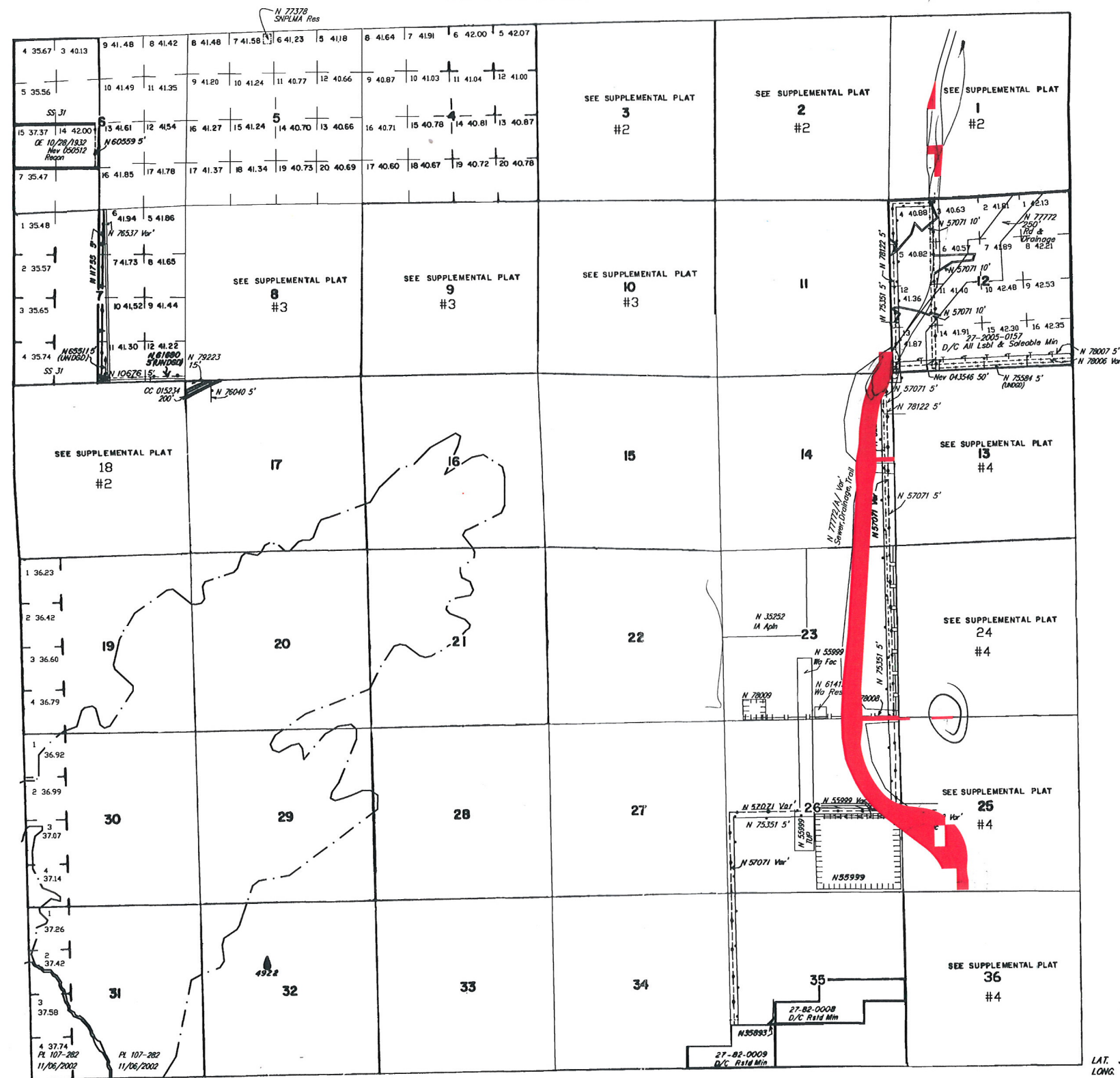
PL 107-262 Lo Modre Wilderness Area
N 76661 Affects:
Secs: 16, 17, 19, 20, 21, 28-32

Dependent Resurvey & Subdivision ACPT 9/14/1995

CURRENT TO	BY
08/31/05	GRC
2/6/06	MS
12/27/06	MS
2/21/07	MS
6/6/07	MS
2/19/08	MS
5/10/2012	320
8/5/14	MS
10/1/14	MS
4/21/15	MS

N 050
T. 19S
R. 59E

1



LAT. 36° 14' 48" N
LONG. 115° 18' 51" W

WARNING STATEMENT

This plot is the Bureau's representation of the Record of Title and should be used only as a graphic display of the township survey data. Records hereon do not reflect title changes which may have been effected by lateral movements of rivers or other bodies of water. Refer to the cadastral surveys for official survey information.

SCALE

10 5 0 10 20 30 60

30 chains to the inch