

---

# 2024 Sewer Master Plan Update

---

## Gardnerville Ranchos General Improvement District

**MAY 2024  
FINAL**

**Prepared For:**



Gardnerville Ranchos  
General Improvement District

931 Mitch Drive  
Gardnerville, NV 89460

**Prepared By:**



308 N. Curry Street, Suite 200  
Carson City, NV 89703  
775-883-7077

## Table of Contents

<b>1.0</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
1.1	General Overview .....	1
1.2	Summary of Findings .....	1
1.3	Summary of Recommendations .....	2
1.3.1	Capital Improvement Plan.....	2
1.3.2	Future Growth Considerations .....	2
1.3.3	On-Going Maintenance and Planning.....	3
<b>2.0</b>	<b>INTRODUCTION.....</b>	<b>4</b>
2.1	GRGID Background and History .....	4
2.2	GRGID and MGSD Agreements & Rates .....	5
2.2.1	GRGID/MGSD Alternatives .....	6
2.3	GRGID Structure.....	10
<b>3.0</b>	<b>DESCRIPTION OF EXISTING SYSTEM .....</b>	<b>11</b>
3.1	Pipelines and Collection Areas .....	11
3.1.1	Cedar Creek System .....	13
3.1.2	System A and Tribe System .....	13
3.1.3	System B.....	13
3.1.4	Systems C, D, E, Kingston Lane, Old Nevada Way, Rocky Terrace .....	13
3.2	System Age.....	15
3.3	Lift Stations .....	17
3.3.1	Pleasantview Lift Station .....	19
3.3.2	Rainshadow Ranch Lift Station .....	20
3.3.3	Rocky Terrace Lift Station .....	21
3.3.4	Springfield (Kimmerling) Lift Station .....	22
<b>4.0</b>	<b>EXISTING AND PROJECTED WASTEWATER FLOWS .....</b>	<b>24</b>
4.1	Land Use Planning .....	24
4.1.1	Existing Land Uses .....	24
4.1.2	Infill and Future Growth .....	25
4.2	Sewer Generation Factor .....	26
4.3	Estimated Existing Wastewater Flow .....	28
4.3.1	EDU Counts .....	28
4.3.2	Existing Wastewater Flows.....	29
4.4	Projected Wastewater Flow.....	30
<b>5.0</b>	<b>EXISTING CONDITION ASSESSMENT .....</b>	<b>31</b>
5.1	Pipeline Inspections.....	31
5.1.1	Condition Ratings .....	31
5.1.2	Proposed Improvements.....	31
5.2	Manhole Inspections .....	34
5.2.1	Proposed Improvements.....	34
<b>6.0</b>	<b>HYDRAULIC MODELING .....</b>	<b>36</b>
6.1	Model Update .....	36
6.2	Existing Scenarios.....	36
6.2.1	Flow Scenarios.....	36
6.2.2	Evaluation Criteria .....	36
6.2.3	Model Results .....	36
6.3	Projected Scenarios.....	37

6.3.1	Flow Scenarios.....	37
6.3.2	Evaluation Criteria .....	37
6.3.3	Model Results .....	37
<b>7.0</b>	<b>CAPITAL IMPROVEMENT PLAN .....</b>	<b>39</b>
7.1	Cost Estimating.....	39
7.2	Project Costs.....	39
7.2.1	Sewer System Asset Management Plan .....	39
7.2.2	Proposed Improvements from Condition Assessment .....	40
7.2.3	Capacity Improvements for Future Growth .....	40
7.2.4	On-Going Maintenance and Planning.....	41
7.3	Capital Improvement Plan.....	41
<b>8.0</b>	<b>REFERENCES.....</b>	<b>43</b>
<b>APPENDIX A</b>	<b>MGSD/GRGID AGREEMENTS .....</b>	<b>1</b>
<b>APPENDIX B</b>	<b>GRGID/WASHOE TRIBE AGREEMENT .....</b>	<b>2</b>
<b>APPENDIX C</b>	<b>PIPE INVENTORY.....</b>	<b>3</b>
<b>APPENDIX D</b>	<b>PIPE SYSTEM SHEET SET.....</b>	<b>4</b>
<b>APPENDIX E</b>	<b>PIPE SYSTEM MAP .....</b>	<b>5</b>
<b>APPENDIX F</b>	<b>PIPE AGE MAP .....</b>	<b>6</b>
<b>APPENDIX G</b>	<b>SYSTEM AGE INVENTORY.....</b>	<b>7</b>
<b>APPENDIX H</b>	<b>LIFT STATION INFORMATION .....</b>	<b>8</b>
<b>APPENDIX I</b>	<b>FLOW MONITORING REPORTS .....</b>	<b>9</b>
<b>APPENDIX J</b>	<b>SEWER MODEL LOADS .....</b>	<b>10</b>
<b>APPENDIX K</b>	<b>SEWER MODEL OUTPUT .....</b>	<b>11</b>
<b>APPENDIX L</b>	<b>ASSET MANAGEMENT PLAN &amp; SYSTEM REPLACEMENT COSTS ..</b>	<b>12</b>
<b>APPENDIX M</b>	<b>11"X17" FIGURES .....</b>	<b>13</b>

### List of Figures

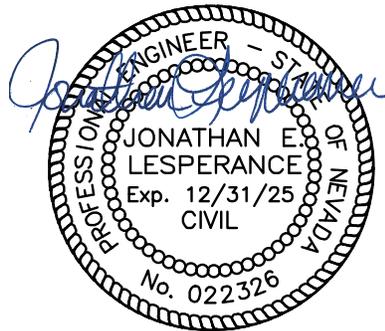
Figure 3.1: Pipe System Overview .....	12
Figure 3.2: Pipe Age Overview.....	16
Figure 3.3: Lift Stations.....	18

## List of Tables

Table 2.1 Breakdown of GRGID Sewer Rates.....	7
Table 2.2 No Action Alternative GRGID User Rates.....	8
Table 2.3 Consolidation Alternative GRGID User Rates.....	9
Table 2.4 System Components and Preliminary Costs for a WWTP.....	9
Table 2.5 WWTP Alternative User Rates.....	10
Table 3.1: Pipe Size Inventory .....	11
Table 3.2: Pipe Age Summary .....	15
Table 3.3: Summary of Lift Station Characteristics .....	19
Table 3.4 Bobwire Lift Station Summary Table .....	20
Table 3.5: Bobwire Lift Station Pump Properties.....	20
Table 3.6 Rainshadow Ranch Lift Station Summary Table.....	21
Table 3.7 Rocky Terrace Lift Station Summary Table .....	22
Table 3.8 Springfield (Kimmerling) Lift Station Existing Summary Table .....	23
Table 3.9: Existing Springfield (Kimmerling) Lift Station Pump Properties.....	23
Table 3.10: Proposed Springfield (Kimmerling) Lift Station Pump Properties .....	23
Table 4.1: Existing Land Uses .....	24
Table 4.2: Infill and Future Growth Land Uses.....	26
Table 4.3 2016 Flow Study Results.....	27
Table 4.4 Comparison of GRGID Winter Water Production .....	28
Table 4.5: EDU Conversion Factors .....	28
Table 4.6: EDU Count for Existing Land Uses .....	29
Table 4.7: Existing Wastewater Flows .....	30
Table 4.8: Projected Wastewater Flows .....	30
Table 5.1: Condition Assessment Ratings.....	31
Table 5.2: Proposed Structural Rehabilitation Projects from Condition Assessment .....	32
Table 5.3: Planned Pipeline Replacements in 2024 .....	32
Table 5.4: Proposed O&M Projects from Condition Assessment .....	33
Table 5.5: Proposed Structural Rehabilitation Projects from Condition Assessment .....	34
Table 5.6: Proposed Manhole Projects from Inspections .....	35
Table 6.1: Capacity Improvements for Future Growth.....	38
Table 7.1: Costs for Proposed Condition Assessment Improvements.....	40
Table 7.2: Costs for Capacity Improvements for Future Growth .....	40
Table 7.3: Recommended CIP .....	42

## Certification

The technical material and data contained in the document were prepared under the supervision and direction of the undersigned professional engineer(s). The opinions contained in this document reflect Lumos & Associates professional judgment in context with the scope of work and contract. The presented opinions are based on the conditions, information, and data provided to Lumos & Associates at the time the document was published and may be subject to change based on changing conditions, information, and data. Lumos & Associates did not verify independent information, conditions, and opinions supplied by others. There is no written or implied warranty or guarantee for any damage that occurs from third party use of this document.



05/09/24

---

Prepared under the Responsible Charge of  
Jonathan Lesperance, P.E.

## **Authorization**

On January 13, 2023, the Gardnerville Ranchos General Improvement District (GRGID) approved a contract with Lumos & Associates (Lumos) to complete a Sewer Master Plan Update for GRGID's sewer collection system. The purpose of the Sewer Master Plan is to complete a periodic update and re-evaluate the short-term and long-term capital improvement plan (CIP). The contract scope of work is summarized as follows:

- Task 1 – Sanitary Sewer Master Plan Update
- Task 2 – Reimbursables

---

## **LIST OF ACRONYMS/ABBREVIATIONS**

ac	Acre
ADF	Average Daily Flow
CIP	Capital Improvement Plan
DU	Dwelling Unit
EA	Each
EDU	Equivalent Dwelling Unit
ft	Feet
FY	Fiscal Year
gpd	Gallons per Day
gpm	Gallons per Minute
GRGID or District	Gardnerville Ranchos General Improvement District
HDPE	High-Density Polyethylene
HP	Horsepower
LF	Linear Feet
MGSD	Minden Gardnerville Sanitation District
NRS	Nevada Revised Statutes
PHF	Peak Hourly Flow
PVC	Polyvinyl Chloride
SR	State Route
TBD	To Be Determined
TDH	Total Dynamic Head

## **1.0 EXECUTIVE SUMMARY**

### **1.1 General Overview**

This Sewer Master Plan has been prepared for the Gardnerville Ranchos General Improvement District (GRGID or District) to document existing conditions, plan for regular life cycle infrastructure replacement, and determine capacity upgrades required to accommodate future growth. Objectives of the Master Plan study were accomplished through the following tasks:

- Update of existing sewer system components in system map and database.
- Assessment of the condition of existing facilities through video inspections and field assessments.
- Review of the existing collection system capacity using computer-based hydraulic modeling of the main collection corridors coupled with flow measurement at critical manholes.
- Estimation of wastewater generation associated with infill areas and future growth.
- Analysis of required infrastructure to accommodate future growth.
- Recommendation of improvements to address existing and future conditions.
- Development of a short-term and long-term Capital Improvement Plan (CIP) over a 20+ year planning period.

### **1.2 Summary of Findings**

The GRGID sewer collection system consists of approximately 48 miles of 6-inch through 15-inch gravity sewer pipe, four sewage lift stations, and associated force mains. The collected wastewater flows through an outfall that continues north to the Minden Gardnerville Sanitation District (MGSD) where the wastewater is subsequently treated. The 2010 GRGID population was 11,318, and as of 2022, there were approximately 4,247 sewer connections. Pipe age within the GRGID collection system ranges from approximately 1 to 46 years old with a significant portion of the system constructed in the 1970s. Over 41% of the system has a pipe age of 41-46 years old.

Future growth that could potentially be served by the GRGID sewer system includes infill areas, undeveloped land within GRGID boundaries, and developed/undeveloped land outside of current GRGID boundaries with potential to be annexed into the District or served as out-of-District customers. The potential growth and trend of smaller residential lots could leave GRGID with over 4,400 additional residential dwelling units at buildout.

Sewer flows for GRGID were confirmed through a previous 2016 flow monitoring study at critical points in the collection system. Existing average daily flows were estimated at that time were approximately 922,500 gallons per day (gpd). Projected average wastewater flows at buildout were estimated at 1,979,000 gpd. A peaking factor of 1.85 was recommended based on results of the flow monitoring study. Existing average daily flows are estimated by MGSD staff to be on the order of 600,000 gpd, which is consistent with GRGID average winter time water consumption. Due to the major interceptor relining project in 2023, current metered flows are not available. A new MGSD flow meter is scheduled to be installed in early 2024 and will provide more accurate flow measurements for the GRGID service area. The estimated buildout flow of 1,979,000 gpd is still used for this update. Existing and projected wastewater flows were used to evaluate the capacity of the backbone trunk sewers using hydraulic modeling. Model results

indicate the existing sewer system has sufficient hydraulic capacity for existing average and peak flows as well as buildout average flows. However, to accommodate future peak flows, approximately 2,500 feet of gravity sewer pipelines would need to be upsized from 12-inch to 15-inch diameter. Additional lift station(s) would also be needed to accommodate growth along the western outskirts of GRGID. The development of this area should be planned to be serviced via as few lift stations as possible.

Video inspections of the existing collection system were used to document areas with structural issues such as deformed pipes, fractures/breaks, corrosion/exposed aggregate, and off-set joints as well as operation and maintenance (O&M) issues such as pipeline blockages from tree root intrusions and grease deposits. Pipeline conditions were rated by severity for inclusion in the CIP. Based on video inspections completed to date, the aging portions of the collection system appear to be in relatively good condition compared to its age.

A short-term and long-term CIP was developed and prioritized based on the results of the hydraulic model, condition assessment, and an asset management plan for aging infrastructure.

### **1.3 Summary of Recommendations**

Recommendations resulting from preparation of the Sewer Master Plan are summarized below.

#### **1.3.1 Capital Improvement Plan**

- A short-term CIP (0-5 years) was developed based on results of a condition assessment and includes the following recommended projects:
  - Replacing approximately 4,774 feet of sewer pipeline at risk of failure from structural damage (e.g. deformed/broken pipe).
  - Cleaning pipeline segments with major blockages ( $\geq 50\%$ ) from roots and grease.
  - Rehabilitating manholes in scope of upcoming paving project.
  - Total short-term CIP cost = \$1,600,000
- A long-term CIP (20+ years) was developed considering future development and system replacement based on age:
  - Upsizing approximately 2,500 feet of backbone trunk sewers and addition of new lift station for future growth. Total cost approximately \$875,000 (funded through impact fees). The backbone trunk sewers are shown in Appendix M.
  - Replace aging infrastructure as needed. It is recommended that GRGID plan to start saving for up to an additional \$860,000 per year for system replacement financing. This would allow for annual replacement of approximately 1% of the existing sewer system, resulting in complete system replacement over a 100 year lifespan. The amount to be saved is an approximate estimate dependent on several factors including actual timing of replacement, final project construction costs, actual system conditions, existing GRGID financial reserves savings interest rates, etc.
  - Consolidate existing lift stations into a single larger lift station to reduce operating costs and maintenance requirements. Siting and preliminary design/sizing of the lift station is not included in this Master Plan and would require further study.

#### **1.3.2 Future Growth Considerations**

- Based on hydraulic modeling of the existing backbone collection system at buildout,

approximately 2,500 feet of backbone trunk sewers would need to be upsized from 12-inch to 15-inch diameter along South Joette Drive, South Bluerock Drive, Kerry Lane, North Long Valley Road, and East Dresslerville Road (included in long-term CIP).

- Based on existing topography, additional pumping would be needed to accommodate growth along the western outskirts of GRGID. The development of this area should be planned to be serviced via a single lift station or as few lift stations as possible (included in long-term CIP).
- As future growth is planned, the hydraulic model should be updated to reflect actual development densities, wastewater flows, and connection points to determine the need and timing for capacity upgrades within the GRGID system.
- The gravity system maintained by MGSD will need to be evaluated for capacity and possibly upsized to handle future growth.
- Future growth projects should be funded through impact fees paid by development.
- Areas to the west that are outside of District boundaries would need to be annexed into the MGSD service area to receive sewer service.

### 1.3.3 On-Going Maintenance and Planning

- Video inspections and field assessments should be scheduled regularly to monitor the condition of the existing system and to identify and prioritize rehabilitation/replacement projects.
- The Sewer Master Plan should be updated at 5-year intervals to reflect current conditions and to re-evaluate the short-term and long-term CIP.
- A sewer rate study should be prepared to determine if adjustments are necessary to support costs for on-going maintenance and capital improvements and to ensure GRGID is saving/reserving sufficient funds.

## 2.0 INTRODUCTION

### 2.1 GRGID Background and History

In the mid-1960s, C.E. (Red) Swift owned a large tract of land that he planned to develop into a subdivision. For approval of the proposed subdivision, Douglas County required service by a municipal water system and paved roadways within the subdivision. Swift initially attempted to annex the land into the towns of Minden and Gardnerville but was unsuccessful due to the distance from both towns. Undeterred, Swift moved forward to create the Gardnerville Ranchos General Improvement District (GRGID or District). GRGID was established through Douglas County Ordinance 147 on April 9, 1965 pursuant to Chapter 318 of the Nevada Revised Statutes (NRS). The GRGID service boundary is located in the central portion of Township 12N and Range 20E.

The first Board of Trustees included C.E. Swift, D.A. Swift, W.P. Bednar, M.K. Swift, and C.N. Swift. Following formation of GRGID, the Board of Trustees secured grants and loans to finance water and street improvements within District boundaries. The properties within Unit 2, Unit 3, Unit 4, and Country Club Estates (the golf course area) were part of the original annexation to the District on May 17, 1967. Ranchos Estates, Unit 5, and Unit 6 were annexed into the District on April 3, 1973 and Unit 7 was annexed into the District on July 18, 1974. Over the years, GRGID's service boundary has continued to grow with the annexation of multiple residential and commercial developments including Pleasantview Subdivision, Silver Ranch Estates, Sunburst Subdivision, Hidden Creek Subdivision, Rocky Terrace Subdivision, Rainshadow Ranch, 540 acres of land south and east of Long Valley Road, Heritage Subdivision on Kimmerling Road, Tillman Commercial Center, Langtree Commercial Center, and many other smaller parcels. Unit 1 was de-annexed from the District during a point in the early history of GRGID. A map of the units/subdivisions, sewer service area, and GRGID boundaries is provided in Appendix M.

Sewer service was provided by the District to Units 2, 3, 4, and Country Club Estates in the late 1970s. Sewer collection facilities for Units 6 and 7 were constructed five years prior to the first residences being built in those areas. In 1995 the State of Nevada required GRGID to develop a plan to provide sewer service to all properties within the District service area. The District set a deadline of July 1, 1998 for all properties on septic systems to connect to the District's sewer collection system. To streamline the process, the District reduced connection fees, applied for and received a community development block grant to assist with construction costs, and set up a loan program to assist residents with fees. The program was extended three times to ensure success and has since been closed out.

Wastewater generated and collected from the GRGID service area flows to the Minden Gardnerville Sanitation District (MGSD) for treatment and disposal. The first Agreement between GRGID and MGSD was entered into on February 1974 with a second Agreement signed in 1990 to increase the capacity allowance for GRGID at the MGSD treatment plant. The MGSD/GRGID Agreements are included in Appendix A and described in more detail in Section 2.2.

GRGID has grown significantly since the late 1960s and 1970s and currently provides water and sewer service to over 4,200 residential and commercial connections. The sewer collection system includes approximately 48 miles of gravity sewer pipelines, 1.3 miles of force mains, and four lift stations. Wastewater flows by gravity to the MGSD for treatment via a main trunk line along Centerville Lane/State Route (SR) 756 that is owned and maintained by MGSD but 60% of O&M

costs are paid for by GRGID. The sewer collection service area is shown in Appendix M and includes the Dresslerville Indian Colony and Unit 1 residences, both of which are outside of GRGID boundaries. For reference, the Agreement between Dresslerville Indian Colony and GRGID is included in Appendix B.

## **2.2 GRGID and MGSD Agreements & Rates**

A history of the Agreements between GRGID and MGSD was provided by Michael Smiley Rowe, Esq., the District Counsel, as summarized below (see Agreements in Appendix A).

On February 1, 1974, GRGID entered into an Agreement with MGSD for the joint use of sewage disposal facilities owned by MGSD for the purposes of collecting, treating, and disposing of sewage emanating and flowing from GRGID to the MGSD-owned plant. Prior to the 1974 Agreement, there were no formalized agreements or understandings between the two districts, although much discussion took place regarding the 1974 Agreement before its execution. For example, there is a sewer interceptor line running from the GRGID boundaries to MGSD. However, prior to the 1974 Agreement, no easements existed for the sewer interceptor line. GRGID was required to, and did, negotiate the easements and pay for the sewer line between the two districts.

Both GRGID and MGSD are NRS 318 General Improvement Districts, although GRGID was authorized to exercise more and diverse powers than those authorized to MGSD which is authorized only to provide a sewage treatment plant and disposal facilities and sewer collection in their service territory.

As a result of the 1974 Agreement, GRGID purchased an initial capacity right of 400,000 gallons average daily flow in the MGSD facilities. The 1974 Agreement provided that, if sewage flows from GRGID exceeded the 400,000 gallons average daily flow, then GRGID would be required to purchase additional capacity in the MGSD plant to accommodate such additional flows. GRGID was to pay \$300,000 for the initial capacity right of 400,000 gallons average daily flow in MGSD's facilities.

In addition, the 1974 Agreement requires that GRGID pay MGSD a portion of MGSD's variable costs including, but not limited to, electric, power, standby power, fuel, chemicals, and supplies. The variable costs are determined each year by an estimate provided by MGSD based upon the previous year's sewage flow. There is a formula provided for either the payment of any overages back to GRGID by MGSD should the amount of variable costs estimated exceed the actual amount, and the converse, payment by GRGID of any amount which exceeded the estimated costs. GRGID is also required to pay a portion of MGSD's fixed costs including, but not limited to, labor or repairs, insurance, vehicles and equipment, maintenance and operational costs, legal, fiscal, accounting, engineering and administrative services, "and all other costs not classified as 'variable costs'."

The 1974 Agreement provided GRGID with the option to acquire additional capacity rights in MGSD's facilities with a formula provided for the computation of the costs of such additional capacity. This paragraph in the Agreement lead to litigation between the parties. The first of such disputes was submitted to binding arbitration which resulted in a determination that the cost of the initial 400,000 gallons average daily flow capacity was to be increased by \$79,067, to \$379,067, which was a significant reduction in the amount provided to MGSD of \$237,200.

The second litigation between the parties occurred at district court, with a decision entered by the Ninth Judicial District Court and appealed by both GRGID and MGSD. The portion of the district court judgment appealed by GRGID was the determination that GRGID's acquisition cost of additional capacity was to be \$6.50 per gallon. The Supreme Court determined that the acquisition price was \$0.947 per gallon.

As a result of the litigation, and the growth of GRGID, by 1990 it was necessary that GRGID purchase additional capacity in MGSD's plant. Among other things, the Supplement to 1974 Agreement entered into on November 21, 1990 by GRGID and MGSD converted the method of measurement of GRGID's flow to equivalent dwelling units (EDUs) and determined that GRGID would not be assessed any connection fee, acreage fee, or capacity fee for all unused and available EDUs, but established a monthly charge calculated by multiplying 35% of the average mean fair market value of all improved property within the boundaries of GRGID as reported by the most recent appraisal by the Douglas County Assessor's office multiplied by MGSD's percentage of shared tax revenues of the Douglas County property tax.

Both GRGID and MGSD continue to operate pursuant to the 1974 Agreement and the Supplement to 1974 Agreement executed on November 21, 1990. Current discussions are in progress to potentially update the existing agreement. To assist in guiding an updated agreement, Lumos has provided a preliminary alternatives analysis regarding rates in Section 2.2.1.

### 2.2.1 GRGID/MGSD Alternatives

As part of the GRGID 2023 sewer master planning effort, an evaluation was conducted to explore the fiscal impact of GRGID maintaining ownership of the sewer collection system. Three alternatives were evaluated, and rates were estimates for each wastewater management alternative:

- Alternative 1: No Action
- Alternative 2: Consolidate GRGID collection system with Minden Gardnerville Sanitation District (MGSD)
- Alternative 3: Construct a GRGID owned and operated wastewater treatment plant (WWTP)

A brief description and the estimated rates for each alternative are provided below.

#### Alternative 1: No Action

Alternative 1 evaluates GRGID continuing to own, operate, and maintain the current collection system, and pay treatment and disposal costs to MGSD. GRGID's rates are a function of the pass-through fees paid to MGSD plus maintenance and operations fees for GRGID.

MGSD has completed a rate study to increase sewer rates, effective January 1, 2024 (MGSD, 2023). GRGID has not yet updated their published fees to reflect the future increase of MGSD pass through fees. As shown in Table 2.1, the GRGID fees are broken into GRGID and MGSD components in order to estimate updated GRGID fees to reflect the MGSD fee increase. For the purpose of this analysis, it was assumed that MGSD portion of the rates would remain constant.

**Table 2.1 Breakdown of GRGID Sewer Rates**

Customer Type	Rates (\$/EDU per month)		
	2023 Rate <sup>1</sup>	MGSD Portion of Rate <sup>2</sup>	GRGID Portion of Rate <sup>3</sup>
In-District Customers connected to District's sewer system PRIOR to May 17, 1990	\$16.00	\$12.24	\$3.76
In-District Customer Connected to District's sewer system AFTER May 17, 1990	\$23.00	\$12.24	\$10.76
Customers in Pump Station 1 Service Area	\$28.00	\$12.24	\$15.76
Out of District Customers	\$36.00	\$12.24	\$23.76
Out of District Customers in Pump Station 1 Area	\$41.00	\$12.24	\$28.76

**Notes**

<sup>1</sup> GRGID Policy and Procedures Manual, Appendix C (Gardnerville Ranchos General Improvement District, 2008)

<sup>2</sup> MGSD rates effective January 1, 2020, through December 31, 2023. Rate is expressed over a 30-day month (MGSD, 2023).

<sup>3</sup> Portion of fees that are allocated to GRGID reserves, O&M fund, etc.

The new user rates for GRGID along with the current GRGID user rates (user rates prior to the new MGSD rates) are provided in Table 2.2 below.

**Table 2.2 No Action Alternative GRGID User Rates**

Customer Type	Rates (\$/EDU per month)						
	2023 Rate <sup>1</sup>	January 2024 <sup>2</sup>	July 2025 <sup>2</sup>	July 2026 <sup>2</sup>	July 2027 <sup>2</sup>	July 2028 <sup>2</sup>	July 2029 <sup>2</sup>
In-District Customers connected to District's sewer system PRIOR to May 17, 1990	\$16.00	\$26.14	\$28.21	\$31.90	\$34.69	\$36.25	\$37.87
In-District Customer Connected to District's sewer system AFTER May 17, 1990	\$23.00	\$33.14	\$35.21	\$38.90	\$41.69	\$43.25	\$44.87
Customers in Pump Station 1 Service Area	\$28.00	\$38.14	\$40.21	\$43.90	\$46.69	\$48.25	\$49.87
Out of District Customers	\$36.00	\$46.14	\$48.21	\$51.90	\$54.69	\$56.25	\$57.87
Out of District Customers in Lift Station Area	\$42.56	\$50.84	\$56.36	\$60.50	\$63.68	\$65.42	\$67.25

Notes:

<sup>1</sup> GRGID Policy and Procedures Manual, Appendix C (Gardnerville Ranchos General Improvement District, Policies, and Procedures Manual, 2012).

<sup>2</sup> GRGID portion from Table 2.1 plus MGSD rates for GRGID customers effective January 1, 2024. Rate is expressed over a 30-day month (MGSD, 2023).

*Alternative 2: Consolidate GRGID Collection System with MGSD*

Alternative 2 evaluates the user rates if GRGID were to consolidate their collection system with MGSD. Consolidation will relieve GRGID of any O&M efforts associated with the collection system. In developing these rates, it was assumed that all GRGID users would pay MGSD customer rates (rather than the MGSD rates for GRGID).

GRGID currently has a healthy reserve in the sewer enterprise fund, and it is recommended that these funds be allocated for improvements within the GRGID service area, since they were generated from these users. The reserve funds could be utilized for upfront costs associated with consolidation rather than impact user rates, including costs incurred during the consolidation process and improvements required to the system. For this analysis, it was assumed that no modifications to the collection system would be made to bring the system to MGSD standards. MGSD may choose to evaluate the system against their standards and make improvements they are identified. These improvements could include pipeline or lift station improvements previously identified in the 2016 Sewer Master Plan that have not been completed or the improvements identified in this master plan update. It was also assumed GRGID's current Supervisory Control and Data Acquisition (SCADA) system for the lift stations will either need to be replaced and/or updated in order to integrate into MGSD's existing SCADA system. The calculated rates are

provided in Table 2.3 below.

**Table 2.3 Consolidation Alternative GRGID User Rates**

Customer Type	Rates (\$/EDU per month)					
	July 2024	July 2025	July 2026	July 2027	July 2028	July 2029
Monthly User fee for Active MGSD Customers <sup>1</sup>	\$22.08	\$27.60	\$31.74	\$34.92	\$36.66	\$38.49

Notes:

<sup>1</sup> MGSD rates effective January 1, 2024. Rate is expressed over a 30-day month (MGSD, 2023).

*Alternative 3: GRGID Owned and Operated WWTP*

Alternative 3 evaluates GRGID constructing a WWTP and conveying the treated effluent to Bentley Ranch for disposal. This is a high-level analysis of a potential WWTP option and was based off a recently completed WWTP project in Douglas County serving the North Valley (Douglas County Community Development Department, 2020). Further engineering efforts would be required to determine optimal location and design if this alternative were chosen. The potential WWTP could be constructed along Centerville Ln and the treated effluent conveyed along U.S. Highway 395 to Buckeye Road for disposal. The preliminary design information and costs are provided in Table 2.4.

**Table 2.4 System Components and Preliminary Costs for a WWTP**

Item	Value
Projected GRGID Average Daily Flow (MGD)	2 MGD
Cost of WWTP (Mil \$) <sup>1</sup>	\$28.6 M
Pipeline Length (ft)	21,590 ft
Pipeline cost (Mil \$)	\$6.5 M
Annual O&M Costs (Mil \$)	\$2 M

<sup>1</sup>WWTP costs were estimated based on construction costs for WWTP in the area within the last 5 years. Costs include all site work, and appurtenance piping associated with the WWTP. This estimate is considered a budgetary, order of magnitude estimate in conformance with the ACEC Class V estimate which may vary by -50% to +100% of actual costs.

Using the information in Table 2.4, user rates for each customer type in the GRGID service area were calculated and are displayed in Table 2.5. User rates also include the estimated O&M costs associated with the WWTP and pipeline. O&M costs were based on the repair and replacements costs for the pipeline and WWTP. Financing costs were developed based on the SRF financing rate (2.21%) and a financing period of 20 years (Young, 2023).

**Table 2.5 WWTP Alternative User Rates**

<b>Customer Type</b>	<b>Monthly Rate/EDU (\$/month per EDU)</b>
In-District Customers connected to District's sewer system PRIOR to May 17, 1990	\$128.46
In-District Customer Connected to District's sewer system AFTER May 17, 1990	\$135.46
Customers in Pump Station 1 Service Area	\$140.46
Out of District Customers	\$148.46
Out of District Customers in Lift Station Area	\$153.46

*Conclusion*

In November of 2023, the GRGID Board of Directors voted to create a subcommittee to consider alternatives for the relation between MGSD and GRGID. As these alternatives are a matter of District Policy, the preferred alternative will ultimately need to be decided by the Board of Directors with input from the newly created subcommittee. Based upon the analysis provided in this master plan update, Alternative 2 may provide the GRGID sewer service area with the cheapest rates and potentially provides the benefit of removing O&M requirements of the sewer system for GRGID operators. It is recommended that GRGID, and especially the GRGID subcommittee, considers pursuing a consolidation plan with MGSD.

**2.3 GRGID Structure**

GRGID is governed by a five-member Board of Trustees that are elected by the registered voters who reside within the District boundaries. The GRGID District Manager is responsible for carrying out the policies set forth by the Board of Trustees. Board meetings are held the first Wednesday of each month and are open to the public.

GRGID is responsible for the operation and maintenance of its sewer system, water system, streets, storm drain system, and streetlights, as well as maintenance of open spaces, parks, and recreational areas. GRGID reviews all proposed housing and commercial development projects located within District boundaries. The District’s recommendations are then forwarded to Douglas County Community Development and Douglas County Commission for review and approval.

### 3.0 DESCRIPTION OF EXISTING SYSTEM

#### 3.1 Pipelines and Collection Areas

The GRGID sewer collection system consists of approximately 50 miles of gravity sewer pipeline ranging from 6 to 15-inch diameter, 1.3 miles of sewer force mains ranging from 2 to 4-inch diameter, and four lift stations. An inventory of existing gravity pipelines and force mains is summarized in Table 3.1 and detailed in Appendix C. A set of collection system maps is included in Appendix D. The backbone collection system consists of gravity trunk sewers, 8 to 15-inch diameter, that convey wastewater to an outfall main that continues north along Centerville Lane/SR 756 to MGSD for treatment and disposal.

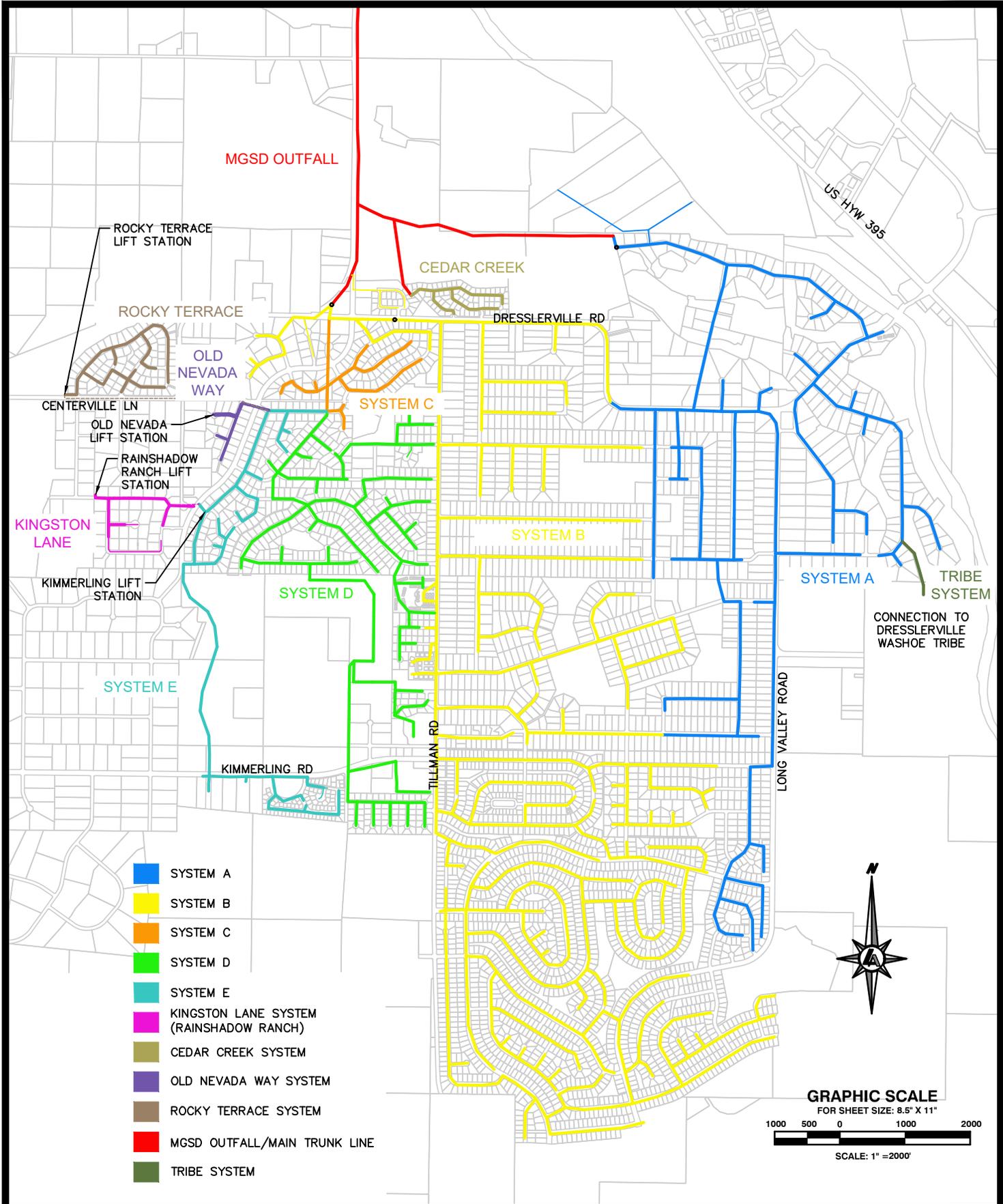
**Table 3.1: Pipe Size Inventory**

Pipe Size	Length <sup>1</sup> (ft)	% of System
2" (force main)	2,028	0.8%
4" (force main)	4,870	1.8%
6"	80,816	30.5%
8"	127,597	48.2%
10"	12,757	4.8%
12"	23,255	8.8%
15"	13,533	5.1%
<b>Total</b>	<b>264,856</b>	<b>100.00%</b>

<sup>1</sup> Pipeline lengths exclude sewer service laterals.

GRGID’s existing collection system can be divided into five major collection areas (designated Systems A through E) and five minor collection areas (designated by neighborhood). The existing collection system is presented in Figure 3.1 with color coding by collection area and lift station locations. In addition, a detailed fold-out map of the collection system is provided in Appendix E and includes manholes, pipeline diameters/slopes/lengths, flow directions, and color-coded collection areas. Manholes have been assigned number and letter designations that generally follow the system upstream in numerical order.

L:\APR\10919.001 - GRGD Sewer MasterPlan Update\3--Design\DWG\Civil\Design\10919.001 - SYSTEMS BY COLOR.dwg, FIG 2 PIPE SYSTEM OVERVIEW, 05/07/2024 08:58 am emckenzie



308 N. CURRY STREET, SUITE 200  
 CARSON CITY, NEVADA 89703  
 PH. (775) 883-7077 | INFO@LUMOSINC.COM

GRGD  
 GRGD SEWER MASTER PLAN  
 PIPE SYSTEM OVERVIEW

GARDNERVILLE DOUGLAS COUNTY NEVADA

Date: MAY 2024  
 Scale: 1" = 2000'  
 Job No: 10919.001  
 FIGURE 3.1

A description of each sewer collection area is provided below.

### 3.1.1 Cedar Creek System

Cedar Creek is a more recent residential development located at the northern side of the District along Dresslerville Road. All gravity sewer pipelines within the Cedar Creek System are 8-inch diameter and were constructed in 2005. Wastewater collected from the Cedar Creek System gravity flows northwest through the development to Cedar Brook Court and connects directly into the MGSD outfall main, independent of the other GRGID collection areas as shown in Figure 3.1.

The Cedar Creek System includes 85 existing single-family residences with 5 vacant lots (total of 90 lots).

### 3.1.2 System A and Tribe System

System A is located along the eastern side of the District and was constructed mostly in the late 70s to early 80s (a small portion of the system was completed in the early 90s). The Tribe System connects into System A near Putter Court. Because the Tribe System is owned and maintained by the Dresslerville Indian Colony, the collection system components are not detailed in Figure 3.1 or the system maps in the Appendices. Gravity sewer pipelines within System A range from 6 to 15-inch diameter. Wastewater collected in the backbone trunk sewers (ranging from 8 to 15-inch diameter) flows to the north along Long Valley Road, Dresslerville Road, Kerry Lane, and Glenwood Drive to the MGSD outfall main as shown in Figure 3.1.

System A includes approximately 570 single-family residences, 20 multi-family residences, and 7 undeveloped residential lots (zoned single-family). System A also includes commercial properties (approx. 3 acres) and public facilities (e.g. schools and parks). The Tribe System consists of 130 existing single-family residences and 30 future single-family residences, as of 2016.

### 3.1.3 System B

System B includes the largest collection area and is located almost entirely through the middle of the District with wastewater flowing from south to north. System B was constructed mostly in the late 70s to early 90s with the exception of the sewer facilities in Sierra Vista Drive and Chisholm Trail which were constructed in 2004. Gravity sewer pipelines within System B range from 6 to 15-inch diameter. Wastewater collected in the backbone trunk sewers (ranging from 8 to 15-inch diameter) flows to the west and north along Mary Jo Drive, Bluerock Drive, Joette Drive, Tillman Lane, and Dresslerville Road to the MGSD outfall main at Centerville Lane/SR 756.

System B consists of approximately 2,114 single-family residences, 584 multi-family residences, and 23 undeveloped residential lots (19 zoned single-family and 4 zoned multi-family). System B also includes developed commercial properties (approx. 6 acres), undeveloped commercial properties (approx. 1 acre), and public facilities (e.g. parks).

### 3.1.4 Systems C, D, E, Kingston Lane, Old Nevada Way, Rocky Terrace

Systems C, D, E, Kingston Lane, Old Nevada Way, and Rocky Terrace connect into System B and collectively outfall to the MGSD main near Dresslerville Road and Centerville Lane/SR 756 as shown in Figure 3.1. These systems are located on the western side of the District and are subdivided into collection areas by trunk sewers and pumping areas.

The combined systems consist of approximately 662 single-family residences, 280 multi-family residences, and 12 undeveloped residential lots (zoned single-family). The combined system also includes developed commercial properties (approx. 14 acres), undeveloped commercial properties (approx. 16 acres) and public facilities (e.g. parks).

A description of each system is provided below.

### System C

System C is a smaller collection area constructed mostly in the early 90s that connects into System B at the northwestern side of the District. Gravity sewer pipelines in System C range from 6 to 10-inch diameter. The backbone trunk sewer is a 10-inch diameter pipeline that flows north from the intersection of Pleasantview Drive and Wintergreen Drive to the connection with System B at Dresslerville Road near Centerville Lane/SR 756. Systems D and E connect into System C at the southern end of the 10-inch trunk sewer.

### System D

System D was constructed from the late 70s to early 90s and is located along the west side of Tillman Lane and the east side of Bing's Aggregate Pit. The industrial center south of Bing's Aggregate Pit connects into System D. Gravity sewer pipelines in System D range from 6 to 10-inch diameter. The backbone trunk sewer is an 8 to 10-inch diameter pipeline that generally flows north along the east side of Bing's Aggregate Pit and along Monarch Lane, Manhattan Way, Kingston Way, and Springfield Drive to the connection with System C at Pleasantview Drive.

### System E

System E was constructed from the early 90s to 2007 and is located along the west side of Bing's Aggregate Pit and along Springfield Drive. Gravity sewer pipelines in System E range from 6 to 10-inch diameter. The backbone trunk sewer is an 8 to 10-inch diameter pipeline that collects wastewater and flows north to the connection with System C at Pleasantview Drive. System E includes the Kimmerling Lift Station located near the intersection of Springfield Drive and Woodford Lane which lifts wastewater to an adjacent manhole via a 4-inch force main.

### Kingston Lane System (Rainshadow Ranch)

The Kingston Lane System serves a fairly new residential development constructed in 2006 named Rainshadow Ranch and is located on the far west side of the District. Gravity sewer pipelines in this system are 8-inch diameter and flow west to the Rainshadow Ranch Lift Station located on Kingston Lane. Wastewater collected at the Rainshadow Ranch Lift Station is pumped via a 4-inch force main to System E near the intersection of Springfield Drive and Woodford Lane.

### Old Nevada Way System (Pleasantview Subdivision)

The Old Nevada Way System serves a residential development constructed in 2003 named Pleasantview Subdivision and is located on the west side of the District. Gravity sewer

pipelines in this system are 8 to 10-inch diameter and flow north and west to the Old Nevada Lift Station located on Bobwire Lane. Wastewater collected at the Old Nevada Lift Station is pumped via dual 2-inch force mains to System E at the intersection of Pleasantview Drive and Springfield Drive.

Rocky Terrace Estates System

The Rocky Terrace Estates serves a fairly new residential development constructed in 2005 located at the northwest corner of the District. Gravity sewer pipelines in this system are 8-inch diameter and flow southwest to the Rocky Terrace Lift Station located on Centerville Lane. Wastewater collected at the Rocky Terrace Lift Station is pumped via a 4-inch force main to System E at the intersection of Pleasantview Drive and Springfield Drive.

**3.2 System Age**

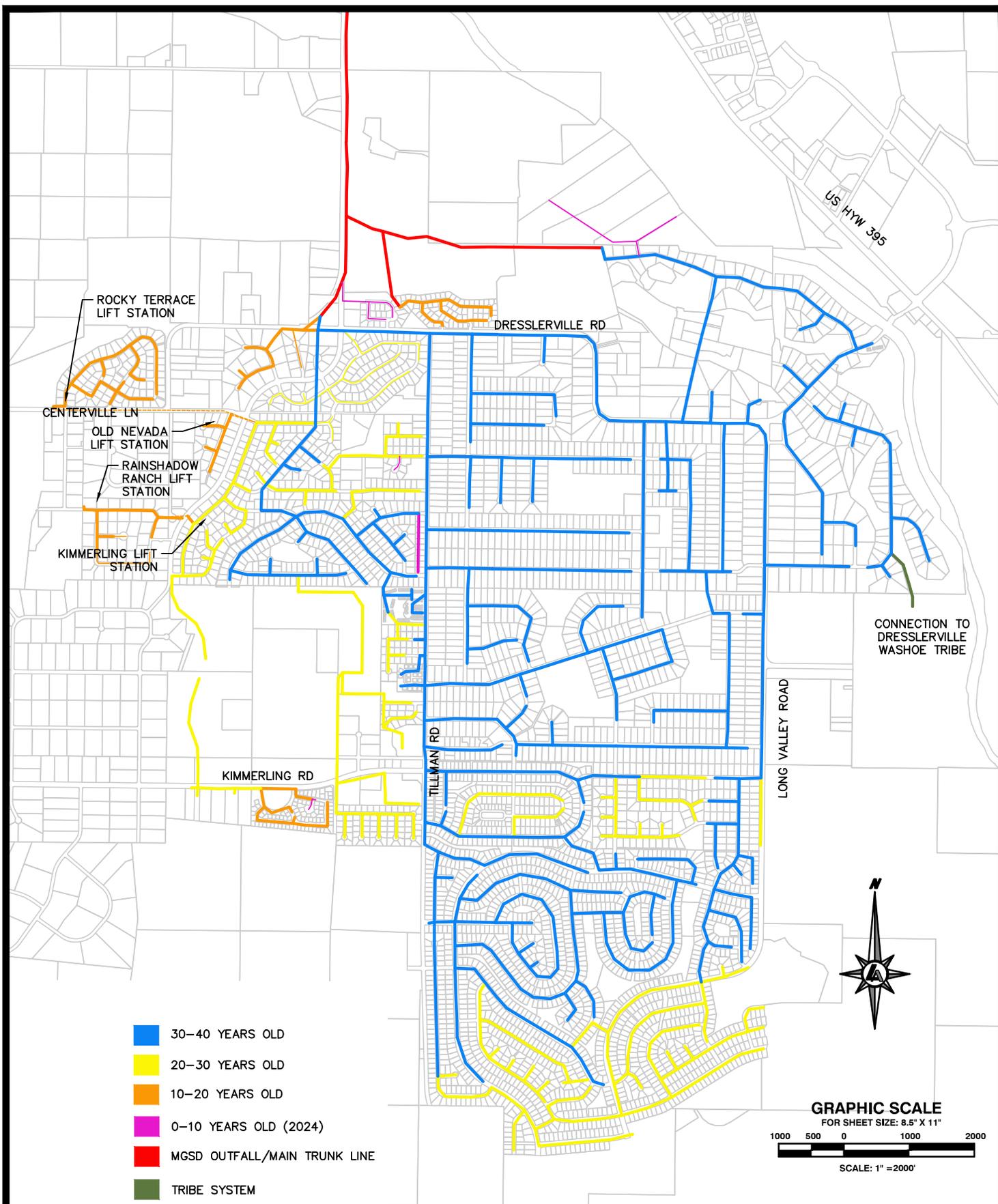
Pipe age within the GRGID collection system ranges from approximately 1 to 46 years old with a significant portion of the system constructed in the 1970s. The existing collection system with color coding by pipe age is presented in Figure 3.2, and a detailed fold-out map is included in Appendix F. Total pipeline lengths by incremental age, including force mains, are summarized in Table 3.2 and further detailed in Appendix G by pipe diameter.

**Table 3.2: Pipe Age Summary**

Pipe Age (years)	Length <sup>1</sup> (ft)	% of System
41-46	109,374	41.4%
36-40	52,685	20%
31-35	40,988	15.5%
26-30	28,509	10.8%
21-25	8,997	3.4%
16-20	22,523	8.5%
11-15	0	0%
6-10	0	0%
0-5 <sup>2</sup>	890	0.34%

<sup>1</sup> Pipeline lengths include force mains but exclude sewer service laterals.

L:\LAP\10919.001 - GRGD Sewer MasterPlan Update\3-Design\DWG\Civil\Design\10919.001 - SYSTEMS BY COLOR.dwg, FIG 3 PIPE AGE OVERVIEW, 05/07/2024 08:58 am emckenzie



**LUMOS**  
& ASSOCIATES  
308 N. CURRY STREET, SUITE 200  
CARSON CITY, NEVADA 89703  
PH. (775) 883-7077 | INFO@LUMOSINC.COM

GRGD  
GRGD SEWER MASTER PLAN  
PIPE AGE OVERVIEW

---

GARDNERVILLE      DOUGLAS COUNTY      NEVADA

Date: MAY 2024  
Scale: 1" = 2000'  
Job No: 10919.001  
FIGURE 3.2

The pipeline material for the majority of the GRGID system is polyvinyl chloride (PVC). PVC pipeline is typically assumed to have a useful life expectancy of 50 years based on industry and local standards (Douglas County Listing of Capital Asset Components & Typical Average Useful Lives of Depreciation Purposes, 2009) although it has been known to exceed its service life. Table 3.2 indicates that over 40% of the system has a pipe age of 41-46 years old; however, based on the condition assessments completed to date (as discussed in Section 5.0), the aging portions of the collection system appear to be in relatively good condition compared to its age and will likely exceed a 50-year service life. Therefore, a useful life assumption of 60 years will be used for planning purposes in the development of the Capital Improvement Plan (CIP) in Section 7.0.

Less than 6% of the collection system consists of concrete pipe generally located in the older portions of the system (20+ years in age).

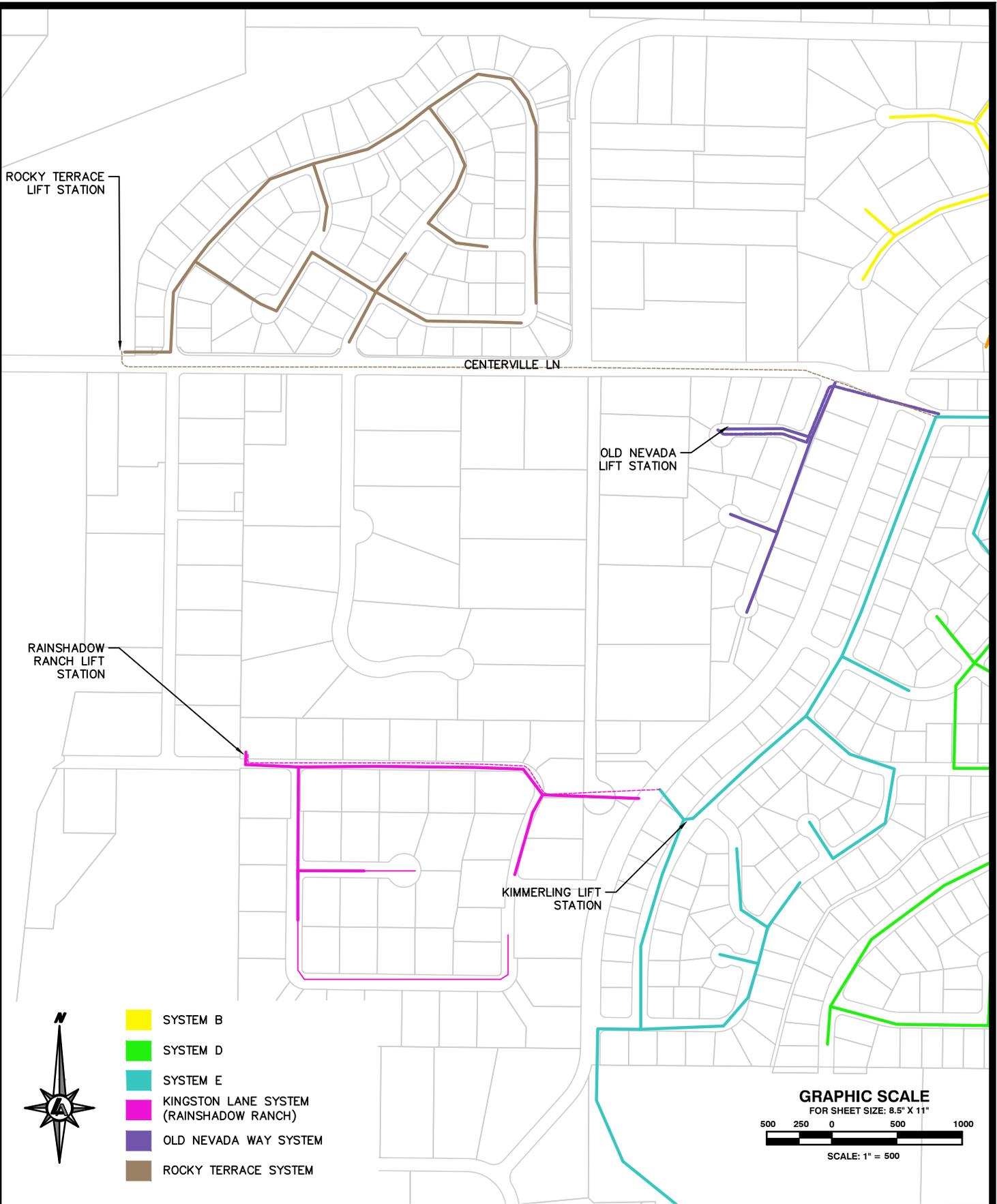
Pending improvements to the GRGID sewer system include the installation of cured in place pipe (CIPP) liner for two sewer mains located behind private property between Manhattan Way and Franklin Lane, currently scheduled for March 2024. The CIPP liner is expected to extend the useful life of the pipeline and prolong the need disturb users to replace and move the main outside of the private property.

Additionally, GRGID is planning a sewer infrastructure replacement project in System D due to a paving project being scheduled in the spring of 2024. The sewer infrastructure includes the replacement of 8 manholes and 1,377 linear feet of primarily 8-inch concrete sewer main. It also includes rehabilitation to one manhole and one pipe section replacement.

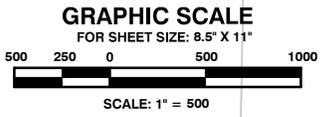
### **3.3 Lift Stations**

The sewer system includes four lift stations that collect wastewater from properties within the Pleasantview Subdivision, Rainshadow Ranch, Rocky Terrace Estates, and System E. Lift station and force main information is summarized in Table 3.3 and detailed in Appendix H. The locations of each lift station are shown in Figure 3.3.

L:\APR\10919.001 - GRGID Sewer MasterPlan Update\3-Design\DWG\Civil\Design\10919.001 - SYSTEMS BY COLOR.dwg\LIFT STATIONS OVERVIEW.  
05/07/2024 08:58 am emckenzie



- SYSTEM B
- SYSTEM D
- SYSTEM E
- KINGSTON LANE SYSTEM (RAINSHADOW RANCH)
- OLD NEVADA WAY SYSTEM
- ROCKY TERRACE SYSTEM



308 N. CURRY STREET, SUITE 200  
CARSON CITY, NEVADA 89703  
PH. (775) 883-7077 | INFO@LUMOSINC.COM

GRGID  
GRGID SEWER MASTER PLAN  
LIFT STATION OVERVIEW

GARDNERVILLE      DOUGLAS COUNTY      NEVADA

Date: MAY 2024  
Scale: 1" = 500'  
Job No: 10919.001  
FIGURE 3.3

**Table 3.3: Summary of Lift Station Characteristics**

<b>Lift Station</b>	<b>Location</b>	<b>Pump Quantity/Size</b>	<b>Force Main Diameter/ Material</b>	<b>Design Capacity/TDH (each pump)</b>
Pleasantview (Bobwire)	Bobwire Lane	(2) Submersible Grinder Pumps, 2 HP each	Dual 2-inch, HDPE	34.5 gpm @ TDH of 32.8 ft
Rainshadow Ranch	Kingston Lane	(2) Submersible Pumps, 5 HP each	4-inch, HDPE	100 gpm @ TDH of 44 ft
Rocky Terrace (Rocky Terrace Estates)	Centerville Lane	(2) Submersible Pumps, 12 HP each	4-inch, C900 PVC	150 gpm @ TDH of 87 ft
Springfield (Kimmerling)	Springfield Drive	(2) Submersible Pumps, 3 HP each	4-inch	-

<sup>1</sup>HP=Horsepower, TDH=Total Dynamic Head, gpm=Gallons per Minute, HDPE=High-Density Polyethylene.

### 3.3.1 Pleasantview Lift Station

The Pleasantview lift station was designed in 2000 and constructed in 2001 and currently serves approximately 24 single family residential homes. The lift station is located in the Old Nevada Way System on Bobwire Lane and was built to serve the Pleasantview subdivision. No backup generator is located at the site currently.

Five (5) pipe mounted mercury level control floats are located within the wet well at the following locations: high water alarm level, lag pump on level, lead pump on level, pump off level, and low water alarm level. Approximate rim, invert, and control level elevations and depths are summarized in the table below. Appendix H also includes a summary sheet for all four (4) lift stations and includes as-built information.

**Table 3.4 Bobwire Lift Station Summary Table**

Parameter <sup>1</sup>	Value
Wet Well Diameter (inches)	60
Approx. Rim Elevation (ft asl)	4,777.60
2" IE Out Depth (ft)	3.50
8" IE In Depth (ft)	9.63
8" IE In Depth (ft)	9.53
High Water Alarm Depth (ft)	9.63
Lag Pump On Depth (ft)	9.87
Lead Pump On Depth (ft)	10.45
Pumps Off Depth (ft)	11.03
Low Water Alarm Depth (ft)	11.53
Total Depth (ft)	11.86
Wet Well Total Volume (gal)	1,742.10
Wet Well Operating Volume (gal)	85.20

<sup>1</sup>Rim, invert, and control level elevation/depth is based on as-built information. Wet well total volume is the calculated volume from rim to bottom of wet well. Wet well operating volume is the calculated volume from the lead-pump-on level to the pumps-off level.

The lift station was designed to handle a peak inflow of 19.5 gpm. Two (2) Series SG 2 HP Grinder Pump are equipped in the wet well for redundancy. The pumps have a flow capacity of 34.5 gpm at a TDH of 32.8 ft. Properties for the pumps are summarized in Table 3.5.

**Table 3.5: Bobwire Lift Station Pump Properties**

No. of Pumps	Pump Make / Model	Revolutions Per Minute	HP	Voltage / Phase	Discharge Size (in)	Impeller Diameter (in)
2	Barnes / XSGV2022L	3450	2	230 / 1	1-1/4	5.62

**3.3.2 Rainshadow Ranch Lift Station**

The Bobwire lift station was designed in 2006 and constructed in 2007 and currently serves approximately 45 single family residential homes. The lift station is located in the Kingston System on Kingston Drive and was built to serve the Rainshadow Ranch subdivision. A gas-powered backup generator is located at the site currently.

Four (4) level control transducers are located within the wet well at the following locations: high water alarm level, lag pump on level, lead pump on level, and pump off level. Approximate rim, invert, and control level elevations and depths are summarized in the table below. Appendix H also includes a summary sheet for all four (4) lift stations and includes as-built information.

**Table 3.6 Rainshadow Ranch Lift Station Summary Table**

<b>Parameter<sup>1</sup></b>	<b>Value</b>
Wet Well Diameter (inches)	96
Approx. Rim Elevation (ft asl)	4,760.70
4" IE Out Depth (ft)	3.50
8" IE In Depth (ft)	5.18
HWL Alarm Depth (ft)	6.20
Lag Pump On Depth (ft)	7.20
Lead Pump On Depth (ft)	8.20
Pumps Off Depth (ft)	9.20
Total Depth (ft)	11.20
Wet Well Total Volume (gal)	4,211.60
Wet Well Operating Volume (gal)	376.04

<sup>1</sup>Rim, invert, and control level elevation/depth is based on as-built information. Wet well total volume is the calculated volume from rim to bottom of wet well. Wet well operating volume is the calculated volume from the lead-pump-on level to the pumps-off level.

The lift station's two (2) pumps are Myers Non-Clog Pumps and rated for 100 gpm at 44 feet of TDH on in the O&M manual, although the record drawings list a TDH of 38 feet.

### 3.3.3 Rocky Terrace Lift Station

The Rocky Terrace lift station was designed in 2005 currently serves approximately 90 single family residential homes. The lift station is located in the Rocky Terrace System on Centerville Lane and was built to serve the Rocky Terrace Estates. No backup generator is located at the site currently.

Five (5) level control floats are located within the wet well at the following locations: highwater alarm level, lag pump on level, lead pump on level, pump off level, and low water alarm level. Approximate rim, invert, and control level elevations and depths are summarized in the table below. Appendix H also includes a summary sheet for all four (4) lift stations and includes as-built information.

**Table 3.7 Rocky Terrace Lift Station Summary Table**

<b>Parameter<sup>1</sup></b>	<b>Value</b>
Wet Well Diameter (inches)	60
Approx. Rim Elevation (ft asl)	4,750.46
2" IE Out Depth	5.29
8" IE In Depth	9.81
8" IE In Depth	10.81
HWL Alarm Depth	12.71
Lag Pump On Depth	12.91
Lead Pump On Depth	13.11
Pumps Off Depth	13.86
LWL Alarm Depth	14.06
Total Depth	15.46
Wet Well Total Volume (gal)	5,813.52
Wet Well Operating Volume (gal)	282.03

<sup>1</sup>Rim, invert, and control level elevation/depth is based on as-built information. Wet well total volume is the calculated volume from rim to bottom of wet well. Wet well operating volume is the calculated volume from the lead-pump-on level to the pumps-off level.

Two (2) ABS AFP Submersible Explosion-Proof Pumps with Contra Block Impellers are equipped in the wet well for redundancy. The pumps have a design flow of 150 gpm at a TDH of 87 ft. Properties for the pumps are summarized in Table 3.5.

### 3.3.4 Springfield (Kimmerling) Lift Station

The Springfield (Kimmerling) lift station was originally designed in 1997 and constructed in 1999 and currently serves approximately 155 single family residential homes and Kimmerling Drive commercial area. The lift station is in System D on Springfield Drive and was built to serve the northwest service area. A project was bid in August 2023 to replace the pumps in the lift station due to frequent clogging and excessive debris in the wet well. The replacement pumps will consist of the proprietary Overwatch system, which uses inline pumps within a dry-pit, as opposed to a submersible pump station with a wet well. This project is anticipated for construction in early 2024. A backup generator and electrical improvements are also included as part of the aforementioned project. Following completion of the construction project, this lift station summary will need to be updated to reflect the as-built condition.

The existing station has five (5) pipe mounted mercury level control floats are located within the wet well at the following locations: highwater alarm level, lag pump on level, lead pump on level, pump off level, and low water alarm level. Approximate rim, invert, and control level elevations and depths are summarized in the table below. Appendix H also includes a summary sheet for all four (4) lift stations and includes as-built information.

**Table 3.8 Springfield (Kimmerling) Lift Station Existing Summary Table**

Parameter <sup>1</sup>	Value
Wet Well Diameter (inches)	60
Approx. Rim Elevation (ft asl)	4,788.00
2" IE Out Depth	3.60
8" IE In Depth	13.83
8" IE In Depth	14.20
HWL Alarm Depth	21.10
Lag Pump On Depth	16.55
Lead Pump On Depth	17.05
Pumps Off Depth	18.05
LWL Alarm Depth	20.60
Total Depth	21.10
Wet Well Total Volume (gal)	23.00
Wet Well Operating Volume (gal)	4,864.97

<sup>1</sup>Rim, invert, and control level elevation/depth is based on as-built information. Wet well total volume is the calculated volume from rim to bottom of wet well. Wet well operating volume is the calculated volume from the lead-pump-on level to the pumps-off level.

The lift station was designed to handle a peak inflow of 235 gpm. Two (2) pumps were initially equipped in the wet well for redundancy. The pumps had a flow capacity of 112 gpm at a TDH of 18 ft. One (1) pump was replaced due to issues handling solids and debris in the wastewater. Due to the issues seen at the lift station, replacement of the pumps with two (2) of the same model is scheduled to take place in the near future. Properties for the current pumps and proposed pumps are summarized in Table 3.9 and

Table 3.10, respectively Table 3.5.

**Table 3.9: Existing Springfield (Kimmerling) Lift Station Pump Properties**

No. of Pumps	Pump Make / Model	Revolutions Per Minute	HP	Discharge Size (in)
1	Flygt / C3085 MT1	1,700	2.4	3-1/8
1	Homa / AMS334-150	1,750	3	3

**Table 3.10: Proposed Springfield (Kimmerling) Lift Station Pump Properties**

No. of Pumps	Pump Make / Model	Revolutions Per Minute	HP	Discharge Size (in)
2	Overwatch Inline Pumps	TBD	TBD	TBD

## 4.0 EXISTING AND PROJECTED WASTEWATER FLOWS

A discussion of existing land uses, future growth areas, and an estimation of existing and projected wastewater flows is provided in the sections to follow.

### 4.1 Land Use Planning

#### 4.1.1 Existing Land Uses

The Gardnerville Ranchos area was historically used for agricultural/ranching purposes but over time has also developed into urban and rural areas. GRGID is primarily a residential community with existing land uses including single-family residential, multi-family residential (apartments, townhouses, duplexes), commercial/industrial, community/public facilities (parks, fire stations, churches), and schools.

GRGID provides over one-third of the housing for the Carson Valley with a diverse market ranging from one-third acre single-family residences to 5-acre single-family residences with custom built homes (Douglas County Community Development Department, 2020). Some of the newer residential neighborhoods such as the Cedar Creek System are denser with approximately six dwelling units per acre. The 2020 GRGID population was 11,318 (Unites States Census Bureau, 2020) and as of 2023 there were approximately 4,247 sewer connections. Based on data provided by GRGID, there were 153 new sewer connections from 2016 to 2023. These connections were single-family residential, except for one (1) new connection being the church located at 974 Tillman Lane. Of the new residential connections, 20% were infill and 80% were new construction. A summary of existing land uses served by the GRGID sewer system is summarized in Table 4.1.

**Table 4.1: Existing Land Uses**

Land Use	Dwelling Units (DUs)	Area (ac)
Single-Family Residential	3,647	-
Multi-Family Residential	870	-
Commercial/Industrial	-	23
Community/Public	-	11
Schools	-	41
<b>Total</b>	<b>4,517</b>	<b>75</b>

<sup>1</sup> Total number of students = 1,710 (Great Schools, 2016).

Areas currently served by GRGID’s sewer system are shown in Appendix M. Land use codes and future use designations for areas surrounding GRGID are also shown in Appendix M.

#### 4.1.2 Infill and Future Growth

Future growth that would potentially be served by the GRGID sewer system includes infill areas, undeveloped land within GRGID boundaries, and developed/undeveloped land outside of current GRGID boundaries with potential to be annexed into the District or served as out-of-District customers. In addition, there are 30 future single-family residential units planned within the Dresslerville/Washoe Tribe area. Future land use designations for residential developments in the Douglas County Master Plan (Douglas County Community Development Department, 2020) are divided into classes by dwelling units per acre as follows:

- Single-Family Residential – Designation for single-family units with densities ranging from no less than one to a maximum of six dwelling units per acre.
- Multi-Family Residential – Designation for multi-family units with densities ranging from no less than six to a maximum of 16 dwelling units per acre.
- Single-Family Estates – Designation for single-family units in rural areas with densities ranging from one to two acres per dwelling unit.

There are three general areas within or surrounding GRGID that are designated for “Future Development and Receiving Areas” in the Douglas County Master Plan (Douglas County Community Development Department, 2020). The first Receiving Area is Bing’s Aggregate Pit located north of Kimmerling Road which is currently zoned heavy industrial/commercial. Now that the Bing Pit operations have concluded, a portion of the area could potentially be developed. The acquisition of development rights and adoption of a comprehensive specific plan with proposed unit densities and County required mitigations would be necessary before the Bing property could be established for development. It is anticipated only a portion of the land in this area will be developable, based upon the extent of excavation and fill required to provide usable property. As such, a density of 1.2 dwelling units per acre is assumed for planning purposes to account for partial development.

The second Receiving Area, commonly referred to as Ranchos 8 and 9, is the undeveloped land located along the southern and eastern outskirts of GRGID within District boundaries (but outside of current sewer service area) including the 80 acres of land located at the end of Tillman Lane, presently known as the Rancho Sierra planned unit development (PUD). It is anticipated that this land will be developed as single-family residential with lot densities of approximately six dwelling units per acre consistent with recent development within GRGID and compatible with the Douglas County Master Plan.

The third Receiving Area is the undeveloped land west of GRGID outside of District boundaries near Rubio Way and Centerville Lane/SR 756. This area is presently referred to as the Serpa Property, based upon current ownership. Existing development surrounding this Receiving Area is primarily rural residential with larger lot sizes. For planning purposes, it is assumed this area will be developed with single-family estates with approximate lot sizes of one acre.

Receiving Areas, infill areas, and other existing/future development areas that could potentially join GRGID are shown in Appendix M with acreages and/or estimated dwelling unit counts where applicable. Approximate slopes based on existing ground elevations in the Receiving Areas are also shown in Appendix M for determining the feasibility of gravity sewer connections to the GRGID sewer system versus the need for additional lift stations. Areas to the west that are outside of District boundaries would need to be annexed into the MGSD service area to receive sewer

service.

A summary of infill and future growth areas that could potentially be served by the GRGID sewer system is provided in Table 4.2. Future community/public areas and student counts were scaled proportionally by comparing existing dwelling unit counts (single-family and multi-family) to infill/future dwelling unit counts. The anticipated growth and trend of smaller residential lots could potentially leave GRGID with over 4,400 additional residential dwelling units at buildout.

**Table 4.2: Infill and Future Growth Land Uses**

Land Use	Infill		Future Growth	
	Dwelling Units (DUs)	Area (ac)	Dwelling Units (DUs)	Area (ac)
Single-Family Residential <sup>1</sup>	152	-	4,418	-
Multi-Family Residential	16	-	-	-
Commercial	-	17	-	27.3
Community/Public	-	-	-	8.4
Schools	-	-	-	- <sup>2</sup>
<b>Total</b>	<b>168</b>	<b>17</b>	<b>4,418</b>	<b>35.7</b>

<sup>1</sup> Includes single-family estates.

<sup>2</sup> Total estimated number of future students = 1,810.

#### 4.2 Sewer Generation Factor

A flow monitoring study was conducted in July of 2015 and used to estimate existing wastewater flows in the collection system for the 2016 Sewer Master Plan. Results of the flow monitoring study and determination of the 2016 wastewater generation factor based on an EDU are summarized in the Tables below and included in detail in Appendix I.

**Table 4.3 2016 Flow Study Results**

<b>Collection Area</b>	<b>Existing EDU Count<sup>1</sup></b>	<b>Actual ADF<sup>2</sup> (gpd)</b>	<b>Generation Factor by Area (gpd/EDU)</b>	<b>Recommended Generation Factor (gpd/EDU)</b>	<b>Calculated ADF (gpd)</b>	<b>% Difference: Calculated vs Actual</b>
System A	650	146,891	226		139,793	-5.1%
System B <sup>3</sup>	2,573	533,298	207	215	553,212	3.6%
System C, D, E <sup>4</sup>	980	190,256 <sup>5</sup>	194		210,704	9.7%
<b>Total</b>	<b>4,203</b>	<b>870,446</b>	<b>-</b>		<b>903,710</b>	<b>3.7%</b>

<sup>1</sup> Excludes EDU counts for schools (flow monitoring conducted when schools were out of session).

<sup>2</sup> Based on results of flow monitoring study (see Appendix I).

<sup>3</sup> Excludes flows from Manholes B1-B3A.

<sup>4</sup> Includes Kingston Lane System, Old Nevada Way System, Rocky Terrace System, and Manholes B1-B3A.

<sup>5</sup> Determined by subtracting Station 2 flows from Station 1 flows.

Three (3) alternative approaches to determine the 2022 sewer generation factor were completed. The first included using lift station pump cycle data, the second an industry standard generation assumption based upon water use, and the third included calibrating the 2016 sewer generation factor with water data.

Daily lift station pump cycle graphs for all four (4) lift stations were provided for May 11, 2023 to May 12, 2023. Weekly and monthly lift station pump cycle graphs were also provided for all four (4) lift stations for April and March. After review of the lift station pump cycle compared to wet well volume and approximate EDUs served, the generation factor was determined approximately 150 gpd/EDU. Since the lift station pump cycle data was limited and only represented small portions of the system, this approach was ranked the least reliable.

Using an industry standard assumption of 60% to 80% of water usage generating sewer waste (Tchobanoglous) was the second approach used. Well production for winter months (with non-revenue factors applied) was used as the base for the calculation, because it reduces the amount of water used for irrigation and other non-waste-generating purposes. After the typical water-to-waste percentages were applied, the corresponding sewer generation was divided by the number of sewer EDU's. Values using this method were lower than the previous 2016 flow study sewer generation (between 120 to 170 gpd/EDU), and it was determined this approach would be less accurate than the field and system data.

The last approach was to calibrate the 2016 sewer generation factor with water data. In order to complete this, winter water production in 2016 was compared to the average winter water production for 2017-2022. Table 4.4 depicts the comparison complete and shows the percent change was approximately 1%.

**Table 4.4 Comparison of GRGID Winter Water Production**

<b>Year</b>	<b>Winter (November-March) Production (gpd)</b>
2016	858,980.26
2017-2022 Average	848,530.93
Percent Change	-1%

Additionally, the EDU count (discussed in Section 4.3.1) has increased by approximately 3%. Since the average winter water production has decreased and EDUs have increased, it is anticipated that the sewer generation factor has decreased by approximately 4%. However, it is recommended for the purpose of master planning efforts to continue using a generation factor of 215 gpd/edu for two reasons:

1. The 215 gpd/EDU was empirically derived from a flow study with the intention of determining a sewer generation factor.
2. The anticipated decrease in the sewer generation factor does not warrant an update due to the relatively small change and the need to be conservative in planning efforts. Although, the sewer generation factor should be evaluated in the next update in order to ensure it is not overestimating system flows.

**4.3 Estimated Existing Wastewater Flow**

Existing wastewater flow estimates were found by developing the current Equivalent Dwelling Unit (EDU) counts and applying the 215 gpd/EDU generation factor.

**4.3.1 EDU Counts**

Conversion factors were used to estimate EDU counts for each land use type. Assuming one EDU is equivalent to one single-family dwelling unit, the EDU conversion factors for other land uses were calculated by comparing assumed population densities or equivalents for each land use type. A summary of recommended EDU conversion factors is provided in Table 4.5.

**Table 4.5: EDU Conversion Factors**

<b>Land Use</b>	<b>Population Equivalent</b>		<b>EDU Conversion Factor</b>	
	<b>(capita/unit)</b>	<b>(capita/ac)</b>	<b>(EDU/unit)</b>	<b>(EDU/ac)</b>
Single Family Residential	3.0 <sup>1</sup>	-	1.0	-
Multi-Family Residential	2.0 <sup>1</sup>	-	0.67	-
Commercial/Industrial	-	12.0 <sup>2</sup>	-	4.0
Community/Public	-	12.0 <sup>2</sup>	-	4.0

<sup>1</sup> Population density per GRGID Policies and Procedures Manual (Gardnerville Ranchos General Improvement District, 2008).

<sup>2</sup> Population equivalent per Carson City Sewer Design Standards (Carson City, 1995).

Using the existing land use information from Table 4.1 and the conversion factors from Table 4.5, a total EDU count for the existing system was determined as summarized in Table 4.6. An EDU conversion factor was not used for schools because wastewater flows are better predicted based on actual number of students rather than an assumed population equivalent.

**Table 4.6: EDU Count for Existing Land Uses**

<b>Land Use</b>	<b>Dwelling Units (DUs)</b>	<b>Area (ac)</b>	<b>EDU Count</b>
Single-Family Residential	3,647	-	3,647
Multi-Family Residential	870	-	583
Commercial/Industrial	-	23.0	92
Community/Public	-	11.0	44
Schools	-	40.9 <sup>1</sup>	-
<b>Total</b>	<b>4,517</b>	<b>72</b>	<b>4,366</b>

<sup>1</sup> Total number of students = 1,710 (Great Schools, 2016).

#### 4.3.2 Existing Wastewater Flows

Table 4.7 summarizes the existing wastewater flows based on EDUs described in the previous section. Wastewater flows for schools were not included in the flow monitoring results and wastewater generation factor analysis because the study was conducted when schools were out of session. For estimation of total existing and projected future wastewater flows when schools are in session, a factor of 11 gpd/student was assumed per industry standard (Wastewater Engineering: Treatment and Resource Recovery, 2013). With a total student count of 1,710 (Great Schools, 2016), this equates to an ADF of 14,399 gpd (equivalent to 67 EDUs at a generation factor of 215 gpd/EDU). Total existing ADF and PHF estimates for GRGID are summarized in Table 4.7.

**Table 4.7: Existing Wastewater Flows**

Land Use	Total EDU Count	Generation Factor		ADF (gpd)	PHF <sup>1</sup> (gpd)
		(gpd/EDU)	(gpd/student)		
Single-Family Residential	3,647	215	-	784,105	1,450,594
Multi-Family Residential	583	215	-	125,345	231,888
Commercial/Industrial	92	215	-	19,780	36,593
Community/Public	44	215	-	9,460	17,501
Schools	67	215	11 <sup>3</sup>	14,399	26,638
<b>Total</b>	<b>4,433</b>	<b>-</b>	<b>-</b>	<b>953,089</b>	<b>1,763,215</b>

<sup>1</sup> Peaking factor of 1.85 per flow monitoring study.

<sup>2</sup> EDU count calculated using generation factor of 11 gpd/student with total number of students = 1,309 (Great Schools, 2016)

<sup>3</sup> Typical wastewater generation factor for schools (Wastewater Engineering: Treatment and Resource Recovery, 2013)

#### 4.4 Projected Wastewater Flow

Projected wastewater flows at buildout of the sewer collection area considering existing land uses, infill areas, future growth, and Receiving Areas are summarized in Table 4.8. Future community/public areas and student counts were scaled proportionally by comparing existing dwelling unit counts (single-family and multi-family) to infill/future dwelling unit counts.

**Table 4.8: Projected Wastewater Flows**

Land Use	Total EDU Count	Generation Factor		ADF (gpd)	PHF <sup>1</sup> (gpd)
		(gpd/EDU)	(gpd/student)		
Single-Family Residential	8,095	215	-	1,740,425	3,219,786
Multi-Family Residential	594	215	-	127,710	236,264
Commercial/Industrial	269	215	-	57,835	106,995
Community/Public	66	215	-	14,190	26,252
Schools	180 <sup>2</sup>	215	11 <sup>3</sup>	38,720	71,632
<b>Total</b>	<b>9,204</b>	<b>-</b>	<b>-</b>	<b>1,978,880</b>	<b>3,660,928</b>

<sup>1</sup> Peaking factor of 1.85 per flow monitoring study.

<sup>2</sup> EDU count calculated using generation factor of 11 gpd/student and total estimated number of students (existing and future) = 3,520.

<sup>3</sup> Typical wastewater generation factor for schools without gym/showers (Wastewater Engineering: Treatment and Resource Recovery, 2013).

## 5.0 EXISTING CONDITION ASSESSMENT

### 5.1 Pipeline Inspections

#### 5.1.1 Condition Ratings

Close-circuit television (CCTV) inspection of existing sewer pipelines was performed from January to April 2016 with inspection priority placed on backbone trunk sewers and aging infrastructure. Appendix M depicts the conditions of the sewer system from that review. For this draft, it is assumed that structural issues, which have not undergone a rehabilitation effort, are still relevant to date.

The condition assessment ratings system was developed during the 2016 Sewer Master Plan to prioritize issues by severity with recommended actions as summarized in Table 5.1. The condition assessment ratings will be used again in the 2023 update.

**Table 5.1: Condition Assessment Ratings**

Condition Rating		Issue	Recommended Action
<u>Structural Issues</u>			
1	Severe	Deformed/Broken Pipe	Repair/replace within next 5 years
2	Moderate	Corrosion/Exposed Aggregate (Concrete Pipes)	Re-inspect in 5+ years, replace if amount of exposed aggregate increases
3	Minor	Off-Set Joints	Re-inspect in 5+ years, repair if build-up begins to occur
<u>O&amp;M Issues</u>			
A	Severe	Large Root Intrusions/Root Balls (≥50% Blockage)	Clean pipes within next 2 years, schedule routine inspection/ cleaning
B	Severe	Deposits/Grease (≥50% Blockage)	Clean pipes within next 2 years, schedule routine inspection/cleaning
C	Moderate/Minor	Medium/Fine Root Intrusions (<50% Blockage)	Re-inspect in 5+ years, clean if necessary
D	Minor	Deposits/Grease (<50% Blockage)	Re-inspect in 5+ years, clean if necessary

#### 5.1.2 Proposed Improvements

**The 2016 Sewer Master Plan found and recommended the ten (10) areas be rehabilitated due to structural issues. Currently, these structural issues have not been addressed and will be recommended for inclusion in a short-term CIP. The areas are summarized in Table 5.2. The streets to be rehabilitated in 2024 are summarized in**

Table 5.3.

**Table 5.2: Proposed Structural Rehabilitation Projects from Condition Assessment**

Upstream MH	Downstream MH	Pipe Size (in)	Pipe Length (ft)	Issue	Recommended Project	Schedule
A42	A41	8	314			
A42-1	A42A	6	430			
B14-1	B14	8	347			
B6-2C3	B6-2C2	8	382	Pipe Deformation (Structural Rating 1)	Replace pipeline or deformed segment of pipe	Within next 5 years
B28-2E	B28-2D	8	380			
B33-2H	B33-2G	6	250			
B54	B53	6	421			
B57	B56	6	368			
E8	E7	8	237			
B26-2	B26-1	10	390	Broken Void Visible (Structural Rating 1)	Replace pipeline or broken segment of pipe	Within next 5 years
Total			3,519			

**Table 5.3: Planned Pipeline Replacements in 2024**

Street Name	From	To	Pipe Size (in)	Pipe Length (ft)
Bolivia Way	Franklin Lane	Manhattan Way	8	950
Ely Way	Monarch Lane	Dead End	8	160
Franklin Lane	Tillman Lane	Manhattan Way	8	1,170
Kingston Way	Springfield Dr	Dead End	8	515
Monarch Lane	Manhattan Way	Manhattan Way	8	2,188
Pioche Lane	Sorensen Lane	Manhattan Way	8	306
Belmont Court	Kingston Way	Cul-de-sac	8	223
Bodie Court	Bolivia Way	Cul-de-sac	8	275
Columbia Court	Monarch Lane	Cul-de-sac	8	252
Como Court	Franklin Lane	Cul-de-sac	8	195
Rawhide Court	Monarch Lane	Cul-de-sac	8	240

Table 5.4 provides the 2016 recommended O&M projects necessary to clear out intrusions, blockages, and deposits/buildup of fat, oils, and grease (FOG). It is likely these areas have been cleaned out by GRGID operators since the 2016 Sewer Master Plan; however, these projects have been included so operators can check on trouble areas. In addition, two trouble areas have been added to the list based on operation feedback: one section at Dora Drive and one section on Mary Jo Drive.

**Table 5.4: Proposed O&M Projects from Condition Assessment**

<b>Upstream MH</b>	<b>Downstream MH</b>	<b>Issue</b>	<b>Recommended Project</b>	<b>Schedule</b>
A14-1A5	A14-1A4			
A30	A29			
A40	A39			
B6-2E	B6-2D			
B8	B7			
B12	B11			
B13	B12	Large Root Ball in Sewer Lateral, >50% Blockage (O&M Rating A)	Remove roots/ clean pipes	Within next 2 years
B14	B13			
B17	B16			
B19	B18			
B26-4	B26-3			
B28-2A	B28-2			
B33-5B	B33-5A			
B33-9	B33-8			
B34	B33			
A14-1A5	A14-1A4			
A7-A22C	A7-22C			
A14-7	A14-6			
A48-2	B51-5	Large Root Ball in Main Barrel/Joint, >50% Blockage (O&M Rating A)	Remove roots/ clean pipes	Within next 2 years
B11-4B	B11-4A			
B14-9	B14-8			
B21-11B	B21-11A			
B25	B24			
B28-5A	B28-5			
B6-3	B6-2	Deposits/Grease, >50% Blockage (O&M Rating B)	Remove buildup/ clean pipes	Within next 2 years
B30-3	B30-2			

D25-4B	D25-4	Large Root Ball in Main Barrel/Joint, >50% Blockage (O&M Rating A)	Remove roots/clean pipes	Within next 2 years
B48	B53	Deposits/Grease (O&M Rating B)	Remove roots/clean pipes	Within next 2 years

In addition to these pipelines, additional scope has been added to the recommended replacement projects due to sewer CCTV review for part of an upcoming District paving project. The pipelines are summarized below and are planned replacement for early 2024.

**Table 5.5: Proposed Structural Rehabilitation Projects from Condition Assessment**

Upstream MH	Downstream MH	Pipe Size (in)	Pipe Length (ft)	Issue	Recommended Project	Schedule
D7	D8	8	306			
D8	D9	8	249	Sags,		
D12	D13	8	5	Potential	Replace pipeline or deformed segment of pipe	Within next 5 years
D14	D15	8	351	Corrosion,		
D15	D15-A	8	344	FOG Buildup,		
D15-A	D16	8	97	Root Intrusion		
Total			1,255			

## 5.2 Manhole Inspections

Manhole inspection was completed in System D in 2023 due to upcoming paving projects. In addition, manholes downstream of lift stations are most likely to experience corrosion from hydrogen sulfide exposure. A lining project was completed in 2019 of all manholes downstream of lift stations to address corrosion. It is expected the lining installation will prevent future corrosion and extend the useful life of the manholes approximately 25 years; however, it is recommended that these manholes are inspected every year for liner issues and other deterioration. The 2023 – 2024 manhole inspections revealed various deficiencies along Kingston Way and Monarch Lane. Of the 18 manholes inspected, six (6) were found to be in need of full replacement and nine (9) needed replacement frames, covers, and grout. These deficiencies will be addressed in the pending 23/24 Road and Street Maintenance project that includes sanitary sewer upgrades.

### 5.2.1 Proposed Improvements

Projects recommended for inclusion in the short-term CIP based on the manhole inspections are summarized in Table 5.6.

**Table 5.6: Proposed Manhole Projects from Inspections**

<b>Area</b>	<b>Issues</b>	<b>Recommended Project</b>	<b>Schedule</b>
D7	Exposed aggregate around base and barrel section. Backflow issues seen.	Replacement	Within next year
D8	Excess grade ring (greater than 12 inches). Flow issues.	Replacement	Within next year
D9	Exposed aggregate around deteriorated base.	Replacement	Within next year
D14	Excess grade ring (greater than 12 inches). Exposed aggregate around deteriorated base. Root intrusion at cone and grade rings.	Replacement	Within next year
D15	Exposed aggregate at base. Damage to top of cone.	Replacement	Within next year
D15-A	Exposed aggregate at base. Root intrusion at top of base.	Replacement	Within next year
D16	Exposed aggregate around deteriorated base.	Replacement	Within next year
E7-2	Deterioration around pipe penetrations	Grout patch around pipe penetrations	Within next year

## 6.0 HYDRAULIC MODELING

The GRGID sewer model was updated to evaluate hydraulic capacity of the system, especially the backbone trunk sewers, at existing and projected wastewater flows. The model update and results are presented in the sections to follow.

### 6.1 Model Update

The backbone sewer model was created using Bentley SewerCAD V8i software. The existing backbone trunk sewers were input when the model was developed in 2016. Additional sewer information delivered in topographic survey and manhole dip deliverables for recent waterline projects were input as part of the update to evaluate new portions of the sewer. Input to the sewer model included additional physical data such as pipe lengths/alignments, elevations, and roughness coefficients. Consistent with GRGID sewer design standards, a Manning's roughness coefficient "n" of 0.013 was used in the model to account for friction losses (Gardnerville Ranchos General Improvement District, 2008). The sewer model is presented in Appendix M and includes pipeline diameters from 6 to 15-inches.

Existing and projected sewer flows were input to the model by assigning loads to each manhole considering sewer collection areas and nearest manhole locations. Loads were input in the form of EDU counts converted from the number of dwelling units and land use acreages within the contributing area. A summary of model loads by manhole for existing, infill, and future areas is provided in Appendix J.

A wastewater generation factor of 215 gpd/EDU (from Section 4.2) was input into the model and the total flows were compared to those calculated in previous sections.

### 6.2 Existing Scenarios

#### 6.2.1 Flow Scenarios

The hydraulic capacity of the existing collection system was evaluated for existing wastewater flows under the following two model scenarios:

- Existing Average Flows: ADF scenario for existing land uses currently served by the sewer system at a wastewater generation factor of 215 gpd/EDU.
- Existing Peak Flows: PHF scenario for existing land uses currently served by the sewer system at a wastewater generation factor of 215 gpd/EDU and a peaking factor of 1.85.

#### 6.2.2 Evaluation Criteria

In evaluating the hydraulic capacity of the existing system, pipelines with a normal flow depth to pipe diameter (d/D) ratio exceeding 0.80 or manholes with surcharging were considered hydraulically deficient.

#### 6.2.3 Model Results

Under the executed flow scenarios, no surcharging of manholes or d/D ratios exceeding 0.80 occurred. Model results indicate the existing sewer system has sufficient hydraulic capacity for both existing average and peak flows. Detailed model results are included in Appendix K.

### **6.3 Projected Scenarios**

Future growth includes infill areas, undeveloped land within GRGID boundaries, and developed/undeveloped land outside of current GRGID boundaries with potential to be annexed into the District or served as out-of-District customers (see Appendix M).

Future model loads were assigned considering topography (see existing ground slopes shown in Appendix M) as well as receiving sewer characteristics (i.e. sewer pipelines sized to accommodate growth and stub-outs for future developments). Future development along the southern and eastern outskirts of the GRGID service area generally slope towards the existing sewer system and could be tied into the existing backbone trunk sewers by gravity. Ground elevations for existing and future developments on the western outskirts of GRGID, on the other hand, slope away from the existing sewer system and would require additional lift stations to pump flows into the backbone system.

Model loads for future growth and Receiving Areas are shown in Appendix M and detailed in Appendix J. Lift stations are not included in the model, but future loads were assigned to manholes along the backbone system that could be pumped into. The development of this area should be planned to be serviced via a single lift station or as few lift stations as possible.

#### **6.3.1 Flow Scenarios**

To assess the capacity of the existing collection system to accommodate growth, the following two model scenarios were evaluated:

- Buildout Average Flows: ADF scenario for existing, infill, and future land use areas at a wastewater generation factor of 215 gpd/EDU.
- Buildout Peak Flows: PHF scenario for existing, infill, and future land use areas at a wastewater generation factor of 215 gpd/EDU and a peaking factor of 1.85.

#### **6.3.2 Evaluation Criteria**

In evaluating the hydraulic capacity of the existing system to accommodate future growth, pipelines with a normal flow depth to pipe diameter (d/D) ratio exceeding 0.80 or manholes with surcharging were considered hydraulically deficient.

#### **6.3.3 Model Results**

Under the future ADF scenario, model results show the existing system has sufficient capacity to accommodate future growth. However, surcharging and d/D ratios exceeding 0.80 would occur under the future PHF scenario for a portion of System A. To accommodate future growth, backbone trunk sewers from manholes A9 to A1 (approximately 2,500 ft) would need to be upsized from 12-inch to 15-inch diameter as shown in Appendix M and summarized in Table 6.1. Detailed model results are included in Appendix K.

**Table 6.1: Capacity Improvements for Future Growth**

<b>Upstream MH</b>	<b>Downstream MH</b>	<b>Existing Size</b>	<b>Required Size</b>	<b>Length (ft)</b>
A9	A8	12"	15"	236
A8	A7	12"	15"	324
A7	A6	12"	15"	341
A6	A5	12"	15"	288
A5	A4	12"	15"	368
A4	A3	12"	15"	388
A3	A2	12"	15"	382
A2	A1-A	12"	15"	16
A1-A	A1	12"	15"	163
<b>Total</b>	-	-	-	<b>2,506</b>

As future growth is planned, the hydraulic model should be updated to reflect actual development densities, wastewater flows, and connection points to determine the need and timing for capacity upgrades within the GRGID system. In addition, the MGSD system will need to be evaluated as growth occurs and potentially upsized to provide sufficient capacity to handle future flows.

## 7.0 CAPITAL IMPROVEMENT PLAN

### 7.1 Cost Estimating

Cost estimates presented in the CIP have been prepared for planning purposes to provide guidance in project planning and timing of implementation. Unit costs have been increased from the 2016 Master Plan based on bid tabulations and experience with similar project designs. Final project costs will vary depending on project scope/complexity, schedule, and labor/material costs at the time of bid. The CIP is intended as a planning tool to ensure GRGID is saving/reserving adequate funds for necessary improvement projects and should be updated regularly.

### 7.2 Project Costs

#### 7.2.1 Sewer System Asset Management Plan

A sewer system asset management plan was developed and prioritized by comparing the age of existing sewer system components with the anticipated useful life of each component. The age of sewer system components was determined considering development history and through as-built drawings and County Assessor information. Useful life assumptions were based on the condition of the existing system and the *Douglas County Listing of Capital Asset Components & Typical Average Useful Lives for Depreciation Purposes* (Douglas County Listing of Capital Asset Components & Typical Average Useful Lives of Depreciation Purposes, 2009) as follows:

- Sewer pipelines and manholes = 60 years
- Sewer force mains = 50 years.
- Lift stations = 35 years.

The Douglas County document referenced above (Douglas County Listing of Capital Asset Components & Typical Average Useful Lives of Depreciation Purposes, 2009) lists a useful life of 50 years for sewer pipelines and manholes which is consistent with industry standard. However, because the system is in relatively good condition, an extended useful life of 60 years is assumed for master planning purposes. Total replacement costs for aging infrastructure were determined considering the replacement year (i.e. end of useful life) and an inflation rate of 3.7%. System replacement costs in 5-year increments are summarized in Appendix L. The total cost to replace the system at the end of each component's useful life is approximately \$75,000,000 million. Aging infrastructure should only be replaced as needed and timing may fall long before or after the assumed useful life of 60 years.

A long-term savings plan is included in Appendix L to estimate the dollar amount that should be saved each year to fund system replacement projects. Considering existing sewer fund reserves, it is recommended that GRGID begin saving up to an additional \$850,000 annually, for a total sewer enterprise annual funding of up to \$2,750,000 per year for system replacement financing. This will allow for GRGID to target approximately 1% of system replacement annually, or a total system replacement on a 100-year life cycle. This is an increased savings amount from the amount recommended in the 2016 Master Plan (\$400,000 to \$600,000 annually) due to the increases in construction costs and older infrastructure. The amount to be saved is a rough estimate dependent on several factors including actual timing of replacement, actual system conditions, final project costs, savings interest rates, etc. A rate study can and should be conducted to further evaluate the savings amount and the impact on rates.

**7.2.2 Proposed Improvements from Condition Assessment**

Based on CCTV inspections completed to date, a total of ten pipe segments have been identified with severe structural issues and 26 segments with severe O&M issues which are recommended to be addressed in the short-term CIP over the next five years (see Table 5.4 and Table 5.6). Estimated project costs associated with replacing the damaged portion of pipe and cleaning blockages related to roots/grease are summarized in Table 7.1.

**Table 7.1: Costs for Proposed Condition Assessment Improvements**

Item	Improvement Project	Quantity	Unit	Unit Cost	Total Cost
1	Replacement Projects: Replace pipeline segments with structural damage	4,774	LF	\$275	\$1,312,850
2	O&M Projects: Clean pipeline segments with blockages (≥50%) from roots/grease	34	EA	\$1,000	\$34,000
3	Manhole Projects: Replace or repair manholes within paving scope of FY23-24	8	EA	\$10,000	\$80,000
Total (Rounded)					\$1,430,000

**7.2.3 Capacity Improvements for Future Growth**

To accommodate future growth and Receiving Areas under PHF conditions, backbone trunk sewers from manholes A9 to A1 would need to be upsized from 12-inch to 15-inch diameter (see Appendix M and Table 6.1). Additional lift station(s) would also be needed to accommodate growth along the western outskirts of GRGID. The development of this area should be planned to be serviced via a single lift station or as few lift stations as possible. Estimated project costs for capacity improvements associated with future growth are summarized in Table 7.2. Funding for future growth projects should be through impact fees paid by development. The gravity system maintained by MGSD will need to be evaluated and potentially upsized to provide sufficient capacity to handle future growth.

**Table 7.2: Costs for Capacity Improvements for Future Growth**

Item	Improvement Project	Quantity	Unit	Unit Cost	Total Cost
1	Replace existing 12" sewer main with 15" sewer main	2,500	LF	\$350	\$875,000
2	New lift station	1	LS	\$700,000	\$700,000

In addition to the improvements in Table 7.2, GRGID should consider replacing the four existing sewer lift stations with a single larger lift station on the west side of District. Consolidating to a single lift station would have a significant reduction in operating costs and maintenance requirements. Further study would be required to identify potential sites and to determine preliminary lift station design/sizing.

#### 7.2.4 On-Going Maintenance and Planning

On-going maintenance and planning projects recommended for inclusion in the CIP are as follows:

- Video inspections and field assessments should be scheduled regularly to monitor the condition of the existing system and to identify and prioritize rehabilitation/replacement projects.
- The Sewer Master Plan should be updated at 5-year intervals to reflect current conditions and to re-evaluate the short-term and long-term CIP.
- A sewer rate study should be prepared to determine if adjustments are necessary to support costs for on-going maintenance and capital improvements and to ensure GRGID is saving/reserving sufficient funds.

#### **7.3 Capital Improvement Plan**

Recommended improvement projects are separated into a short-term CIP (0-5 years), long-term CIP (20+ years), and intermediate 5-year increments as summarized in Table 7.3.

**Table 7.3: Recommended CIP**

<b>Recommended Fiscal Year (FY)</b>	<b>Recommended Project/Study</b>	<b>Total Cost</b>
<b><u>0-5 Year CIP (Short-Term)</u></b>		
2023-24	FY 23-24 Street and Sewer Improvement Project (Sewer Items Only)	\$840,000
2024-25	Convert Sewer Model to GIS-Based Program	\$20,000
2025-26	Replacement Projects (structural damage)	\$295,000
2026-27	Sewer Rate and Connection Fee Study	\$50,000
2027-28	Replacement Projects (structural damage)	\$295,000
	<i>Total</i>	\$1,500,000
<b><u>5-10 Year CIP</u></b>		
2028-33	5-Yr Update to Sewer Master Plan	\$50,000
	CCTV Inspections	\$60,000
	Rehabilitation/Repair and Cleaning Projects	\$1,430,000
	<i>Total</i>	\$1,540,000
<b><u>10-15 Year CIP</u></b>		
2033-38	5-Yr Update to Sewer Master Plan	\$50,000
	CCTV Inspections	\$60,000
	Rehabilitation/Repair and Cleaning Projects	\$1,430,000
	<i>Total</i>	\$1,540,000
<b><u>15-20 Year CIP</u></b>		
2038-43	5-Yr Update to Sewer Master Plan	\$50,000
	CCTV Inspections	\$60,000
	Rehabilitation/Repair and Cleaning Projects	\$1,430,000
	<i>Total</i>	\$1,540,000
<b><u>20+ Year CIP (Long-Term)</u></b>		
	Replace aging infrastructure per asset management plan (rounded) <sup>1</sup>	\$77,000,000
	Future growth: replace existing 2,500 LF of 12" sewer main with 15" sewer main <sup>2</sup>	\$875,000
	Future growth: new lift station <sup>2</sup>	\$700,000
	Replace existing lift stations with single lift station <sup>3</sup>	\$700,000

<sup>1</sup> Total cost to replace system at end of useful life (Appendix L).

<sup>2</sup> Future growth projects should be funded through impact fees paid by development.

<sup>3</sup> Further study required to estimate costs.

## 8.0 REFERENCES

- Carson City. (1995). Nevada Municipal Code - Section 12.06.280 Sanitary Design Standards and Specifications.
- Douglas County Community Development Department. (2020). Nevada Master Plan 2020 Update.
- Douglas County Listing of Capital Asset Components & Typical Average Useful Lives of Depreciation Purposes. (2009, 05 06).
- Gardnerville Ranchos General Improvement District. (2008, 04 01). Policies and Procedures Manual - Sewer System Design Criteria.
- Gardnerville Ranchos General Improvement District, Policies, and Procedures Manual. (2012, 07 01). Appendix C - Sewer Rates, Fees and Charges (Resolution 12-03).
- Great Schools. (2016, 06 16). School profile.
- MGSD. (2023). *Rate Study*.
- Tchobanoglous, C. a. (n.d.). *Small and Decentralized Wastewater Management Systems*. McGraw-Hill.
- United States Census Bureau. (2020). American Fact Finder Community Facts: Gardnerville Ranchos CDP, Nevada.
- Wastewater Engineering: Treatment and Resource Recovery. (2013). *5th Edition*. Metcalf and Eddy.
- Young, S. D. (2023). *Memorandum for the Heads of Executive Departments and Agencies*. Washington D.C: Executive Office of the President.

**Appendix A MGSD/GRGID Agreements**



MANOUKIAN, SCARFELLO & ALLENG, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING

CARRON CITY OFFICE  
203 EAST PROCTOR STREET  
CARRON CITY, NEVADA 89701  
TELEPHONE (702) 863-4377

P. O. BOX 93  
ZEPHYR GOV. NEVADA 89448  
TELEPHONE (702) 868-1878

1 territory in Douglas County, Nevada, and as such is authorized and  
2 empowered to enter into this agreement; and

3 WHEREAS, GRID is a public corporation duly organized pur-  
4 suant to Chapter 318 of Nevada Revised Statutes, consisting of  
5 territory in Douglas County, Nevada, and one of the basic powers  
6 of said GRID is to furnish sanitary sewer services to its inhabi-  
7 tants at this time; and

8 WHEREAS, the parties hereto jointly agree for the joint use  
9 of sewage disposal facilities of MGSD for the purpose of collec-  
10 ting from GRID, treating and disposing of sewage emanating and  
11 flowing from the territory of GRID and to provide for the method  
12 to accomplish said purpose, whereby the public interest, economy  
13 and general welfare will be better served thereby; and

14 WHEREAS, the parties hereto desire to enter into an inter-  
15 local cooperative agreement pursuant to the provisions of Nevada  
16 Revised Statutes 277.180.

17 NOW, THEREFORE, in consideration of the mutual promises of  
18 the parties and other good and valuable consideration as herein-  
19 after set forth, the parties hereto covenant and agree as follows:

20 1. CAPACITY RIGHTS:

21 MGSD does hereby grant and reserve unto GRID an initial  
22 capacity right of Four Hundred Thousand gallons (400,000) average  
23 daily flow in the said facilities of MGSD, for so long as the  
24 same may be owned or operated by MGSD or its duly constituted  
25 assigns, or successors in interest.

26 a. Said facilities are hereby defined to include  
27 all jointly used sewage and treatment, collection, storage, and  
28 disposal facilities, both existing and proposed, the treatment  
29 plant and the pumps, valves, lines and appurtenances used in  
30 connection therewith.

31 b. Said capacity shall include the perpetual right  
32 to use and enjoy up to Four Hundred Thousand gallons (400,000)

HARRISON, V. DUNFELLO & ALLIEN, M.L.L.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
ZEPHYR COVE, NEVADA 89448  
TELEPHONE (702) 550-1676

CARSON CITY OFFICE  
803 EAST FRONTIER STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 882-4873

1 per day of Average Daily Flow, as hereinafter defined, including  
2 infiltration in and to all of the portion of the facilities int-  
3 ended to be utilized by GRID for the collection, transmission,  
4 treatment and disposal of sewage which is or will be emanating  
5 from within its boundaries as same may from time to time in the  
6 future be modified or expanded.

7 c. Average Daily Flow as used herein is defined as  
8 follows: The total number of gallons accumulated from all sources  
9 within any consecutive seven-day period, divided by seven, and ex-  
10 pressed in gallons per day (gpd).

11 d. If at any time in the future the then existing  
12 capacity rights of GRID shall be exceeded by the application of  
13 the formula set forth in subpart (c), above, for more than any  
14 seven days during any fiscal year, GRID shall be required to pur-  
15 chase additional capacity in order to accommodate such flows by  
16 paying for the same in the manner hereinafter provided.

17 e. MGSD does hereby acknowledge and agree to the  
18 foregoing reservation of capacity, upon the condition that GRID  
19 shall not sell, assign, hypothecate, contract for or otherwise  
20 transfer any right or interest therein without first obtaining  
21 the written consent of MGSD, except as intended herein. GRID shall  
22 not be allowed to collect the sewage from any area outside the  
23 boundaries of GRID without prior written consent of MGSD being first  
24 had and obtained, it being intended that the capacity shall be used  
25 only within the boundaries of GRID.

26 2. PAYMENT FOR INITIAL CAPACITY:

27 For and in consideration of the reservation of capacity  
28 rights made by MGSD, GRID does hereby covenant and agree to pay  
29 the sum of Three Hundred Thousand (\$300,000.00) Dollars represent-  
30 ing payment for the initial capacity right of Four Hundred Thousand  
31 (400,000) gallons Average Daily Flow in the said facility of MGSD,  
32

MANOUKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
ZENITH COVE, NEVADA 89448  
TELEPHONE (702) 508-1076

CARSON CITY OFFICE  
303 EAST WILSON STREET  
CARSON CITY, NEVADA 89708  
TELEPHONE (702) 892-4377

1 subject to adjustment as set forth in the following paragraph.

2 It is understood and agreed that MGSD is planning to expand  
3 their existing 0.5 MGD treatment plant to provide treatment for  
4 2.0 MGD. The charge of \$0.75 per gallon is based upon estimates of  
5 plant expansion costs contained in "Report on Expansion of the  
6 Minden-Gardnerville Sanitation District," dated January 1, 1973, as  
7 same may be changed, modified, adjusted, supplemented, replaced or  
8 substituted by MGSD subsequent to the date hereof. In the event  
9 that the actual total project cost of said plant expansion should  
10 vary upward or downward from the estimates in said report, then the  
11 initial capacity charge shall be adjusted to accurately reflect  
12 such change and shall be promptly paid by GRID, upon demand so to  
13 do. It is the intent of the parties that GRID shall pay for its  
14 share of the proposed 1,500,000 gpd plant expansion of MGSD based  
15 upon their initial 400,000 gpd capacity acquisition.

16 In no event shall an award of contract be made in the  
17 event that the lowest responsible bid for the construction of the  
18 proposed improvements exceeds by 25% the final engineers' estimate  
19 of construction costs which will be prepared after completion of  
20 construction plans and specifications, without the prior conference  
21 of the joint Boards of the parties hereto.

22 It is agreed that MGSD will proceed diligently and in good  
23 faith with the planning and construction of such plant expansion.  
24 In the event a construction contract for the plant expansion has  
25 not been awarded within three (3) years from the date of the execution  
26 of this agreement then either MGSD or GRID shall have the  
27 option to terminate this agreement without further liability each  
28 to the other.

29 Said \$300,000.00 shall be deposited in escrow by GRID, in  
30 cash, upon receipt of written notification by GRID of the receipt  
31 of all required public approvals and the offer and acceptance by  
32 MGSD of public grants required to undertake and complete the pro-

MANOUKIAN, SCARFELLO & ALLING, L.T.C.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
2875R COVE, NEVADA 89448  
TELEPHONE (702) 858-8878

CARSON CITY OFFICE  
303 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 882-4377

1 posed improvements which are the subject of this agreement. Said  
2 escrow instructions shall provide that said monies shall be prompt-  
3 ly distributed to MGSD on receipt by said escrow holder of written  
4 notification from MGSD of the award of a construction contract for  
5 the construction of said improvements. Such escrow instructions  
6 shall be jointly prepared by the parties hereto.

7 Upon the award of a construction contract for the expanded  
8 plant facilities and other improvements, this agreement shall be  
9 irrevocable except in the event of default as hereinafter set forth

10 3. COSTS OF TREATMENT: QUARTERLY PAYMENTS:

11 Variable Costs:

12 GRID shall pay to MGSD a sum equal to its rateable por-  
13 tion of the variable costs incurred in the maintenance and opera-  
14 tion of those facilities reasonably required for the receiving and  
15 collection, processing, treatment and disposal of the sewage of  
16 GRID, based upon the percentage which the annual flows of GRID bear  
17 to the total annual flows then being treated by MGSD.

18 a. "Variable Costs" shall include, but not neces-  
19 sarily be limited to: Electric power, standby power, fuel, chemi-  
20 cals and supplies.

21 b. Payments for "variable costs" shall be calculat-  
22 ed by application of the following formula: Each year MGSD shall  
23 cause an estimate to be made of its "variable costs" required for  
24 the forthcoming year. The meter readings provided for herein shall  
25 be used as a basis to determine the percentage of the total thereo  
26 to be levied against GRID. In the event the meters do not functio  
27 properly they shall be repaired without undue delay and charges  
28 shall be computed based on prorated meter readings before and after  
29 the repair.

30 (1) The annual charge to GRID shall thereupon be  
31 calculated by determining the proportion that such meter read  
32 ings of the previous twelve (12) consecutive month period bear

MANOUKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TUDOR OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
SHERMAN COVE, NEVADA 89418  
TELEPHONE (702) 288-8176

CARSON CITY OFFICE  
503 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 882-1577

*Quantity*

1 to the total of all metered flows of sewage collected, pro-  
2 cessed, treated and disposed of by the facilities of MGSD.  
3 This proportion multiplied times the estimate of the variable  
4 costs for the forthcoming fiscal year, shall result in the  
5 annual assessment to be levied against GRID for its share of  
6 such charges.

7 (2) The previous year's annual assessment for  
8 variable costs shall be recomputed using the proportion deter-  
9 mined above and applying it to the previous year's charges.  
10 If this calculation establishes that GRID was assessed for  
11 more than its share of the previous year's costs, the amount  
12 of over-assessment shall be deducted from the annual assess-  
13 ment for the forthcoming fiscal year's variable cost charge.  
14 If a calculation establishes that GRID was under-assessed for  
15 the previous year's charge, the amount of the under-assessment  
16 shall be added to the annual assessment for the forthcoming  
17 fiscal year's charge. Pending the recorded meter readings  
18 during the first operative year, estimates of flows alone shall  
19 be used to calculate GRID's variable cost payment hereunder  
20 with adjustments to be made in the same manner as herein set  
21 forth.

22 Fixed Costs:

23 In like fashion, MGSD shall annually estimate the share  
24 of fixed costs to be paid by GRID based upon the prorata percentage  
25 of capacity in the entire system of MGSD then owned by GRID.  
26 "Fixed Costs" shall include, but not necessarily be limited to:  
27 Labor or repairs, insurance, vehicles and equipment, maintenance  
28 and operational costs, legal, fiscal, accounting, engineering and  
29 administrative services, and all other costs not classified as  
30 "variable costs" in paragraph 3.a, above.

31 (3) Payments for fixed costs shall be paid  
32

MANUKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 38  
TEHAMA COVE, NEVADA 89448  
TELEPHONE (702) 898-6976

CAIRSON CITY OFFICE  
301 EAST PROCTOR STREET  
CAIRSON CITY, NEVADA 89301  
TELEPHONE (702) 893-4877

1 quarterly, in advance, on or before August 15, November 15,  
2 February 15, and May 15, of each fiscal year, commencing with  
3 the next quarterly payment following the date of substantial  
4 completion of the proposed facilities. Substantial completion  
5 of the project shall be construed to mean initial start-up of  
6 the plant by the contractor.

7 (4) Payments for variable costs shall be paid  
8 quarterly, in advance, on or before August 15, November 15,  
9 February 15, and May 15, of each fiscal year, commencing with  
10 the next quarterly payment following the completion of the  
11 proposed facilities and connections thereto by GRID.

12 (5) The responsibility for maintenance and  
13 operation of those facilities required for the sole use of  
14 GRID shall exclusively be the responsibility of GRID. Notwith-  
15 standing anything herein to the contrary, GRID alone shall be  
16 responsible for all maintenance and operational charges of the  
17 main trunk line between its boundaries and the sewer treatment  
18 plant of MGSD. In the event that other users shall connect to  
19 said line, the costs of GRID shall be reduced rateably.

20 4. OPTIONS TO ACQUIRE ADDITIONAL CAPACITY:

21 As a further consideration of this agreement, MGSD gives  
22 to GRID an option to acquire additional capacity rights in the  
23 said facilities in minimum incremental increases of Fifty Thousand  
24 (50,000) gpd flow, provided that such unused capacity is available.  
25 Unused capacity is defined as the difference between 1.3 million  
26 gallons per day, which is 65% of the 2.0 MGD capacity after plant  
27 expansion to 2.0 MGD, and the sum of the average daily flow to the  
28 sewage treatment plant by the combined flows as defined in Para-  
29 graph 1(c) above. Such increases in capacity shall be computed and  
30 paid for at the time of their commitment, in the same amount as  
31 paid for the initial capacity purchase, as same may be adjusted in  
32 the future to properly reflect increased costs of construction,

MANOUKIAN, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LANE TARDOR OFFICE  
RECORD HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
SEPMER COVE, NEVADA 89418  
TELEPHONE (702) 884-8578

CARSON CITY OFFICE  
308 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89401  
TELEPHONE (702) 884-8577

1 engineering, legal, fiscal, administrative and other related costs

2 a. Written notice of the intention of GRID to acq-  
3 uire additional capacity rights shall be given to MGSD with as muc  
4 advance notice as possible in the circumstances in order to give  
5 MGSD an adequate opportunity to make provision therefor.

6 b. At such time as 65% of the 2.0 MGD capacity is  
7 reached, the parties mutually agree to confer and determine whether  
8 or not additional capacity in the facilities will be required in  
9 order to meet future requirements of either MGSD or GRID and the  
10 steps to be taken in furtherance thereof. It is the intent of the  
11 parties that MGSD shall, irrespective of any exercise of the option  
12 granted hereunder, have reserved unto itself 0.7 MGD capacity which  
13 shall not, in any event, be available to GRID.

14 c. In the event that MGSD, alone, elects to expand  
15 the treatment plant, MGSD, alone, shall bear all costs of such  
16 construction, provided, however, that GRID shall thereupon reim-  
17 burse MGSD for all costs per gallon of such increased capacity in  
18 excess of MGSD's original cost per gallon apportionable to such  
19 construction, limited, however, to the number of gallons of capa-  
20 city then held by GRID which shall not include costs of engineer-  
21 ing, financing, public grants or other administrative costs. It  
22 is understood that the original cost per gallon of MGSD shall be  
23 established by applying the total project cost of the expansion  
24 from the existing 0.5 MGD capacity to the contemplated 2.0 MGD  
25 capacity upon final completion thereof. The application of this  
26 paragraph is limited to any excess above the initial 400,000 gpd,  
27 or the then existing aggregate capacity having theretofore been  
28 acquired by GRID.

29 d. In the event that unused capacity is unavailable  
30 and GRID requires additional capacity and MGSD does not desire  
31 additional capacity, then GRID shall have the right to expand the  
32 treatment plant and such other facilities as may be required to

MANUKIAN, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TANGOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
LEHIGH COVE, NEVADA 89448  
TELEPHONE (702) 588-1678

CAIRSON CITY OFFICE  
303 EAST PROCTOR STREET  
CAIRSON CITY, NEVADA 89701  
TELEPHONE (702) 832-4077

1 increase such capacity. In such case, GRID, alone, shall bear all  
2 costs of such construction.

3 e. MGSD makes no representation that the capacity  
4 acquired by GRID hereunder is or may be adequate for the present or  
5 projected needs of GRID.

6 Requirements for any construction contemplated hereunder  
7 shall be submitted to MGSD for its approval and MGSD shall promptly  
8 proceed to design, engineer and construct such required facilities  
9 it being the intent of the parties that nothing herein contained  
10 shall impair the right of MGSD to make all decisions concerning  
11 the operation and expansion of the subject plant, and its facilities,  
12 in order to insure complete compatibility with the overall  
13 design and operational concept. In addition to all direct and indirect  
14 construction costs, GRID shall also pay to MGSD all administrative  
15 and other costs incurred thereby. MGSD further agrees to  
16 fully cooperate in such construction and to do everything necessary  
17 to expedite and facilitate plant and other facility expansion as  
18 may then be required by GRID.

19 5. FUTURE MODIFICATION: EXPANSION OR IMPROVEMENT  
20 OF FACILITIES:

21 MGSD, in its sole discretion, as its Board of Trustees  
22 determines, may make any necessary capital improvements for any  
23 purpose including, but not limited to, capital improvements required  
24 by law or regulation, to jointly used sewage treatment and  
25 disposal facilities. GRID shall pay an additional sum for joint  
26 use towards the cost of said capital improvements to said sewage  
27 treatment and disposal facilities so jointly used, except for  
28 capital improvements that increase treatment and disposal capacity  
29 for MGSD's sole use. Said payments shall be made by GRID in cash  
30 upon receipt of notice from MGSD that it is necessary or required  
31 so to do.

32 If modification, expansion or extension of the system or

MANOUKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 81  
SOUTH LAKE TAHOE, NEVADA 89449  
TELEPHONE (702) 818-8878

CARSON CITY OFFICE  
303 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 881-4577

1 its facilities is required by law or regulation solely to improve  
2 the quality of the effluent or to change the point of discharge  
3 of the effluent, but does not increase the capacity of the system,  
4 then GRID shall be required to make payment to MGSD for its share  
5 of such costs regardless of whether the decision so to do is that  
6 of any public regulatory agency or that of the MGSD. Such payment  
7 shall be made in cash by GRID as soon as it is legally practicable  
8 so to do, following receipt of written notice by MGSD of its re-  
9 quirement therefore. Any payment made in furtherance hereof shall  
10 be equal to the percentage of capacity in the total system of MGSD  
11 as from time to time may be modified in the future which GRID then  
12 holds in order to bear its proportionate share of such costs.

13 It is the intent of this paragraph to insure that each  
14 party to this agreement shall bear its fair share of all appropri-  
15 ate costs for the collection, treatment and disposal of sewage  
16 emanating from within its boundaries.

17 It is agreed that the initial Capacity-Payment set forth  
18 in Paragraph 2 includes the share of GRID to cover plant expansion  
19 to a capacity of 2.0 MGD and that this paragraph is intended to  
20 cover contributions by GRID other than for the initial plant ex-  
21 pansion to 2.0 MGD.

22 7. INTERCEPTOR LINE FROM BOUNDARY OF GRID TO SEWER PLANT:

23 GRID agrees to construct an interceptor line from the  
24 boundaries of GRID to a point to be designated by MGSD in order to  
25 connect with the system of MGSD for the purpose of transporting  
26 the sewage of GRID to the facilities of MGSD. Such lines shall be  
27 of dimensions and in a location specified by MGSD. All costs and  
28 responsibility of construction and right-of-way acquisition shall  
29 be the responsibility of GRID.

30 MGSD agrees to reimburse GRID for the costs incurred in  
31 the construction of said line which are in excess of the costs  
32 necessary to meet the design requirements of GRID for said line.

MANOUKIAN, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 18  
ZENITH COTE, NEVADA 89416  
TELEPHONE (702) 591-8578

CARRON CITY OFFICE  
203 EAST PROCTOR STREET  
CARRON CITY, NEVADA 89701  
TELEPHONE (702) 882-1877

1 Such reimbursement shall be made from monies to be received from  
2 future users of such line, provided that such reimbursement shall  
3 not exceed 100% of such excess costs during a period of ten (10)  
4 years from date of completion of said line. Said payments to be  
5 received by MGSD and disbursed to GRID in accordance with the terms  
6 and provisions of Public Service Commission Tariff NO. 704, as  
7 same may be modified from time to time in the future.

8 GRID agrees at the request of MGSD to timely make any  
9 grants of rights-of-way, bills of sale and other conveyances as  
10 shall be deemed necessary or appropriate by MGSD. Specifically,  
11 GRID agrees to forthwith make conveyances of the aforesaid inter-  
12 ceptor line, its appurtenances and rights-of-way, to MGSD upon its  
13 completion and acceptance by GRID.

14 It is understood that certain facilities of GRID have  
15 been constructed prior to the date hereof. If in the judgment of  
16 MGSD such facilities as constructed and utilized may be harmful,  
17 inconvenient or damaging to any part of the system of MGSD, its  
18 maintenance or operation or its administration or in any respect  
19 below the standards of MGSD, GRID at its sole cost and expense shall  
20 be required to correct such deficient construction within twelve  
21 (12) months from receipt of written notice by GRID of the require-  
22 ments so to do.

23 **8. METERING OF FLOWS:**

24 Flows of GRID shall be continuously metered, which such  
25 meters shall be periodically inspected and calibrated. Such meters  
26 must be of a type and quality acceptable to MGSD. Meters shall be  
27 selected, installed and operated by MGSD at locations to be desig-  
28 nated and approved by MGSD, all costs of which shall be the  
29 responsibility of GRID and shall be promptly paid on request. Such  
30 inspection, calibration and metering shall be done in accordance  
31 with generally acceptable engineering practices, the costs of which  
32 shall be borne by GRID.

MANOUJIAN, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
FOUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
ZEPHYR DRIVE, NEVADA, 89448  
TELEPHONE (702) 882-8878

CARSON CITY OFFICE  
808 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 882-4177

1           9. GRID'S FACILITIES - CONSTRUCTION AND COST: EASEMENTS:

2           The cost of construction and placing into use the GRID  
3 sewage collection systems, interceptor sewers, pump stations and other  
4 facilities, together with all lands and easements therefor, and the  
5 connection thereof with MGSD's sewer system required to collect  
6 and transport sewage emanating and flowing from within the territory  
7 of said GRID, shall be at the sole expense of and be the exclusive  
8 responsibility of GRID. GRID's facilities shall be designed and  
9 constructed in accordance with the minimum requirements of MGSD,  
10 or equal. GRID's sewer system shall be connected to the MGSD's  
11 sewer system at such points as may be reasonably required and  
12 approved by MGSD. GRID shall pay all costs of acquiring said lands  
13 and easements, including, but not limited to, legal, engineering,  
14 appraisal and court costs. GRID further agrees to make such grants  
15 of easements, special use permits, or other documents or instruments  
16 which, in the judgment of MGSD, may be required to properly service  
17 and maintain the facilities of GRID. GRID shall further furnish  
18 MGSD with "as-built" drawings of each facility within ninety (90)  
19 days after acceptance of said facility by GRID. GRID shall furnish  
20 MGSD maps of said facilities and sewer systems at a scale of  
21 1"-100' which are equivalent to the "Sewer Grid Maps" now maintain-  
22 ed by MGSD, or at a scale and to a format to be specified by MGSD.  
23 The inspection and approval of all construction, or installation  
24 of facilities associated with metering and connection to the  
25 facilities of MGSD and all points of connection of GRID shall be  
26 accomplished by the designated engineer of MGSD prior to the  
27 transportation by GRID of any sewage into the joint facilities,  
28 all costs of which shall be paid by GRID.

29           Wherever in this agreement a plan check and inspection is  
30 provided to be made by MGSD, that District shall have ten (10)  
31 days within which to accomplish such approval or disapproval,  
32 absent which GRID shall presume same to be approved as submitted.

MANOLIKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 881  
ZEPHYR COVE, NEVADA 89448  
TELEPHONE (702) 888-1878

CARBON CITY OFFICE  
303 EAST FROCTOR STREET  
CARBON CITY, NEVADA 89701  
TELEPHONE (702) 893-4377

1 10. COMPLIANCE WITH RULES AND REGULATIONS: UNUSUALLY  
2 HIGH FLOWS: NOTICE TO PLANT MANAGER:

3 In the event GRID contemplates the discharge of unusual  
4 ly high flows which can be anticipated with reasonable certainty,  
5 or with regard to unusual treatment considerations, GRID shall be  
6 required to give to the treatment plant manager notice of its in-  
7 tention so to do.

8 GRID shall not cause or permit to be placed in the faci-  
9 lities of MGSD for the handling, treatment and disposal thereof by  
10 MGSD, any liquids or materials which shall interfere with or pre-  
11 vent the effective use or operation of the sewage treatment dis-  
12 posal facilities of MGSD, further agreeing to comply with all rules  
13 and regulations adopted by MGSD respecting types of sewage and  
14 other waste which may be discharged in the joint system, manner of  
15 discharge, use of grease traps and regulation plumbing, drainage  
16 and sewerage, and further agrees to adopt as its own minimum re-  
17 quirements the applicable provisions of the ordinances adopted by  
18 MGSD as same may be from time to time in the future amended, modi-  
19 fied or otherwise changed in such respects and otherwise agree to  
20 comply with any applicable Public Service Commission, State Health  
21 Department or other regulatory body regulations.

22 11. LIABILITY INSURANCE:

23 Each party agrees to procure and maintain in force during  
24 the term of this agreement public liability insurance in companies  
25 approved by the Insurance Commissioner of the State of Nevada, to  
26 protect against liability on comprehensive general liability, and  
27 including, but not limited to, contractual liability insurance,  
28 damage claims through public use of, or arising out of accidents  
29 occurring in the operation of any of the works and facilities of  
30 the insuring party, and for damage claims due or incident to, either  
31 in whole or in part, and whether direct or indirect, the construc-  
32 tion, operation, repair, existence or failure of any of said work

MANDOURIAN, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TANCE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 85  
RENO, NEVADA 89402  
TELEPHONE (702) 818-0076

CARSON CITY OFFICE  
303 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 483-4377

1 and facilities of the insuring party in a minimum coverage of  
2 bodily injury liability, \$500,000.00 for each person, \$1,000,000.00  
3 for each occurrence, \$1,000,000.00 aggregate bodily injury, and  
4 property damage, \$100,000.00 aggregate and a comprehensive excess  
5 indemnity occurrence limit \$1,000,000.00 aggregate limit  
6 \$1,000,000.00. Such insurance policies shall provide coverage for  
7 each party's liability on such claims or losses. Certificates of  
8 insurance shall be delivered to the other party for keeping. MGSD  
9 and GRID agree to obtain a written obligation from their insurers  
10 to notify MGSD or GRID in writing at least thirty (30) days prior  
11 to cancellation or refusal to renew any such policy or policies of  
12 MGSD or GRID.

13 **12. TOTAL OR PARTIAL DESTRUCTION OR FAILURE OF FACILITIES:**

14 In the event the sewage treatment and disposal facilities  
15 of MGSD jointly used are totally destroyed, or totally fail, or  
16 are partially destroyed or partially fail, and cause interruption  
17 of joint use service so that MGSD cannot treat and dispose of  
18 GRID's sewer and waste water as herein defined, or the operation  
19 of state, regional or federal law causes said interruption of  
20 service, or any cause beyond the control of MGSD causes said inter-  
21 ruption of service, GRID shall hold MGSD harmless from interrup-  
22 tion of service, and MGSD shall retain all payments made by GRID. MGSD  
23 shall make all reasonable efforts to cause a resumption of such  
24 interrupted service.

25 **13. JOINT LIABILITY: INDEMNITY:**

26 In the event any judgment is entered against MGSD and  
27 GRID, or either of them, because of the concurrent negligence of  
28 MGSD and GRID, or either of them, their BOARDS OF Directors,  
29 Officers, Agents and Employees, an apportionment of liability to  
30 pay said judgment shall be made by the court of competent jurisdic-  
31 tion hereinafter provided. GRID shall hold MGSD harmless and  
32 shall indemnify and reimburse MGSD for all costs, fees and other

1 expenses incurred by MGSD in the event that MGSD shall be named  
2 as a defendant in any litigation or complaint brought by reason of  
3 any jointly claimed right, liability or the exercise of any right,  
4 flowing from or incidental to this agreement.

5 14. RETENTION OF PAYMENTS:

6 In the event of termination of this agreement by reason  
7 of the default of GRID as herein provided, GRID shall not be en-  
8 titled to refund of any payments made to MGSD prior to the date  
9 hereof.

10 15. DEFAULT IN PAYMENT: PENALTIES:

11 In the event that GRID shall be in default in the making  
12 of any payment required of it under this agreement, or for the  
13 breach of any other covenant contained herein, and such default  
14 continues after ninety (90) days written notice to cure such de-  
15 fault, MGSD hereby reserves the right to discontinue service to  
16 GRID as herein set forth without further notice being required  
17 prior thereto.

18 If the annual statement, or any part thereof, is not paid  
19 within sixty (60) days after presentation, interest shall  
20 accrue thereon in favor of MGSD at the rate of one (1%) percent  
21 per month. The sole remedy of GRID shall be to pay under protest  
22 and submit the matter to arbitration. If not paid, MGSD shall have  
23 the right to sever connection of the GRID system with its systems,  
24 and same shall not be again reconnected until all charges and in-  
25 terest and the cost of disconnecting and reconnecting are paid to  
26 MGSD.

27 In the event of failure or refusal of GRID to make any  
28 payment of monies required of it under this agreement, MGSD shall  
29 have the right to elect to advance such monies for and on behalf  
30 of GRID, without waiving any right on default to which it may be  
31 entitled, and shall be entitled to charge GRID all administrative,  
32 interest and other costs incurred thereby.

MANOLKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
SOUTH LAKE TAHOE, NEVADA 89448  
TELEPHONE (702) 888-4878

CARSON CITY OFFICE  
303 BART FRICTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 892-4277

1 Service shall not be terminated if such termination would  
2 be violative of any state, federal or local law, ordinance, rule or  
3 regulation.

4 16. DURATION OF AGREEMENT: TERMINATION:

5 This agreement shall continue in perpetuity unless sooner  
6 terminated by agreement of the parties hereto, it being the clear  
7 understanding of the parties that, notwithstanding such termination  
8 GRID shall not be entitled to any reimbursement for any monies  
9 theretofore paid pursuant to this agreement, or any part thereof.  
10 Provided, however, in the event that a construction contract is not  
11 awarded within three (3) years from the date hereof, for plant ex-  
12 pansion to 2.0 MGD then at the option of either party this agreement  
13 may be terminated and all monies theretofore paid by GRID shall be  
14 returned to GRID, except any monies allocable to GRID's portion of  
15 engineering, legal, accounting or administrative costs incurred in  
16 furtherance hereof.

17 17. SEVERABILITY:

18 If any section, subsection, sentence, clause, phrase or  
19 word of this agreement, or the application thereof to either party  
20 or to any other person or circumstance is for any reason held in-  
21 valid, it shall be deemed severable and the validity of the remain-  
22 der of this agreement, or the application of such provision to the  
23 other parties, or to any other persons or circumstances shall not  
24 be affected thereby. Each party hereby declares that it would have  
25 entered into this agreement and each section, subsection, sentence,  
26 clause, phrase or word hereof notwithstanding the application thereof  
27 to either party or any other person or circumstance may be held  
28 invalid.

29 18. SUPPLEMENTAL AGREEMENT:

30 This agreement may from time to time be changed, altered,  
31 modified or supplemented by and with the consent of the parties  
32 hereto in accordance with the authorization by the respective go-

MANOUKIAN, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
ZENITH COVE, NEVADA 89448  
TELEPHONE (702) 868-1878

CAIRN CITY OFFICE  
305 EAST PROCTOR STREET  
CAIRN CITY, NEVADA 89704  
TELEPHONE (702) 893-4377

1 ing bodies of the parties.

2 19. OWNERSHIP OF MGSD'S FACILITIES:

3 Nothing in this agreement, nor any sewage treatment and  
4 disposal facility constructed by MGSD in furtherance thereof, shall  
5 transfer, assign or convey to GRID any right of ownership in any  
6 such facility of MGSD now constructed, owned and operated by MGSD,  
7 or in the future constructed, owned and operated by MGSD, MGSD  
8 further reserving the right to use all reserved but unused capacity  
9 in the facilities the subject hereof.

10 20. GRID'S FACILITIES: MGSD HARMLESS FROM LIABILITY:

11 GRID agrees to indemnify MGSD, its Board of Trustees,  
12 Officers, Agents and Employees, and to hold them free and harmless  
13 from any and all claims, demands, damages, losses, cost, expenses  
14 or liability, due or incident to, either in whole or in part, and  
15 whether directly or indirectly, the design, construction, operation,  
16 repair, existence, or failure of any works and facilities of  
17 GRID, save and excepting any claims, demands, damages, losses,  
18 cost, expenses or liability arising by reason of any willful misconduct  
19 or gross negligence of MGSD or its agents, employees or  
20 representatives.

21 21. MGSD'S FACILITIES: GRID HARMLESS FROM LIABILITY:

22 MGSD agrees to indemnify GRID, its Board of Trustees,  
23 Officers, Agents and Employees, and to hold them free and harmless  
24 from any and all claims, demands, damages, losses, cost, expenses  
25 or liability, due or incident to, either in whole or in part, and  
26 whether directly or indirectly, the design, construction, operation,  
27 repair, existence or failure of any works and facilities of MGSD,  
28 save and excepting any claims, demands, damages, losses, cost, expenses  
29 or liability arising by reason of any willful misconduct or  
30 gross negligence of GRID, or its agents, employees or representatives.

31 //

32 //

MANOLIKAV, SCARFELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
ZENITH COVE, NEVADA 89448  
TELEPHONE (702) 869-1878

CARSON CITY OFFICE  
303 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 601-4177

1 22. NOTICES:

2 All notices provided in this agreement shall be in writ-  
3 ing and shall be sufficient if sent by certified mail to the address  
4 of the party to whom notice is to be given.

5 23. EFFECTIVENESS OF AGREEMENT:

6 Each of the parties signatory hereto shall approve the  
7 execution hereof by appropriate resolution or ordinance at the time  
8 of executing this agreement, the full force and effectiveness of  
9 which is conditioned if required upon receipt of approval by the  
10 Office of the Attorney General for the State of Nevada, the Nevada  
11 State Board of Health and the Nevada Public Service Commission,  
12 and any other affected public agency. The necessity or requirement  
13 of obtaining approval of all affected public or governmental  
14 agencies in furtherance of this agreement shall be the responsi-  
15 bility of GRID, MGSD agreeing to cooperate fully in this respect.  
16 If required by law, both parties shall timely seek a judicial con-  
17 firmation hereof.

18 24. JURISDICTION:

19 In the event either party institutes any legal or equi-  
20 table action to determine or enforce any rights under this agree-  
21 ment, such legal or equitable action, jurisdiction and venue shall  
22 be in the First Judicial District Court of the State of Nevada, in  
23 and for the County of Douglas.

24 25. MUTUAL COOPERATION: CONTINGENT EFFECT:

25 Both parties covenant and agree to timely make, execute  
26 and deliver applications, requests for grants, easements, rights-  
27 of-way, deeds, bills of sale, or other instruments or documents, to  
28 make and give notice, to conduct hearings, and to in other respect  
29 use their best efforts, jointly and severally, to carry out the  
30 full intent and purpose of this agreement, it being further under-  
31 stood that the full force and effectiveness of this agreement is  
32 contingent upon complete Federal funding of the MGSD share of the

MANOUKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 88  
SHEPHERD COVE, NEVADA 89418  
TELEPHONE (702) 881-8574

CARSON CITY OFFICE  
303 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 882-1517

1 proposed construction of improvements as well as the satisfaction  
2 of any condition or qualification referred to herein.

3 It is further understood that the full force and  
4 effectiveness of this agreement is contingent upon GRID completing  
5 special assessment proceedings or other financing necessary to  
6 fund its financial obligation hereunder, no later than three (3)  
7 months from the date hereof, failing which this agreement shall be  
8 rendered null and void and of no further force and legal effect.

9 26. REMEDIES:

10 The remedies of either party set forth in any agreement  
11 herein in the event of failure of the other party to perform any  
12 said agreement herein, shall not be the exclusive remedy of either  
13 party for said breach, and shall not deprive either party, or limit  
14 the application, of any other remedy in addition thereof and joint-  
15 ly therewith provided by this agreement or law.

16 27. COSTS OF AGREEMENT:

17 GRID shall promptly upon request pay to MGSD all reason-  
18 able legal, accounting, engineering and other administrative costs  
19 incurred by MGSD in the preparation, drafting and execution of this  
20 agreement.

21 28. TIME:

22 Time is of the essence of this agreement.

23 29. BINDING EFFECT:

24 This agreement shall be binding upon and shall inure to  
25 the benefit of any successor entities to the parties signatory  
26 hereto.

27 IN WITNESS WHEREOF, the parties hereto have hereunto set their  
28 hands and affixed their seals the day and year first above written.

29 //  
30 //  
31 //  
32 //

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32

HINDEN-GARDNERVILLE SANITATION DISTRICT, a municipal corporation

By: *Don J. Lumbel*  
President

Attest:

*David H. Hicken*  
Secretary

MANDUKIAN, SCARPELLO & ALLING, LTD.  
ATTORNEYS AT LAW

LAKE TAHOE OFFICE  
ROUND HILL PROFESSIONAL BUILDING  
P. O. BOX 81  
ZEPHYR COVE, NEVADA 89448  
TELEPHONE (702) 818-0878

CARSON CITY OFFICE  
808 EAST PROCTOR STREET  
CARSON CITY, NEVADA 89701  
TELEPHONE (702) 881-4877

GARDNERVILLE RANCHOS IMPROVEMENT DISTRICT, a municipal corporation

By: *C. S. Oja*  
President

Attest:

*Leontine D. Wolfe*  
Secretary

SUPPLEMENT TO 1974 CONTRACT

This Agreement made and entered into this 21st day of November, 1990 by and between MINDEN GARDNERVILLE SANITATION DISTRICT (hereinafter "MGSD") and GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT (hereinafter "GRGID") is an Agreement whereby MGSD agrees to sell, and GRGID agrees to purchase additional sewer capacity in the MGSD plant.

W I T N E S S E T H

I.

MGSD and GRGID are political subdivisions duly organized and existing under NRS 318.010 et seq. "General Improvement Districts." WHEREAS, MGSD presently owns and operates a sewage treatment plant and disposal facility.

WHEREAS, GRGID desires to purchase sewer capacity in the sewage treatment plant and disposal facility of MGSD, and MGSD desires to sell to GRGID additional sewer capacity in its treatment plant and disposal facilities.

WHEREAS, the total past, present and future available capacity owned by GRGID (used and unused) in the MGSD treatment plant is 513,571 gallons (400,000 gallons plus 113,571). Of that amount GRGID has presently used 469,657 gallons of capacity (hereafter "used capacity").

WHEREAS, GRGID's presently owned but unused capacity is 43,914 gallons (hereinafter "unused capacity"). All of GRGID's unused capacity must be used within the current boundaries of GRGID except that with the express written consent of MGSD, GRGID may also apply available unused capacity to the areas identified in Exhibit "A".

Unused capacity may not be used or applied outside the present boundaries of GRGID.

WHEREAS, GRGID desires to acquire additional capacity from MGSD in order to accommodate future growth within its boundaries, MGSD is willing to sell GRGID additional capacity on certain terms and conditions.

WHEREAS, MGSD and GRGID are parties to a written contract dated February 1, 1974 (the 1974 contract) pertaining to the treatment and disposal of sewage. The 1974 contract was amended February 10, 1975, and has been the subject of two separate disputes, one of which resulted in an arbitration award dated August 18, 1976, and one of which resulted in a judgment on appeal from the Supreme Court of Nevada dated February 22, 1989. The parties agree that as a result of the acquisition by GRGID of sewer capacity pursuant to the 1974 contract, and as a result of the arbitration award and the judgment on appeal from the Supreme Court, GRGID's total past, present and future available capacity owned by it in the MGSD treatment plant is 513,571 gallons. The 1974 agreement applies to and shall remain in full force and effect as to the total past, present and future available capacity owned by GRGID in the MGSD treatment plant including but not limited to Paragraphs 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29.

WHEREAS, the parties agree that this Agreement shall apply to the sale of any additional capacity by MGSD to GRGID in the sewage disposal facilities of MGSD.

WHEREFORE, the parties have entered into this Agreement on the following terms and conditions.

TERMS AND CONDITIONS

1. All of GRGID's unused capacity is hereby converted to equivalent dwelling units (EDU's). The conversion rate is 250 gallons equals one EDU. GRGID's total unused capacity expressed in EDU's is 176 ("unused available EDU's").

2. GRGID has provided MGSD with a complete list of all connections and hookups in, on, or onto GRGID's collection system. MGSD accepts and confirms this list. This list is attached hereto as Exhibit "B" and is made a part of this Agreement. GRGID will provide an updated list and provide MGSD a comprehensive list of all new connections in or onto GRGID's collection system on the first working day following the first day of January, April, July and October of each year. This paragraph does not supersede any other notice requirements for connections which are set forth elsewhere in this Agreement.

3. Every proposed or actual connection or hookup from whatsoever source in, on, or onto GRGID's collection system after the date of this Agreement shall be reported weekly to MGSD. On notification of approval by GRGID of any proposed connection or hookup, or on notification that any connection or hookup has actually been made (whichever occurs first), MGSD shall deduct from GRGID's available unused EDU's the amount of EDU's allocable to each such connection or hookup made. The amount or number of EDU's allocated each such connection shall be made on the same basis on which MGSD allocates or calculates EDU's for all other similar

connections or hookups occurring elsewhere within the District at the time the connection is approved or made.

4. GRGID will not be assessed any connection fee, acreage fee, or capacity fee for all unused, available EDU's, however, a monthly user charge will be assessed for each connection made after the date of this Agreement at the time of connection to GRGID's collection system, including all connections for unused available EDU's and any and all additional EDU's purchased by GRGID. The amount of the monthly user charge shall be 88.63% of the monthly user charge assessed similar users in MGSD's District at the time the charge is made. This charge will be adjusted periodically at the same time as charges for in-district consumers are adjusted and in the same proportionate amount. In addition, for each and every connection made after the date of this Agreement, GRGID will pay an additional monthly charge calculated by multiplying 35% of the average mean fair market value of all improved property within the boundaries of GRGID, as reported by the most recent appraisal of the Douglas County Assessor multiplied by MGSD's July 1, 1990, percentage of shared tax revenues on the Douglas County Property Tax Bill (.1188%) divided by 12 for 12 months of the year.

This rate will be adjusted periodically by MGSD to reflect the existing current percentage of MGSD's shared property tax revenues, and, in addition, will be adjusted from time to time to reflect the current average mean valuation of all improved property within the boundary of GRGID. Improved property will consist of all property within the boundary of GRGID existing at the time of each evaluation, which is improved by a residential, commercial or industrial

structure as reported to MGSD by the Douglas County Assessor. The valuation will include both the ground and improvement on the ground. Such reports or evaluations may be requested by MGSD from the Douglas County Assessor at any time, and will be deemed final and conclusive on the question of value of property within GRGID. Adjustments based on increases of property valuations cannot be made more often than annually, but may be made at any time during the year.

Adjustments for increases in MGSD's shared tax revenue rates will be made each time any such increase is made as follows. Upon sixty (60) days' notice to GRGID to allow it to comply with NRS 318.199, which requires schedules, public hearings, and the adoption of a resolution setting rates, tolls and charges for sewage services, adjustments for increases and MGSD shared tax revenues will be made by GRGID each time any such increase is requested by MGSD. Until the first adjustment, the mean valuation is fixed at \$85,000.00. MGSD shared tax revenue as of July, 1990 will be .1188% of the assessed valuation which is 35% of the fair market value of property within GRGID. This product, divided by 12, yields an additional charge of \$2.95 to be added to the monthly user charge for each connection made after the date of this Agreement.

5. From time to time GRGID may apply to MGSD to purchase additional EDU's. MGSD shall consider each such application on its merits considering the compliance with all MGSD rules, regulations and ordinances as amended or modified from time to time, the available supply, the capacity of the plant, prior commitments, and

the needs of all other present and future users within MGSD's District. MGSD will consider any application by GRGID on the same basis as it considers all other applications for contracts for service. Any and all moratoriums on the purchase of capacity shall apply to GRGID.

6. If an application is approved, GRGID agrees to pay the same acreage fee and capacity fee as is charged all other users within the MGSD District. GRGID agrees to pay the current rate for the capacity fees as such fees exist at the time each application is made. For all capacity purchased for new property annexed into GRGID, GRGID shall also remit the full amount of the acreage fee applicable to such property. Capacity purchased for newly annexed areas may not be transferred to any other parcel or parcels. Each application must be accompanied by a check for the full amount of the capacity fee for the capacity requested together with any and all pertinent documentation and where applicable, the full amount of the acreage fee. These fees shall not be refundable except in such amounts representing the amount of any capacity applied for but not approved. Except as provided for above, any capacity applied for and approved, but not actually used within two years of the date of approval, shall be forfeited to MGSD without refund of any fees. Any and all capacity applied for and approved must be used within the present boundaries of GRGID, or, on express written consent of MGSD, in areas designated on Exhibit "A".

7. For all connections made after all of GRGID's presently owned, available, and unused EDU's are exhausted, or for any connection made for any newly purchased EDU's, GRGID agrees to pay

65% of the connection fee charged all of the users within the District applicable to the same type of connection. The connection fee shall be at the same rate in existence at the time each and every connection is made. GRGID shall remit to MGSD the full amount of the acreage fee and connection fee each time it notifies MGSD that GRGID has approved a connection or hookup, except in cases where capacity is purchased for new property annexed into GRGID, in which case GRGID shall remit the full amount of the acreage fee at the time the application for capacity is first made.

FIXED AND VARIABLE COST

1. For the purposes of computing GRGID's proportionate share of variable costs pursuant to Paragraph 3 of the 1974 contract, GRGID's annual flow shall be fixed at 469,657 gallons.

2. For purposes of computing GRGID's proportionate share of fixed costs under Paragraph 3 of the 1974 contract, GRGID's ownership of "capacity" shall be fixed at 513,000 gallons. For purposes of computing fixed costs, for each quarter of each calendar year after the date of this Agreement, beginning on January 1, April 1, July 1, and October 1, 1991, GRGID shall deduct 250 gallons for all E.D.U.'s connected during the quarter until all unused, available E.D.U.'s have been connected. At such time and for all times thereafter, GRGID's ownership of capacity shall be fixed at 469,657 gallons. The capacity of the entire system shall be fixed at the existing rated capacity of the plant, as rated by the Nevada Division of Environmental Protection for the year in which fixed costs are due (currently 1,500,000). The total capacity of the plant, for purposes of calculating GRGID's

proportionate share of fixed costs shall be adjusted from time to time to reflect the plant's currently existing rated capacity, and if such adjustment is made during the year, fixed costs for the year shall be adjusted proportionately. GRGID's proportionate share of fixed costs shall be adjusted retroactively to reflect the current rated capacity of the plant (1,500,000 gallons) and GRGID's ownership of capacity (513,571) as of the date GRGID exercised and paid for the option to acquire 113,571 gallons. GRGID shall remit the amount of arrearage owed within 60 days of the date this Agreement is signed.

#### SPECIAL ASSESSMENTS

1. If for any reason MGSD makes or levies a system-wide special assessment, GRGID agrees to pay its proportionate share of any such special assessment based upon its percentage share of the total number of connected users within the entire system at the time the assessment is made, including all connections made prior to the date of this Agreement.

#### PAYMENTS

1. All payments due under any of the terms of this Agreement shall be due within 30 days after the date of MGSD's invoices.

#### LAWS, ORDINANCES AND REGULATIONS

GRGID agrees to abide by, and within its own service area enforce all regulations and ordinances of MGSD as modified or amended from time to time, and all applicable requirements of State and Federal law upon 60 days' notice to GRGID of any modification or amendment of MGSD's regulations and ordinances.

### MAINTENANCE AND INSPECTIONS

GRGID will maintain its own collection system in its entirety. MGSD reserves the right to come onto GRGID's property and inspect GRGID's system at all mutually agreed upon times and places and to install monitors, meters, or other devices to measure flow (whether permanent or temporary). If MGSD reasonably concludes that any aspect, act, omission or activity occurring on, in, or within GRGID's collection system violates any MGSD ordinance, state law or regulation, or constitutes an unsafe or hazardous situation or excessive infiltration, then GRGID agrees to immediately correct, remedy, or repair said situation. MGSD reserves the right to inspect GRGID's books and records at all mutually agreed upon times and places in order to check or verify connections and charges.

### OTHER CONTRACTS

GRGID may not sell or allocate any E.D.U.'s for use or consumption outside the existing boundaries of GRGID as such boundaries exist at the time of this Agreement without obtaining prior written consent of the Board of Directors of MGSD. MGSD reserves the right to refuse any application by GRGID for additional E.D.U.'s for use or consumption outside GRGID's existing boundaries. Nothing contained in this Agreement shall prevent or prohibit MGSD from directly entering into any contract for sewage treatment or disposal with any other person or entity. Nothing contained in this Agreement shall obligate or require MGSD to provide service or sell capacity for use or consumption outside MGSD's service territory as it exists at the time any application is made. Nothing in this Agreement shall impair, impede, diminish.



**Appendix B GRGID/Washoe Tribe Agreement**

# AGREEMENT

**Between the  
WASHOE TRIBE OF NEVADA & CALIFORNIA  
and the  
GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT**

I. PURPOSE

The purpose of this agreement between the Washoe Tribe of Nevada & California (hereinafter "the Tribe") and the Gardnerville Ranchos General Improvement District (hereinafter "the District") is to set out the terms and conditions by which the District will provide sewer services to the Tribal community known as Dresslerville. It is the intent of both the Tribe and the District for the Dresslerville Community to enjoy quality service and for the sewer collection system in the community to be connected to the District's sewer collection system for transportation to the Minden Gardnerville Sanitation District for treatment and disposal.

II. TERM

The term of this agreement shall commence January 1, 2002 and remain in effect until either party terminates this agreement according to the terms set forth in Section III of this agreement.

III. TERMINATION AND DEFAULT

Either party may terminate this agreement by serving written notice upon the other party twelve (12) months prior to the date the party desires to terminate the agreement. The party that chooses to terminate this agreement shall be obligated to pay all reasonable costs and expenses associated with the abandonment of all sewer lines connecting the Dresslerville Community to the District. In the event that the Tribe develops or gains access to an alternative wastewater treatment facility capable of serving the Dresslerville Indian Colony, this agreement may be terminated by the Tribe with three (3) months notice to the District.

If default be made in the performance of an obligation of this Agreement, including but not limited to violation of the minimum maintenance requirement, either party shall give notice to the party in default, which party shall have 180 days to cure the default, after which time, if the default has not been cured, this agreement may be terminated by either party.

IV. RATES

All charges by the District to the Tribe, including monthly service fees and one-time connection fees, shall be at the same in-district rate charged by the District to other customers except for any taxes or other charges having no application to

Indian lands. Thus, in accordance with the District rate schedule, the Dresslerville Community units connected prior to May 17, 1990 shall be charged the Category I rate and units connected after this date shall be charged the Category II rate. Furthermore, the charges by the District to the Tribe shall not include charges for maintenance, it being expressly agreed and understood that the District shall not be responsible for maintenance of sewer lines in the Dresslerville Community.

V. PAYMENT FOR SERVICES

On a timely basis, the District shall submit by mail to the Tribe monthly statements for all charges for services provided to the Dresslerville Community. The Tribe shall submit to the District within thirty (30) days of receipt of each statement full payment for all services provided to the Dresslerville Community. With the exception of disputes regarding the terms and conditions of this agreement, procedures for contesting any charges and all procedures and penalties for delinquent payment shall be controlled by the written policies of the District now in effect and as amended from time-to-time and as applied to all of the District's customers.

VI. CONFIRMATION AND INSPECTION

Within thirty (30) days after the anniversary date of this agreement the Tribe shall provide to the District in writing a list of dwellings connected to the Dresslerville sewer system served by the District's system. Representatives of the District necessary for the confirmation and inspection of all hook-ups and lines on the Dresslerville system shall be allowed entry on the Tribal lands for confirmation and inspection. In the case of an emergency where the risk of a sewage spill and contamination is imminent, District representatives shall first attempt to contact the Tribe by telephone before entering onto Tribal lands. If a sewage spill is located on Tribal lands, and the risk of contamination is imminent, upon notification to the Tribe the Tribe must take all reasonable steps to limit the risk of contamination both on and off Tribal lands. No efforts to remediate spills or contamination on Tribal lands shall be undertaken by the District without prior consultation and agreement with the Tribe. Where a sewage spill occurs off Tribal lands that may impact Tribal lands, the District shall notify the Tribe immediately and take all reasonable steps to limit risk of contamination to both on and off Tribal lands.

Within one hundred and eighty (180) days of the completion of any improvements to the Dresslerville sewer system, the Tribe shall provide "as built" drawings, complete with a certificate of inspection by a qualified engineer and a description of the materials used, to the District to allow the District to monitor modifications to the system it hereby agrees to serve.

///

VII. MAINTENANCE

The Tribe shall be responsible for all maintenance of sewer lines and connections comprising the sewer collection system in the Dresslerville Community. At a minimum such maintenance must include the vacuum cleaning of all annually, for the first two consecutive years after the execution of this agreement, and then one-third of the Tribe's total lines every year thereafter.

VIII. EXPANSION

It is anticipated that the need for sewer services in the Dresslerville Community will continue to increase in the future. To apply for additional sewer capacity, the Tribe shall request additional capacity in writing, providing the number of units requested for connection, the address(s) of the units, a site map of the Dresslerville Community depicting the location of the address(s) and a check for the full amount for the cost of the requested one-time connection fee stated in section IV of this agreement. Upon receipt of the Tribe's request, the District shall request the additional capacity from the Minden Gardnerville Sanitation District in the same manner the District would request additional capacity to serve additional in District units. After the Minden Gardnerville Sanitation District has approved the District's request for additional capacity, the District shall notify the Tribe and process the Tribe's check. If the request for additional capacity is denied by the Minden Gardnerville Sanitation District, the District shall return the Tribe's unprocessed check immediately.

IX. ANNUAL MEETINGS

The District and the Tribe shall schedule and conduct an annual meeting, within the first month of the District's fiscal year (July), with staff and/or elected officials to discuss the needs of the Tribe, including anticipated new capacity, for the upcoming year and any other topics related to the administration of this agreement. The meeting may be initiated by either the District or the Tribe.

X. NOTICE

The District shall send notices of meetings, agendas, rate increases and policy changes to the Tribe by mail. Notices regarding rate increases affecting sewer service or the agreement between the District and the Minden Gardnerville Sewer District shall include supporting documentation regarding the need for the proposed rate increase.

All notices and contracts required by this agreement shall be directed and addressed to the following officers as the respective contacts for each of the parties.

Tribal Chairman  
Washoe Tribe of Nevada & California  
919 Highway 395 South  
Gardnerville, Nevada 89410

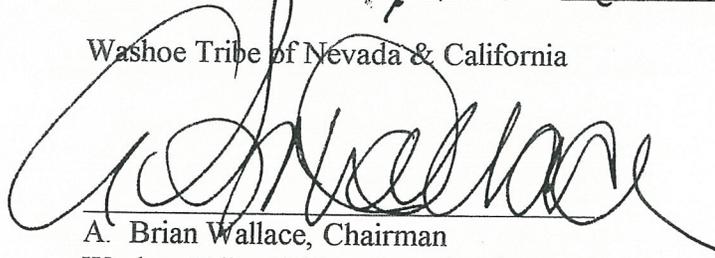
Gardnerville Ranchos General  
Improvement District  
District Manager  
931 Mitch Drive  
Gardnerville, Nevada 89410

XII. MERGER

This agreement constitutes the entire understanding between the parties with respect to sewer services for the Dresslerville Community and all prior or contemporaneous agreements, oral or written, are merged into this agreement. Neither this agreement nor any of its provisions may be waived, amended or terminated except by written instrument signed by the party against which the enforcement of such waiver, amendment or termination is sought, and then only to the extent set forth in such instrument.

AGREED TO AND ACCEPTED this 7<sup>th</sup> day of December, 2001.

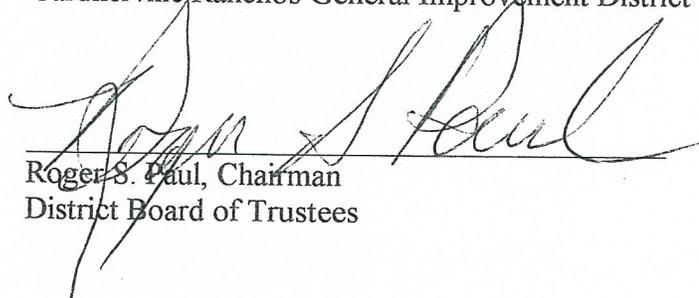
Washoe Tribe of Nevada & California



A. Brian Wallace, Chairman  
Washoe Tribe of Nevada and California

AGREED TO AND ACCEPTED this 5<sup>th</sup> day of December, 2001.

Gardnerville Ranchos General Improvement District



Roger S. Paul, Chairman  
District Board of Trustees

## **Appendix C Pipe Inventory**

# SYSTEM A

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
A1	A1-A	164	15	PVC	Glenwood Dr.	1979	44
A1-A	A2	15	15	PVC	Glenwood Dr.	1979	44
A2	A3	383	12	PVC	Glenwood Dr.	1979	44
A3	A4	387	12	PVC	Glenwood Dr.	1979	44
A4	A5	369	12	PVC	Glenwood Dr.	1979	44
A5	A6	288	12	PVC	Glenwood Dr.	1979	44
A6	A7	340	12	PVC	Glenwood Dr.	1979	44
A7	A7-1	383	12	PVC	Glenwood Dr.	1979	44
A7-1	A7-2	385	12	PVC	Glenwood Dr.	1979	44
A7-2	A7-3	265	12	PVC	Glenwood Dr.	1979	44
A7-3	A7-4	257	12	PVC	Glenwood Dr.	1979	44
A7-4	A7-5	277	12	PVC	Glenwood Dr.	1979	44
A7-5	A7-6	256	12	PVC	Glenwood Dr.	1979	44
A7-6	A7-7	301	12	PVC	Glenwood Dr.	1979	44
A7-6	A7-6A	216	12	PVC	Lou Ct.	1979	44
A7-6A	A7-6B	260	12	PVC	Lou Ct.	1979	44
A7-7	A7-8	188	12	PVC	Glenwood Dr.	1979	44
A7-8	A7-9	291	12	PVC	Glenwood Dr.	1979	44
A7-9	A7-10	303	12	PVC	Riverview Dr.	1979	44
A7-9	A7-9A	254	12	PVC	Riverview Dr.	1979	44
A7-10	A7-11	320	12	PVC	Riverview Dr.	1979	44
A7-11	A7-12	350	12	PVC	Riverview Dr.	1979	44
A7-12	A7-13	142	12	PVC	Riverview Dr.	1979	44
A7-12	A7-12A	378	8	PVC	Niblick Lane	1979	44
A7-12A	A7-12B	126	8	PVC	Niblick Lane	1979	44
A7-13	A7-13A	373	8	PVC	Riverview Dr.	1979	44
A7-13A	A7-13B	139	8	PVC	Riverview Dr.	1979	44
A7-13B	A7-13C	360	8	PVC	Riverview Dr.	1979	44
A7-13C	A7-13D	285	8	PVC	Riverview Dr.	1979	44
A7-13D	A7-13E	307	8	PVC	Riverview Dr.	1979	44
A7-13E	A7-13F	329	8	PVC	Riverview Dr.	1979	44
A7-13F	A7-13G	218	8	PVC	Riverview Dr.	1979	44
A7-13G	A7-13H	232	8	PVC	Riverview Dr.	1979	44
A7-13H	A7-13I	307	8	PVC	Riverview Dr.	1979	44
A7-13H	A7-13H1	340	8	PVC	Meadow View Rd.	1979	44
A7-13H1	A7-13H2	155	8	PVC	Meadow View Rd.	1979	44
A7-13H2	A7-13H3	300	8	PVC	Meadow View Rd.	1979	44
A7-13I	A7-13J	183	8	PVC	Riverview Dr.	1979	44
A7-13	A7-14	246	12	PVC	Fairway Dr.	1979	44
A7-14	A7-15	251	12	PVC	Fairway Dr.	1979	44
A7-15	A7-16	212	12	PVC	Fairway Dr.	1979	44
A7-16	A7-17	270	12	PVC	Fairway Dr.	1979	44
A7-16	A7-16A	284	8	PVC	Eagle Ct.	1979	44
A7-17	A7-18	428	12	PVC	Fairway Dr.	1979	44
A7-17	A7-17A	292	8	PVC	Birdie Ct	1979	44
A7-18	A7-19	177	12	PVC	Fairway Dr.	1979	44
A7-19	A7-20	388	12	PVC	Fairway Dr.	1979	44
A7-20	A7-21	371	12	PVC	Fairway Dr.	1979	44
A7-21	A7-22	375	12	PVC	Fairway Dr.	1979	44
A7-22	A7-23	265	12	PVC	Fairway Dr.	1979	44
A7-22	A7-22A	247	8	PVC	Fifth Green Ct.	1979	44
A7-22A	A7-22B	123	8	PVC	Fifth Green Ct.	1979	44
A7-22B	A7-22C	118	8	PVC	Fifth Green Ct.	1979	44
A7-22C	A7-22D	502	8	PVC	Fifth Green Ct.	1979	44
A7-23	A7-24	284	12	PVC	Fairway Dr.	1979	44
A7-24	A7-25	235	8	PVC	Fairway Dr.	1979	44

# SYSTEM A

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
A7-25	A7-26	220	8	PVC	South Riverview Dr.	1979	44
A7-25	A7-25A	210	8	PVC	Putter Ct.	1979	44
A7	A8	323	12	PVC	Kerry Ln.	1979	44
A8	A9	235	12	PVC	Kerry Ln.	1979	44
A9	A10	323	12	PVC	Kerry Ln.	1979	44
A10	A11	314	12	PVC	Kerry Ln.	1979	44
A11	A12	326	12	PVC	Kerry Ln.	1979	44
A12	A13	355	12	PVC	Kerry Ln.	1979	44
A13	A14	347	12	PVC	Kerry Ln.	1979	44
A14	A14-1	252	8	PVC	Dresslerville Rd.	1979	44
A14-1	A14-1A	332	8	PVC	Dresslerville Rd.	1979	44
A14-1A	A14-1A1	292	8	PVC	Mitch Dr.	1979	44
A14-1A1	A14-1A2	265	8	PVC	Mitch Dr.	1979	44
A14-1A2	A14-1A3	371	8	PVC	Mitch Dr.	1979	44
A14-1A3	A14-1A4	378	8	PVC	Mitch Dr.	1979	44
A14-1A4	A14-1A5	378	8	PVC	Mitch Dr.	1979	44
A14-1A5	A14-1A6	294	8	PVC	Mitch Dr.	1979	44
A14-1A6	A14-1A7	306	8	PVC	Mitch Dr.	1979	44
A14-1A7	A14-1A8	299	8	PVC	Mitch Dr.	1979	44
A14-1A8	A14-1A9	227	8	PVC	Mitch Dr.	1979	44
A14-1A9	A14-1A10	197	8	PVC	Mitch Dr.	1979	44
A14-1A	A14-1B	306	8	PVC	Dresslerville Rd.	1979	44
A14-1B	A14-1C	231	8	PVC	Dresslerville Rd.	1979	44
A14-1C	A14-1D	180	8	PVC	Dresslerville Rd.	1979	44
A14-1	A14-2	320	8	PVC	None	1979	44
A14-2	A14-3	250	8	PVC	None	1979	44
A14-3	A14-4	350	8	PVC	Topaz Ln.	1979	44
A14-3	A14-3A	112	8	PVC	Topaz Ln.	1979	44
A14-3	A14-3B	235	8	PVC	None	1979	44
A14-3B	A14-3C	255	8	PVC	None	1979	44
A14-3C	A14-3D	112	8	PVC	Evening Star Ln.	1979	44
A14-3C	A14-3E	114	8	PVC	Evening Star Ln.	1979	44
A14-4	A14-5	351	8	PVC	Monument Peak Dr.	1979	44
A14-5	A14-6	349	8	PVC	Monument Peak Dr.	1979	44
A14-6	A14-7	353	8	PVC	Monument Peak Dr.	1979	44
A14-7	A14-8	334	8	PVC	Monument Peak Dr.	1979	44
A14-8	A14-9	320	8	PVC	Monument Peak Dr.	1979	44
A14-9	A14-9A	290	8	PVC	South Riverview Dr.	1979	44
A14-9A	A14-9B	140	8	PVC	South Riverview Dr.	1979	44
A14-9	A14-10	271	8	PVC	South Riverview Dr.	1979	44
A14-10	A14-11	317	8	PVC	None	1979	44
A14-10	A14-10A	252	8	PVC	South Riverview Dr.	1979	44
A14-10A	A14-10B	123	8	PVC	South Riverview Dr.	1979	44
A14-11	A14-12	339	8	PVC	None	1979	44
A14-12	A14-13	252	8	PVC	Muir Drive	1979	44
A14-13	A14-14	382	8	PVC	Whitney Wy.	1979	44
A14-14	A14-15	387	8	PVC	Whitney Wy.	1979	44
A14-15	A14-16	381	8	PVC	Whitney Wy.	1979	44
A14-16	A14-17	350	8	PVC	Whitney Wy.	1979	44
A14-17	A14-18	287	8	PVC	Whitney Wy.	1979	44
A14-17	A14-17A	361	8	PVC	Annkim Cr.	1979	44
A14-17A	A14-17B	392	8	PVC	Annkim Cr.	1979	44
A14-17B	A14-17C	388	8	PVC	Annkim Cr.	1979	44
A14-17C	A14-17D	182	8	PVC	Annkim Cr.	1979	44
A14-18	A14-19	280	8	PVC	Whitney Wy.	1979	44
A14-19	A14-20	406	8	PVC	Langley Dr.	1979	44

# SYSTEM A

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
A14-19	A14-19A	326	8	PVC	Langley Dr.	1979	44
A14-20	A14-21	383	8	PVC	Langley Dr.	1979	44
A14-21	A14-22	355	8	PVC	Langley Dr.	1979	44
A14	A15	435	12	PVC	Dresslerville Rd.	1979	44
A15	A16	215	12	PVC	Dresslerville Rd.	1979	44
A15	A15-1	291	8	PVC	Sagebrush Ct.	1979	44
A15-1	A15-2	155	8	PVC	Sagebrush Ct.	1979	44
A16	A17	352	12	PVC	Dresslerville Rd.	1979	44
A16	A16-1	318	8	PVC	Dean Dr.	1979	44
A16-1	A16-2	324	8	PVC	Dean Dr.	1979	44
A16-2	A16-3	363	8	PVC	Dean Dr.	1979	44
A16-3	A16-4	327	8	PVC	Dean Dr.	1979	44
A16-4	A16-5	324	8	PVC	Dean Dr.	1979	44
A16-5	A16-6	324	8	PVC	Dean Dr.	1979	44
A16-6	A14-10A	294	8	PVC	Dean Dr.	1979	44
A17	A18	177	12	PVC	Dresslerville Rd.	1979	44
A17	A17-1	252	8	PVC	Tumbleweed Ct.	1979	44
A17-1	A17-2	155	8	PVC	Tumbleweed Ct.	1979	44
A18	A19	167	12	PVC	Dresslerville Rd.	1979	44
A19	A20	174	12	PVC	Dresslerville Rd.	1979	44
A20	A21	368	12	PVC	Dresslerville Rd.	1979	44
A21	A22	328	12	PVC	Dresslerville Rd.	1979	44
A22	A23	381	12	PVC	Dresslerville Rd.	1979	44
A23	A24	359	12	PVC	Dresslerville Rd.	1979	44
A24	A25	393	12	PVC	Dresslerville Rd.	1979	44
A25	A26	362	12	PVC	Long Valley Rd.	1979	44
A25	A25-1	346	8	PVC	South Riverview Dr.	1979	44
A25-1	A25-2	228	8	PVC	South Riverview Dr.	1979	44
A25-2	A25-3	280	8	PVC	South Riverview Dr.	1979	44
A25-3	A25-4	261	8	PVC	South Riverview Dr.	1979	44
A25-4	A25-5	137	8	PVC	South Riverview Dr.	1979	44
A26	A27	392	12	PVC	Long Valley Rd.	1979	44
A27	A28	319	12	PVC	Long Valley Rd.	1979	44
A27	A27-1	324	8	PVC	Long Valley Rd.	1979	44
A28	A29	295	12	PVC	Long Valley Rd.	1979	44
A29	A30	346	12	PVC	Long Valley Rd.	1979	44
A30	A31	350	12	PVC	Long Valley Rd.	1979	44
A31	A32	355	12	PVC	Long Valley Rd.	1979	44
A32	A33	396	12	PVC	Long Valley Rd.	1979	44
A33	A33-A	255	12	PVC	Long Valley Rd.	1979	44
A33-A	A34	199	6	PVC	Long Valley Rd.	1979	44
A34	A35	332	8	PVC	James Rd	1983	40
A34	A34-1	301	8	PVC	Long Valley Rd.	1983	40
A34-1	A34-2	300	8	PVC	Long Valley Rd.	1983	40
A34-2	A34-3	301	8	PVC	Long Valley Rd.	1983	40
A34-3	A34-4	136	8	PVC	Long Valley Rd.	1983	40
A35	A36	354	8	PVC	Lassen Wy.	1983	40
A35	A35-1	353	6	PVC	James Rd	1992	31
A36	A37	345	8	PVC	Lassen Wy.	1983	40
A36	A36-1	455	6	PVC	Tyndall way.	1992	31
A37	A38	399	8	PVC	Lassen Wy.	1983	40
A37	A37-1	350	8	PVC	Shasta Dr.	1992	31
A37-1	A37-1A	128	6	PVC	Shasta Dr.	1992	31
A37-1	A37-2	309	8	PVC	East Peak Ln.	1992	31

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B1	B2	209	15	Concrete	Dresslerville Ln.	1979	44
B2	B3	405	15	Concrete	Dresslerville Ln.	1979	44
B2	B2-1	213	12	PVC	Dresslerville Ln.	1979	44
B2-1	B2-2	324	12	PVC	Dresslerville Ln.	1979	44
B2-2	B2-3	206	10	PVC	None	2004	19
B2-3	B2-4	191	10	PVC	None	2004	19
B2-4	B2-5	164	8	PVC	Sierra Vista Dr.	2004	19
B2-4	B2-4A	159	6	PVC	Sierra Vista Dr.	2004	19
B2-4A	B2-4B	168	6	PVC	Sierra Vista Dr.	2004	19
B2-5	B2-6	113	8	PVC	Sierra Vista Dr.	2004	19
B2-6	B2-7	255	6	PVC	Chisolm Trail	2004	19
B2-7	B2-8	200	6	PVC	Chisolm Trail	2004	19
B2-8	B2-9	87	6	PVC	Chisolm Trail	2004	19
B2-8	B2-8A	152	6	PVC	Chisolm Trail	2004	19
B2-9	B2-10	123	6	PVC	Chisolm Trail	2004	19
B3	B3-A	102	15	Concrete	Dresslerville Ln.	1979	44
B3-A	B4	492	15	Concrete	Dresslerville Ln.	1979	44
B3	B3-1	218	6	PVC	None	1979	44
B3-1	B3-2	225	6	PVC	Maverick Ct.	1994	29
B3-2	B3-3	355	6	PVC	Sierra Vista Dr.	1994	29
B3-3	B3-4	282	6	PVC	Sierra Vista Dr.	1994	29
B3-4	B3-5	277	6	PVC	Sierra Vista Dr.	1994	29
B3-5	B3-6	266	6	PVC	Silver Ranch Dr.	1994	29
B4	B5	507	15	Concrete	Dresslerville Ln.	1979	44
B5	B6	210	15	Concrete	Dresslerville Ln.	1979	44
B6	B7	404	15	Concrete	Tillman Rd.	1979	44
B6	B6-1	384	8	PVC	Dresslerville Ln.	1979	44
B6-1	B6-2	220	8	PVC	Dresslerville Ln.	1979	44
B6-2	B6-3	392	8	PVC	Dresslerville Ln.	1979	44
B6-2	B6-2A	296	8	PVC	Arrowhead Dr.	1979	44
B6-2A	B6-2B	302	8	PVC	Arrowhead Dr.	1979	44
B6-2B	B6-2C	313	8	PVC	Arrowhead Dr.	1979	44
B6-2C	B6-2D	161	8	PVC	Arrowhead Dr.	1979	44
B6-2C	B6-2C1	323	8	PVC	Marlettr Cr.	1979	44
B6-2C1	B6-2C2	319	8	PVC	Marlettr Cr.	1979	44
B6-2C2	B6-2C3	382	8	PVC	Marlettr Cr.	1979	44
B6-2C3	B6-2C4	255	8	PVC	Marlettr Cr.	1979	44
B6-2C4	B6-2C5	333	8	PVC	Marlettr Cr.	1979	44
B6-2C5	B6-2C6	122	8	PVC	Marlettr Cr.	1979	44
B6-2D	B6-2E	303	8	PVC	Arrowhead Dr.	1979	44
B6-2E	B6-2F	361	8	PVC	Marlettr Cr.	1979	44
B6-2E	B6-2E1	280	8	PVC	Arrowhead Dr.	1979	44
B6-2F	B6-2G	343	8	PVC	Marlettr Cr.	1979	44
B6-2G	B6-2H	418	8	PVC	Marlettr Cr.	1979	44
B6-3	B6-4	392	8	PVC	Dresslerville Ln.	1979	44
B6-4	B6-5	317	8	PVC	Dresslerville Ln.	1979	44
B6-5	B6-5A	400	8	PVC	Wagon Wheel Ct.	1979	44
B6-5	B6-6	307	8	PVC	Dresslerville Ln.	1979	44
B6-6	B6-7	333	8	PVC	Dresslerville Ln.	1979	44
B6-7	B6-8	154	8	PVC	Dresslerville Ln.	1979	44
B6-8	B6-9	149	8	PVC	Dresslerville Ln.	1979	44
B6-9	B6-10	350	8	PVC	Dresslerville Ln.	1979	44
B6-10	B6-11	414	8	PVC	Dresslerville Ln.	1979	44
B6-11	A14-1D	174	8	PVC	Dresslerville Ln.	1979	44
B7	B8	395	15	Concrete	Tillman Rd.	1979	44
B8	B9	381	15	Concrete	Tillman Rd.	1979	44

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B9	B10	413	15	Concrete	Tillman Rd.	1979	44
B10	B11	302	15	Concrete	Tillman Rd.	1979	44
B11	B12	378	15	Concrete	Tillman Rd.	1979	44
B11	B11-1	333	8	PVC	Topaz Ln.	1979	44
B11-1	B11-2	298	8	PVC	Topaz Ln.	1979	44
B11-2	B11-3	258	8	PVC	Topaz Ln.	1979	44
B11-2	B11-2A	370	8	PVC	Arrowhead Dr.	1979	44
B11-2A	B11-2B	408	8	PVC	Arrowhead Dr.	1979	44
B11-3	B11-4	220	8	PVC	Topaz Ln.	1979	44
B11-4	B11-5	234	8	PVC	Topaz Ln.	1979	44
B11-4	B11-4A	351	8	PVC	Starlight Court	1979	44
B11-4A	B11-4B	345	8	PVC	Starlight Court	1979	44
B11-5	B11-6	256	8	PVC	Topaz Ln.	1979	44
B11-6	B11-7	362	8	PVC	Topaz Ln.	1979	44
B11-6	B11-6A	322	8	PVC	Morning Star Ct.	1979	44
B11-6A	B11-6B	345	8	PVC	Morning Star Ct.	1979	44
B11-7	B11-8	362	8	PVC	Topaz Ln.	1979	44
B11-8	B11-9	375	8	PVC	Topaz Ln.	1979	44
B11-9	B11-10	385	8	PVC	Topaz Ln.	1979	44
B12	B13	391	15	Concrete	Tillman Rd.	1979	44
B13	B14	351	15	Concrete	Tillman Rd.	1979	44
B14	B15	286	15	Concrete	Tillman Rd.	1979	44
B14	B14-1	347	8	PVC	Jobs Peak Dr.	1979	44
B14-1	B14-2	277	8	PVC	Jobs Peak Dr.	1979	44
B14-2	B14-3	372	8	PVC	Jobs Peak Dr.	1979	44
B14-3	B14-4	389	8	PVC	Jobs Peak Dr.	1979	44
B14-4	B14-5	323	8	PVC	Jobs Peak Dr.	1979	44
B14-5	B14-6	320	8	PVC	Jobs Peak Dr.	1979	44
B14-6	B14-7	320	8	PVC	Jobs Peak Dr.	1979	44
B14-7	B14-8	367	8	PVC	Jobs Peak Dr.	1979	44
B14-8	B14-9	356	8	PVC	Jobs Peak Dr.	1979	44
B15	B16	301	15	Concrete	Tillman Rd.	1979	44
B16	B17	401	15	Concrete	Tillman Rd.	1979	44
B16	B16-1	339	8	PVC	South Riverview Ct.	1979	44
B16-1	B16-2	295	8	PVC	South Riverview Ct.	1979	44
B16-2	B16-3	365	8	PVC	South Riverview Ct.	1979	44
B16-2	B16-2A	304	8	PVC	Arrowhead Dr.	1979	44
B16-2A	B16-2B	277	8	PVC	Arrowhead Dr.	1979	44
B16-2B	B16-2C	318	8	PVC	Arrowhead Dr.	1979	44
B16-2B	B16-2B1	396	8	PVC	Ritter Dr.	1979	44
B16-2B1	B16-2B2	375	8	PVC	Ritter Dr.	1979	44
B16-2B2	B16-2B3	274	8	PVC	Ritter Dr.	1979	44
B16-2B3	B16-2B4	427	8	PVC	Ritter Dr.	1979	44
B16-2B4	B16-2B5	265	8	PVC	Ritter Dr.	1979	44
B16-2C	B16-2D	342	8	PVC	Arrowhead Dr.	1979	44
B16-2D	B16-2E	246	8	PVC	Banner Dr.	1979	44
B16-2D	B16-2D1	222	8	PVC	Arrowhead Dr.	1979	44
B16-2E	B16-2F	326	8	PVC	Banner Dr.	1979	44
B16-2F	B16-2G	206	8	PVC	Banner Dr.	1979	44
B16-3	B16-4	432	8	PVC	South Riverview Ct.	1979	44
B16-4	B16-5	364	8	PVC	South Riverview Ct.	1979	44
B16-5	B16-6	320	8	PVC	South Riverview Ct.	1979	44
B16-6	B16-7	320	8	PVC	South Riverview Ct.	1979	44
B16-7	B16-8	317	8	PVC	South Riverview Ct.	1979	44
B16-8	B16-9	365	8	PVC	South Riverview Ct.	1979	44
B17	B18	417	15	Concrete	Tillman Rd.	1979	44

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B17	B17-1	253	8	PVC	Tillman Rd.	1979	44
B17-1	B17-2	130	6	PVC	Redwood Cr.	1979	44
B17-2	B17-3	160	6	PVC	Redwood Cr.	1979	44
B18	B19	281	15	Concrete	Tillman Rd.	1979	44
B19	B19-A	109	15	Concrete	Tillman Rd.	1979	44
B19	B19-1	209	6	PVC	Chardonney Dr.	1979	44
B19-A	B20	138	15	Concrete	Tillman Rd.	1979	44
B20	B20-A	162	15	Concrete	Tillman Rd.	1979	44
B20	B20-1	119	6	PVC	Zinfandel Dr.	1979	44
B20-1	B20-2	246	6	PVC	None	1979	44
B20-2	B20-3	191	6	PVC	Alicia Cr.	1979	44
B20-A	B21-A	84	15	Concrete	Tillman Rd.	1979	44
B21-A	B21	210	15	Concrete	Tillman Rd.	1979	44
B21-1	B21-2	261	8	PVC	Muir Dr.	1979	44
B21-2	B21-3	336	8	PVC	Muir Dr.	1979	44
B21-3	B21-4	274	8	PVC	Muir Dr.	1979	44
B21-4	B21-5	220	8	PVC	Muir Dr.	1979	44
B21-5	B21-6	368	8	PVC	Muir Dr.	1979	44
B21-5	B21-5A	354	8	PVC	Russel Wy.	1979	44
B21-6	B21-7	358	8	PVC	Muir Dr.	1979	44
B21-7	B21-8	369	8	PVC	Muir Dr.	1979	44
B21-8	B21-9	233	8	PVC	Muir Dr.	1979	44
B21-8	B21-8A	333	8	PVC	Selkirk Cr.	1979	44
B21-8A	B21-8B	189	8	PVC	Selkirk Cr.	1979	44
B21-8B	B21-8C	308	8	PVC	Selkirk Cr.	1979	44
B21-8C	B21-8D	388	8	PVC	Selkirk Cr.	1979	44
B21-9	B21-10	251	8	PVC	Lyell Wy.	1979	44
B21-9	B21-9A	379	8	PVC	Muir Dr.	1979	44
B21-9A	B21-9B	362	8	PVC	Muir Dr.	1979	44
B21-9B	B21-9C	219	8	PVC	Muir Dr.	1979	44
B21-9C	B21-9D	266	8	PVC	Palisade Cr.	1979	44
B21-9D	B21-11C	240	8	PVC	Palisade Cr.	1979	44
B21-10	B21-11	248	8	PVC	Lyell Wy.	1979	44
B21-11	B21-12	238	8	PVC	Lyell Wy.	1979	44
B21-11	B21-11A	358	8	PVC	Palisade Cr.	1979	44
B21-11A	B21-11B	290	8	PVC	Palisade Cr.	1979	44
B21-11B	B21-11C	310	8	PVC	Palisade Cr.	1979	44
B21-12	B21-13	393	8	PVC	Lyell Wy.	1979	44
B21	B22-A	167	15	Concrete	Tillman Rd.	1979	44
B22-A	B22	93	15	Concrete	Tillman Rd.	1979	44
B22	B23	276	15	Concrete	Tillman Rd.	1979	44
B23	B24	194	15	Concrete	Tillman Rd.	1979	44
B23	B23-1	407	8	PVC	Wheeler Wy.	1979	44
B23-1	B23-2	359	8	PVC	Wheeler Wy.	1979	44
B23-2	B23-3	300	8	PVC	Wheeler Wy.	1979	44
B23-3	B23-4	194	8	PVC	Wheeler Wy.	1979	44
B23-4	B23-5	165	8	PVC	Wheeler Wy.	1979	44
B23-4	B22-4A	336	8	PVC	Russel Wy.	1979	44
B23-4A	B23-4B	132	8	PVC	Russel Wy.	1979	44
B23-5	B23-6	138	8	PVC	Wheeler Wy.	1979	44
B23-6	B23-7	311	8	PVC	Langley Dr.	1979	44
B23-6	B23-6A	168	8	PVC	Wheeler Wy.	1979	44
B23-7	B23-8	244	8	PVC	Langley Dr.	1979	44
B23-8	B23-9	329	8	PVC	Langley Dr.	1979	44
B23-8	B23-8A	358	8	PVC	Galena Ct.	1979	44
B23-9	B23-10	280	8	PVC	Langley Dr.	1979	44

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B23-10	B23-11	363	8	PVC	Langley Dr.	1979	44
B23-11	B23-12	279	8	PVC	Langley Dr.	1979	44
B23-12	A14-22	264	8	PVC	Langley Dr.	1979	44
B24	B25	207	15	Concrete	Tillman Rd.	1979	44
B25	B25-1	322	8	PVC	Langley Dr.	1979	44
B25-1	B25-2	370	8	PVC	Langley Dr.	1979	44
B25-2	B25-3	299	8	PVC	Langley Dr.	1979	44
B25-3	B25-4	184	8	PVC	Langley Dr.	1979	44
B25	B26-A	206	15	-	Tillman Rd.	1979	44
B26-A	B26	162	15	-	Tillman Rd.	1979	44
B26	B27	392	15	PVC	Tillman Rd.	1984	39
B26	B26-1	300	10	PVC	Kimmerling Rd.	1984	39
B26-1	B26-2	390	10	PVC	Kimmerling Rd.	1984	39
B26-1	B26-1A	347	6	PVC	Linda Dr.	1984	39
B26-1A	B26-1B	171	6	PVC	Linda Dr.	1984	39
B26-2	B26-3	400	10	PVC	Kimmerling Rd.	1984	39
B26-3	B26-4	408	10	PVC	Kimmerling Rd.	1984	39
B26-4	B26-5	270	10	PVC	Kimmerling Rd.	1984	39
B26-5	B26-6	251	10	PVC	Kimmerling Rd.	1984	39
B26-6	B26-7	321	10	PVC	Kimmerling Rd.	1984	39
B26-7	B26-8	243	8	PVC	James Rd.	1984	39
B26-7	B26-7A	360	6	PVC	Kimmerling Rd.	1984	39
B26-8	B26-9	354	8	PVC	James Rd.	1984	39
B26-9	B26-10	364	8	PVC	James Rd.	1984	39
B26-9	B26-9A	324	8	PVC	Lyell Wy.	1995	28
B26-9A	B26-9A1	227	6	PVC	Ashley Ct.	1995	28
B26-9A	B26-9B	305	8	PVC	Lyell Wy.	1995	28
B26-9B	B26-9B1	222	6	PVC	Amanda Ct.	1995	28
B26-9B	B26-9C	290	8	PVC	Lyell Wy.	1995	28
B26-9C	B26-9C1	220	6	PVC	Mathew Ct.	1995	28
B26-9C	B26-9D	370	8	PVC	Shasta Dr.	1995	28
B26-9D	B26-9D1	203	6	PVC	Harley Ct.	1995	28
B26-9D	B26-9E	339	8	PVC	Shasta Dr.	1995	28
B26-9E	B26-9E1	198	6	PVC	Lois Dr.	1995	28
B26-9E	B26-9F	268	6	PVC	Shasta Dr.	1995	28
B26-10	B26-11	353	8	PVC	Mammoth Wy.	1993	30
B26-10	B26-10A	578	6	PVC	James Rd.	1993	30
B26-10A	B26-10B	436	6	PVC	James Rd.	1993	30
B26-11	B26-12	355	8	PVC	Mammoth Wy.	1993	30
B26-12	B26-13	300	8	PVC	Mammoth Wy.	1993	30
B26-13	B26-14	155	6	PVC	Mammoth Wy.	1993	30
B26-14	B25-15	229	6	PVC	Mammoth Wy.	1993	30
B26-14	B26-14A	191	6	PVC	Tyndall Wy.	1993	30
B27	B28	403	15	PVC	Tillman Rd.	1983	40
B28	B29	343	15	PVC	Tillman Rd.	1983	40
B28	B28-1	243	12	PVC	Kimmerling Rd.	1984	39
B28-1	B28-2	321	12	PVC	Kimmerling Rd.	1984	39
B28-1	B28-1A	230	6	PVC	Linda Dr.	1984	39
B28-2	B28-3	242	12	PVC	Kimmerling Rd.	1984	39
B28-2	B28-2A	274	8	PVC	Wagon Dr.	1986	37
B28A-2A	B28-2B	265	8	PVC	Wagon Dr.	1986	37
B28-2B	B28-2C	214	8	PVC	Wagon Dr.	1986	37
B28-2C	B28-2D	381	8	PVC	Wagon Dr.	1986	37
B28-2D	B28-2E	380	8	PVC	Wagon Dr.	1986	37
B28-2E	B28-2F	342	8	PVC	Wagon Dr.	1986	37
B28-2F	B28-2G	203	8	PVC	Wagon Dr.	1986	37

## SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B28-3	B28-4	300	12	PVC	Kimmerling Rd.	1984	39
B28-4	B28-5	305	12	PVC	Kimmerling Rd.	1984	39
B28-5	B28-6	385	10	PVC	Kimmerling Rd.	1984	39
B28-5	B28-5A	310	8	PVC	Wheeler Wy.	1984	39
B28-5A	B28-5B	365	8	PVC	Wagon Dr.	1986	37
B28-5B	B28-5C	274	8	PVC	Wagon Dr.	1986	37
B28-5C	B28-5D	181	6	PVC	Wagon Dr.	1986	37
B28-6	B28-7	387	10	PVC	Kimmerling Rd.	1984	39
B28-7	B28-8	180	10	PVC	Robin Dr.	1983	40
B28-7	B28-7A	282	6	PVC	Kimmerling Rd.	1984	39
B28-7A	B28-7B	225	6	PVC	Kimmerling Rd.	1984	39
B28-8	B28-9	344	10	PVC	Robin Dr.	1983	40
B28-9	B28-10	279	10	PVC	Robin Dr.	1983	40
B28-10	B28-11	263	10	PVC	Bluerock Rd.	1984	39
B28-11	B28-11A	236	6	PVC	Lyell Wy.	1995	28
B28-11	B28-12	225	10	PVC	Bluerock Rd.	1984	39
B28-12	B28-13	320	10	PVC	Bluerock Rd.	1984	39
B28-13	B28-14	406	10	PVC	Bluerock Rd.	1984	39
B28-14	B28-15	231	10	PVC	Bluerock Rd.	1984	39
B28-14	B28-14A	390	6	PVC	Bowles Ln.	1984	39
B28-14A	B28-14B	403	6	PVC	Bowles Ln.	1984	39
B28-14B	B28-14C	178	6	PVC	Bowles Ln.	1984	39
B28-14C	B28-14D	277	6	PVC	Bowles Ln.	1984	39
B28-14D	B28-14E	296	6	PVC	Bowles Ln.	1984	39
B28-15	B28-15A	244	8	PVC	Purple Sage Dr.	1992	31
B28-15A	B28-15B	168	8	PVC	Purple Sage Dr.	1992	31
B28-15B	B28-15C	418	8	PVC	Purple Sage Dr.	1992	31
B28-15C	B28-15D	358	8	PVC	Purple Sage Dr.	1992	31
B28-15	B28-16	72	8	PVC	Bluerock Rd.	1984	39
B28-16	B28-17	286	8	PVC	Bluerock Rd.	1984	39
B28-17	B28-17-1	261	8	PVC	Lassen Wy.	1983	40
B28-17-1	B28-17-1A	93	8	PVC	East Peak Ln.	1992	31
B28-17-1A	B28-17-1B	184	8	PVC	East Peak Ln.	1992	31
B28-17-1	B28-17-2	239	8	PVC	Lassen Wy.	1983	40
B28-17-2	B28-17-2A	202	6	PVC	Canyon Ct.	1983	40
B28-17-2	B28-17-3	157	8	PVC	Lassen Wy.	1983	40
B28-17-3	B28-17-4	224	6	PVC	None	1983	40
B28-17-4	B28-17-5	389	6	PVC	None	1983	40
B28-17	B28-17A	275	6	PVC	Bluerock Rd.	1983	40
B28-17A	B28-17B	313	6	PVC	Bluerock Rd.	1983	40
B28-17B	B28-17C	504	6	PVC	None	1983	40
B28-17C	B28-17D	279	6	PVC	None	1983	40
B28-17	B28-18	331	8	PVC	Lassen Wy.	1983	40
B28-18	B28-18A	430	6	PVC	Angora Dr.	1983	40
B28-18A	B28-18B	233	6	PVC	Angora Dr.	1983	40
B28-18B	B28-18C	466	6	PVC	Angora Dr.	1983	40
B28-18	B28-19	266	8	PVC	Lassen Wy.	1983	40
B28-19	B28-20	246	8	PVC	Lassen Wy.	1983	40
B28-20	B28-20A	112	6	PVC	Lassen Wy.	1983	40
B28-20A	B28-20B	259	6	PVC	Lassen Wy.	1983	40
B28-20	B28-21	134	8	PVC	Ann Wy.	1991	32
B28-21	B28-22	349	8	PVC	Ann Wy.	1991	32
B28-22	B28-23	166	8	PVC	Ann Wy.	1991	32
B28-23	B28-23A	362	8	PVC	Long Valley Rd.	1990	33
B28-23A	B28-23A1	159	6	PVC	Long Valley Rd.	1990	33
B28-23A	B28-23B	397	8	PVC	Long Valley Rd.	1990	33

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B28-23	B28-23-1	376	6	PVC	Long Valley Rd.	1990	33
B28-23-1	B33-15	402	6	PVC	Long Valley Rd.	1990	33
B28-23	B28-24	328	6	PVC	Ann Wy.	1991	32
B28-24	B28-24A	429	6	PVC	Patricia Dr.	1991	32
B28-24A	B51-6	405	6	PVC	Patricia Dr.	1991	32
B28-24	B28-25	133	6	PVC	Ann Wy.	1991	32
B28-25	B28-26	279	6	PVC	Ann Wy.	1991	32
B28-26	B28-27	192	6	PVC	Ann Wy.	1991	32
B29	B30	240	15	PVC	Yellow Jacket Ln.	1983	40
B30	B31	395	15	PVC	Addler Rd.	1984	39
B30	B30-1	255	6	PVC	Yellow Jacket Ln.	1983	40
B30-1	B30-2	238	6	PVC	Yellow Jacket Ln.	1983	40
B30-2	B30-3	241	6	PVC	Yellow Jacket Ln.	1983	40
B30-3	B30-4	415	6	PVC	Yellow Jacket Ln.	1983	40
B30-4	B30-5	424	6	PVC	Yellow Jacket Ln.	1983	40
B30-5	B30-6	432	6	PVC	Yellow Jacket Ln.	1983	40
B30-6	B30-7	400	6	PVC	Yellow Jacket Ln.	1983	40
B31	B32	349	15	PVC	Addler Rd.	1984	39
B31	B31-1	260	6	PVC	Gold Bug Ct.	1984	39
B32	B33	338	15	PVC	Addler Rd.	1984	39
B33	B34	332	15	PVC	Joette Dr.	1984	39
B33	B33-1	309	15	PVC	Cardinal Ct.	1983	40
B33-1	B33-2	370	12	PVC	Bluerock Dr.	1984	39
B33-1	B33-1A	309	6	PVC	Cardinal Ct.	1983	40
B33-1A	B33-1B	310	6	PVC	Cardinal Ct.	1983	40
B33-1B	B33-1B1	311	6	PVC	Hornet Dr.	1983	40
B33-1B1	B33-1B2	320	6	PVC	Hornet Dr.	1983	40
B33-1B2	B33-1B3	320	6	PVC	Hornet Dr.	1983	40
B33-1B3	B33-1B4	317	6	PVC	Hornet Dr.	1983	40
B33-1B4	B33-1B5	262	6	PVC	Hornet Dr.	1983	40
B33-1B5	B33-1B6	278	6	PVC	Hornet Dr.	1983	40
B33-1B6	B33-1B7	259	6	PVC	Hornet Dr.	1983	40
B33-1B	B33-1C	267	6	PVC	Cardinal Ct.	1983	40
B33-1C	B33-1C2	304	6	PVC	Hornet Dr.	1983	40
B33-1C2	B33-1C3	191	6	PVC	Hornet Dr.	1983	40
B33-1C3	B33-1C4	277	6	PVC	Allyn Ct.	1983	40
B33-1C4	B33-1C5	280	6	PVC	Hornet Dr.	1983	40
B33-1C5	B33-1C6	145	6	PVC	Donna Ct.	1983	40
B33-1C5	B33-1C7	175	6	PVC	Hornet Dr.	1983	40
B33-1C7	B33-1C8	205	6	PVC	Hornet Dr.	1983	40
B33-1C8	B33-1B7	171	6	PVC	Hornet Dr.	1983	40
B33-1C	B33-1D	297	6	PVC	Cardinal Ct.	1983	40
B33-1	B33-1E	364	6	PVC	Bluerock Rd.	1983	40
B33-1E	B33-1E1	266	6	PVC	Honeybee Ln.	1983	40
B33-1E1	B33-1E2	393	6	PVC	Honeybee Ln.	1983	40
B33-1E2	B33-1E3	395	6	PVC	Honeybee Ln.	1983	40
B33-1E3	B33-1E4	397	6	PVC	Honeybee Ln.	1983	40
B33-1E4	B33-1E5	421	6	PVC	Honeybee Ln.	1983	40
B33-1E5	B33-1E6	361	6	PVC	Leonard Rd.	1985	38
B33-1E6	B33-1E7	490	6	PVC	Berry In.	1984	39
B33-1E7	B33-1E8	301	6	PVC	Berry In.	1984	39
B33-1E8	B33-1E9	263	6	PVC	Bumblebee Dr.	1985	38
B33-1E9	B33-1E10	236	6	PVC	Bumblebee Dr.	1985	38
B33-1E10	B33-1E11	156	6	PVC	Bumblebee Dr.	1985	38
B33-1E11	B33-1E12	320	6	PVC	Bumblebee Dr.	1985	38
B33-1E11	B33-1K	170	6	PVC	Bumblebee Dr.	1985	38

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B33-1E12	B33-1E13	311	6	PVC	Bumblebee Dr.	1985	38
B33-1E	B33-1F	253	6	PVC	Bluerock Rd.	1983	40
B33-1F	B33-1F1	197	6	PVC	Bluerock Rd.	1983	40
B33-1E5	B33-1G	405	6	PVC	Honeybee Ln.	1983	40
B33-1G	B33-1G1	371	6	PVC	Honeybee Ln.	1983	40
B33-1E6	B33-1H	301	6	PVC	Leonard Rd.	1985	38
B33-1H	B33-1H1	262	6	PVC	Leonard Rd.	1985	38
B33-1H1	B33-1H2	323	6	PVC	Leonard Rd.	1985	38
B33-1E7	B33-1I	470	6	PVC	Bowles Ln.	1984	39
B33-1I	B33-1I1	272	6	PVC	Bowles Ln.	1984	39
B33-1I1	B33-1I2	277	6	PVC	Bowles Ln.	1984	39
B33-1I2	B28-14E	324	6	PVC	Bowles Ln.	1984	39
B33-1E8	B33-1J	334	6	PVC	Bumblebee Dr.	1985	38
B33-1J	B33-1J1	235	6	PVC	Bumblebee Dr.	1985	38
B33-1J1	B33-1J2	198	6	PVC	Bumblebee Dr.	1985	38
B33-1J2	B33-1J3	184	6	PVC	Bumblebee Dr.	1985	38
B33-2	B33-3	344	6	PVC	Bluerock Dr.	1987	36
B33-2	B33-2A	419	6	PVC	Leonard Rd.	1985	38
B33-2A	B33-2B	163	6	PVC	Leonard Rd.	1985	38
B33-2B	B33-2C	352	6	PVC	Leonard Rd.	1985	38
B33-2C	B33-2D	399	6	PVC	Leonard Rd.	1985	38
B33-2D	B33-2E	226	6	PVC	Leonard Rd.	1985	38
B33-2E	B33-2F	263	6	PVC	Leonard Rd.	1985	38
B33-2F	B33-2G	242	6	PVC	Leonard Rd.	1985	38
B33-2H	B33-2I	173	6	PVC	Carmel Wy.	1988	35
B33-2I	B33-2J	255	6	PVC	Carmel Wy.	1988	35
B33-2J	B33-2K	244	6	PVC	Carmel Wy.	1988	35
B33-2G	B33-2H	250	6	PVC	Leonard Rd.	1985	38
B33-2H	B33-1H2	159	6	PVC	Leonard Rd.	1985	38
B33-2G	B33-2G1	300	6	PVC	Leonard Ct.	1985	38
B33-2G1	B33-2G2	208	6	PVC	Leonard Ct.	1985	38
B33-3	B33-4	299	6	PVC	Patricia Dr.	1984	39
B33-3	B33-3A	432	6	PVC	Bluerock Dr.	1987	36
B33-3A	B33-3B	380	6	PVC	Bluerock Dr.	1987	36
B33-3B	B33-3C	252	6	PVC	Bluerock Dr.	1987	36
B33-3C	B33-3D	413	6	PVC	Bluerock Dr.	1987	36
B33-3D	B33-3E	390	6	PVC	Bluerock Dr.	1987	36
B33-4	B33-5	273	6	PVC	Patricia Dr.	1984	39
B33-5	B33-6	268	6	PVC	Patricia Dr.	1984	39
B33-5	B33-5A	165	6	PVC	Mary Jo Dr.	1989	34
B33-5A	B33-5B	424	6	PVC	Mary Jo Dr.	1989	34
B33-5B	B33-5C	381	6	PVC	Mary Jo Dr.	1989	34
B33-5B	B33-5B1	124	6	PVC	Victoria Dr.	1986	37
B33-5B1	B33-5B2	404	6	PVC	Victoria Dr.	1986	37
B33-5B2	B33-5B3	400	6	PVC	Victoria Dr.	1986	37
B33-5B3	B33-5B4	418	6	PVC	Victoria Dr.	1986	37
B33-5B4	B33-5B5	131	6	PVC	Victoria Dr.	1986	37
B33-5B5	B33-5B6	237	6	PVC	Victoria Ct.	1986	37
B33-5C	B33-5D	236	6	PVC	Mary Jo Dr.	1989	34
B33-5D	B33-5E	341	6	PVC	Mary Jo Dr.	1989	34
B33-5D	B33-5D1	203	6	PVC	Fay Ct.	1989	34
B33-5E	B33-5F	303	6	PVC	Mary Jo Dr.	1989	34
B33-5E	B33-5E1	185	6	PVC	Kelly Ct.	1989	34
B33-5F	B33-5G	270	6	PVC	Mary Jo Dr.	1989	34
B33-5F	B33-5F1	275	6	PVC	Victoria Wy.	1986	37
B33-5G	B33-5H	184	6	PVC	Mary Jo Dr.	1989	34

# SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B33-5G	B33-5G1	239	6	PVC	Renee Ct.	1989	34
B33-6	B33-7	234	6	PVC	Patricia Dr.	1984	39
B33-7	B33-8	405	6	PVC	Patricia Dr.	1984	39
B33-8	B33-9	396	6	PVC	Patricia Dr.	1984	39
B33-9	B33-10	367	6	PVC	Patricia Dr.	1984	39
B33-10	B33-11	493	6	PVC	Carmel Wy.	1988	35
B33-10	B33-10A	232	6	PVC	Patricia Dr.	1984	39
B33-10A	B33-10B	391	6	PVC	Patricia Dr.	1984	39
B33-10B	B33-10C	165	6	PVC	Patricia Dr.	1984	39
B33-11	B33-12	284	6	PVC	Jane Wy.	1988	35
B33-12	B33-13	353	6	PVC	Long Valley Rd.	1988	35
B33-12	B33-12A	364	6	PVC	Long Valley Rd.	1988	35
B33-13	B33-14	367	6	PVC	Long Valley Rd.	1988	35
B33-14	B33-15	229	6	PVC	Long Valley Rd.	1988	35
B34	B35	390	15	PVC	Joettte Dr.	1991	32
B35	B36	410	15	PVC	Joettte Dr.	1991	32
B36	B37	411	15	PVC	Joettte Dr.	1991	32
B37	B38	406	15	PVC	Joettte Dr.	1991	32
B38	B39	471	12	PVC	Joettte Dr.	1991	32
B39	B40	183	12	PVC	Joettte Dr.	1991	32
B39	B39-1	280	6	PVC	Joettte Ct.	1991	32
B40	B41	169	12	PVC	Joettte Dr.	1991	32
B41	B42	396	12	PVC	Joettte Dr.	1991	32
B42	B43	250	12	PVC	Joettte Dr.	1991	32
B43	B44	133	12	PVC	Joettte Dr.	1991	32
B44	B45	215	12	PVC	Bluerock Rd.	1988	35
B45	B46	397	12	PVC	Bluerock Rd.	1988	35
B46	B47	340	12	PVC	Bluerock Rd.	1988	35
B46	B46-1	279	10	PVC	Lisa Ln.	1990	33
B46-1	B46-2	385	10	PVC	Lisa Ln.	1990	33
B47	B48	327	6	PVC	Rose Way	1990	33
B47	B47-1	262	12	PVC	Bluerock Rd.	1990	33
B47-1	B47-2	373	8	PVC	Rancho Rd.	1990	33
B47-2	B47-3	359	8	PVC	Rancho Rd.	1990	33
B47-3	B47-4	363	8	PVC	Rancho Rd.	1990	33
B47-4	B47-5	357	8	PVC	Rancho Rd.	1990	33
B48	B49	296	6	PVC	Mary Jo Dr.	1989	34
B48	B48-1	227	6	PVC	Mary Jo Dr.	1989	34
B48-1	B48-2	184	6	PVC	Adaline Wy.	1989	34
B48-2	B48-3	380	6	PVC	Adaline Wy.	1989	34
B48-3	B48-4	212	6	PVC	Adaline Wy.	1989	34
B49	B50	402	6	PVC	Mary Jo Dr.	1989	34
B50	B51	348	6	PVC	Mary Jo Dr.	1989	34
B51	B52	403	6	PVC	Mary Jo Dr.	1989	34
B51	B51-1	479	6	PVC	Long Valley Rd.	1989	34
B51-1	B51-2	271	6	PVC	Patricia Dr.	1988	35
B51-1	B33-12A	446	6	PVC	Long Valley Rd.	1988	35
B51-2	B51-3	247	6	PVC	Patricia Dr.	1988	35
B52-2	B51-2A	123	6	PVC	Patricia Ct.	1988	35
B51-2A	B51-2B	200	6	PVC	Patricia Ct.	1988	35
B51-3	B51-4	353	6	PVC	Patricia Dr.	1988	35
B51-4	B51-5	134	6	PVC	Patricia Dr.	1988	35
B51-5	B51-6	317	6	PVC	Patricia Dr.	1988	35
B52	B53	417	6	PVC	Mary Jo Dr.	1989	34
B53	B54	421	6	PVC	Mary Jo Dr.	1989	34
B53	B53-1	323	6	PVC	Sally Ln.	1989	34

## SYSTEM B

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B53-1	B53-2	290	6	PVC	Kathy Wy.	1989	34
B53-1	B53-1A	390	6	PVC	Sally Ln.	1989	34
B53-1A	B53-1B	215	6	PVC	Sally Ln.	1989	34
B53-1B	B53-1C	249	6	PVC	Sally Ln.	1989	34
B53-1C	B53-1D	309	6	PVC	Sally Ln.	1989	34
B53-1D	B53-1E	275	6	PVC	Sally Ln.	1989	34
B53-2	B53-3	298	6	PVC	Kathy Wy.	1989	34
B53-2	B53-2A	313	6	PVC	Kathy Ct.	1989	34
B53-3	B53-4	301	6	PVC	Kathy Wy.	1989	34
B53-3	B53-3A	241	6	PVC	Kim Ct.	1989	34
B53-4	B53-5	376	6	PVC	Kathy Wy.	1989	34
B53-5	B53-6	257	6	PVC	Kathy Wy.	1989	34
B53-6	B53-6A	246	6	PVC	Kathy Wy.	1989	34
B53-6	B53-7	202	6	PVC	Jill Dr.	1988	35
B53-7	B53-8	160	6	PVC	Jill Dr.	1988	35
B53-8	B53-9	230	6	PVC	Jill Dr.	1988	35
B54	B55	413	6	PVC	Mary Jo Dr.	1989	34
B55	B56	403	6	PVC	Mary Jo Dr.	1989	34
B56	B57	368	6	PVC	Mary Jo Dr.	1989	34

# SYSTEM C

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
B2	C1	245	10	Concrete	None	1994	29
C1	C2	211	10	Concrete	None	1994	29
C2	C3	305	10	Concrete	None	1994	29
C3	C3-A	283	10	Concrete	None	1994	29
C3-A	C4	11	10	Concrete	Sierra Vista Dr.	1994	29
C4	C4-A	307	10	Concrete	None	1994	29
C4-A	C5	70	10	Concrete	None	1994	29
C4	C4-1	203	8	PVC	Sierra Vista Dr.	1994	29
C4-1	C4-2	281	8	PVC	Sierra Vista Dr.	1994	29
C4-2	C4-3	167	6	PVC	Ponderosa Dr.	1994	29
C4-2	C4-2A	156	8	PVC	Sierra Vista Dr.	1994	29
C4-2A	C4-2B	235	8	PVC	Sierra Vista Dr.	1994	29
C4-3	C4-4	156	6	PVC	Ponderosa Dr.	1994	29
C4-4	C4-5	250	6	PVC	Ponderosa Dr.	1994	29
C4-5	C4-6	317	6	PVC	Ponderosa Dr.	1994	29
C4-6	C4-7	144	6	PVC	Ponderosa Dr.	1994	29
C4-1	C4-1A	239	8	PVC	Silveranch Dr.	1994	29
C4-1A	C4-1B	424	8	PVC	Silveranch Dr.	1994	29
C4-1B	C4-1C	224	6	PVC	Silveranch Dr.	1994	29
C4-1C	C4-1D	302	6	PVC	Silveranch Dr.	1994	29
C4-1D	C4-1E	331	6	PVC	Silveranch Dr.	1994	29
C4	C4A	167	10	PVC	Sierra Vista Dr.	1994	29
C4A	C4B	176	8	PVC	Sierra Vista Dr.	1994	29
C4B	C4C	201	8	PVC	Sierra Vista Dr.	1994	29
C4C	C4D	66	8	PVC	Sierra Vista Dr.	1994	29
C4D	C4E	152	6	PVC	Sierra Vista Ct.	1994	29
C4E	C4F	130	6	PVC	Sierra Vista Ct.	1994	29
C5	C6	210	8	PVC	Pleasantview Dr.	1994	29
C6	C7	126	8	PVC	Pleasantview Ct.	1994	29
C6	C6-1	95	8	PVC	Pleasantview Dr.	1994	29
C7	C8	167	8	PVC	Pleasantview Ct.	1994	29

## ROCKY TERRACE ESTATES

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
LS	RT-1	177	8	PVC	Pleasantview Dr.	2005	18
RT-1	RT-2	230	8	PVC	Rocky Terrace Dr.	2005	18
RT-2	RT-3	145	8	PVC	Rocky Terrace Dr.	2005	18
RT-3	RT-4	85	8	PVC	Rocky Terrace Dr.	2005	18
RT-3	RT-3A	299	8	PVC	None	2005	18
RT-3A	RT-3B	69	8	PVC	Keystone Ct.	2005	18
RT-3B	RT-3C	264	8	PVC	Keystone Ct.	2005	18
RT-3C	RT-3D	288	8	PVC	Rocky Terrace Dr.	2005	18
RT-3D	RT-3E	224	8	PVC	Rocky Terrace Dr.	2005	18
RT-3D	RT-3D1	218	6	PVC	Cobblestone Dr.	2005	18
RT-3D	RT-3D2	186	8	PVC	Cobblestone Dr.	2005	18
RT-3E	RT-3F	219	8	PVC	Rocky Terrace Dr.	2005	18
RT-3F	RT-3G	145	8	PVC	Rocky Terrace Dr.	2005	18
RT-4	RT-5	343	8	PVC	Rocky Terrace Dr.	2005	18
RT-5	RT-6	176	8	PVC	Rocky Terrace Dr.	2005	18
RT-6	RT-6A	173	8	PVC	Keystone Ct.	2005	18
RT-6A	RT-6B	92	8	PVC	Keystone Ct.	2005	18
RT-6	RT-7	216	8	PVC	Rocky Terrace Dr.	2005	18
RT-7	RT-8	157	8	PVC	Rocky Terrace Dr.	2005	18
RT-8	RT-9	129	8	PVC	Rocky Terrace Dr.	2005	18
RT-9	RT-9A	157	8	PVC	Cobblestone Dr.	2005	18
RT-9A	RT-9B	109	8	PVC	Cobblestone Dr.	2005	18
RT-9B	RT-9C	95	8	PVC	Cobblestone Dr.	2005	18
RT-9C	RT-9D	171	8	PVC	Cobblestone Dr.	2005	18
RT-9D	RT-9E	131	6	PVC	Lost River Ln.	2005	18
RT-9E	RT-9F	120	6	PVC	Lost River Ln.	2005	18
RT-9	RT-10	226	8	PVC	Rocky Terrace Dr.	2005	18
RT-10	RT-11	128	8	PVC	Rocky Terrace Dr.	2005	18
RT-11	RT-12	105	8	PVC	Rocky Terrace Dr.	2005	18
RT-12	RT-13	101	8	PVC	Rocky Terrace Dr.	2005	18
RT-13	RT-14	219	8	PVC	Rocky Terrace Dr.	2005	18
RT-14	RT-15	234	8	PVC	Rocky Terrace Dr.	2005	18
RT-15	RT-16	229	8	PVC	Rocky Terrace Dr.	2005	18

## KINGSTON LANE (RAINSHADOW RANCH)

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
KW-1	KW-2	203	8	PVC	Kingston Ln.	2006	17
KW-2	KW-3	298	8	PVC	Kingston Ln.	2006	17
KW-2	KW-2A	359	8	PVC	Rainshadow Ln.	2006	17
KW-3	KW-4	378	8	PVC	Kingston Ln.	2006	17
KW-4	KW-5	186	8	PVC	Kingston Ln.	2006	17
KW-5	KW-6	124	8	PVC	Kingston Ln.	2006	17
KW-6	KW-6A	369	8	PVC	None	2006	17
KW-6	KW-7	79	8	PVC	Kingston Ln.	2006	17
KW-7	KW-8	248	8	PVC	Kingston Ln.	2006	17

## OLD NEVADA WAY (PLEASANTVIEW)

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
ON-1	ON-2	222	10	PVC	Bobwire Ln.	2003	20
ON-2	ON-3	117	10	PVC	Bobwire Ln.	2003	20
ON-3	ON-3A	229	8	PVC	Old Nevada Wy.	2003	20
ON-3	ON-3B	387	8	PVC	Old Nevada Wy.	2003	20
ON-3B	ON-3B1	193	8	PVC	Keepsake Cr.	2003	20
ON-3B	ON-3C	329	8	PVC	Old Nevada Wy.	2003	20

## CEDAR CREEK

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
MGSD	CR-1	206	8	PVC	None	2005	18
CR-1	CR-2	55	8	PVC	Cedar brooks Ct.	2005	18
CR-2	CR-3	106	8	PVC	Cedar brooks Ct.	2005	18
CR-3	CR-4	222	8	PVC	Cedar brooks Ct.	2005	18
CR-4	CR-4A	143	8	PVC	Aspen Brook Ln.	2005	18
CR-4A	CR-4B	161	8	PVC	Aspen Brook Ln.	2005	18
CR-4B	CR-4C	88	8	PVC	Aspen Brook Ln.	2005	18
CR-4C	CR-4D	110	8	PVC	Aspen Brook Ln.	2005	18
CR-4D	CR-4E	49	8	PVC	Aspen Brook Ln.	2005	18
CR-4	CR-5	279	8	PVC	Cedar Creek Cr.	2005	18
CR-5	CR-5A	158	8	PVC	Cedar Creek Cr.	2005	18
CR-5A	CR-5B	295	8	PVC	Cedar Creek Cr.	2005	18
CR-5B	CR-5C	102	8	PVC	Cedar Creek Cr.	2005	18
CR-5C	CR-5D	116	8	PVC	Cedar Creek Cr.	2005	18
CR-5D	CR-5E	225	8	PVC	Cedar Creek Cr.	2005	18
CR-5	CR-6	129	8	PVC	Cedar Creek Cr.	2005	18
CR-6	CR-7	208	8	PVC	Cedar Creek Cr.	2005	18
CR-7	CR-8	241	8	PVC	Cedar Creek Cr.	2005	18
CR-8	CR-9	226	8	PVC	Cedar Creek Cr.	2005	18
CR-9	CR-10	129	8	PVC	Cedar Creek Cr.	2005	18

# SYSTEM D

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
D1	D1-A	295	10	Concrete	Wintergreen Dr.	1977	46
D1-A	D2	84	10	Concrete	Wintergreen Dr.	1977	46
D2	D2-A	225	10	Concrete	Wintergreen Dr.	1977	46
D2-A	D3	145	10	Concrete	Wintergreen Dr.	1977	46
D2	D2-1	390	8	PVC	Springtime Dr.	1977	46
D3	D3-A	151	10	Concrete	Wintergreen Dr.	1977	46
D3-A	D4-A	194	10	Concrete	Wintergreen Dr.	1977	46
D3	D4	444	10	PVC	Wintergreen Dr.	1977	46
D3	D3-1	121	8	PVC	Wintergreen Ct.	1977	46
D3-1	D3-2	139	8	PVC	Wintergreen Ct..	1977	46
D4	D5	112	10	Concrete	Wintergreen Dr.	1977	46
D4	D4A	231	8	PVC	Soresen Ct.	1977	46
D4-A	D4	58	10	Concrete	Wintergreen Dr.	1977	46
D4	D4-1	176	8	PVC	Soresen Ln.	1977	46
D4-1	D4-2	194	8	PVC	Soresen Ln.	1977	46
D4-2	D4-3	254	8	PVC	Soresen Ln.	1977	46
D4-3	D4-4	394	8	PVC	Soresen Ln.	1977	46
D4-3	D4-3A	213	8	PVC	Pioche Dr.	1978	45
D4-4	D4-5	223	8	PVC	Springtime Dr.	1995	28
D4-4	D4-4A	60	8	PVC	Soresen Ln.	1995	28
D4-5	D4-6	118	8	PVC	Springtime Dr.	1995	28
D4-6	D4-7	268	8	PVC	Topaz Ln.	1995	28
D4-6	D4-6A	97	8	PVC	Springtime Dr.	1995	28
D4-7	D4-8	405	8	PVC	None	1995	28
D4-8	D4-9	300	8	PVC	None	1995	28
D4-9	D4-10	304	8	PVC	Gina Ln.	1995	28
D4-9	D4-9A	323	8	PVC	Topaz Ln.	1995	28
D4-9A	D4-9B	247	8	PVC	Topaz Ln.	1995	28
D4-10	D4-11	184	8	PVC	Jodi Ln.	1995	28
D4-11	D4-12	152	8	PVC	Jodi Ln.	1995	28
D4-11	D4-11A	202	6	PVC	Jodi Ln.	1995	28
D4-12	D4-13	204	8	PVC	Jodi Ln.	1995	28
D5	D6	292	10	PVC	None	1995	28
D6	D7	185	10	PVC	Kingston Wy.	1978	45
D7	D8	306	10	Concrete	Kingston Wy.	1978	45
D8	D9	249	10	Concrete	Kingston Wy.	1978	45
D9	D10	336	8	PVC	Manhattan Wy.	1978	45
D9	D9-1	150	8	PVC	Manhattan Wy.	1978	45
D9-1	D9-2	300	8	PVC	Manhattan Wy.	1978	45
D9-2	D9-3	305	8	PVC	Manhattan Wy.	1978	45
D9-3	D9-4	340	8	PVC	Manhattan Wy.	1978	45
D9-3	D9-3A	240	6	PVC	Wonder Ct.	1978	45
D9-3A	D9-3B	253	6	PVC	None	1978	45
D9-3B	D9-3C	370	6	PVC	Sorensen Ln.	1995	28
D9-3C	D9-3D	367	6	PVC	Sorensen Ln.	1995	28
D9-3D	D9-3E	315	6	PVC	Sorensen Ln.	1995	28
D9-4	D9-5	340	6	PVC	Manhattan Wy.	1977	46
D9-4	D9-4A	330	6	PVC	Franklin Ln.	1978	45
D9-4A	D9-4A1	330	6	PVC	Bolivia Wy.	1977	46
D9-4A1	D9-4A2	130	6	PVC	Bolivia Wy.	1977	46
D9-4A2	D9-4A3	300	6	PVC	Bolivia Wy.	1977	46
D9-4A2	D9-4A4	240	6	PVC	Bodie Ct.	1977	46
D9-4A	D9-4B	135	6	PVC	Franklin Ln.	1978	45
D9-4B	D9-4B1	150	6	PVC	Como Ct.	1977	46
D9-4B	D9-4C	365	6	PVC	Franklin Ln.	1978	45
D9-4C	D9-4D	230	6	PVC	Franklin Ln.	1978	45

# SYSTEM D

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
D9-4D	D9-4E	890	6	PVC	None	2024	0
D9-5	D9-6	439	6	PVC	Manhattan Wy.	1977	46
D9-6	D9-7	257	6	PVC	None	1977	46
D9-6	D9-6A	251	6	PVC	Manhattan Wy.	1977	46
D9-6A	D9-6B	150	6	PVC	Manhattan Wy.	1977	46
D9-7	D9-8	116	6	PVC	None	1977	46
D9-8	D9-9	268	6	PVC	Redwood Cr.	1980	43
D9-8	D9-8A	430	6	PVC	Redwood Cr.	1980	43
D9-8A	D9-8B	67	6	PVC	Redwood Cr.	1980	43
D9-9	D9-10	235	6	PVC	Redwood Cr.	1980	43
D9-10	D9-11	233	6	PVC	None	1980	43
D9-10	D9-10A	227	6	PVC	Redwood Cr.	1980	43
D9-10A	D9-10B	166	6	PVC	Redwood Cr.	1980	43
D9-11	D9-12	143	6	PVC	Chardonney Dr.	1993	30
D9-11	D9-11A	155	6	PVC	Chardonney Dr.	1993	30
D9-12	D9-13	250	6	PVC	Cabernet Ct.	1993	30
D9-13	D9-14	251	6	PVC	Cabernet Ct.	1993	30
D9-13	D9-13A	245	6	PVC	Zinfandel Dr.	1993	30
D9	D9-A	300	6	PVC	Kingston Wy.	1978	45
D9-A	D9-A1	200	6	PVC	Belmont Ct.	1977	46
D9-A	D9-B	152	6	PVC	Kingston Wy.	1978	45
D9-B	D9-C	200	6	PVC	Kingston Wy.	1978	45
D9-C	D9-D	200	6	PVC	Kingston Wy.	1978	45
D9-D	D9-E	120	6	PVC	Kingston Wy.	1978	45
D9-E	D9-F	361	6	PVC	Kingston Wy.	1978	45
D9-F	D9-G	215	6	PVC	Kingston Wy.	1978	45
D10	D11	347	8	PVC	Manhattan Wy.	1977	46
D11	D12	347	8	PVC	Manhattan Wy.	1977	46
D12	D13	302	8	Concrete	Manhattan Wy.	1977	46
D13	D13A	146	6	Concrete	Manhattan Wy.	1977	46
D13	D14	264	8	Concrete	Monarch Ln.	1977	46
D14	D15	351	8	Concrete	Monarch Ln.	1977	46
D15	D15-A	344	8	PVC	Monarch Ln.	1977	46
D15	D16	428	8	PVC	Monarch Ln.	1977	46
D15	D15-1	240	6	PVC	Rawhide Ct.	1977	46
D16	D17	252	8	PVC	Ely Wy.	1989	34
D16	D16-1	290	8	PVC	Monarch Ln.	1977	46
D16-1	D16-2	300	6	PVC	Monarch Ln.	1977	46
D16-1	D16-1A	250	6	PVC	Columbia Ct.	1977	46
D16-2	D16-3	140	6	PVC	Monarch Ln.	1977	46
D17	D18	320	8	PVC	Bing Pit	1989	34
D18	D19	319	8	PVC	Bing Pit	1989	34
D19	D20	201	8	Concrete	Bing Pit	1989	34
D20	D21	255	8	Concrete	Bing Pit	1989	34
D21	D22	342	8	Concrete	Bing Pit	1989	34
D22	D23	343	8	Concrete	Bing Pit	1989	34
D23	D24	342	8	Concrete	Bing Pit	1989	34
D24	D25	295	8	Concrete	Bing Pit	1989	34
D25	D25-A	101	8	PVC	Bing Pit	1989	34
D25-A	D26	419	8	PVC	Bing Pit	1989	34
D25	D25-1	323	8	PVC	Bing Pit	1989	34
D25-1	D25-2	286	8	PVC	Bing Pit	1989	34
D25-2	D25-3	352	8	PVC	None	1989	34
D25-3	D25-4	125	8	PVC	None	1989	34
D25-4	D25-5	387	8	PVC	None	1989	34
D25-4	D25-4A	211	8	PVC	None	1989	34

# SYSTEM D

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
D25-4A	D25-4B	204	8	PVC	Dora Dr.	1989	34
D25-5	D25-6	178	6	PVC	Dora Dr.	1989	34
D25-6	D25-7	334	6	PVC	Pollen Ct.	1989	34
D25-7	D25-8	99	6	PVC	Pollen Ct.	1989	34
D25-5	D25-5A	307	6	PVC	None	1989	34
D25-5A	D25-5B	220	6	PVC	None	1989	34
D25-5	D25-5-1	466	6	PVC	None	1989	34
D26	D27	400	8	PVC	Bing Rd.	1989	34
D27	D28	401	8	PVC	Bing Rd.	1989	34
D28	D29	403	8	PVC	Bing Rd.	1989	34
D29	D30	217	8	PVC	Bing Rd.	1989	34
D30	D31	246	8	PVC	Bing Rd.	1989	34
D29	D30-1	246	8	PVC	Kimmerling Rd.	1994	29
D30-1	D30-2	503	8	PVC	Kimmerling Rd.	1994	29
D30-2	D30-3	141	8	PVC	None	1994	29
D30-3	D30-4	188	8	PVC	None	1994	29
D30-4	D30-5	132	8	PVC	None	1994	29
D30-5	D30-6	266	6	PVC	None	1994	29
D30-6	D30-7	245	6	PVC	None	1994	29
D31	D32	140	8	PVC	Kyndal Wy.	1993	30
D32	D33	257	8	PVC	Kyndal Wy.	1993	30
D32	D32-1	365	8	PVC	Sunburst Ct.	1993	30
D33	D34	261	8	PVC	Kyndal Wy.	1993	30
D33	D33-1	357	8	PVC	Raab Rd.	1993	30
D34	D35	270	8	PVC	Kyndal Wy.	1993	30
D34	D34-1	356	8	PVC	Sunnyside Ct.	1993	30
D35	D36	257	8	PVC	Kyndal Wy.	1993	30
D35	D35-1	357	8	PVC	Morning Sun Ct.	1993	30
D36	D37	373	8	PVC	Kyndal Ct.	1993	30

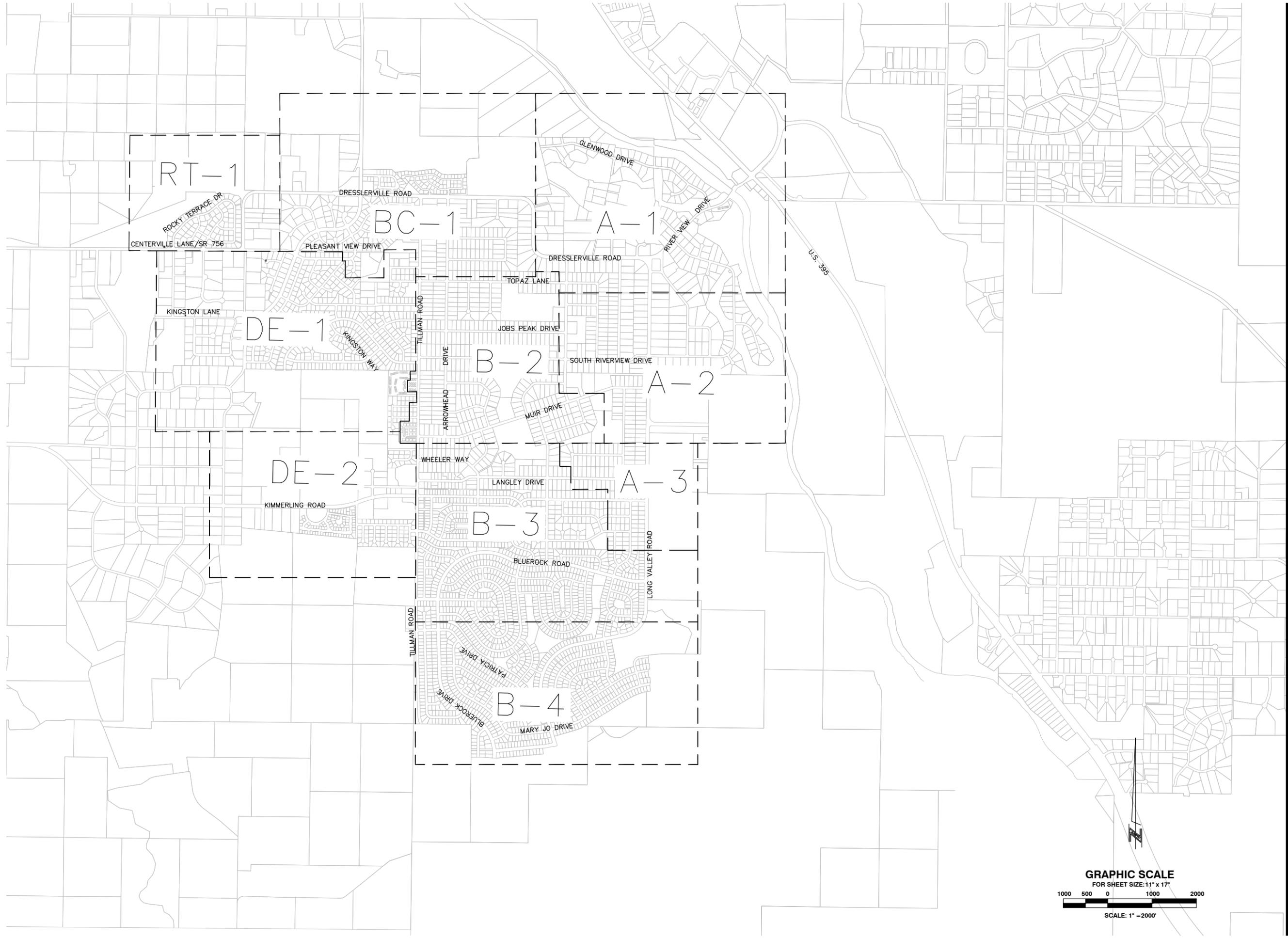
# SYSTEM E

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
C5	E1	297	10	PVC	Pleasantview Dr.	1991	32
E1	E2	301	10	PVC	Pleasantview Dr.	1991	32
E2	E3	304	10	PVC	Pleasantview Dr.	1991	32
E2	E2-1	302	8	PVC	Fieldgate Wy.	1993	30
E2-1	E2-2	180	8	PVC	Fieldgate Wy.	1993	30
E2-1	E2-1A	133	8	PVC	Fieldgate Ct.	1993	30
E2-2	E2-3	232	8	PVC	Fieldgate Wy.	1993	30
E3	E4	400	8	PVC	Springfield Dr.	1994	29
E3	F.M.	3216	4	PVC	Rocky Terrace	2005	18
E3	F.M.	2028	2	PVC	Barbwire	2000	23
E4	E5	385	8	PVC	Springfield Dr.	1994	29
E5	E6	188	8	PVC	Springfield Dr.	1994	29
E6	E7	268	8	PVC	Springfield Dr.	1994	29
E6	E6-1	285	6	PVC	Wintergreen Dr.	1994	29
E7	E8	237	8	PVC	Springfield Dr.	1996	27
E7	E7-1	219	8	PVC	Kingston Wy.	1996	27
E7-1	E7-2	180	8	PVC	Kingston Wy.	1996	27
E7-2	E7-3	211	8	PVC	Sweetwater Dr.	1998	25
E7-3	E7-4	242	8	PVC	Sweetwater Dr.	1998	25
E7-4	E7-5	167	8	PVC	Sage Ocean Ct.	1998	25
E8	E9-A	272	10	PVC	Springfield Dr.	1996	27
E9-A	E9	75	8	PVC	Springfield Dr.	1996	27
E9	E9-1	195	8	PVC	None	2007	16
E9-1	FM	1654	4	PVC	Kingston Wy.	2006	17
E10	E11	286	8	PVC	Springfield Dr.	1998	25
E11	E11-A	233	10	PVC	Springfield Dr.	1996	27
E11-A	E12	252	10	PVC	Springfield Dr.	1996	27
E12	E13	165	8	PVC	Sweetwater Dr.	2000	23
E12	E12-1	321	8	PVC	Sweetwater Dr.	2000	23
E12-1	E12-2	145	8	PVC	Sweetwater Dr.	2000	23
E12-2	E12-3	137	8	PVC	Sweetwater Dr.	2000	23
E12-3	E12-4	143	8	PVC	Sweetwater Dr.	2000	23
E12-3	E12-3A	152	8	PVC	Sweetwater Dr.	2000	23
E12-4	E12-5	122	8	PVC	Woodford Ln.	2000	23
E12-4	E12-4A	212	8	PVC	Sweetwater Dr.	2000	23
E12-5	E12-6	236	8	PVC	Woodford Ln.	2000	23
E13	E14	275	8	PVC	Bing Pit	1999	24
E14	E15	255	8	PVC	Bing Pit	1999	24
E15	E16	351	8	PVC	Bing Pit	1999	24
E16	E17	248	8	PVC	Bing Pit	1996	27
E17	E18	320	8	PVC	Bing Pit	1999	24
E18	E19	323	8	PVC	Bing Pit	1999	24
E19	E19-A	400	8	PVC	Bing Pit	1996	27
E19-A	E20	301	8	PVC	Bing Pit	1999	24
E20	E20-A	399	8	PVC	Bing Pit	1999	24
E20-A	E21	276	8	PVC	Bing Pit	1996	27
E21	E22	347	8	PVC	Bing Pit	1999	24
E22	E23	296	8	PVC	Kimmerling Dr.	2000	23
E22	E22-1	204	8	PVC	None	1999	24
E23	E24	257	8	PVC	Kimmerling Dr.	2000	23
E24	E25	181	8	PVC	Kimmerling Dr.	2000	23
E25	E26	216	8	PVC	Kimmerling Dr.	2000	23
E26	E27	287	8	PVC	Ellies Wy.	2007	16
E26	E26-1	291	8	PVC	Kimmerling Dr.	2000	23
E26-1	E26-2	245	8	PVC	Kimmerling Dr.	2000	23
E26-2	E26-3	116	8	PVC	Ellies Wy.	2007	16

## SYSTEM E

Downstream MH	Upstream MH	Length (FT)	Diameter (in)	Material	Street	Year Installed	Pipe Age (years)
E26-3	E26-4	254	8	PVC	Ellies Wy.	2007	16
E27	E28	141	8	PVC	Ellies Wy.	2007	16
E27	E27-1	150	8	PVC	Ellies Wy.	2007	16
E27-1	E27-2	286	8	PVC	Ellies Wy.	2007	16
E27-2	E27-3	87	8	PVC	Ellies Wy.	2007	16
E28	E29	108	8	PVC	Cottage Loop	2007	16
E29	E30	154	8	PVC	Cottage Loop	2007	16
E30	E31	393	8	PVC	Cottage Loop	2007	16
E31	E32	178	8	PVC	Cottage Loop	2007	16
E31	E31-1	99	8	PVC	Ellies Wy.	2007	16
E32	E33	358	8	PVC	Cottage Loop	2007	16
E33	E34	200	8	PVC	Cottage Loop	2007	16
E34	E35	169	8	PVC	Bing Rd.	2000	23

## **Appendix D Pipe System Sheet Set**

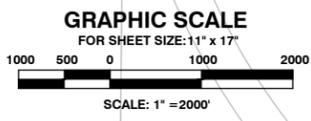


GRGID  
**GRGID SEWER MASTER PLAN**  
**SYSTEM MAP - INDEX**  
GARDNERVILLE DOUGLAS NEVADA

REV	DATE	DESCRIPTION

**INDEX**

DATE:	MAY 2024
DRAWN BY:	
DESIGNED BY:	
CHECKED BY:	
JOB NO.:	10919.001

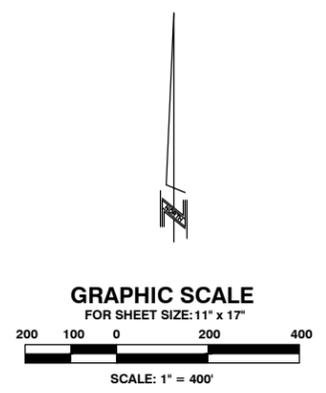
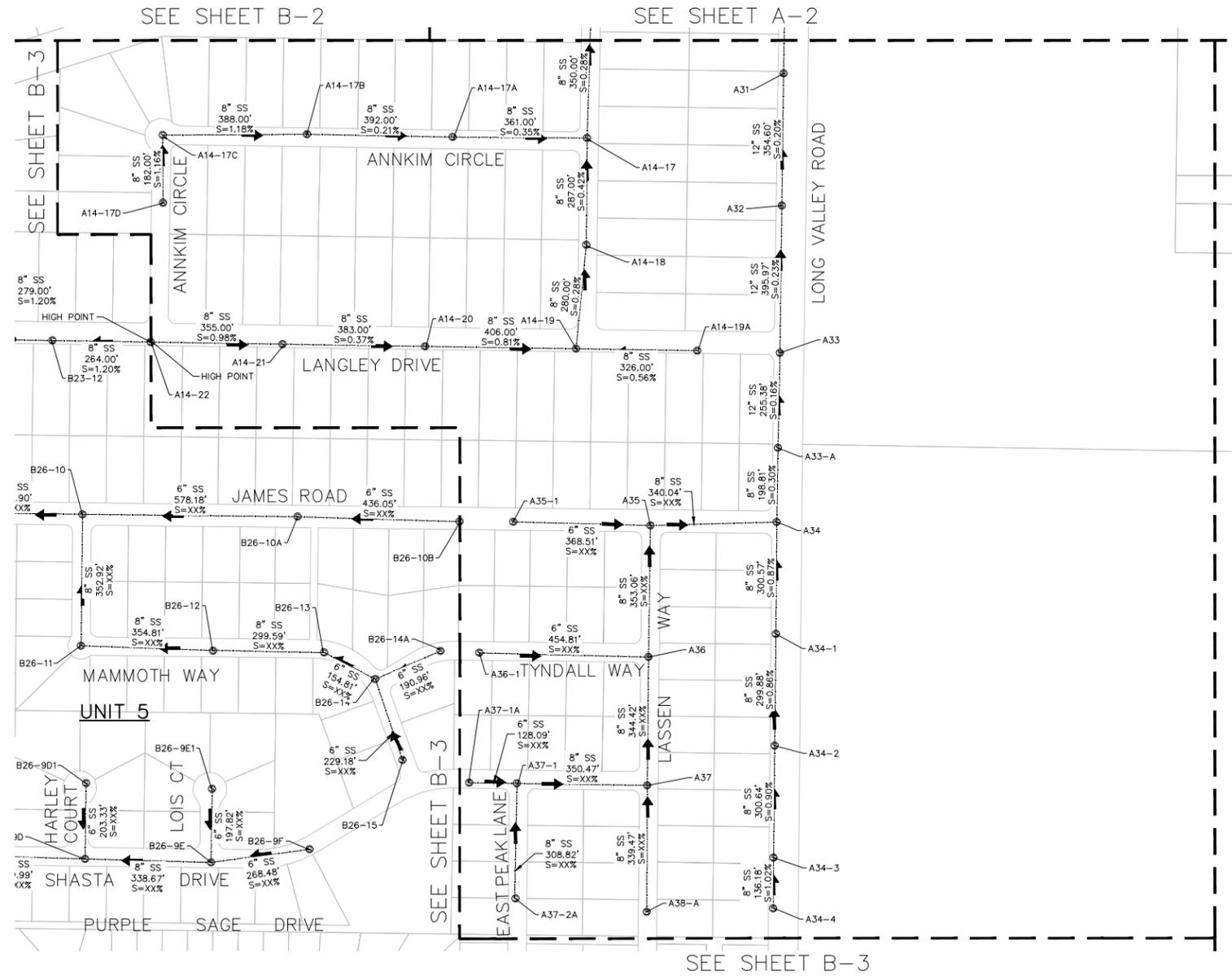


L:\Projects\10919.001 - GRGID Sewer MasterPlan Update\3 - Design\DWG\Civil\Sheets\87870049\HETS.dwg,INDEX, 05/07/2024 09:18 am emckendic





L:\Projects\1919\01 - GRGD Sewer MasterPlan Update\3 - Design\DWG\Civil\Sheets\871704\871704-SHEETS.dwg, A-3, 5/17/2024 9:18:18 am emcandz6



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

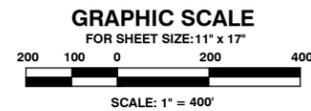
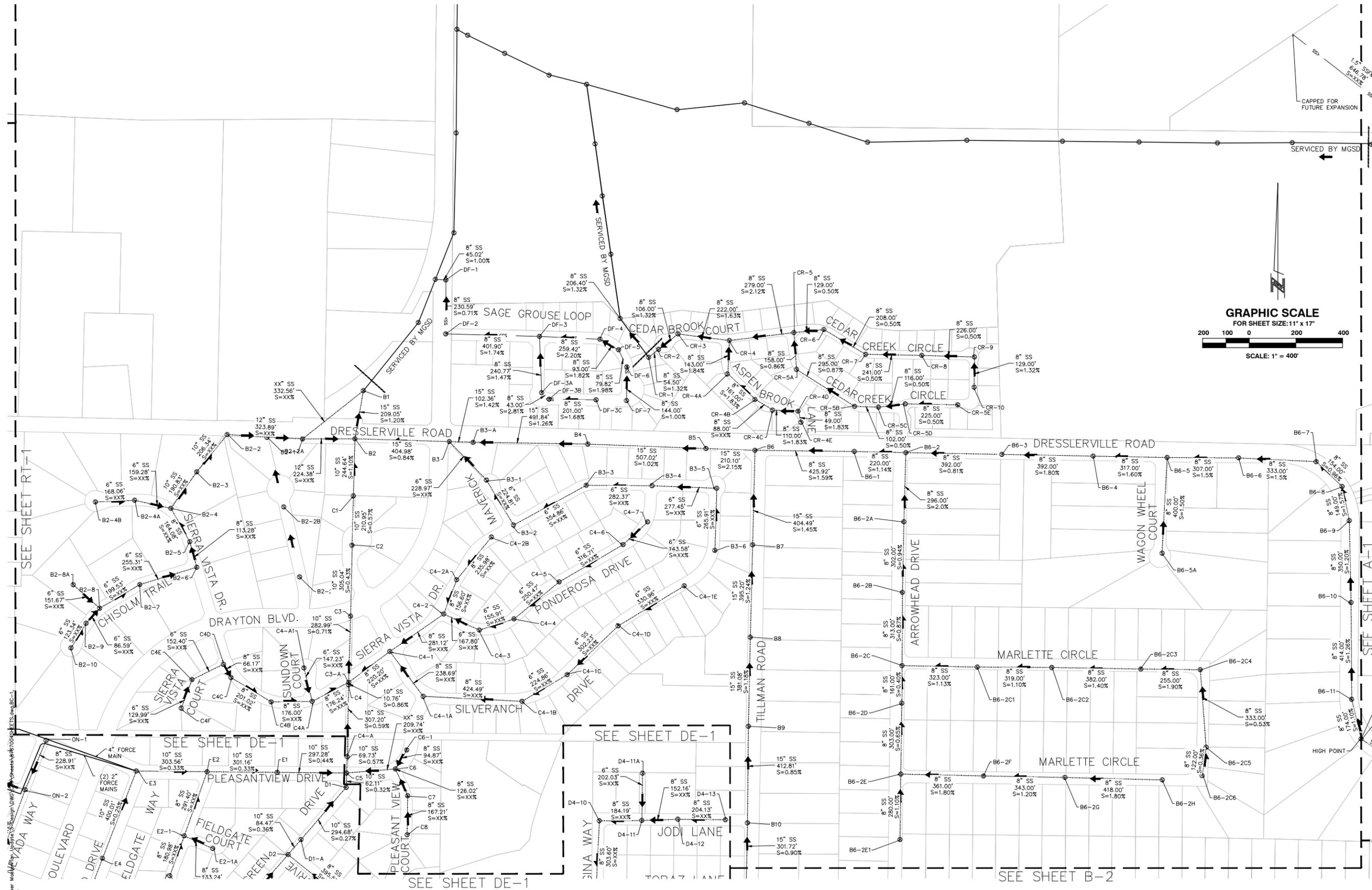
WWW.LUMOSINC.COM  
CIVIL ENGINEERING  
GEOTECHNICAL ENGINEERING  
PLANNING  
LANDSCAPE ARCHITECTURE  
SURVEYING / GIS  
CONSTRUCTION SERVICES  
MATERIALS TESTING

GRGD  
GRGD SEWER MASTER PLAN  
SYSTEM MAP  
GARDNERVILLE  
DOUGLAS  
NEVADA

REV	DATE	DESCRIPTION	BY

**A-3**

DATE: MAY 2024  
DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001



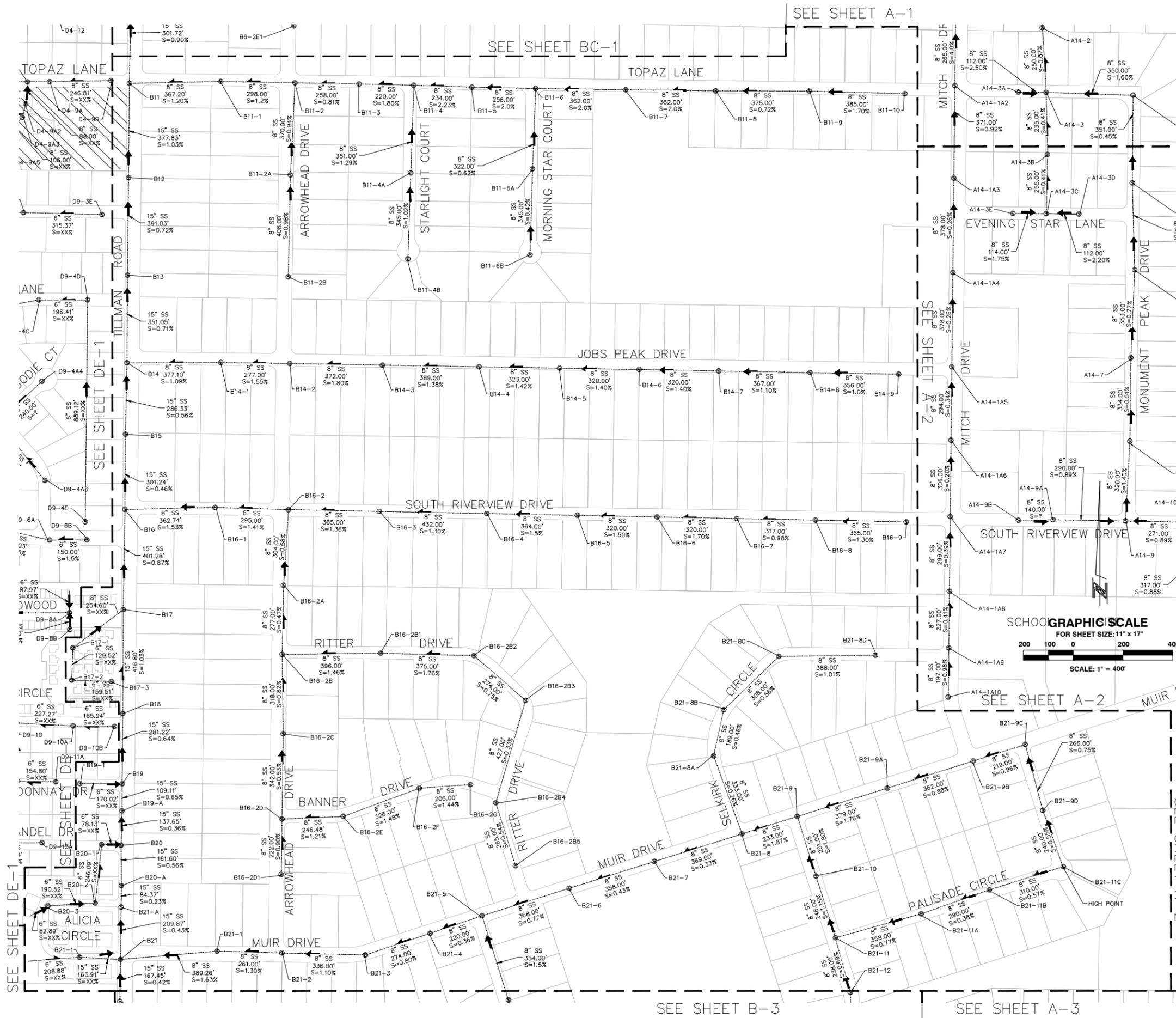
GRGD  
 GRGD SEWER MASTER PLAN  
 SYSTEM MAP  
 DOUGLAS  
 NEVADA  
 GARDNERVILLE

REV	DATE	DESCRIPTION

**BC-1**

DATE: MAY 2024  
 DRAWN BY:  
 DESIGNED BY:  
 CHECKED BY:  
 JOB NO.: 10919.001

L:\Projects\10919.001 - GRGD Sewer Master Plan\Drawings\10919.001-GRGD-BC-1.dwg  
 05/07/2024 09:10 am emcandice



GRGD  
GRGD SEWER MASTER PLAN  
SYSTEM MAP  
NEVADA  
DOUGLAS  
GARDNERVILLE

REV	DATE	DESCRIPTION

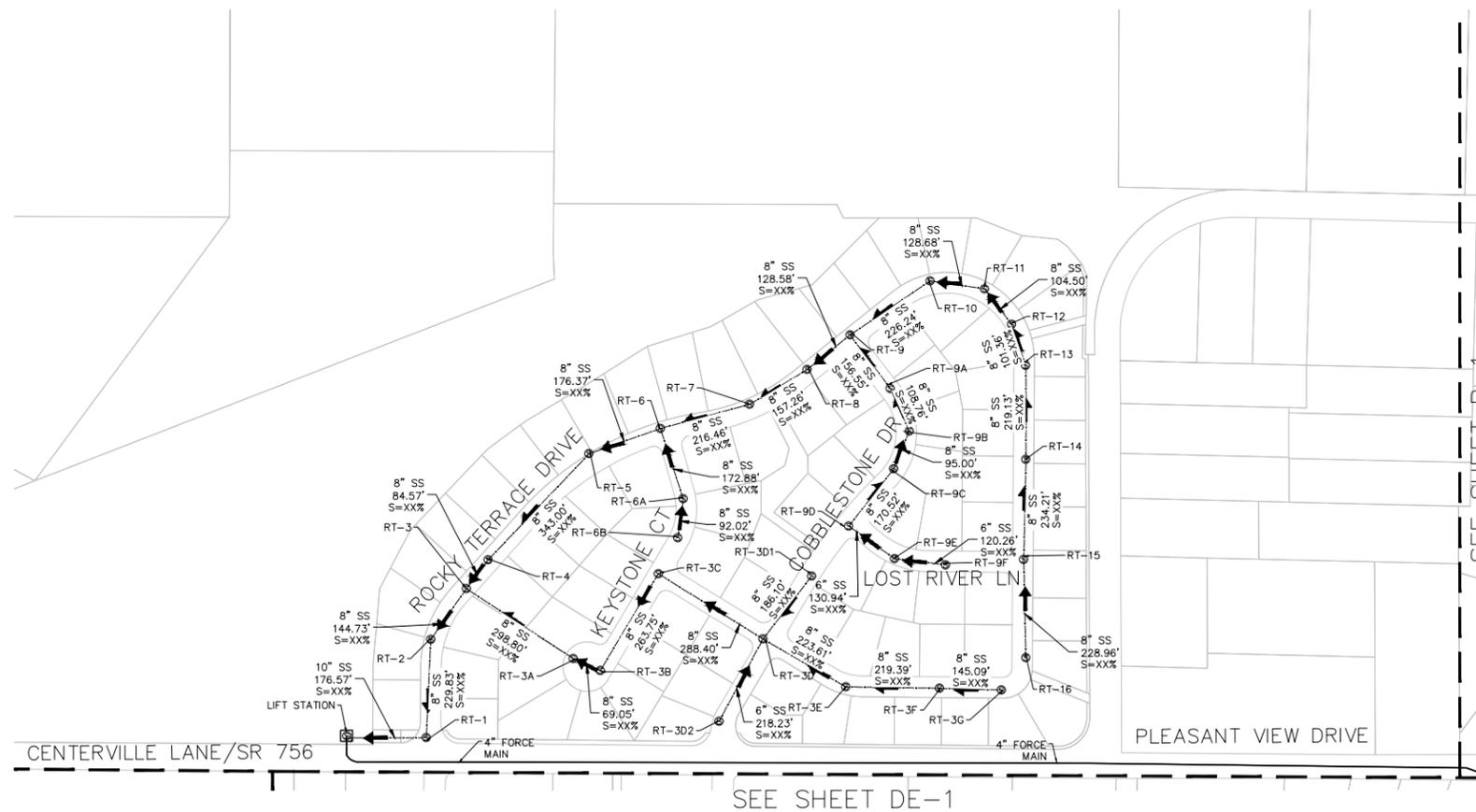
**B2**

DATE: MAY 2024  
DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

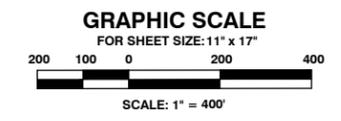
L:\Projects\10919.001 - GRGD Sewer MasterPlan Update\3 - Design\DWG\Civil\Sheets\B7B704-SHEETS.dwg B2  
05/07/2024 09:10 am emcendacz







L:\Projects\19919.001 - GRGD Sewer MasterPlan Update\3 - Design\DWG\Civil\Sheets\RT1\RT1.dwg, RT1, 05/07/2024 09:10 am, emcandz6



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

WWW.LUMOSINC.COM

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

GRGD  
**GRGD SEWER MASTER PLAN**  
**SYSTEM MAP**

REV	DATE	DESCRIPTION	BY

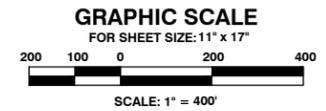
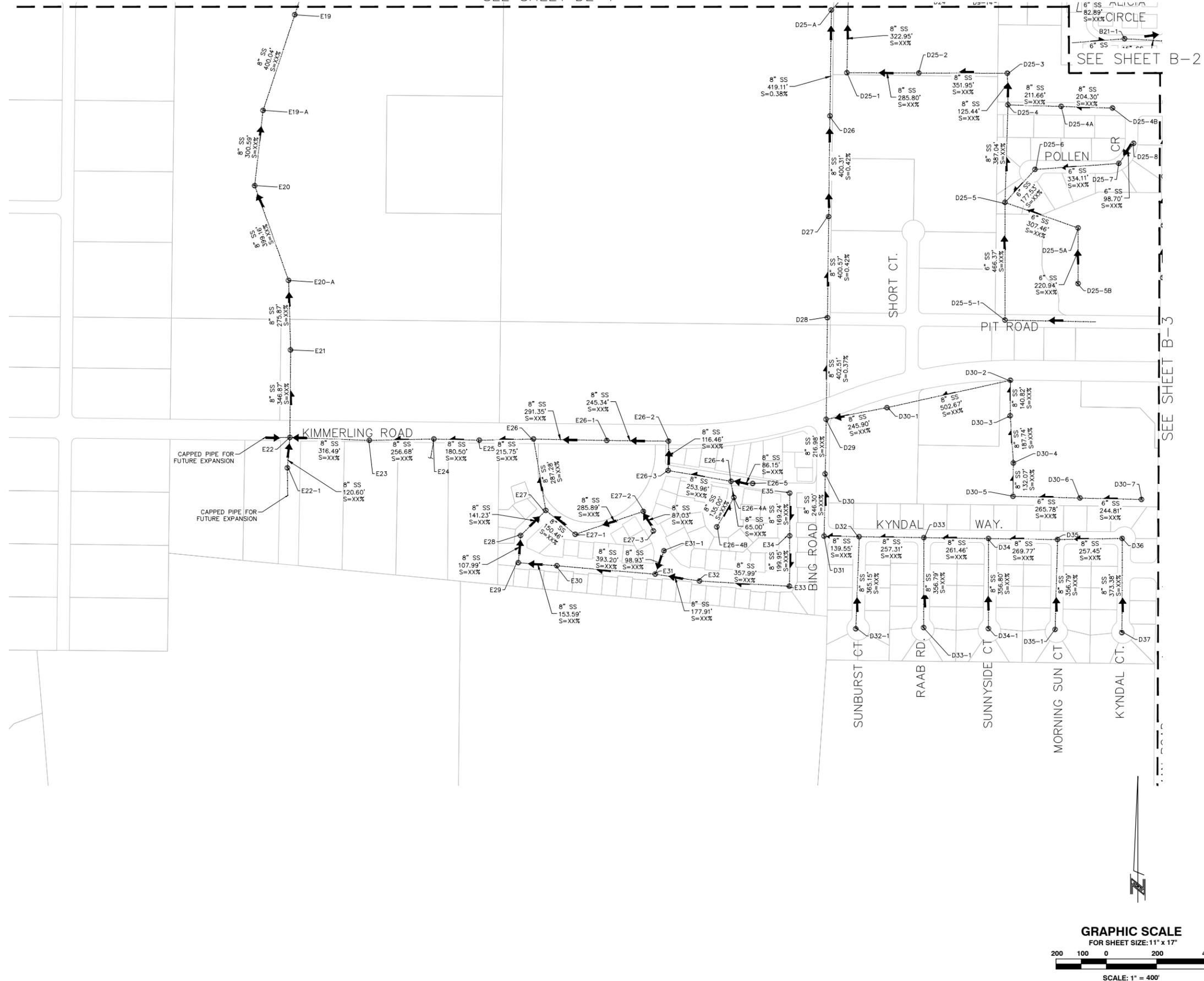
**RT1**

DATE: MAY 2024  
 DRAWN BY:  
 DESIGNED BY:  
 CHECKED BY:  
 JOB NO.: 10919.001



L:\Projects\1919\01 - GRGD Sewer MasterPlan Update\3 - Design\DWG\Civil\Sheets\8787049\DETS.dwg:DE-2, 05/07/2024 09:10 am emcandz6

SEE SHEET DE-1



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

WWW.LUMOSINC.COM

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

GRGD  
NEVADA  
DOUGLAS  
GARDNERVILLE

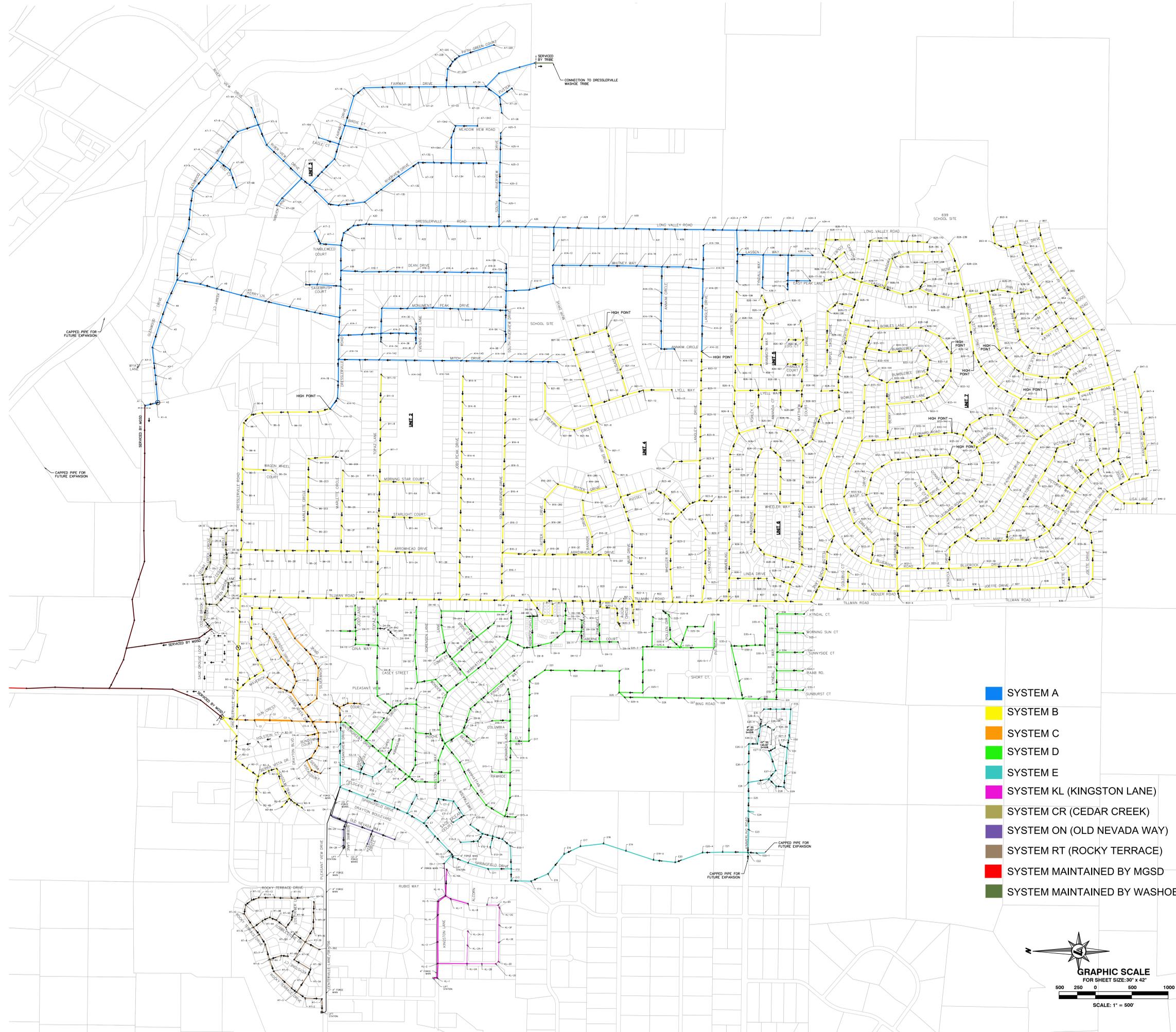
**GRGD SEWER MASTER PLAN  
SYSTEM MAP**

REV	DATE	DESCRIPTION

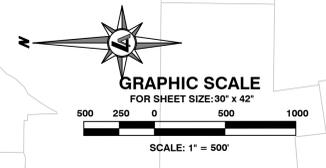
**DE-2**

DATE: MAY 2024  
DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

**Appendix E Pipe System Map**



- SYSTEM A
- SYSTEM B
- SYSTEM C
- SYSTEM D
- SYSTEM E
- SYSTEM KL (KINGSTON LANE)
- SYSTEM CR (CEDAR CREEK)
- SYSTEM ON (OLD NEVADA WAY)
- SYSTEM RT (ROCKY TERRACE)
- SYSTEM MAINTAINED BY MGSD
- SYSTEM MAINTAINED BY WASHOE TRIBE



**GRGD SEWER MASTER PLAN  
PIPE SYSTEM MAP BY COLOR**

GRGD

REV	DATE	DESCRIPTION

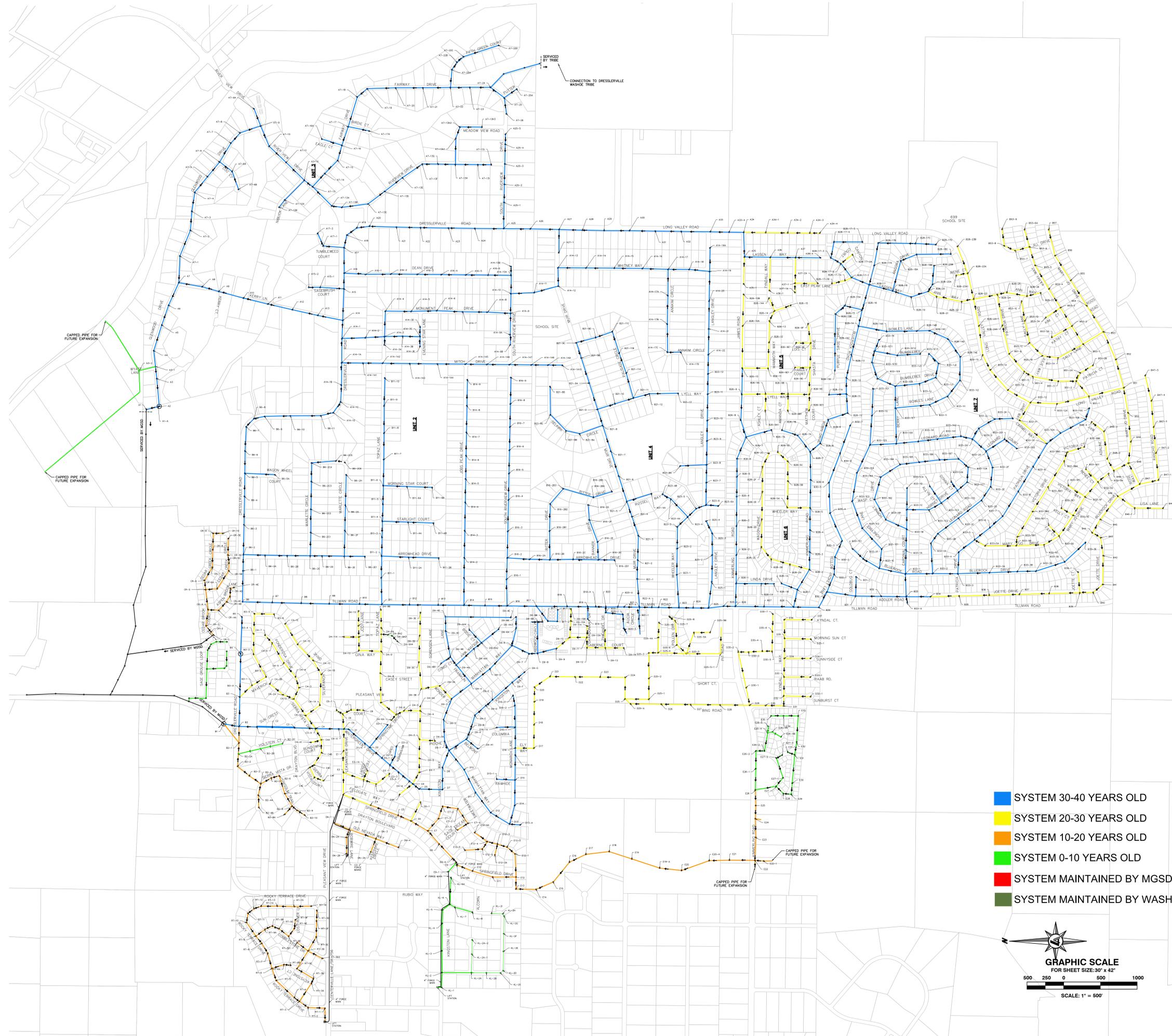
BAR IS 1 INCH ON ORIGINAL DRAWING  
SCALE  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

GARDNERVILLE DOUGLAS COUNTY NEVADA

MAY 2024

**Appendix F Pipe Age Map**



**GRGD SEWER MASTER PLAN**  
**PIPE AGE BY COLOR**

GRGD

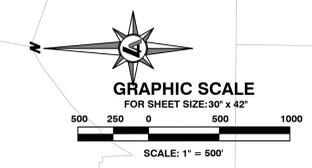
NEVADA

DOUGLAS COUNTY

GARDNERVILLE

MAY 2024

- SYSTEM 30-40 YEARS OLD
- SYSTEM 20-30 YEARS OLD
- SYSTEM 10-20 YEARS OLD
- SYSTEM 0-10 YEARS OLD
- SYSTEM MAINTAINED BY MGSD
- SYSTEM MAINTAINED BY WASHOE TRIBE



REV	DATE	DESCRIPTION

BAR IS 1 INCH ON ORIGINAL DRAWING  
SCALE  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

L:\Map\10919.001 - GRGD Sewer MasterPlan Update\3-Design\DWG\Civil\Design\10919.001 - SYSTEMS BY COLOR.dwg.F1 PIPE AGE BY COLOR 05/07/2024 08:56 am emsenzle

**Appendix G System Age Inventory**

**APPENDIX G  
GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
SEWER MASTER PLAN  
SYSTEM AGE INVENTORY**

TOTAL PIPE LENGTH BY SIZE								Corrected for 2019 rehab Manholes
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
2,028	4,870	80,816	127,597	12,757	23,255	13,533	264,856	942
TOTAL PIPE LENGTH BY SIZE, 41-46 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
0	0	10,177	69,276	2,448	18,658	8,815	109,374	386
TOTAL PIPE LENGTH BY SIZE, 36-40 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
0	0	34,149	8,294	5,360	1,781	3,101	52,685	173
TOTAL PIPE LENGTH BY SIZE, 31-35 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
0	0	23,262	11,728	1,566	2,816	1,617	40,988	135
TOTAL PIPE LENGTH BY SIZE, 26-30 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
0	0	9,835	16,027	2,647	0	0	28,509	115
TOTAL PIPE LENGTH BY SIZE, 21-25 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
2,028	0	0	6,969	0	0	0	8,997	30
TOTAL PIPE LENGTH BY SIZE, 16-20 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
0	4,870	1,613	15,304	736	0	0	22,523	94
TOTAL PIPE LENGTH BY SIZE, 0-15 YEARS OLD								
2" FM (LF)	4" FM (LF)	6" PVC (LF)	8" PVC (LF)	10" PVC (LF)	12" PVC (LF)	15" PVC (LF)	Total Length (LF)	
0	0	890*	0	0	0	0	890*	9

\* 890 Feet of 6" PVC to be installed in Manhattan to Franklin St Pipeline, est. 2024

**Appendix H Lift Station Information**

**APPENDIX H  
GRGID SEWER MASTER PLAN  
LIFT STATION INFORMATION**

**Old Nevada Lift Station (Pleasantview Subdivision)**

Construction Year	2003	
Location	Bobwire Lane	
Wet Well	60" Diameter, Precast Manhole	
	Rim EL	4,777.60 ft
	IE Out (2")	4,774.10 ft
	IE In (8")	4,767.97 ft
	IE In (8")	4,768.07 ft
	High Water Alarm EL	4,767.97 ft
	Lag Pump On EL	4,767.73 ft
	Lead Pump On EL	4,767.15 ft
	Pumps Off EL	4,766.57 ft
	Low Water Alarm EL	4,766.07 ft
	Bottom EL	4,765.74 ft
	Wet Well Total Volume	1,742.10 gal
	Wet Well Operating Volume	85.20 gal
Pumps/Controls	(2) Series SG Grinder Pumps, 2 HP Level control by pipe mounted mercury level controls Waterman P-32 Sluice Gate with K-2 Stem Guide	
Force Main	(2) 2" Force Mains, HDPE	

**Rainshadow Ranch Lift Station (Kingston Lane)**

Construction Year	2006	
Location	Kingston Lane	
Wet Well	96" Diameter	
	Rim EL	4,760.70 ft
	IE Out (4")	4,757.20 ft
	IE In (8")	4,755.52 ft
	High Water Alarm EL	4,754.50 ft
	Lag Pump On EL	4,753.50 ft
	Lead Pump On EL	4,752.50 ft
	Pumps Off EL	4,751.50 ft
	Bottom EL	4,749.50 ft
	Wet Well Capacity	4,211.60 gal
	Wet Well Operating Volume	376.04 gal
Pumps/Controls	(2) Submersible Pumps rated for 100 GPM at 38' TDH Level control by transducers Connected to appropriate telemetry and GRGID SCADA System	
Force Main	4" Force Main, HDPE (SDR-11)	

**Rocky Terrace Lift Station (Rocky Terrace Estates)**

Construction Year	2005	
Location	Pleasantview Drive	
Wet Well	96" Diameter	
	Rim EL	4,750.46 ft
	IE Out (4")	4,745.17 ft
	IE In (2")	4,740.65 ft
	IE IN (8")	4,739.65 ft
	High Water Alarm EL	4,737.75 ft
	Pump 2 On EL	4,737.55 ft
	Pump 1 On EL	4,737.35 ft
	Pumps Off EL	4,736.60 ft
	Low Alarm	4,736.40 ft
	Bottom	4,735.00 ft
	Well Capacity	5,813.52 gal
	Wet Well Operating Volume	282.03 gal
Pumps/Controls	(2) ABS AFP 1049 Submersible Pumps, 12 HP Explosion Proof Pumps with Contra-Block Impellers Design flow of 150 GPM at 87 ft TDH Submersible ABS RW 2022 Mixer, 2 HP	
Force Main	4" Force Main, C900 PVC	

**Kimmerling Lift Station (Springfield Drive)**

Construction Year	1997	
Location	Springfield Drive	
Wet Well	72" Diameter	
	Rim EL	4,788.00 ft
	IE Out (4")	4,784.40 ft
	IE In (8")	4,774.17 ft
	IE IN (8")	4,773.80 ft
	IE IN (8")	4,766.90 ft
	High Water Alarm EL	4,771.45 ft
	Pump 2 On EL	4,770.95 ft
	Pump 1 On EL	4,769.95 ft
	Pumps Off EL	4,767.40 ft
	Low Alarm	4,766.90 ft
	Bottom	4,765.00 ft
	Well Capacity	4,864.97 gal
	Wet Well Operating Volume	539.38 gal
Pumps/Controls	(2) Gorman-Rupp Submersible Pumps, 3 HP Explosion Proof Pumps Level control by float switches	
Force Main	4" Force Main	

# PLEASANTVIEW

## PHASE 9

# IMPROVEMENT PLANS

A PORTION OF SECTION 17, T.12N., R.20E., M.D.B.& M. • DOUGLAS COUNTY, NEVADA • SEPTEMBER 2000

**DEVELOPER:**

GREG LYNN CONSTRUCTION  
780 IMMIGRANT TRAIL  
MARKLEEVILLE, CA 96120  
(916) 694-2445

**CONTRACTOR:**

Crockett Enterprises  
Post Office Box 1168  
Minden, Nevada 89423  
(775) 782-7640  
License No. 19812 unlimited

**INDEX OF DRAWINGS**

INDEX OF DRAWINGS	DWG NO	SHT NO
COVER & INDEX OF DRAWINGS	TS	1
VICINITY MAP, COORDINATES, GENERAL NOTES	G1	2
SITE PLAN, SYMBOLS AND ABBREVIATIONS	G2	3
GRADING PLAN	C1	4
GRADING PLAN	C2	5
AUGHT SIX LANE - PLAN & PROFILE	C3	6
AUGHT SIX LANE - PLAN & PROFILE	C4	7
CENTERFIRE COURT - PLAN & PROFILE	C5	8
RIMFIRE COURT - PLAN & PROFILE	C6	9
WEST DITCH - PLAN & PROFILE	C7	10
WINTERGREEN STORM AND SEWER SYSTEM - PLAN & PROFILE	C8	11
PLEASANTVIEW DR - PLAN & PROFILE	C9	12
PRIVATE DRIVEWAY - PLAN & PROFILE	C10	13
DRAYTON BOULEVARD - PLAN & PROFILE	C11	14
DRAYTON BOULEVARD - PLAN & PROFILE	C12	15
DRAYTON BOULEVARD - PLAN & PROFILE	C13	16
DRAYTON BOULEVARD - PLAN & PROFILE	C14	17
ROAD AND MISCELLANEOUS DETAILS	C15	18
SEWER AND WATER DETAILS	C16	19
MISCELLANEOUS DETAILS	C17	20
STORM DRAINAGE DETAILS	C18	21
SEWER PUMP STATION	C19	22
PUMP STATION ELECTRICAL	E1	23
PUMP STATION ELECTRICAL	E2	24

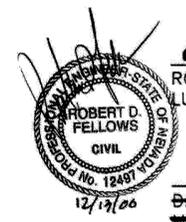
*[Signature]*  
ERIC TEITELMAN, P.E.  
DOUGLAS COUNTY ENGINEER  
DATE: 12/14/00

*[Signature]*  
STEVE EISELE, FIRE CHIEF  
EAST FORK FIRE PROTECTION DISTRICT  
DATE: 11-7-00

*[Signature]*  
BOB SPELLBERG, DISTRICT MANAGER  
GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
DATE: 11-22-00

*[Signature]*  
ROBERT D. FELLOWS, P.E.  
LUMOS & ASSOCIATES, INC.  
DATE: 11-16-00

*[Signature]*  
DANIEL R. HELLWINKEL, CHAIRMAN  
MINDEN-GARDNERVILLE SANITATION DISTRICT  
DATE: \_\_\_\_\_



**BASIS OF ELEVATION**

SOUTHWEST QUARTER OF SECTION 7, TOWNSHIP 12 NORTH, RANGE 20 EAST, 5/8 INCH BY 3 FEET IRON BAR SET 0.3 FEET EAST OF THE FENCE NEAR SECTION CORNER COMMON TO SECTIONS 8, 9, 16 AND 17. THE CONTROL POINT KNOWN AS HV-5 (WF005-B) FOR THE GENGE AERIAL SURVEYS (FLOWN 6-1-77) HAS AN ELEVATION OF 4785.36

**BASIS OF BEARING**

N 00°21'34" W  
A PORTION OF THE WEST LINE OF RANCHO ESTATES PER RECORD OF SURVEY TO SUPPORT A LOT LINE ADJUSTMENT FOR ROBERT E. AND PATRICIA L. DUTCHER AND GREGORY C. LYNN, TRUSTEE, SUZANNE TOWSE, TRUSTEE OF THE GREGORY C. LYNN AND SUZANNE TOWSE TRUST, DOCUMENT NO. 37263, DOUGLAS COUNTY, NEVADA, RECORDER'S OFFICE.

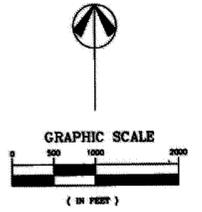
LUMOS AND ASSOCIATES  
Civil Engineering • Surveying • Material Testing • Planning  
1478-B 4th Street, Minden, NV 89423 (775) 782-8017

PROFESSIONAL ENGINEER  
ROBERT D. FELLOWS  
CIVIL  
LICENSE NO. 12491 EXPIRES 12/31/05  
CIVIL ONLY

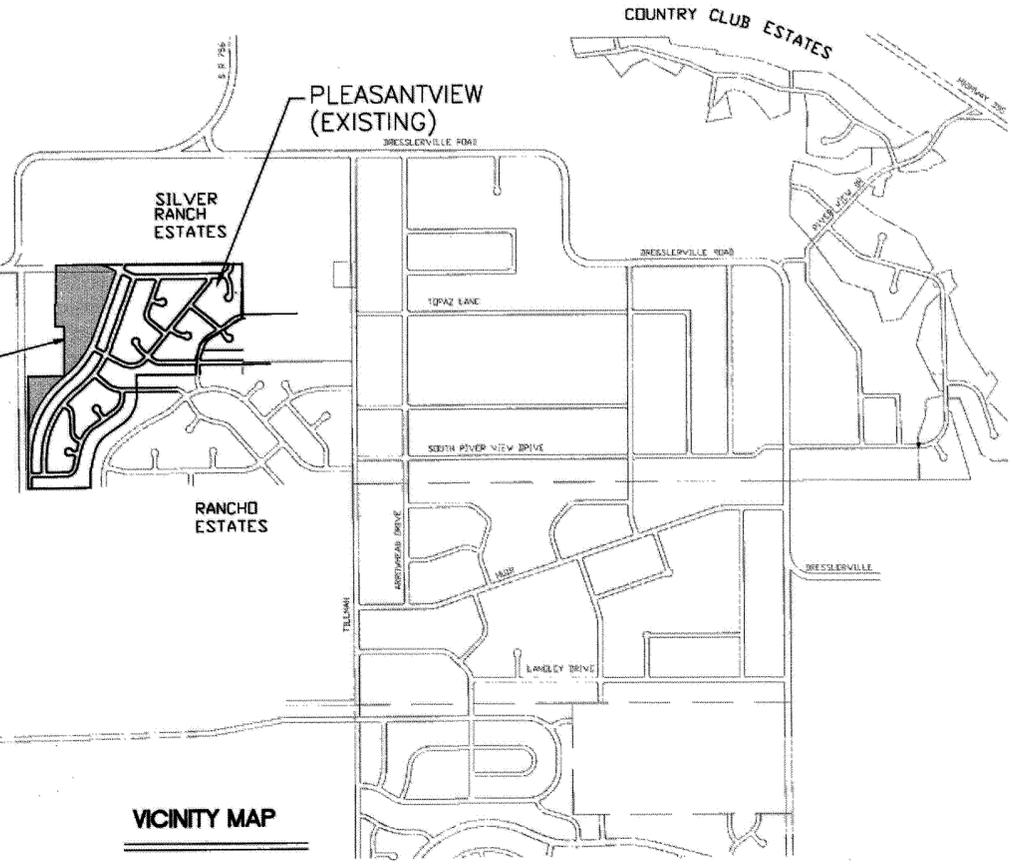
GREG LYNN CONSTRUCTION  
TITLE SHEET for  
PLEASANTVIEW PHASE 9  
DOUGLAS COUNTY

DATE: 09/27/00  
SCALE:  
DRAWN BY: RCS  
DESIGNED BY: RDT/RES  
CHECKED BY: RDT  
JOB NO.: 4572.000  
DWG. NO.:  
TS  
SHEET 1 OF 24

00171 Phase 9  
SIP 00171  
Office Copy



PLEASANTVIEW PHASE 9



**GENERAL NOTES**

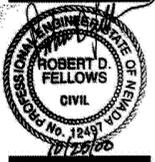
- 1) ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1996 EDITION, G.R.G.I.D. STANDARDS, AND DOUGLAS COUNTY STANDARDS.
- 2) PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL POTHOLE EXISTING UTILITIES TO DETERMINE LOCATION, SIZE AND MATERIAL.
- 3) DEVELOPER SHALL CONDUCT A PRE CONSTRUCTION CONFERENCE WITH ALL UTILITIES, M.G.S.D., G.R.G.I.D. AND DOUGLAS COUNTY REPRESENTATIVES PRESENT.
- 4) SURVEY MONUMENTS SHALL BE INSTALLED AT CENTERLINE INTERSECTIONS AND BEGINNING AND ENDING OF CURVES.
- 5) ALL SANITARY SEWER LINES SHALL BE PVC ASTM 3034 SDR 35 CONSTRUCTED TO THE LINES AND GRADES SHOWN IN CONFORMANCE WITH MINDEN-GARDNERVILLE SANITATION DISTRICT SPECIFICATIONS.
- 6) ALL SEWER LATERALS SHALL HAVE WYE CONNECTIONS TO MAIN LINES AND CLEANOUTS.
- 7) CONTRACTOR SHALL CONTACT AND COORDINATE WITH MGSD AND ALL OTHER UTILITIES 48 HOURS PRIOR TO CONSTRUCTION.
- 8) ALL SEWER LATERALS SHALL BE 4". MAINS & LATERALS SHALL BE PVC ASTM D3034 SDR 35.
- 9) ALL WATER LINES OTHER THAN INDIVIDUAL SERVICES SHALL BE PVC IN ACCORDANCE WITH AWWA C900 AND HAVE A CLASS 150 PRESSURE RATING. VALVES SHALL HAVE RISERS, VALVE BOXES, AND BE AWWA APPROVED. SEE DETAIL FOR SERVICE REQUIREMENTS.
- 10) CONTRACTOR SHALL NOTIFY G.R.G.I.D. AND ALL AFFECTED PROPERTY OWNERS 24 HOURS IN ADVANCE OF MAKING CONNECTION TO EXISTING WATER LINES.
- 11) WATERLINE DISINFECTION SHALL BE IN CONFORMANCE WITH AWWA C651-92, SECTION 5.1, THE TABLET METHOD.
- 12) ALL WATER LINES SHALL BE TESTED TO 200 PSI AND CONFORM WITH THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, SECTION 336.03.08.
- 13) ALL SEWER CONSTRUCTION SHALL CONFORM TO MGSD STANDARDS AND NO BACKFILLING WILL BE ALLOWED UNTIL INSPECTED AND APPROVED BY MGSD.
- 14) WATER AND NATURAL GAS SHALL NOT SHARE A COMMON TRENCH.
- 15) ALL BOLTS AT THRUST BLOCKS AND VALVE SADDLES SHALL BE COVERED WITH VISQUEEN AND TAPED PRIOR TO CONCRETE ENCASUREMENT.
- 16) ALL SEWER LINES SHALL BE TESTED IN CONFORMANCE WITH M.G.S.D. STANDARDS. ALL PRESSURE TESTING SHALL BE PERFORMED AFTER ALL OTHER UTILITIES ARE INSTALLED.
- 17) NO PAVEMENT TRENCH CUTS SHALL BE MADE WITHOUT PRIOR APPROVAL OF G.R.G.I.D.
- 18) SEWER FORCE MAINS SHALL BE POLYETHYLENE PIPE ASTM D-2239, SDR-7.

**GENERAL GRADING NOTES**

1. All work shall be done in accordance with the Uniform Building Code OSHA requirements for excavation, and special requirements of the permit. Violations will result in the stoppage of all work until the violation is corrected.
2. No work shall be started without first notifying the County Inspector at (775) 782-9005 at least 2 working days before work is commenced.
3. Slopes shall be no steeper than 2 horizontal to 1 vertical, or as determined by the Soils Engineer and approved by the County.
4. Fills shall be placed in accordance with the requirements of the "Standard Specifications for Public Works Construction."
5. Fill areas shall be cleared of all vegetation and debris, scarified, and be approved by the Engineer of Record prior to the placing of the fill.
6. Protective measures and temporary drainage provisions shall be used to protect adjoining properties during construction of improvements.
7. Dust shall be controlled by the Contractor to the satisfaction of the County, and in accordance with the Air Quality Permit from the Nevada Division of Environmental Protection when required.
8. All streets shall be maintained free of dust and mud caused by grading operations. All operations shall comply with the requirements of the Stormwater Discharge Permit from the Nevada Division of Environmental Protection.
9. The Developer's Engineer and/or Contractor's Surveyor shall set grade stakes for all drainage devices and the contractor shall obtain inspection before placing the work.
10. In the event of changes arising during construction, the developer shall be responsible for determining an acceptable solution and revising the plans for review and approval by the County. No changes in the design will be permitted unless written approval is given by the County.

Number	Northing	Eastng	Elevation	Description	Number	Northing	Eastng	Elevation	Description
20000	9787.6082	9157.6607	4777.67	FG	20056	9599.1349	9687.5798	4782.62	FG
20001	9724.6177	9201.9865	4778.13	FG	20057	9493.1481	9649.0038	4783.08	FG
20002	9752.6801	9240.6014	4778.38	FG	20058	9387.1612	9610.4278	4783.54	FG
20003	9765.1085	9258.9819	4778.45	FG	20059	9281.1744	9571.8518	4784.00	FG
20004	9765.8919	9378.4958	4778.93	FG	20060	9176.3967	9533.7159	4784.46	FG
20005	9766.1045	9410.9338	4779.06	FG	20061	9072.2208	9492.4708	4784.60	FG
20006	9761.5831	9437.0769	4779.20	FG	20062	9025.2656	9315.8279	4783.51	FG
20007	9747.4176	9475.9963	4779.37	FG	20063	8954.4363	9429.5691	4785.52	FG
20008	9794.4022	9493.0974	4779.37	FG	20064	8894.0261	9262.0349	4785.60	FG
20009	9808.5677	9454.1779	4779.20	FG	20065	8830.4211	9339.5274	4787.10	FG
20010	9816.1035	9410.6061	4779.06	FG	20066	8901.0220	9243.1740	4785.56	FG
20011	9815.4089	9304.6332	4778.63	FG	20067	8671.5170	9173.8865	4790.00	FG
20012	9814.7142	9198.6555	4778.05	FG	20068	9996.5016	9469.9493	4781.91	FG
20014	9792.0855	9159.9047	4777.71	FG	20073	9607.1722	9319.7062	4781.50	FG
20015	9971.9425	9632.2092	4781.40	FG	20074	9632.3219	9208.2415	4779.64	FG
20016	9872.5147	9596.0204	4780.47	FG	20075	9285.3521	9179.0543	4783.95	FG
20017	9766.5277	9557.4443	4779.48	FG	20076	9614.7606	9303.8834	4781.22	FG
20018	9660.5408	9518.8682	4779.93	FG	20077	9624.4419	9262.1384	4780.52	FG
20019	9554.5540	9480.2922	4780.39	FG	20078	9605.2030	9318.9768	4782.20	FG
20020	9448.5671	9441.7161	4780.85	FG	20079	9611.1340	9302.9643	4782.46	FG
20021	9342.5804	9403.1401	4781.31	FG	20080	9617.1007	9261.1309	4783.09	FG
20022	9237.8027	9365.0041	4781.77	FG	20081	9624.5696	9208.7657	4782.23	FG
20023	9180.8594	9348.2261	4782.03	FG	20082	8900.9160	9173.5376	4788.05	FG
20024	9155.9730	9345.3561	4782.13	FG	20083	9374.1443	9082.2760	4783.23	FG
20025	9140.5345	9345.3563	4782.23	FG	20084	9902.1784	9797.8784	4784.10	FG
20026	9123.3002	9352.1311	4782.36	FG	20085	9102.2257	9172.5520	4786.33	FG
20027	9075.9255	9328.6297	4782.73	FG	20086	9927.1449	9787.5369	4783.82	FG
20028	9070.8066	9306.7074	4782.86	FG	20087	9263.5709	9171.4974	4784.87	FG
20029	9071.9510	9297.5810	4782.88	FG	20088	9984.2864	9656.6569	4781.21	FG
20030	9075.7066	9287.3170	4782.86	FG	20089	9997.0883	9559.4587	4781.71	FG
20031	9115.2565	9262.7647	4782.54	FG	20090	9839.0614	9078.1352	4777.24	FG
20032	9154.3756	9284.5994	4782.24	FG	20091	9993.9443	9079.8396	4778.20	FG
20033	9167.0800	9293.8054	4782.13	FG	20092	9306.9457	9106.6283	4785.08	FG
20034	9191.9664	9299.4753	4782.03	FG	20093	9574.4650	9080.2237	4780.22	FG
20035	9240.8244	9313.1203	4781.83	FG	20094	9279.0928	9072.2942	4784.02	CPT
20036	9254.9037	9318.0195	4781.77	FG	20095	9367.6037	9070.2452	4783.01	CPT
20037	9368.1676	9359.2442	4781.28	FG	20096	9642.7578	9084.6837	4780.21	CPT
20038	9452.7399	9390.0260	4780.91	FG	20097	8181.2423	8691.0672	4783.34	FG
20039	9553.9005	9430.4851	4780.42	FG	20098	8416.3650	8734.5713	4784.53	FG
20040	9721.7833	9487.9498	4779.73	FG	20099	8395.1549	8913.4914	4788.17	FG
20041	9806.3557	9518.7316	4779.70	FG	20100	8525.0231	9016.6568	4790.17	FG
20042	9970.2484	9578.3837	4781.22	FG	20101	8542.6080	8997.3335	4789.78	FG
20043	9393.8018	9347.2907	4781.27	FG	20102	8417.2996	8881.3985	4786.73	FG
20044	9420.0970	9275.0453	4781.60	FG	20103	8665.9614	8737.9826	4785.12	FG
20045	9419.2504	9259.3788	4781.56	FG	20104	8540.9622	8738.7784	4785.90	FG
20046	9417.1176	9224.7701	4781.38	FG	20105	8521.3947	8738.9030	4785.82	FG
20047	9438.1379	9199.9852	4781.22	FG	20106	8503.0119	8751.3279	4785.70	FG
20048	9486.6845	9203.5600	4781.00	FG	20107	7683.7366	8694.2347	4784.70	FG
20049	9504.2136	9245.6386	4781.28	FG	20108	8181.9218	8795.4178	4785.80	FG
20050	9477.8004	9280.6893	4781.54	FG	20109	8461.0777	8669.2858	4784.20	FG
20051	9467.0817	9292.1463	4781.60	FG	20113	9994.9659	9235.6827	4780.81	FG
20052	9440.7865	9364.3917	4781.27	FG	20114	9995.7337	9352.8202	4781.43	FG
20053	9483.3809	9201.2977	4780.98	FG					
20054	9811.1088	9764.7318	4783.16	FG					
20055	9705.1219	9726.1558	4782.17	FG					

DATE	
NO.	
COMMENTS	



**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-8017

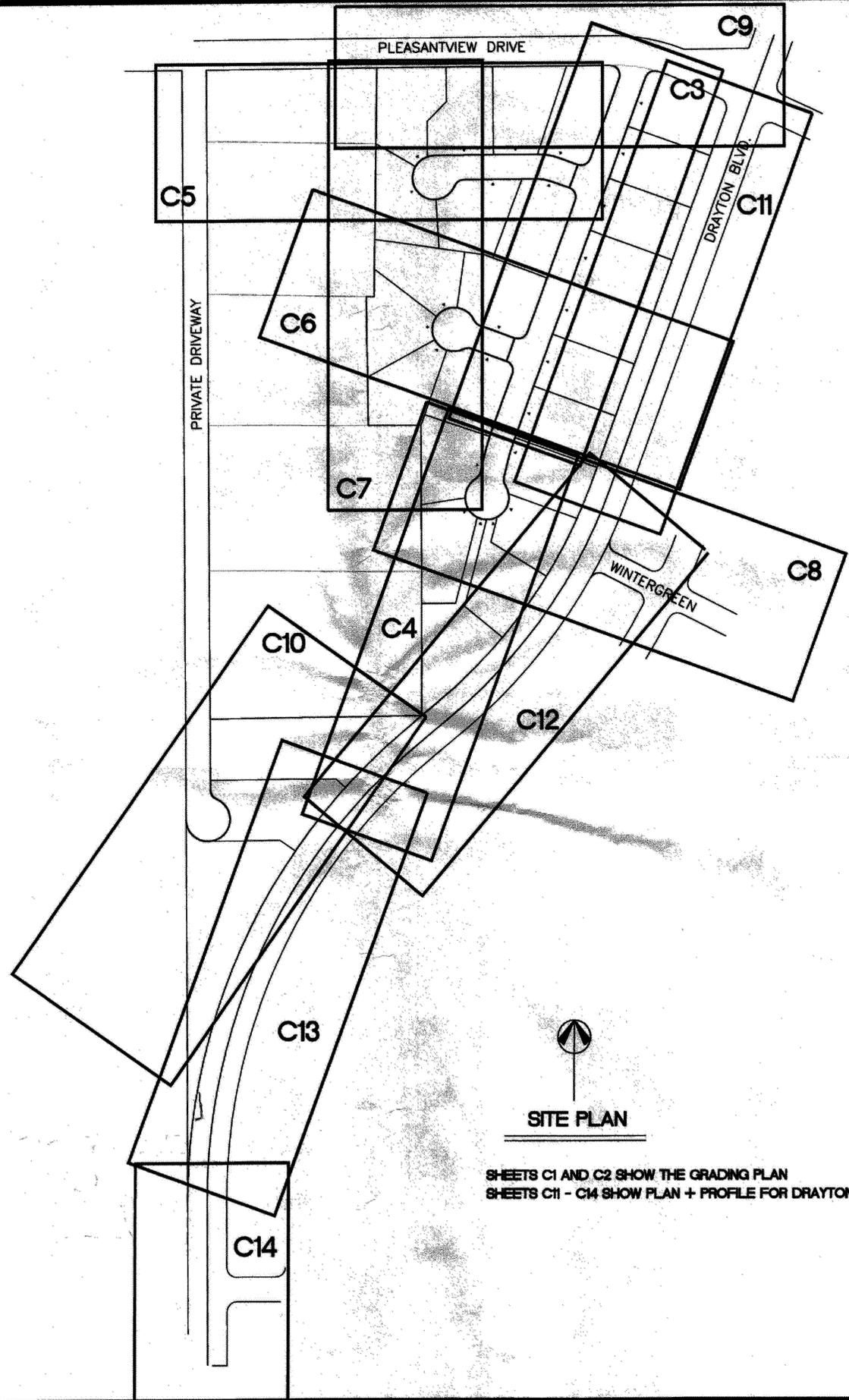
**VICINITY MAP AND GENERAL NOTES**  
 for  
**PLEASANTVIEW PHASE 9**  
 NEVADA  
 DOUGLAS COUNTY

DATE:	08/29/09
SCALE:	AS SHOWN
DRAWN BY:	RES
DESIGNED BY:	RES
CHECKED BY:	RES
JOB NO.:	4572.000

DWG. NO.:  
**91**  
 SHEET 2 OF 24

Project: 1572.0001 Pleasantview.dwg 15720901.dwg 10/25/2000 08:29:57 AM  
 C:\Pleasantview.dwg 15720901.dwg 10/25/2000 08:29:57 AM

Project: 1572.CC001 File: 1572.CC001 File: 1572.CC001 Task: C:\Pleasantview\1572\1572.CC001.dwg, 08/21/2006 11:44:11 AM



**SITE PLAN**  
 SHEETS C1 AND C2 SHOW THE GRADING PLAN  
 SHEETS C11 - C14 SHOW PLAN + PROFILE FOR DRAYTON BLVD.

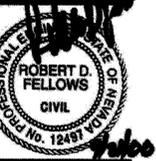
**ABBREVIATIONS**

AC	ASPHALT CONCRETE	MGSD	MINDEN GARDNERVILLE SANITATION DIST
AGG	AGGREGATE	MANUF	MANUFACTURER
BCR	BEGIN CURVE RETURN	MAX	MAXIMUM
BVCE	BEGIN VERTICAL CURVE E	MIN	MINIMUM
BVCS	BEGIN VERTICAL CURVE S	MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
		N	NORTH, NORTHERLY
CL	CENTERLINE	OD	OUTSIDE DIAMETER, OUTSIDE DIMENSION
CB	CATCH BASIN	PCC	PORTLAND CEMENT CONCRETE
CI	CAST IRON	PL	PROPERTY LINE
		PRC	POINT OF REVERSE CURVE
DIA. Ø	DIAMETER	PSI	POUNDS PER SQUARE INCH
DG	DECOMPOSED GRANITE	PSF	POUNDS PER SQUARE FOOT
DI	DUCTILE IRON	PVC	POLYVINYL CHLORIDE
DWS	DOUBLE WATER SERVICE	PVI	POINT OF VERTICAL CURVE
E	EAST	R	RADIUS
ECR	END CURVE RETURN	R/W	RIGHT OF WAY
ELEV	ELEVATION	RCP	REINFORCED CONCRETE PIPE
EX OR EXIST	EXISTING		
		S	SOUTH
FG	FINISHED GRADE	SD	STORM DRAIN
FH	FIRE HYDRANT	SDR	STANDARD DIMENSION RATIO
FIN	FINISHED	SS	SANITARY SEWER
FLEX	FLEXIBLE	SSMH	SANITARY SEWER MANHOLE
FT	FOOT, FEET	SSL	SANITARY SEWER LATERAL
FTG	FOOTING	STA	STATION
		STD	STANDARD
GB	GRADE BREAK	STR	STREET
GPM	GALLONS PER MINUTE	SWS	SINGLE WATER SERVICE
GRGD	GARDNERVILLE RANCHOS GEN IMPROV DIST		
GALV	GALVANIZED	T	TANGENT
GV	GATE VALVE	TC	TOP OF CURB
		TBC	TOP BACK OF CURB
HOR, HORZ	HORIZONTAL	TYR	TYPICAL
		VC	VERTICAL CURVE
INV	INVERT	VERT	VERTICAL
IE	INVERT ELEVATION		
		WV	WATER VALVE
L	LENGTH		
LAT	LATERAL		

**SYMBOLS**

	CONCRETE		GATE VALVE
	CRUSHED ROCK		SANITARY SEWER
	NATIVE BACKFILL		SINGLE WATER SERVICE 3/4" LINE
	SAND		DOUBLE WATER SERVICE 1" LINE
	NEW THIS PHASE (HEAVY LINE) (OR HEAVY DASHED LINE)		EXIST WATER SERVICE
	EXISTING (FAINT OR FAINT DASHED LINE) OR FUTURE		EXISTING CATCH BASIN OR MANHOLE
	CENTERLINE		AIR RELEASE VALVE ASSEMBLY
	MONUMENT		FLUSH VALVE ASSEMBLY
			DELTA (ANGLE), ANGLE POINT
			GRADE BREAK
			FIRE HYDRANT
			SEWER SERVICE
			LOT NUMBER
			STREET LIGHT
			EXISTING STREET LIGHT

DATE	
NO. COMMENTS	

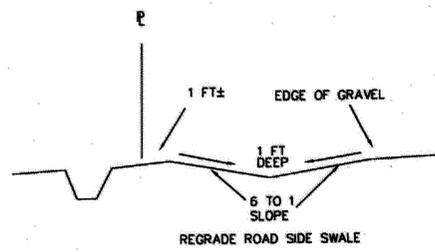
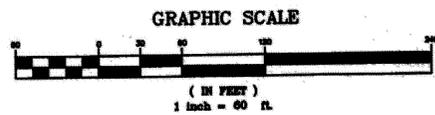


**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (776) 782-0017

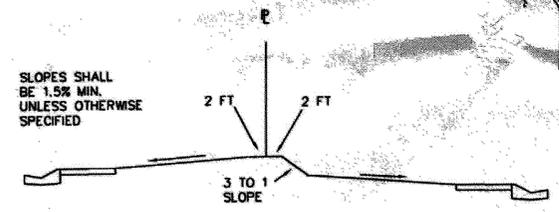
**SITE PLAN, SYMBOLS, & ABBREVIATIONS**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY, NEVADA

DATE	08/28/06
SCALE	AS SHOWN
DRAWN BY	RLS
DESIGNED BY	RLS
CHECKED BY	RLS
JOB NO.	4572.000

DWG. NO.:  
**G2**  
 SHEET 3 OF 24



**B** ROADSIDE SWALE  
NO SCALE

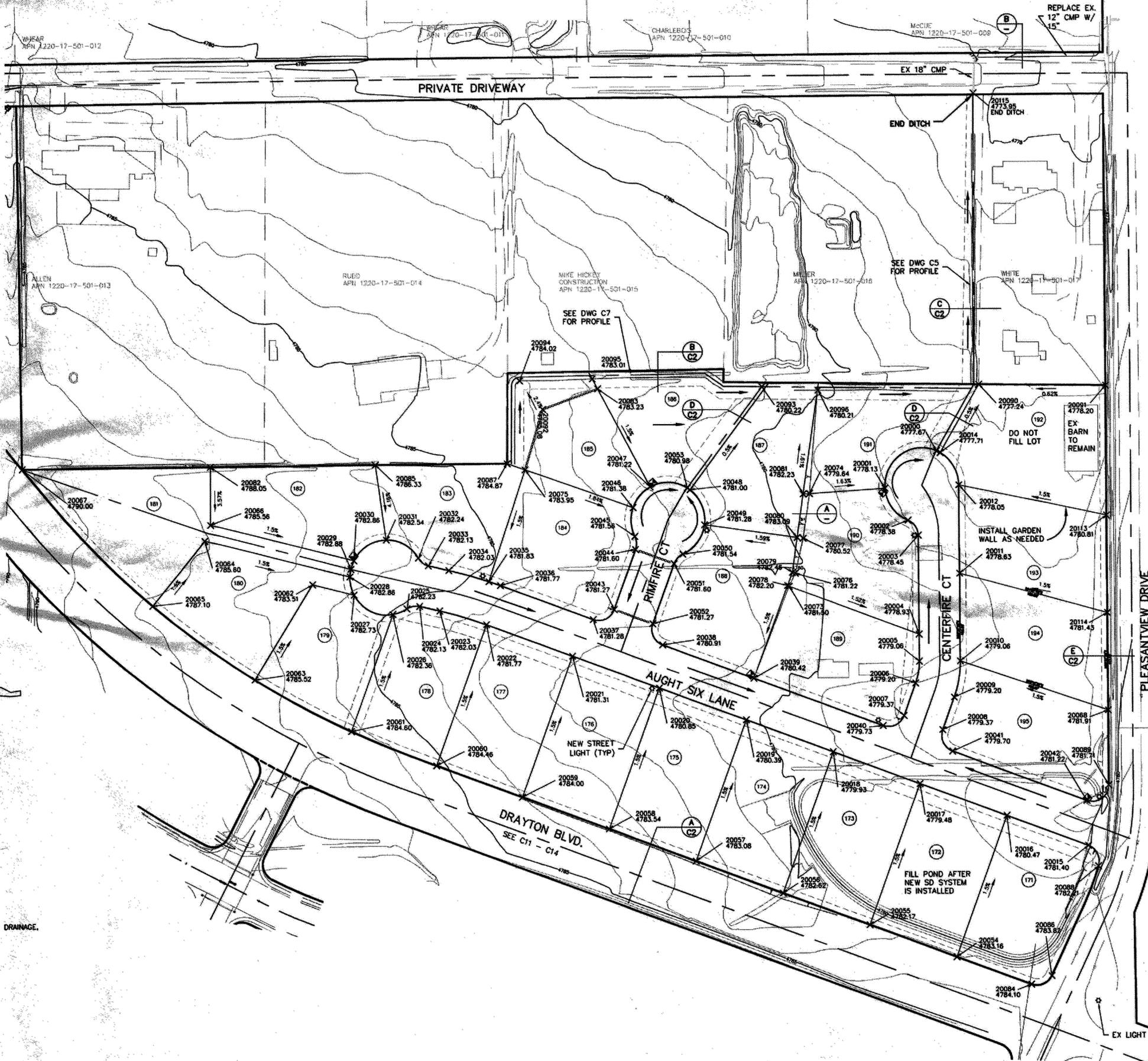


**A** LOT GRADING DETAIL  
NO SCALE

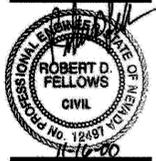
NOTE: CONTRACTOR SHALL EXCAVATE LOTS TO AN ELEVATION 0.17 FEET BELOW FINISH GRADE.

- NOTES:
- SEE DRAWING G1 FOR COORDINATE LIST OF FINISH GRADE POINTS
  - FINISH FLOOR AND PAD ELEVATIONS ARE TO BE SET BY HOME BUILDER TO MAINTAIN POSITIVE DRAINAGE.
  - A 5 FOOT UTILITY EASEMENT EXISTS ALONG EACH LOT LINE WHICH INCLUDES SURFACE DRAINAGE. SEE FINAL MAP.
  - SEE PLAN AND PROFILE SHEETS FOR EXISTING UTILITIES AND ROAD IMPROVEMENTS.
  - ◇ EXISTING FIRE HYDRANT LOCATIONS
  - ◆ NEW FIRE HYDRANT LOCATIONS

SEE DWG C2



DATE	11/20/20
NO.	
COMMENTS	REVISIONS



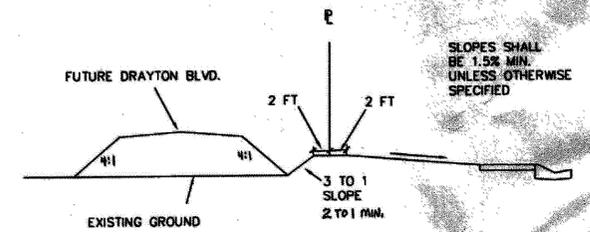
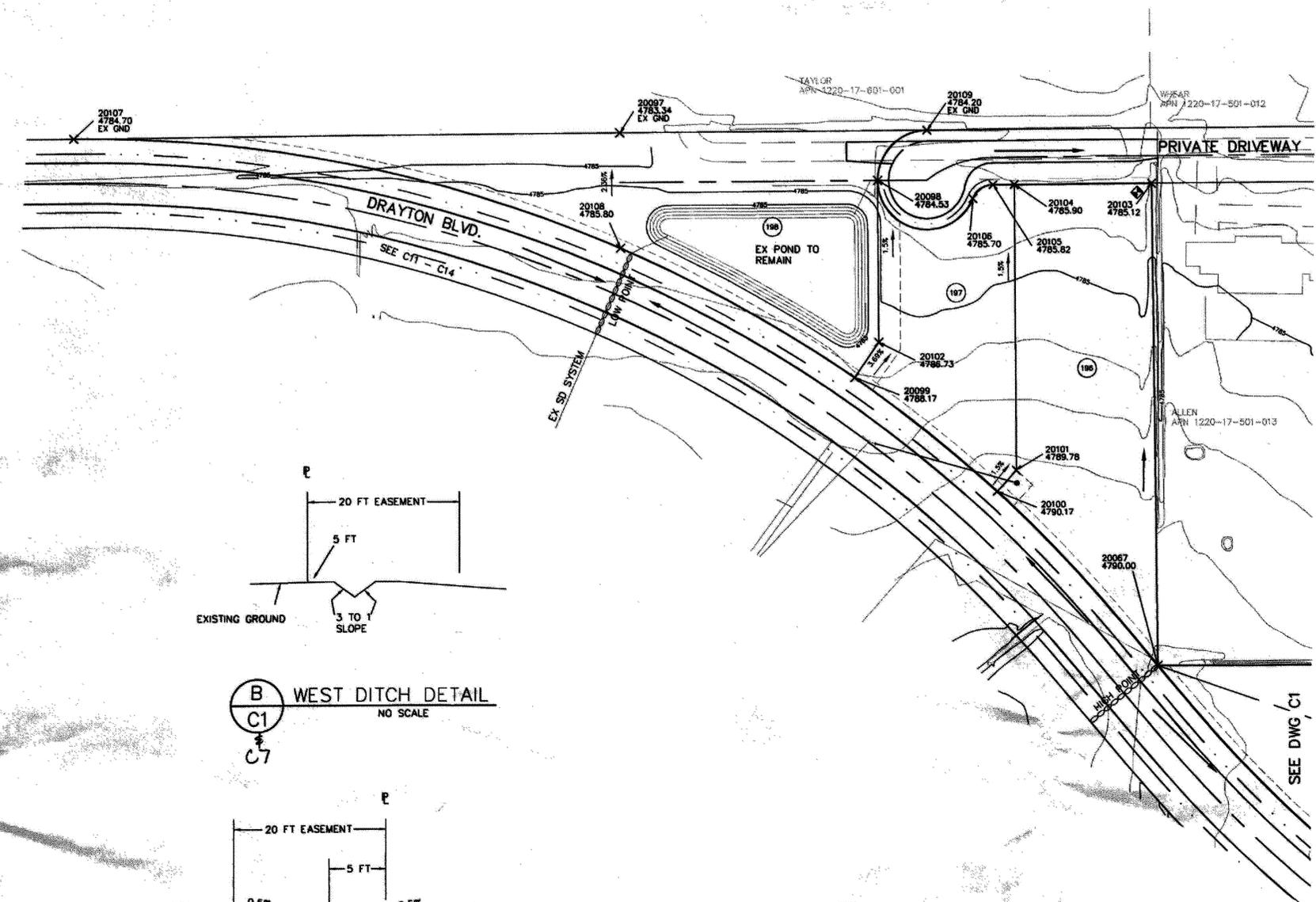
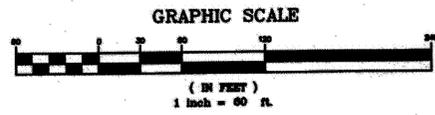
**LUMOS AND ASSOCIATES**  
Civil Engineering • Surveying • Material Testing • Planning  
1478-B 4th Street, Minden, NV 89423 (775) 782-6017

CONSTRUCTION  
**GRADING PLAN**  
for  
**PLEASANTVIEW PHASE 9**  
DOUGLAS COUNTY NEVADA

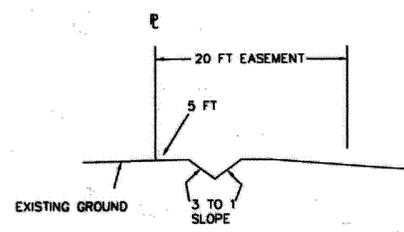
DATE	08/26/20
SCALE	1" = 60'
DRAWN BY	RES
DESIGNED BY	RES/RES
CHECKED BY	RES
JOB NO.	4872.000

DWG. NO.:  
**C1**  
SHEET 4 OF 24

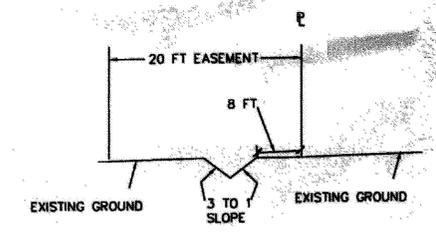
\\157-2-0000\p\essent\en\1572 Task C\p\essent\en\dwg\15720601.dwg, 11/18/2020 08:55:52 AM



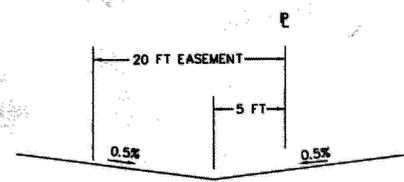
**A**  
**C1** EAST PROPERTY LINE GRADING DETAIL  
NO SCALE



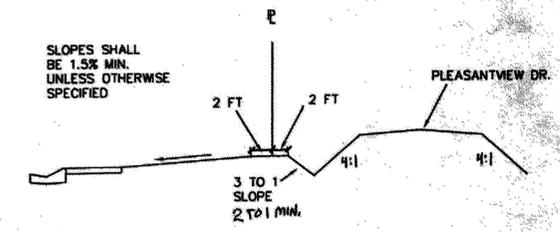
**B**  
**C1** WEST DITCH DETAIL  
NO SCALE



**C**  
**C1** CENTERFIRE DITCH DETAIL  
NO SCALE



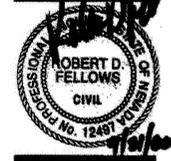
**D**  
**C1** SWALE DETAIL  
NO SCALE



**E**  
**C1** NORTH PROPERTY LINE GRADING DETAIL  
NO SCALE

- NOTES:**
- SEE DRAWING G1 FOR COORDINATE LIST OF FINISH GRADE POINTS
  - FINISH FLOOR AND PAD ELEVATIONS ARE TO BE SET BY HOME BUILDER TO MAINTAIN POSITIVE DRAINAGE.
  - A 5 FOOT UTILITY EASEMENT EXISTS ALONG EACH LOT LINE WHICH INCLUDES SURFACE DRAINAGE. SEE FINAL MAP.
  - SEE PLAN AND PROFILE SHEETS FOR EXISTING UTILITIES AND ROAD IMPROVEMENTS.
  - ◇ EXISTING FIRE HYDRANT LOCATIONS
  - ◆ NEW FIRE HYDRANT LOCATIONS

DATE	
NO. COMMENTS	



**LUMOS AND ASSOCIATES**  
Civil Engineering • Surveying • Material Testing • Planning  
1478-B 4th Street, Minden, NV 89423 (775) 782-8017

GREG LYNN CONSTRUCTION

**GRADING PLAN**  
for  
**PLEASANTVIEW PHASE 9**  
DOUGLAS COUNTY NEVADA

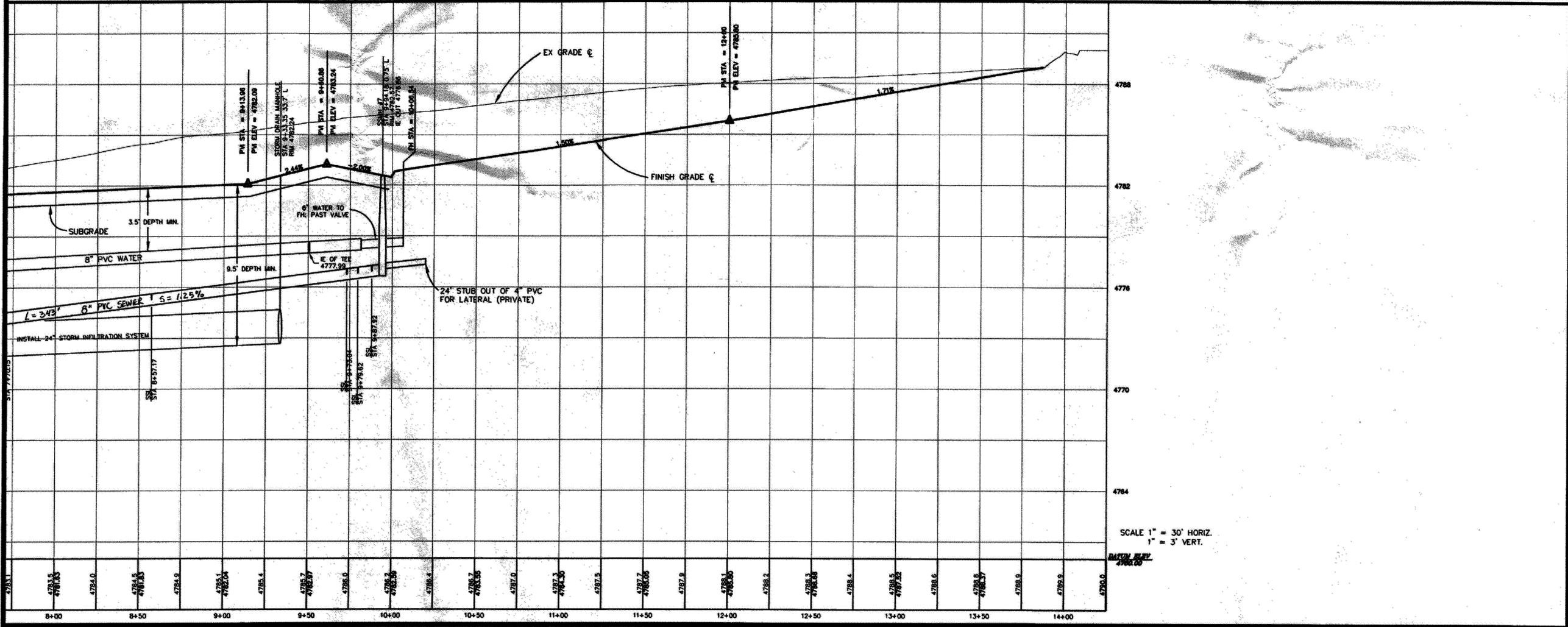
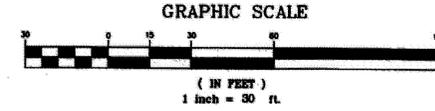
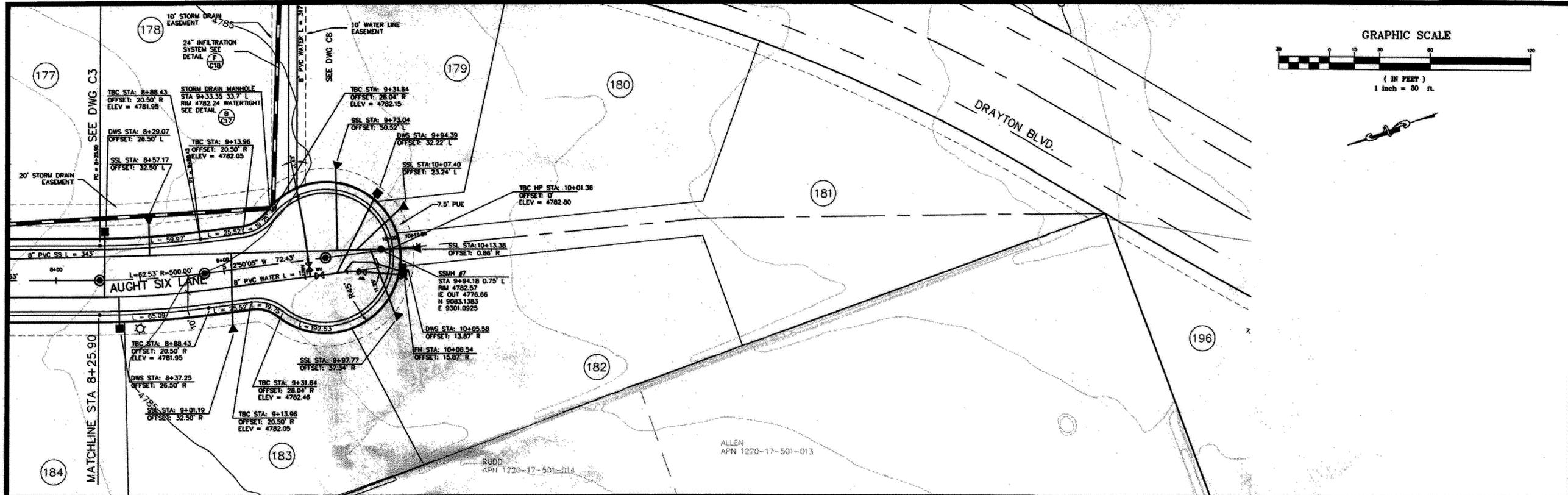
DATE:	08/28/09
SCALE:	1" = 60'
DRAWN BY:	RES
DESIGNED BY:	RES/RES
CHECKED BY:	RES
JOB NO.:	4972.000

DWG. NO.:	<b>C2</b>
SHEET 5 OF 24	

Project: 1572.DOC\1572.DWG Pleasantview.dwg 09/21/2009 12:52:56 PM

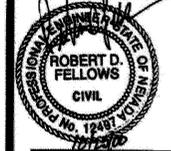


N:\57-2-000M - P esonant, ew\1572 Task c\p esonant, ew\dwg\157-25001.dwg, 10/21/2000 04:41:01 PM



SCALE 1" = 30' HORIZ.  
1" = 3' VERT.

DATE	10/21/00
NO.	
COMMENTS	

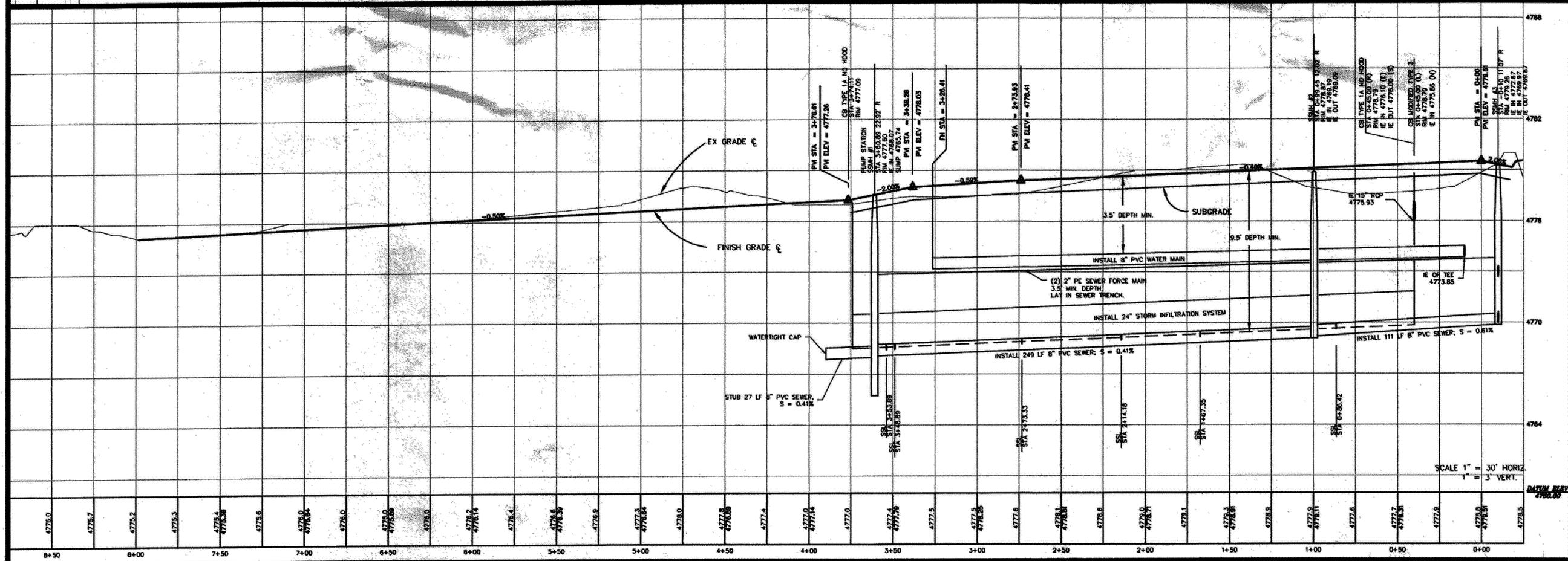
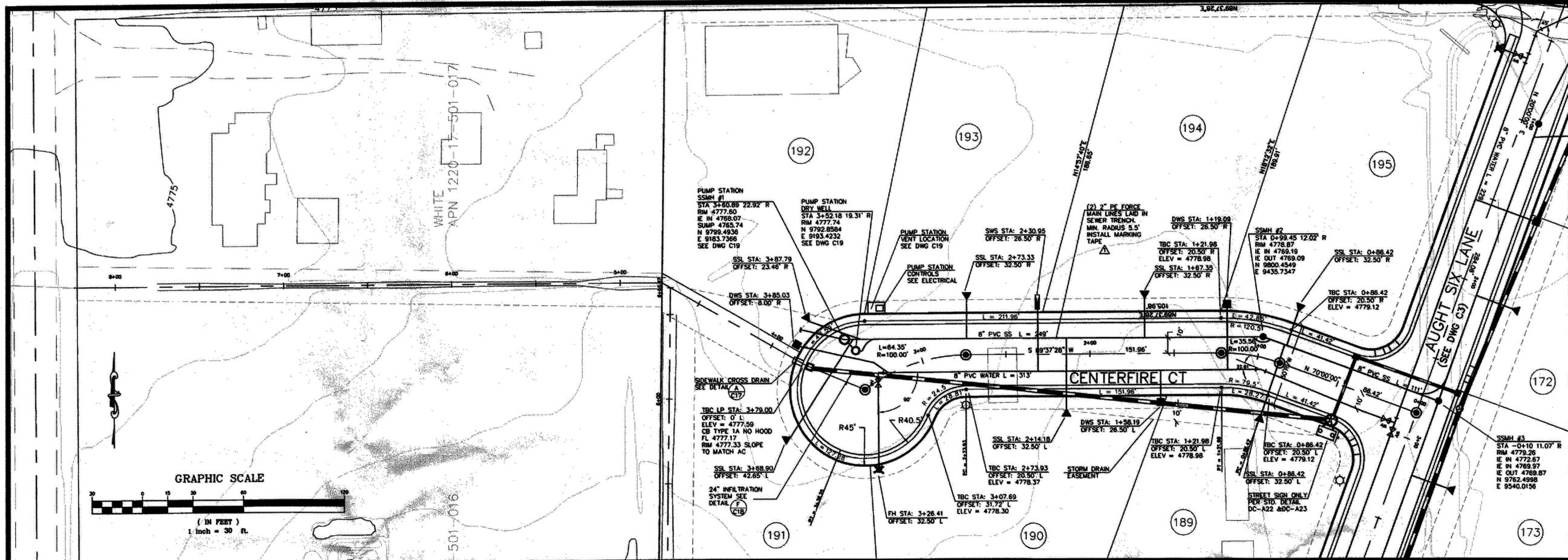


**LUMOS AND ASSOCIATES**  
Civil Engineering • Surveying • Material Testing • Planning  
1478-B 4th Street, Minden, NV 89423 (775) 782-8017

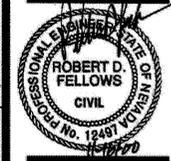
GREG LYNN CONSTRUCTION  
**AUGHT-SIX LANE PLAN & PROFILE**  
for  
**PLEASANTVIEW PHASE 9**  
DOUGLAS COUNTY NEVADA

DATE	08/22/00
SCALE	1" = 30'
DRAWN BY	RES
DESIGNED BY	RES/UES
CHECKED BY	RES
JOB NO.	4572.000

DWG NO.:  
**04**  
SHEET 7 OF 24



DATE	02/20/00
NO. COMMENTS	
1	REVISION
2	
3	
4	
5	
6	
7	
8	
9	
10	



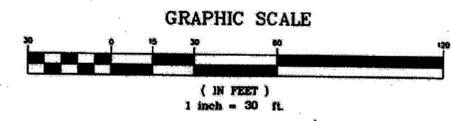
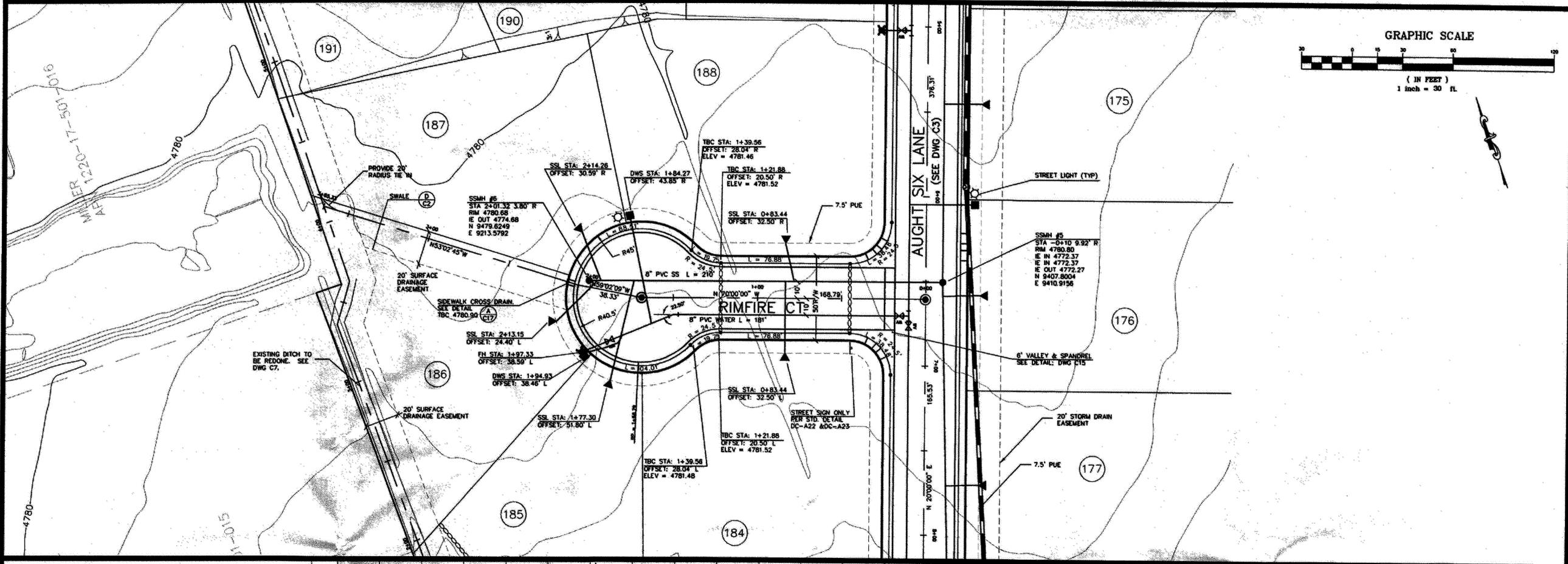
**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1479-B 4th Street, Menden, NY 69423 (775) 782-6017

**CENTERFIRE COURT PLAN & PROFILE**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLASS COUNTY NEVADA

DATE: 02/20/00  
 SCALE: 1" = 30'  
 DRAWN BY: BLS  
 DESIGNED BY: RFRS  
 CHECKED BY: RFR  
 JOB NO.: 4572.000

DWG. NO.: **C5**  
 SHEET 8 OF 24

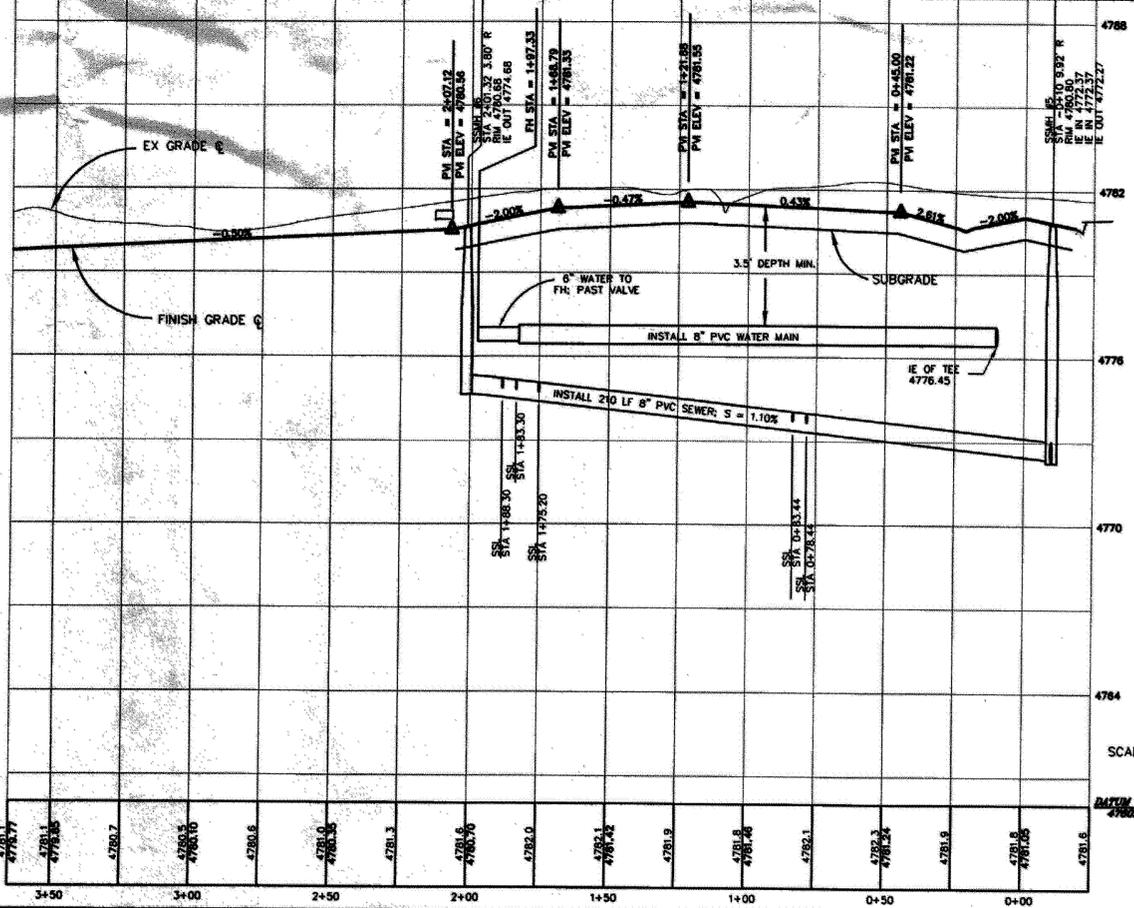
Project: 1572.CC01 - Pleasanton - New 1572 Task: C:\Pleasanton\new\1572\1572cc01.dwg, 10/21/2008 0:15:18 PM



DATE	
NO.	
COMMENTS	



**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-6017



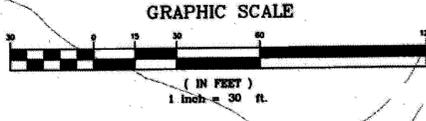
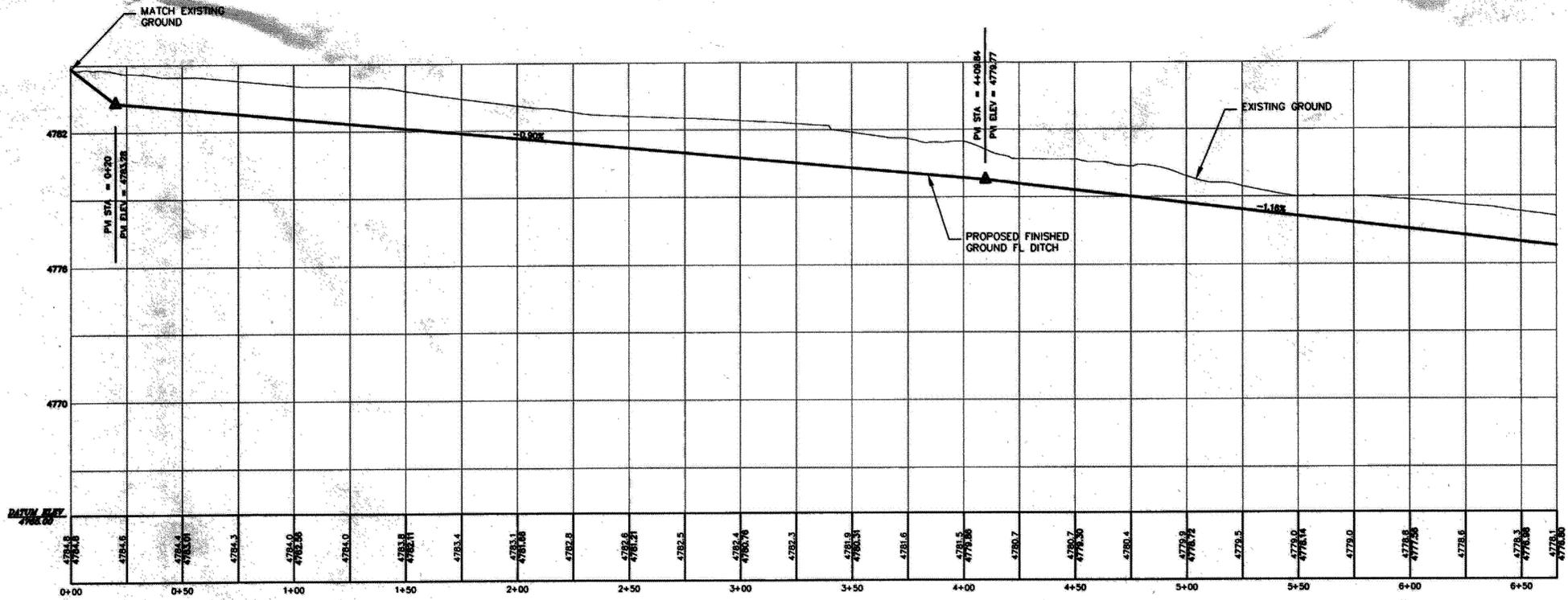
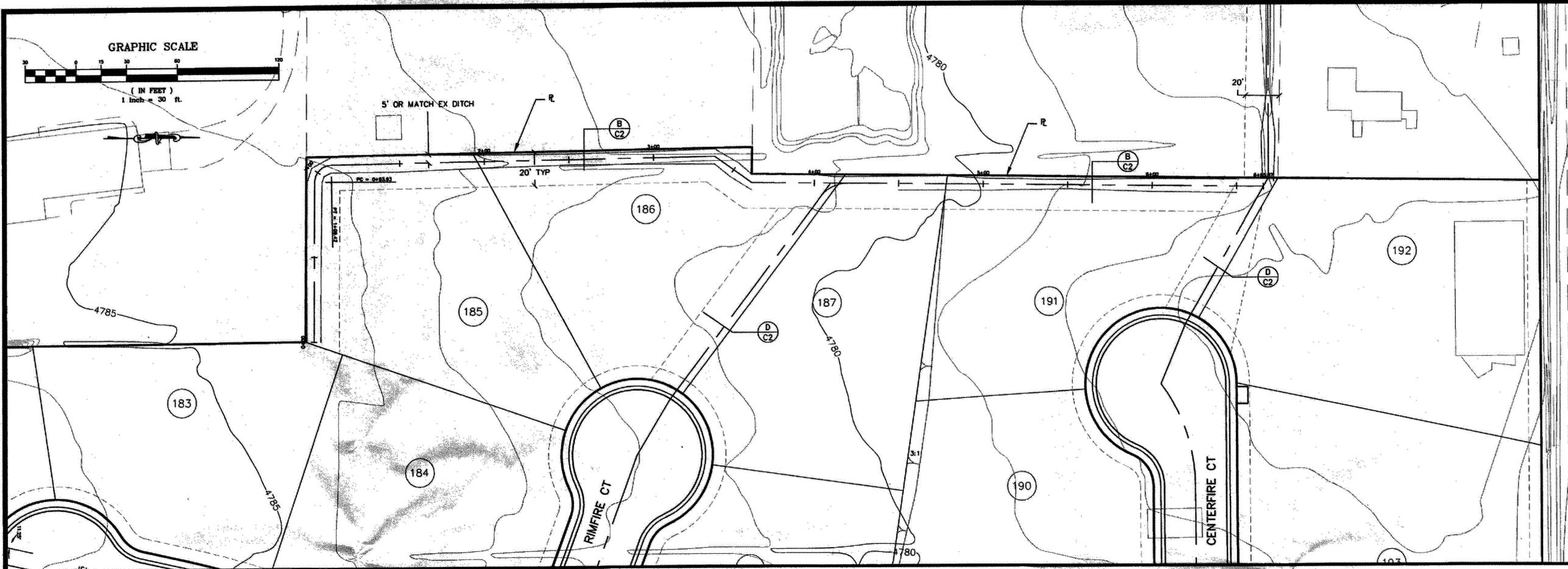
SCALE 1" = 30' HORIZ.  
 1" = 3' VERT.

BATCH ELEV  
 4782.00

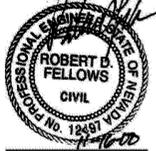
GREG LYNN CONSTRUCTION  
**RIMFIRE COURT PLAN & PROFILE**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

DATE: 09/27/08  
 SCALE: 1" = 30'  
 DRAWN BY: RES  
 DESIGNED BY: RES  
 CHECKED BY: RES  
 JOB NO.: 1572.000

DWG. NO.:  
**C6**  
 SHEET 9 OF 24



DATE	
NO. COMMENTS	



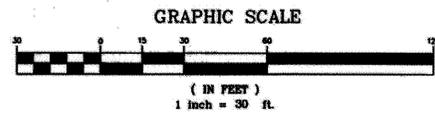
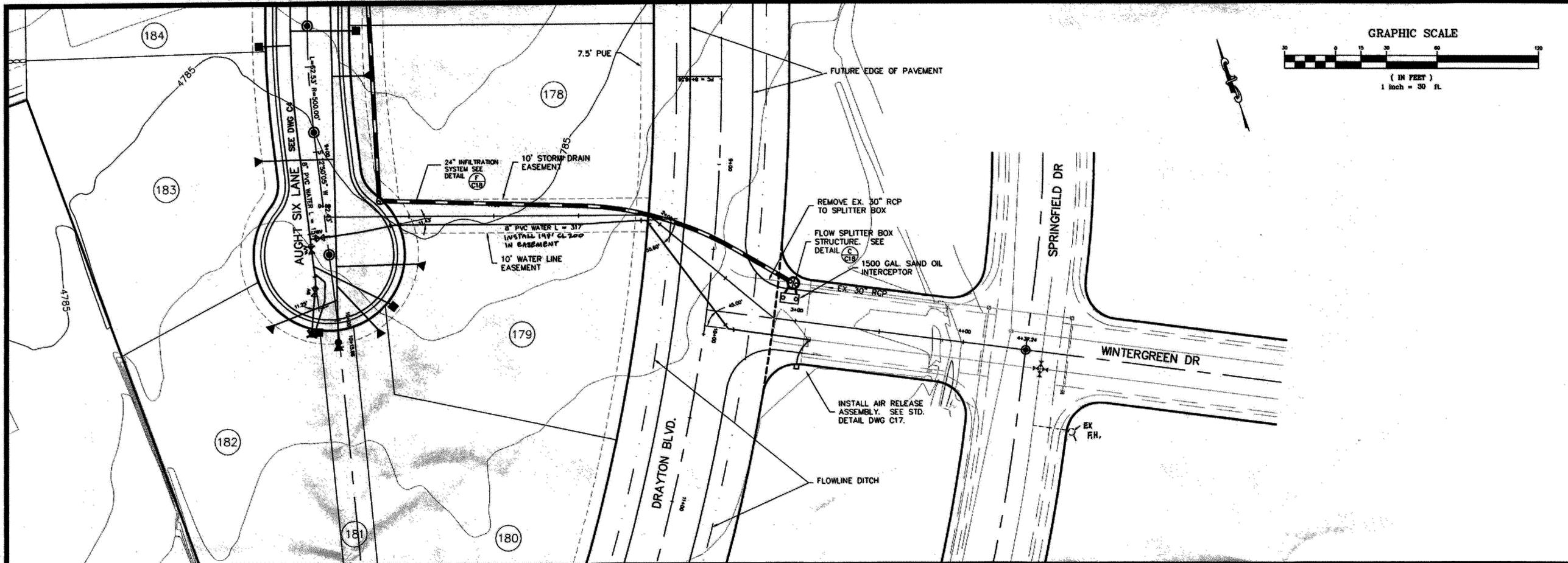
**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1479-B 4th Street, Minden, NV 89423 (775) 782-8017

GREG LYNN CONSTRUCTION  
**WEST DITCH PLAN & PROFILE**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

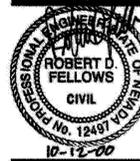
DATE: 09/07/00  
 SCALE: 1" = 30'  
 DRAWN BY: RES  
 DESIGNED BY: RES/RES  
 CHECKED BY: RES  
 JOB NO.: 2572-000

DWG. NO.:  
**C7**  
 SHEET 10 OF 24

Project: 4572.0000 Pleasantview 4572 Task: c:\pleasantview\4572\dwg\4572cc08.dwg, 10/12/2000 08:07:15 AM



DATE	10/2000
COMMENTS	REVISED PER ORIGIN COMMENTS
NO.	
1.	

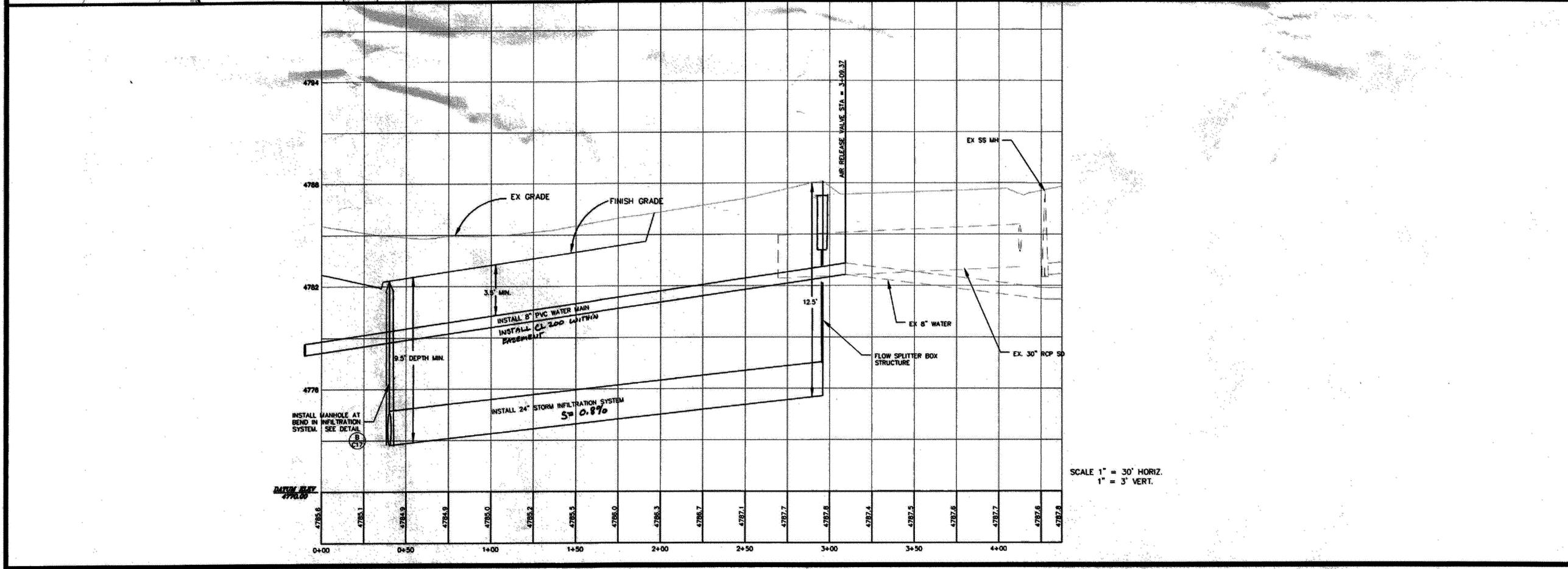


**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-8017

GREG LYNN CONSTRUCTION  
**WINTERGREEN STORM & SEWER SYSTEM**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

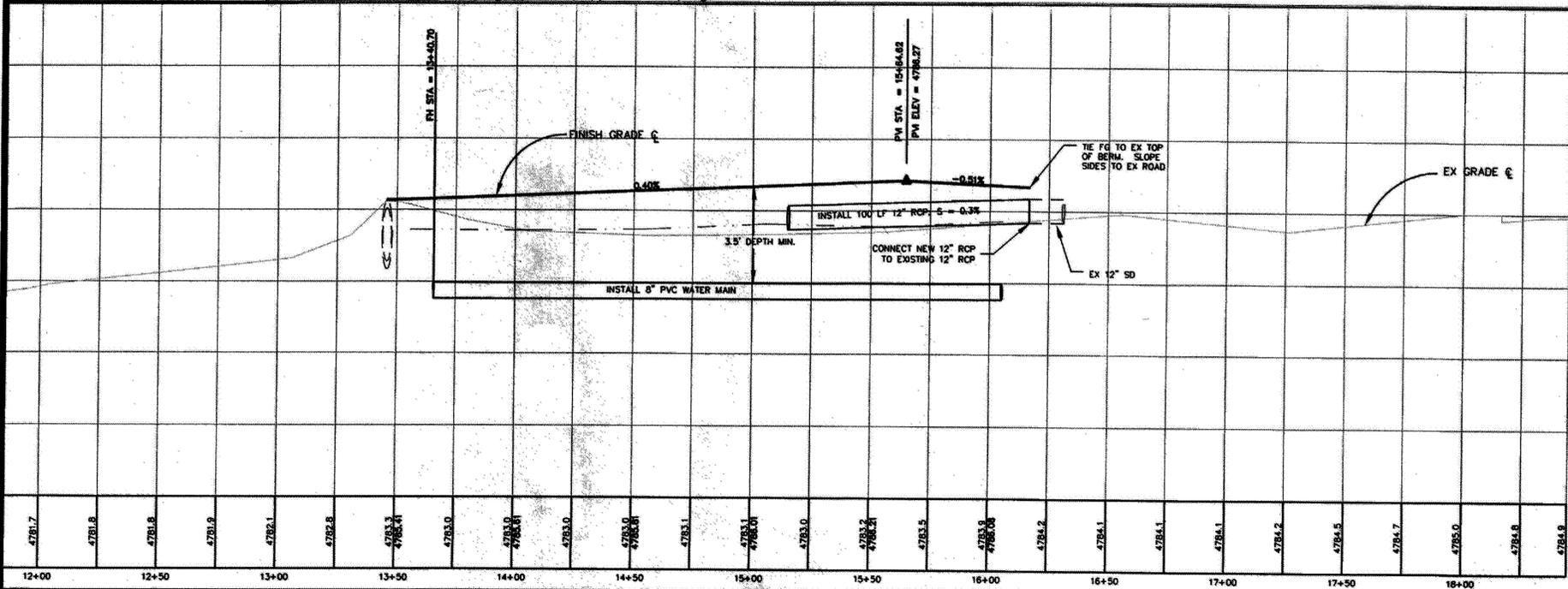
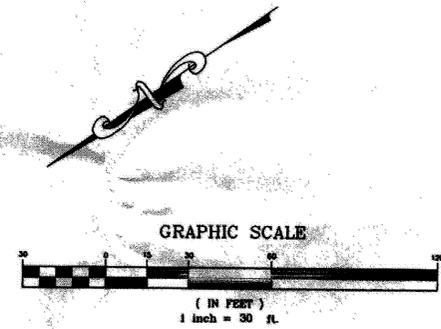
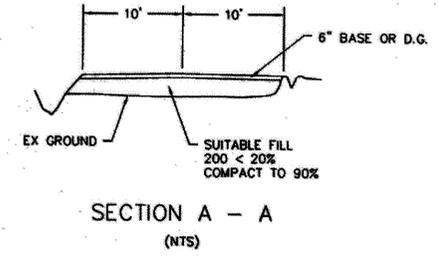
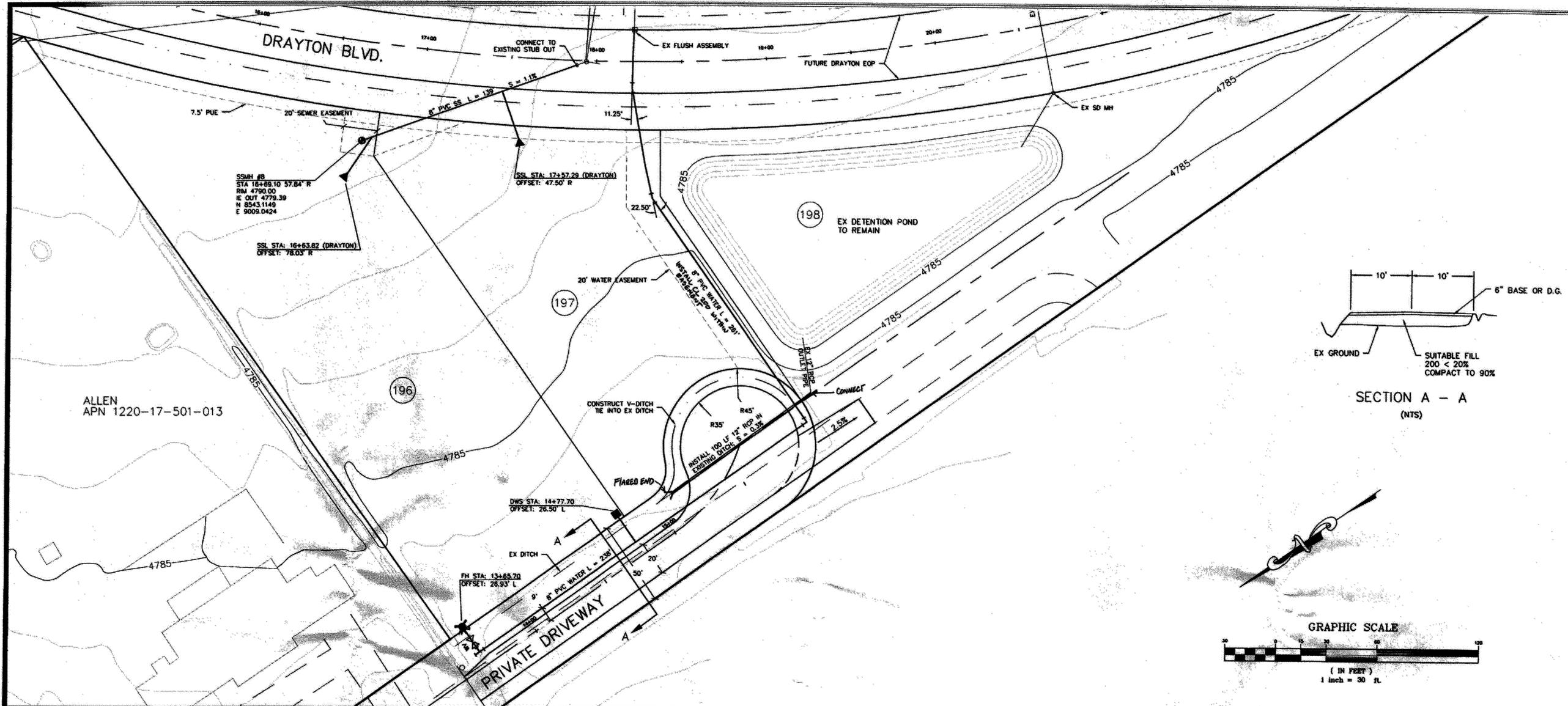
DATE: 09/07/00  
 SCALE: 1" = 30'  
 DRAWN BY: BLS  
 DESIGNED BY: BLS  
 CHECKED BY: BLS  
 JOB NO.: 4572.0000

DWG. NO.:  
**08**  
 SHEET 11 OF 24



SCALE 1" = 30' HORIZ.  
 1" = 3' VERT.





4776 PROFILE FOR SANITARY SEWER NOT SHOWN  
 DATUM ELEV 4778.00  
 SCALE 1" = 30' HORIZ.  
 1" = 3' VERT.

\Projects\1572.DWG\ Pleasani.rev.1572 Task C:\Pleasani\rev.1572\1572.dwg, 10/24/2000 04:16:31 PM

DATE	
NO. COMMENTS	



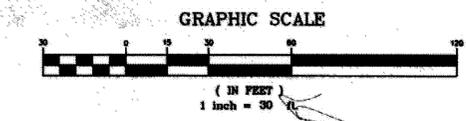
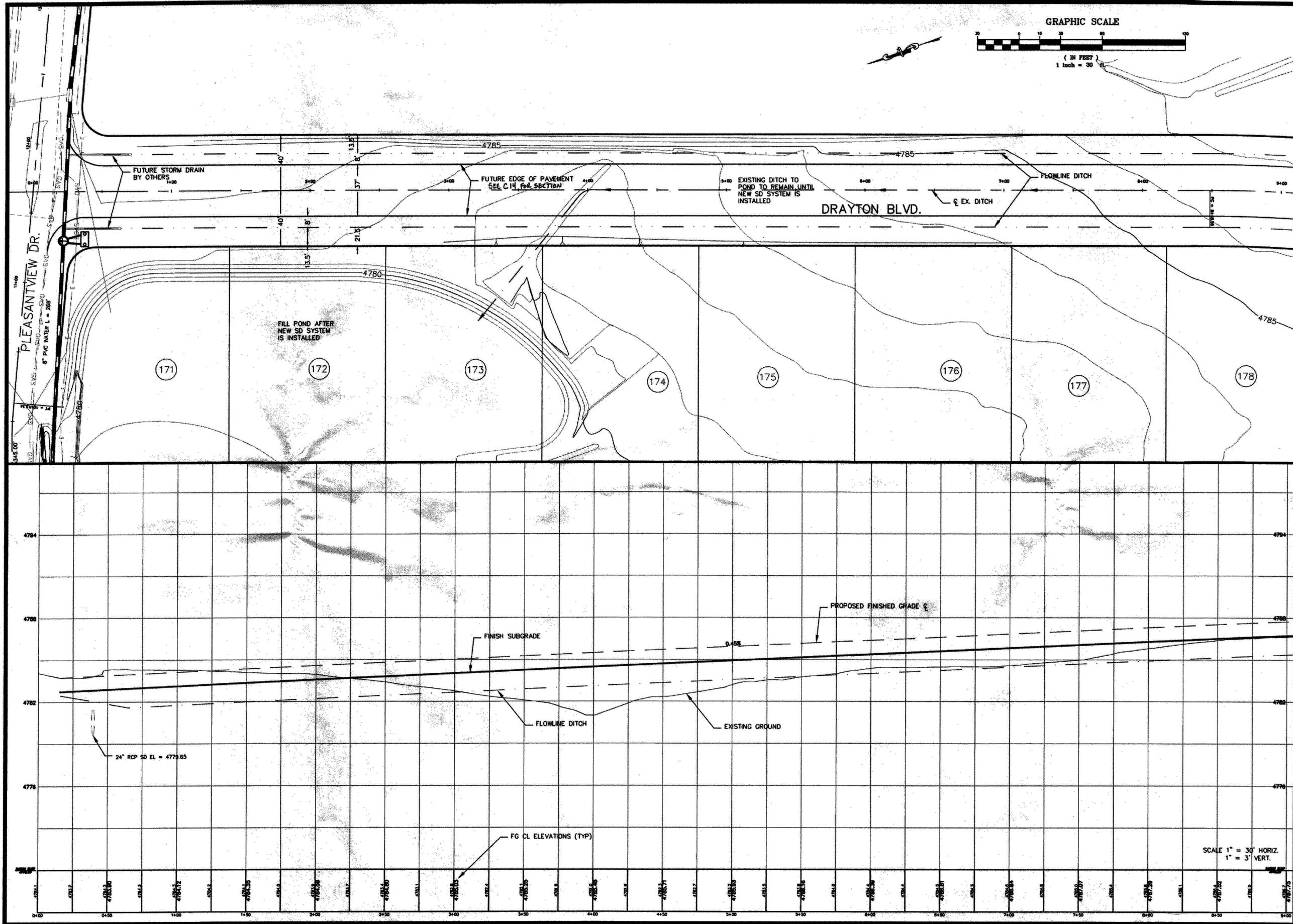
**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-6017  
 LUMOS AND ASSOCIATES  
 NEVADA

GREG LYNN CONSTRUCTION  
**PRIVATE DRIVEWAY PLAN & PROFILE**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

DATE: 09/21/00  
 SCALE: 1" = 30'  
 DRAWN BY: RES  
 DESIGNED BY: RES  
 CHECKED BY: RES  
 JOB NO.: 4572.000

DRAWN BY:  
**C10**  
 SHEET 13 OF 24

Projects\1572.0000\ Pleasantview\1572 Task C\ Pleasantview.dwg, 09/21/2000 01:11:22 PM



DATE: \_\_\_\_\_  
 NO. COMMENTS: \_\_\_\_\_  
 ROBERT D. FELLOWS  
 CIVIL ENGINEER  
 LICENSE NO. 12497

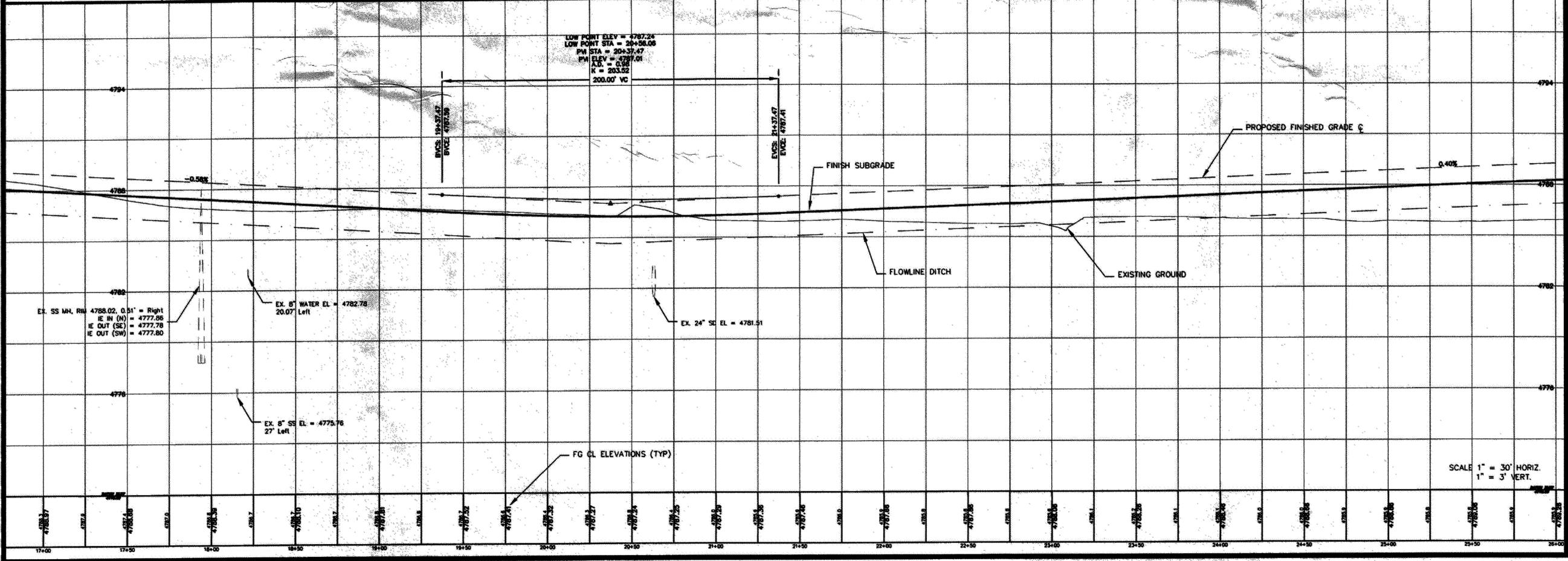
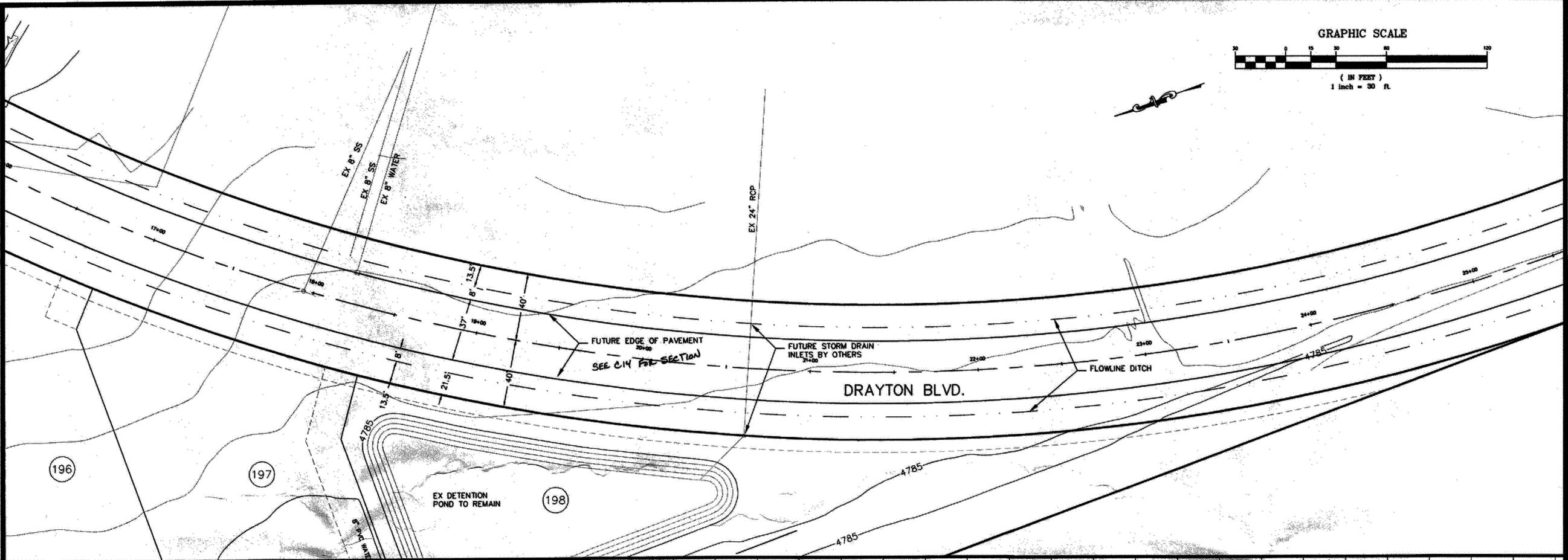
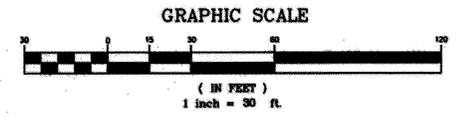
**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1470-B 4th Street, Minden, NV 89423 (775) 782-6017

GREG LYNN CONSTRUCTION  
**DRAYTON BLVD. PLAN & PROFILE**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

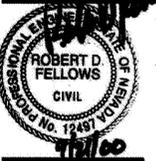
DATE: 09/28/00  
 SCALE: 1" = 30'  
 DRAWN BY: RES  
 DESIGNED BY: RES  
 CHECKED BY: RES  
 JOB NO.: 4572.000

DWG. NO.:  
**CF**  
 SHEET 14 OF 24





DATE	
NO.	
COMMENTS	



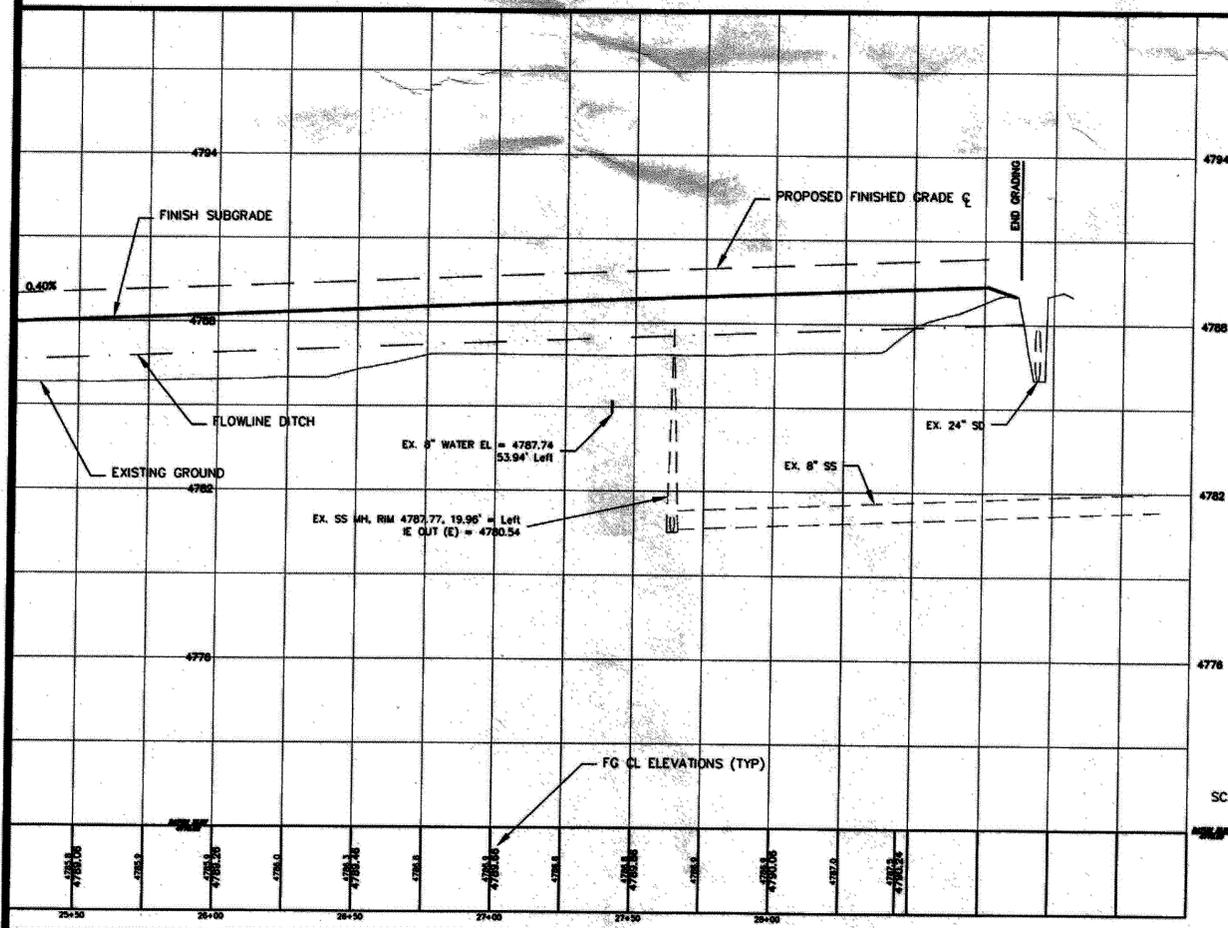
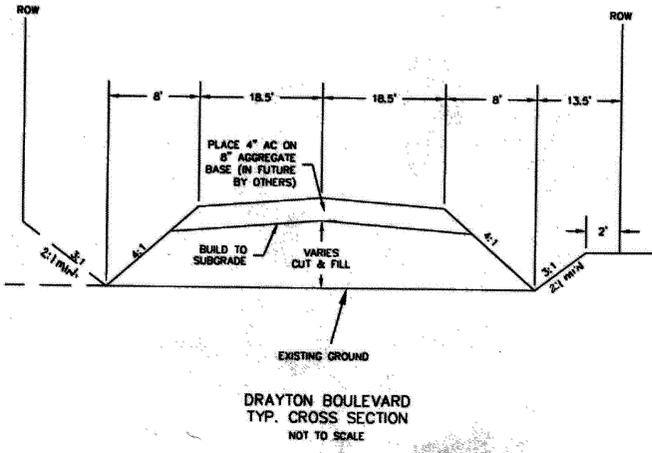
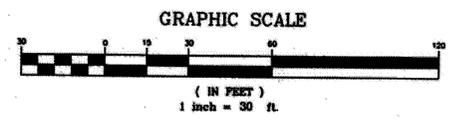
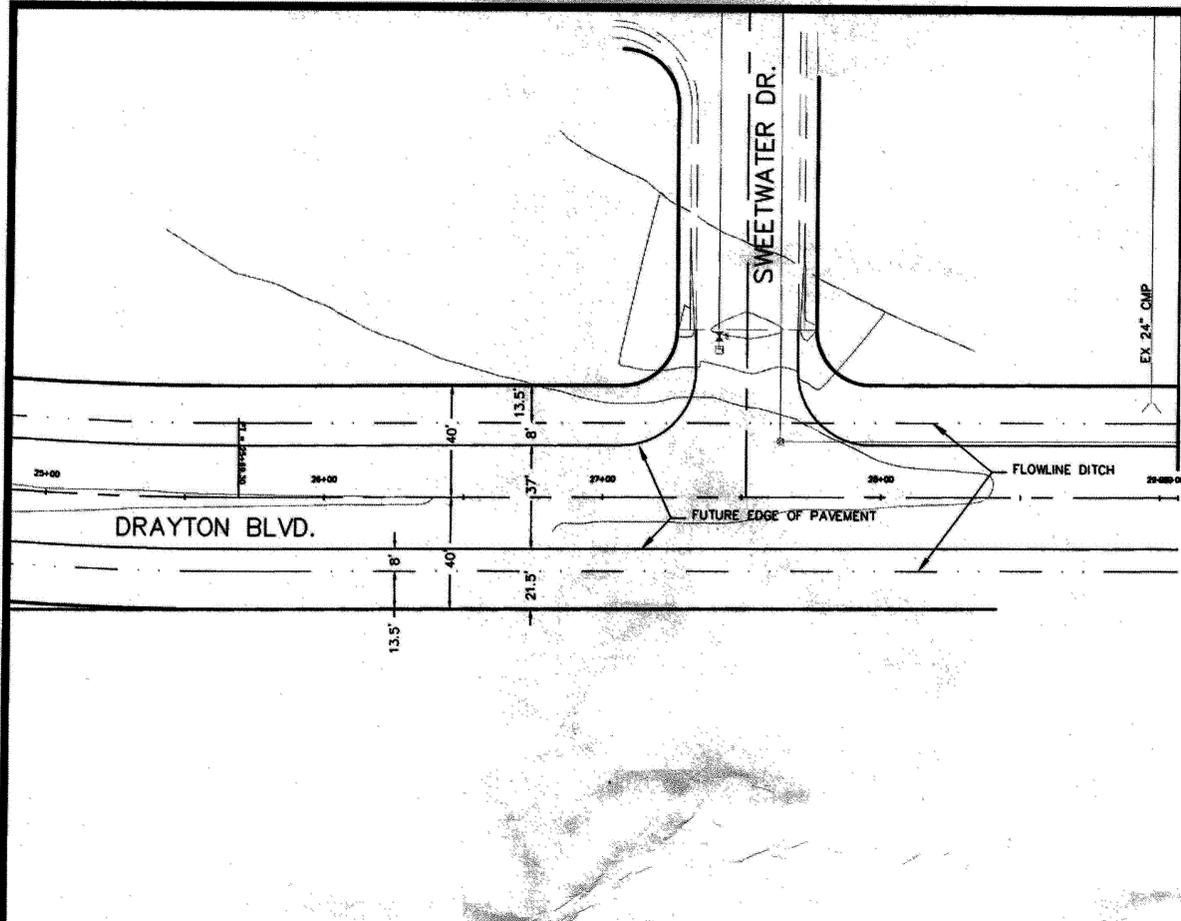
**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-8017

**DRAYTON BLVD. PLAN & PROFILE**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

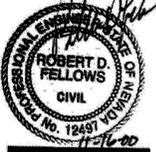
DATE: 09/28/00  
 SCALE: 1" = 30'  
 DRAWN BY: JES  
 DESIGNED BY: JES  
 CHECKED BY: JES  
 JOB NO.: 4572.000

DWG. NO.:  
**C13**  
 SHEET 16 OF 24

\Projects\1572\CCOM Pleasantview\1572 Task C\pleasontview\1572cc13.dwg, 09/21/2000 01:14:42 PM



DATE	
NO.	
COMMENTS	

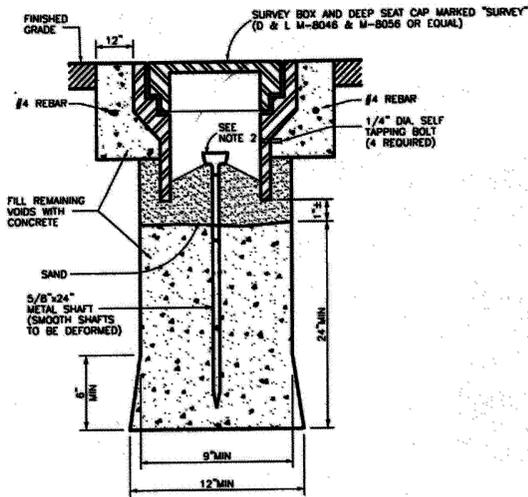


**LUMOS AND ASSOCIATES**  
Civil Engineering • Surveying • Material Testing • Planning  
1478-B 4th Street, Minden, NV 89423 (776) 762-8017

GREG LYNN CONSTRUCTION  
**DRAYTON BLVD. PLAN & PROFILE**  
for  
**PLEASANTVIEW PHASE 9**  
DOUGLAS COUNTY NEVADA

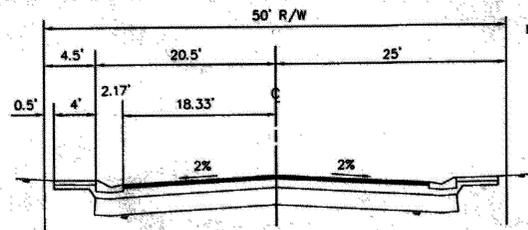
DATE: 08/28/00  
SCALE: 1" = 30'  
DRAWN BY: RES  
DESIGNED BY: RES  
CHECKED BY: RES  
JOB NO.: 4572000

DWG. NO.:  
**C14**  
SHEET 17 OF 24



- NOTES:
- BRONZE SURVEY MARKER (SERVCO #286 OR EQUAL) MAY BE SUBSTITUTED FOR THE 5/8" SHAFT AND CAP.
  - 1-1/2" MIN. NONFERROUS CAP WITH PLUS PERMANENTLY ATTACHED PRIOR TO PLACEMENT.
  - PRE-PUNCHED CAPS SHALL NOT BE PERMITTED.
  - PORTLAND CEMENT CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION FOR CONCRETE EXPOSED TO FREEZE-THAW ENVIRONMENTS.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			<b>MONUMENTS</b>	DRAWING NO. DC-A39 DATE 4/98 PAGE A-25



ALL OTHER STREETS

3" ASPHALTIC CONCRETE TYPE III OVER (USE AC-20)

6" AGGREGATE BASE TYPE II COMPACTED TO 95%

COMPACT SUBGRADE TO 90%

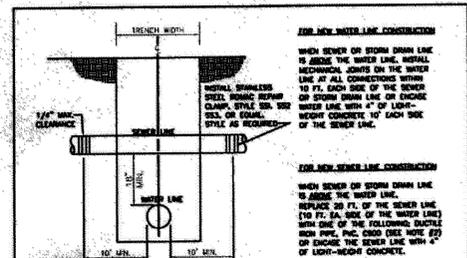
**TYPICAL 50' STREET SECTION**

NO SCALE

NOTE: CONTRACTOR SHALL SAND SEAL ROADWAYS. PER STD. SPECS SECTION 317.01, PAGES 246 TO 249

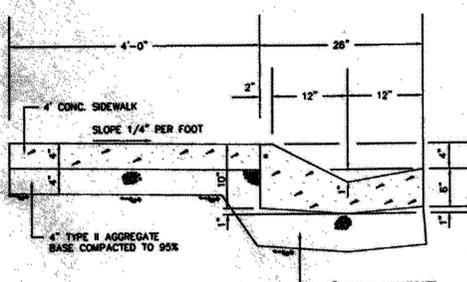
STREET SECTIONS ARE BASED ON SOILS REPORT BY H.A. DECEMBER 8, 1989 PLEASANTVIEW SUBDIVISION HLA JOB NO. 19,662,001.05

SUBMIT AC MIX DESIGN TO GRGD 10 DAYS PRIOR TO PAVING.

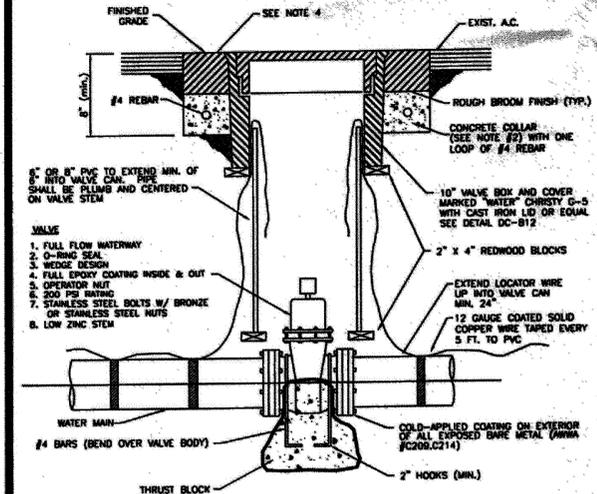


- CROSSING SANITARY SEWER**
- GENERAL NOTES:
- IN ALL CASES, PROVIDE 18" MIN. OF VERTICAL SEPARATION BETWEEN WATER LINES AND SEWER OR STORM DRAIN LINES. WHEN SEPARATION CANNOT BE OBTAINED, WATER LINE SHALL BE ROUTED UNDER THE SEWER OR STORM DRAIN LINE. IN ACCORDANCE WITH THE STANDARD DETAIL, NO C-10, IF TRENCH WIDTH EXCEEDS 36", THEN DETAIL DRAWING NO. 2-11 (D-1) SHALL APPLY.
  - PVC TO BE USED ONLY WHEN EXIST. LINE IS PVC.
  - IF INSTALL LINE TO 10" OR GREATER ABOVE THE SEWER LINE OR STORM DRAIN LINE, NO SPECIAL CONSTRUCTION IS REQUIRED.
  - ALL PROVISIONS ABOVE SHALL APPLY FOR CROSSINGS OTHER THAN 90° TO THE POINT AT WHICH THE 10" SEPARATION BETWEEN THE WATER AND SEWER OR STORM DRAIN LINE IS ACHIEVED (10"/SIDE OF CROSSING ANGLE).
  - FOR PURPOSES OF SEPARATIONS AND PROTECTION OF THE WATER SUPPLY, A REINFORCED CONCRETE CURB SHALL BE CONSTRUCTED AT CROSSING ANGLE.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			<b>SANITARY SEWER AND STORM DRAIN CROSSINGS</b>	DRAWING NO. DC-B12 DATE 10/98 PAGE B-15

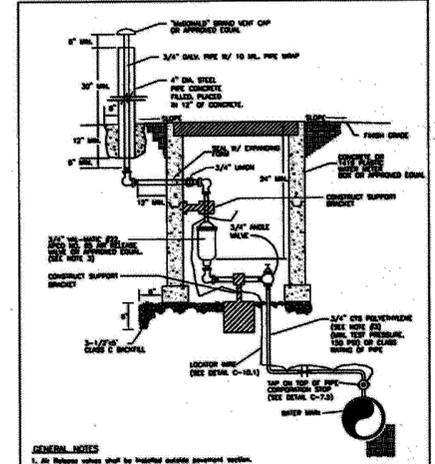


- TYPE II CURB AND GUTTER**
- NO SCALE
- ALL P.C.C. CURB AND GUTTER AND SIDEWALK SHALL BE CLASS AA OR DA CONCRETE UNLESS OTHERWISE SPECIFIED, (4,000 PSI), MEETING FREEZE-THAW SPECS.
  - ALL CONCRETE CURB, GUTTER AND SIDEWALK SHALL HAVE 1/2" EXPANSION JOINTS EVERY 30 FEET AND AT ALL CURB RETURNS AND SHALL HAVE WEAKER PLANE JOINTS EVERY 10 FEET.
  - AGGREGATE BASE MATERIAL SHALL CONFORM TO THE SPECIFICATIONS FOR TYPE II AGGREGATE BASE AND SHALL BE COMPACTED TO A MIN. 95% MAX. DRY DENSITY.
  - SIDEWALK AND CURB MAY BE PLACED MONOLITHIC. IF MONOLITHIC, 1/2" EXPANSION JOINTS SHALL BE PLACED EVERY 100 FEET AND AT ALL CURB RETURNS.
- \* JOINT IF PLACED SEPARATELY.



- VALVE DETAIL**
- GENERAL NOTES:
- SEE DETAIL DC-B17 FOR THRUST BLOCK SIZE. (MATERIAL USED FOR THRUST BLOCKING SHALL NOT PREVENT ACCESS TO THE BOLT ASSEMBLY).
  - CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 202.12 OF THE STANDARD SPECIFICATIONS.
  - IN ALL AREAS, LIDS SHALL BE SET FLUSH WITH FINISHED GRADE UNLESS OTHERWISE NOTED.
  - THE CONCRETE COLLAR SHALL BE LEFT 2-1/2" - 3" BELOW FINISHED ASPHALT SURFACE. APPLY AN APPROVED TACK COAT AND FILL VOID BETWEEN ADJACENT PAVEMENT AND FINISH WITH TYPE 3 A.C. FINISH, CHIP OR FOG SEAL PAVED SURFACE. EXCEPTION: WHEN STRUCTURE NOT LOCATED IN ASPHALT PAVEMENT OR IN AN UNPAVED AREA, EXTEND CONCRETE TO FINISHED GRADE. ALL CUTS IN A.C. SHALL BE STRAIGHT & EVEN.
  - SPLICES IN WIRE SHALL BE CONNECTED BY SOLDER OR WIRE NUTS AND WRAPPED WITH UL LISTED ELECTRICAL TAPE.

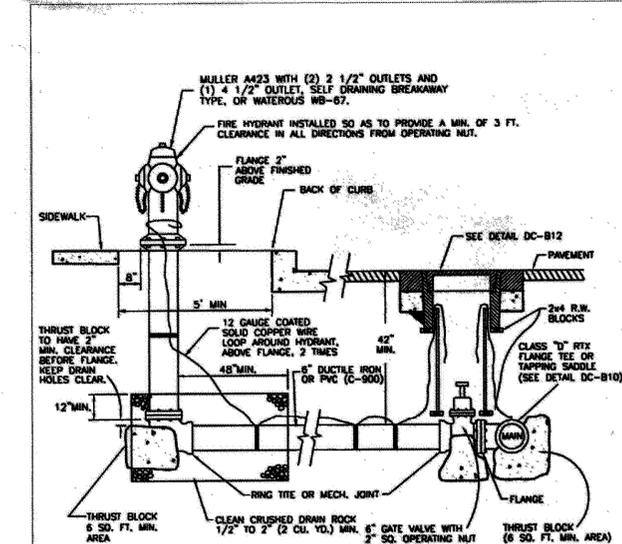
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			<b>VALVE DETAIL</b>	DRAWING NO. DC-B11 DATE 10/98 PAGE B-15



- POTABLE WATER AIR-RELEASE DETAIL**
- GENERAL NOTES:
- ALL RELEASE VALVES SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S INSTRUCTIONS. THESE SHALL BE INSTALLED FROM THE TOP OF THE VALVE TO PREVENT FROM FLIPPING BY WINDSTORMS.
  - ALL RELEASE VALVES SHALL HAVE SLOTTED HOLES FROM THE TOP OF THE VALVE TO THE BOTTOM OF THE HOLES.
  - ALL RELEASE VALVES SHALL BE INSTALLED WITH THE HOLES TO THE TOP OF THE VALVE.

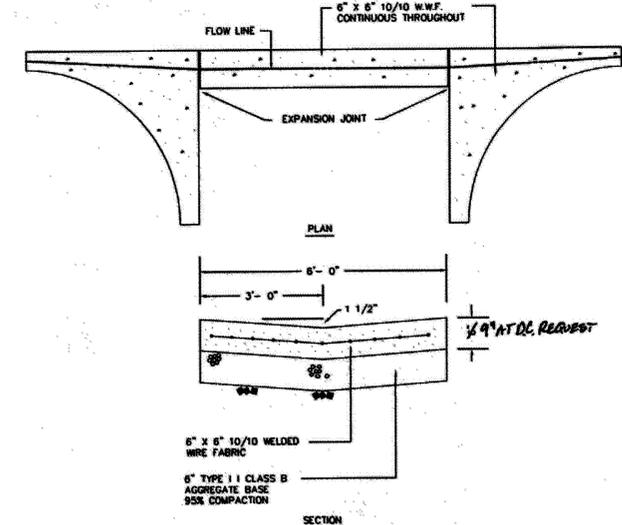
PROVIDE "FIRE-LITE" HYDRANT SPOTTER, OR EQUAL, OFFSET 18" FROM CENTER LINE OF STREET IN LINE W/ HYDRANT. USE 2-PART EPOXY FOR INSTALLATION.

ALTERNATE INSTALLATION LOCATION IS ON CURB SLOPE FACE.



- FIRE HYDRANT ASSEMBLY DETAIL**
- GENERAL NOTES:
- HYDRANT COLOR SHALL BE BASED ON FIRE FLOW TEST RESULTS AS DETERMINED BY FIRE AUTHORITY.
  - OPERATING NUT SHALL BE 1 1/2" PENTAGON.
  - INSPECTION BY WATER UTILITY SHALL BE REQUIRED PRIOR TO BACKFILLING.
  - IF SIDEWALK NOT PRESENT, SET HYDRANT SO THAT OPERATING NUT IS 3' 6" BEHIND BACK OF CURB.
  - IF CURB NOT PRESENT, INSTALL 6" DIAMETER STEEL BOLLARDS (CONCRETE FILLED).
  - NO FENCES SHALL BE ALLOWED WITHIN 3' OF ANY PORTION OF A FIRE HYDRANT.

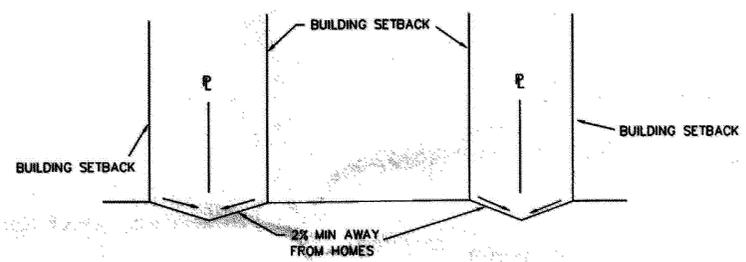
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			<b>FIRE HYDRANT ASSEMBLY DETAIL</b>	DRAWING NO. DC-B13 DATE 8/20/98 PAGE B-17



**P.C.C. VALLEY GUTTER AND SPANDEL**

NO SCALE

1) PORTLAND CEMENT CONCRETE SHALL BE CLASS AA OR DA 4,000 PSI MIN.



**SECTION A-A LOTS**

NO SCALE

- PAINT FIRE HYDRANT HEAVY DUTY GLOSS EMAMEL BRIGHT RED (612-62, 615-62) BY FULLER O'BRIEN, PAINT FIRE HYDRANT BONNET HEAVY DUTY EMAMEL SAFETY GREEN (612-63, 615-63) IF FLOW IS BETWEEN 1000 GPM AND 1499 GPM; PORT BLUE (D-109) IF 1500 GPM AND ABOVE.

PIPE SIZE	BEARING AREA (SQUARE FEET)			
	FITTINGS OR BENDS			
	11 1/4"	22 1/2"	45"	90"
4"	1	1	2	2
6"	2	4	4	4
8"	2	4	7	5
10"	3	6	12	8
12"	5	10	16	12
14"	6	12	20	14
16"	8	15	27	18
18"	13	25	45	32
24"	18	35	65	46

- THRUST BLOCKS TO BE CONSTRUCTED OF CLASS C CONCRETE.
  - AREAS GIVEN ARE FOR CLASS 150 PIPE AT A TEST PRESSURE OF 150 PSI, WITH 2000 PSF BEARING CAPACITY. INSTALLATIONS USING DIFFERENT PIPE, TEST PRESSURE, AND/OR SOIL TYPES SHOULD ADJUST AREAS ACCORDINGLY. SUBJECT TO APPROVAL OF ENGINEER.
  - BLOCKS TO BE POURED AGAINST UNDISTURBED SOIL.
  - JOINTS AND FACE OF PLUGS TO BE KEPT CLEAR OF CONCRETE.
- INFORMATION FOR THRUST BLOCK AREAS IS FROM DRAWING NO. 307 "THRUST BLOCK BEARING AREAS", IN THE STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION.

**THRUST BLOCK TABLE**

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY



**LUMOS AND ASSOCIATES**

Civil Engineering • Surveying • Material Testing • Planning

1478-B 4th Street, Minden, NV 89423 (775) 782-8017

**ROAD & MISCELLANEOUS DETAILS**

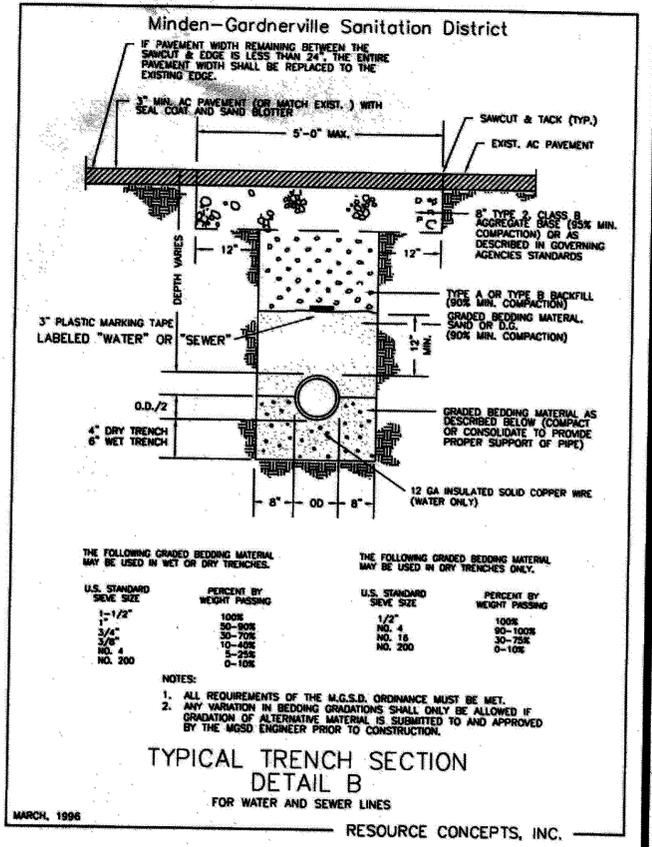
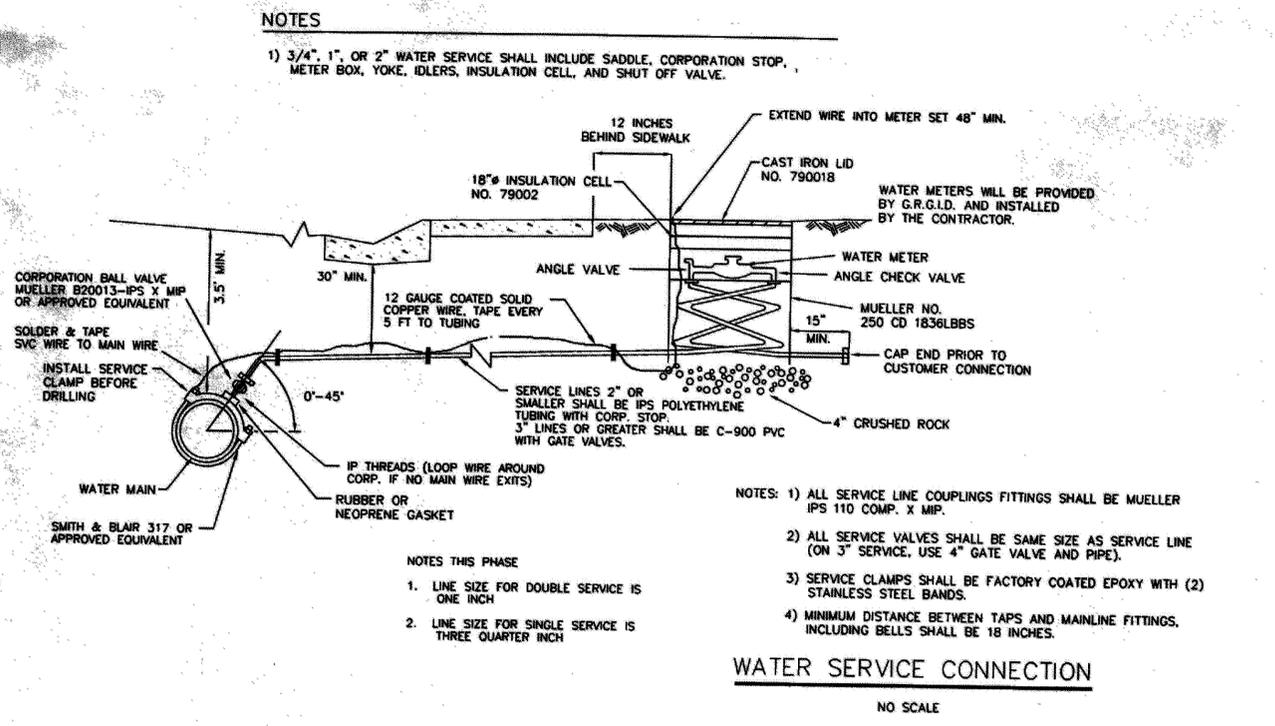
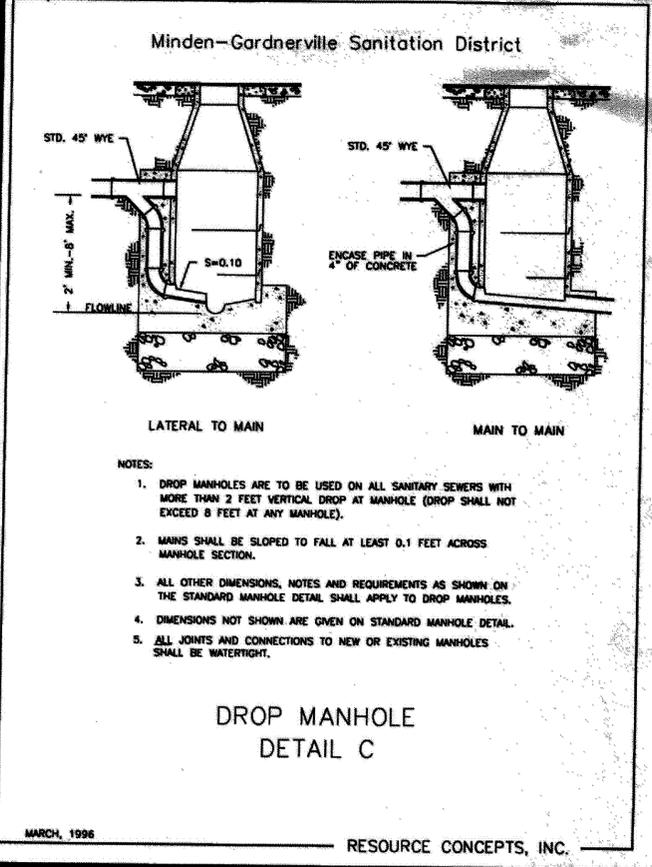
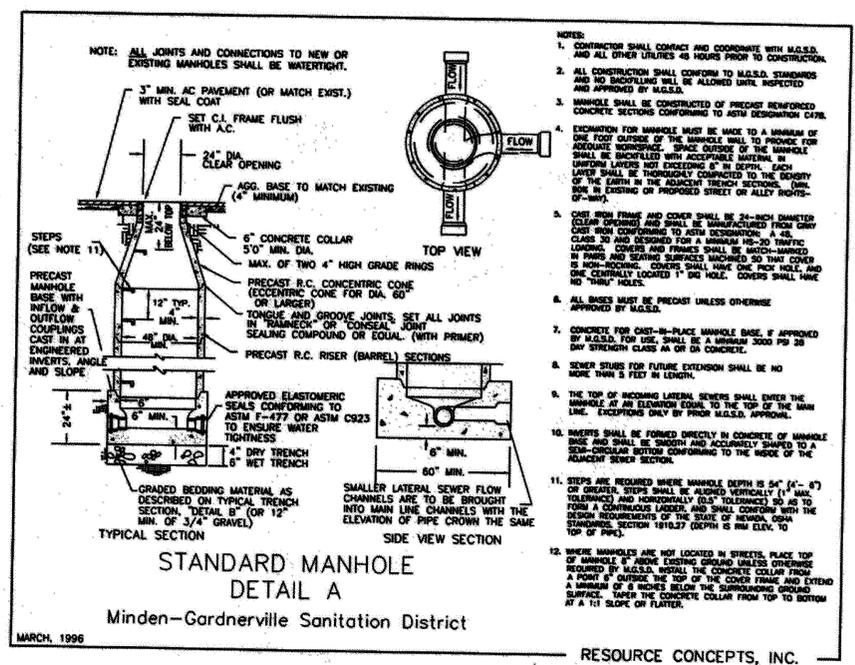
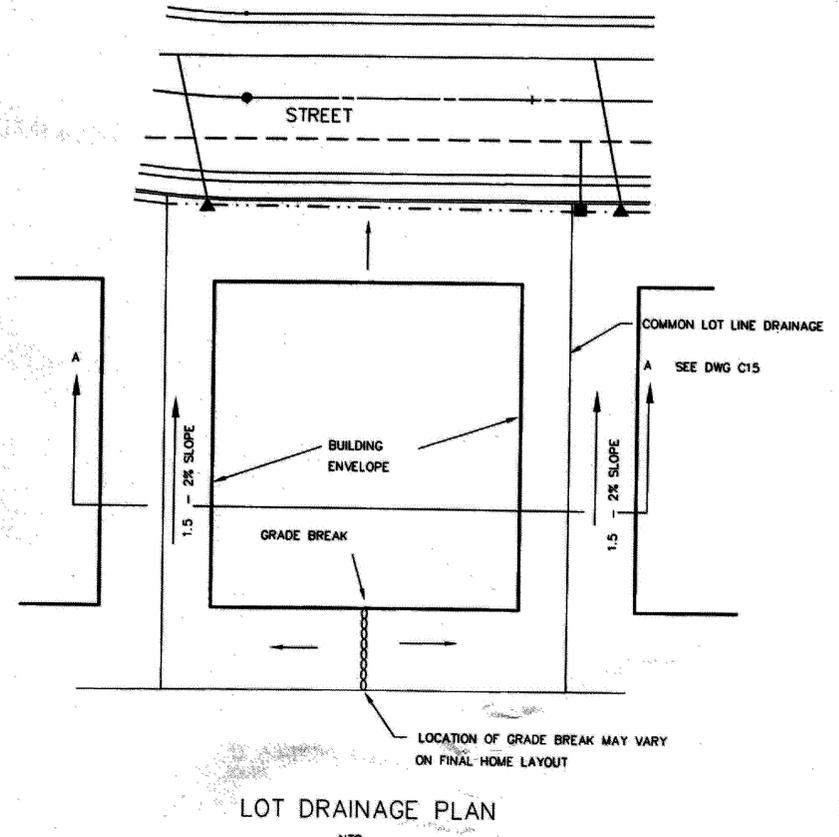
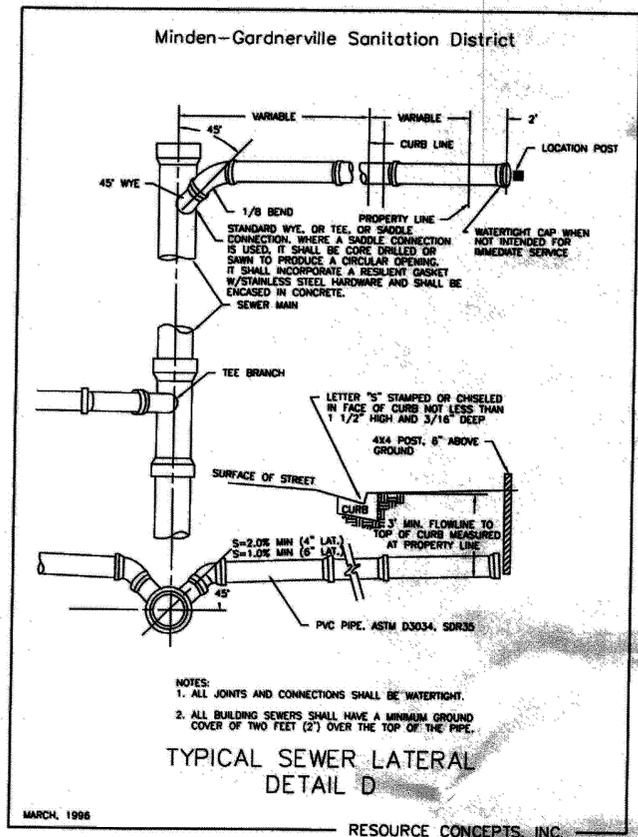
for **PLEASANTVIEW PHASE 9**

DOUGLAS COUNTY NEVADA

DATE:	08/20/98
SCALE:	
DRAWN BY:	BSJ
DESIGNED BY:	BSJ
CHECKED BY:	BSJ
JOB NO.:	4572.000

DWG. NO. **C15**

SHEET 18 OF 24



DATE: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

ROBERT D. FELLOWS  
 CIVIL  
 LICENSE NO. 12491

**LUMOS AND ASSOCIATES**  
 Civil Engineering - Surveying - Material Testing - Planning  
 1470-B 4th Street, Minden, NV 89423 (775) 782-0077

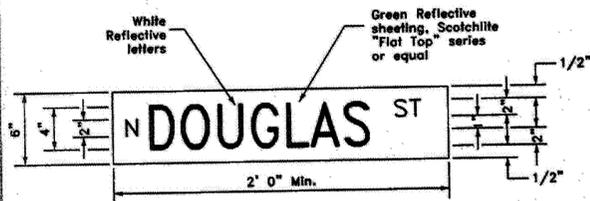
CREG LYNN CONSTRUCTION

**SEWER & WATER DETAILS**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY NEVADA

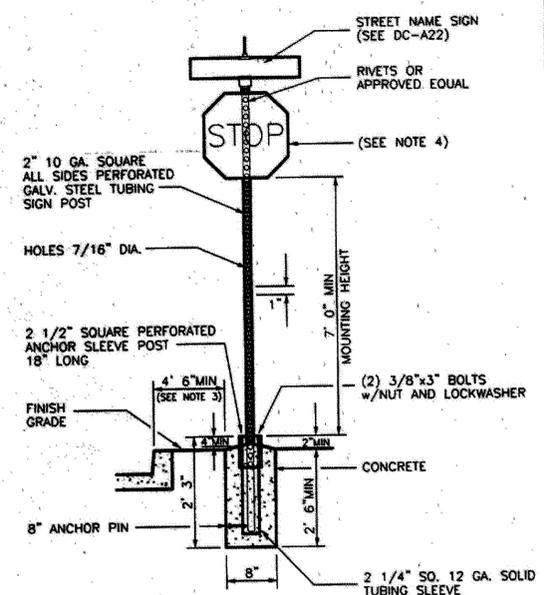
DATE: 08/20/00  
 SCALE: \_\_\_\_\_  
 DRAWN BY: JES  
 DESIGNED BY: BEVES  
 CHECKED BY: JES  
 JOB NO.: 4572.000

DWG. NO.: **C16**

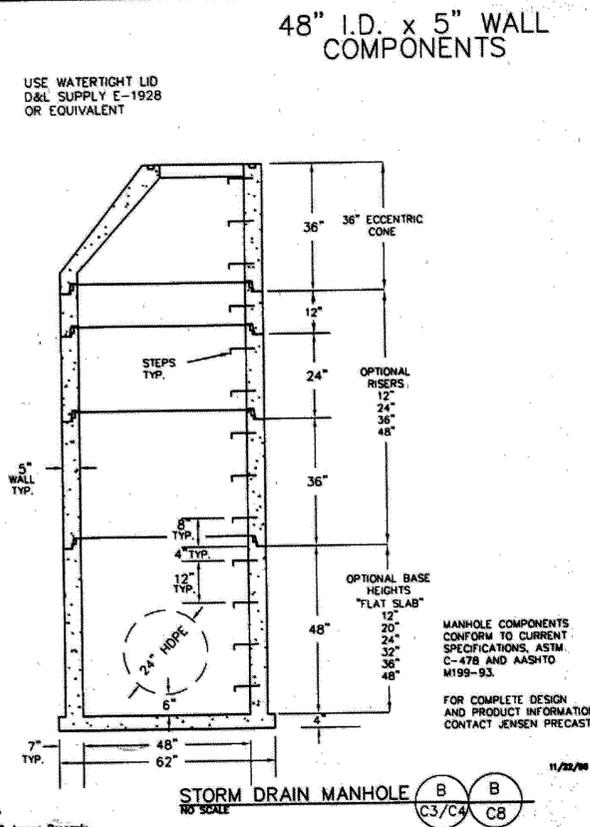
SHEET 18 OF 24



- NOTES:
1. Street name sign shall be in conformance with the latest edition of the MUTCD.
  2. Reflective materials shall be mounted on flat plate aluminum 6061-T6, 0.125 inch, in accordance with Section 215 of the Standard Specifications for Public Works Construction.



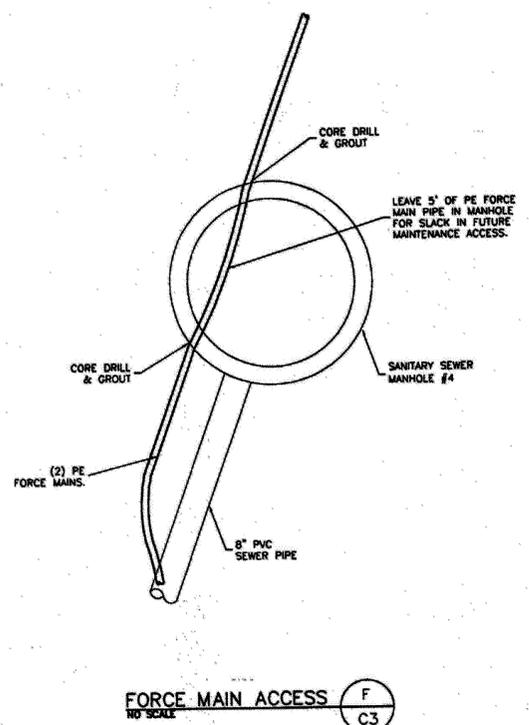
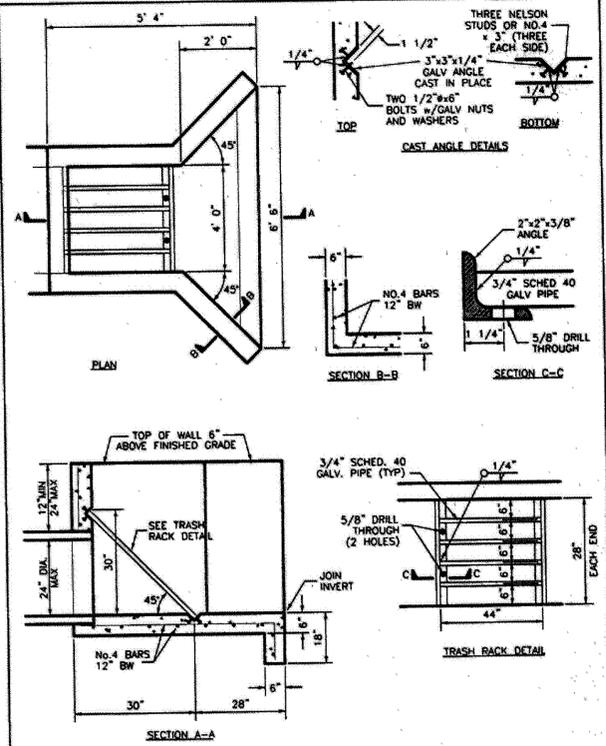
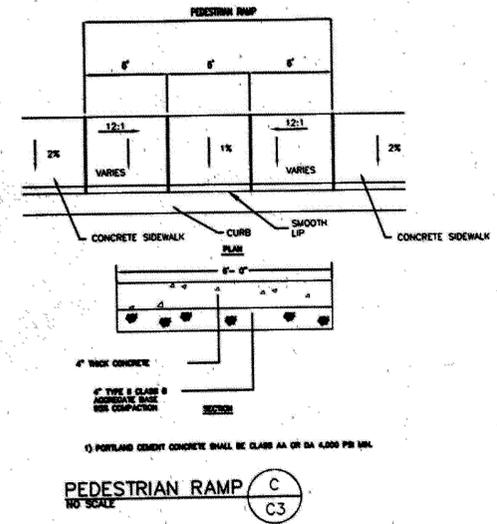
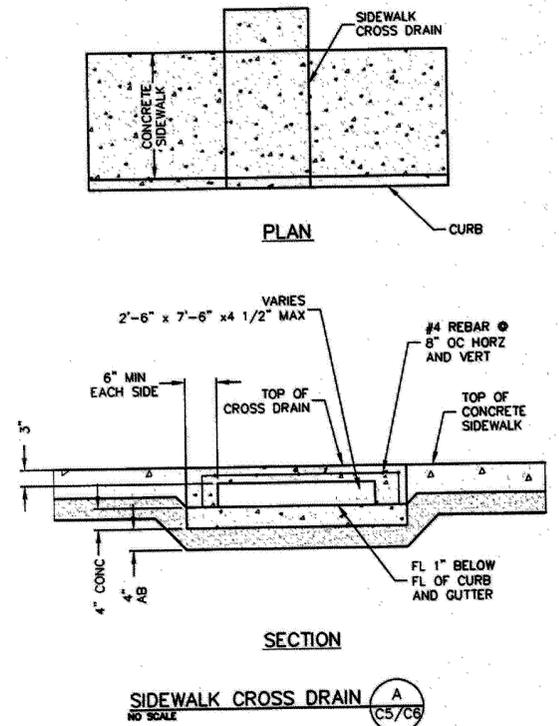
- NOTES:
1. SIGN MATERIALS, CONSTRUCTION AND PLACEMENT SHALL BE IN CONFORMANCE WITH THE MOST RECENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND SECTION 215 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  2. STREET NAME SIGN SHALL BE MOUNTED WITH VANDAL-PROOF HARDWARE.
  3. ON STREETS WHERE CURBING DOES NOT EXIST, SET SIGN 6\"/>
  - 4. STOP SIGN 90°.
  - 5. SIGN POST SHALL NOT BE ANCHORED IN SIDEWALK.



MANHOLE COMPONENTS CONFORM TO CURRENT SPECIFICATIONS, ASTM C-478 AND AASHTO M199-93.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION, CONTACT JENSEN PRECAST.

STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION				SECTION DOUGLAS COUNTY			
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	NO.	REVISION	DATE	SECTION DOUGLAS COUNTY
<b>STREET NAME SIGN</b>				<b>STANDARD STREET SIGN</b>			
DRAWING NO. DC-A22				DRAWING NO. DC-A23			
DATE 10/96				DATE 10/96			
PAGE A-08				PAGE A-09			

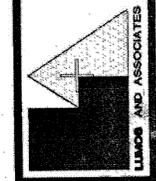


STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION				SECTION DOUGLAS COUNTY			
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	NO.	REVISION	DATE	SECTION DOUGLAS COUNTY
<b>TRASH RACK (24\"/&gt; </b>				<b>FORCE MAIN ACCESS</b>			
DRAWING NO. DC-D12				DRAWING NO. DC-D12			
DATE 8/20/98				DATE 8/20/98			
PAGE D-09				PAGE D-09			

NO.	REVISION	DATE	COMMENTS



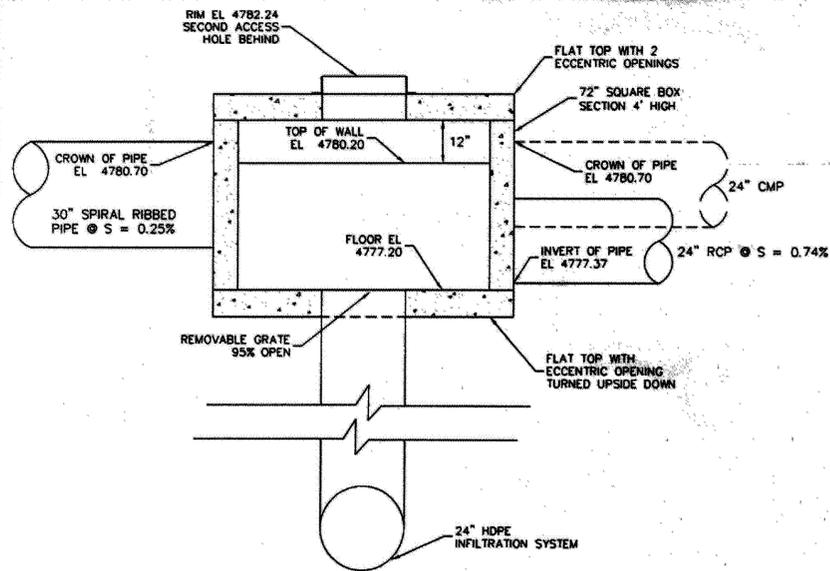
**LUMOS AND ASSOCIATES**  
 Civil Engineering - Surveying - Material Testing - Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-8017



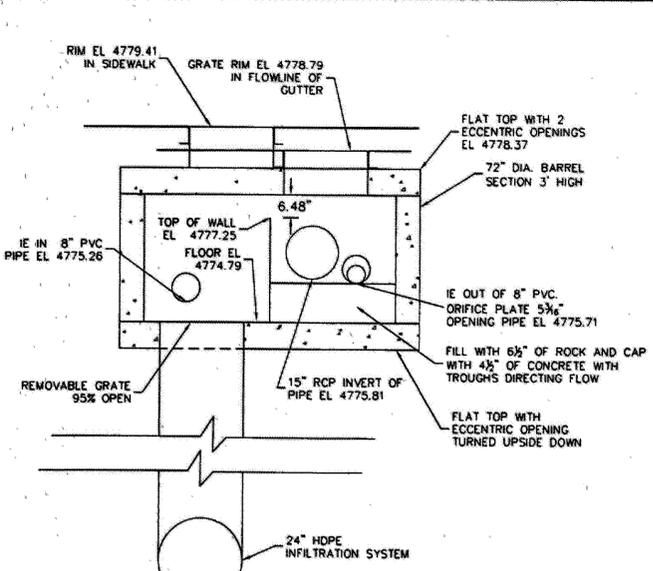
**MISCELLANEOUS DETAILS**  
 for  
**PLEASANTVIEW PHASE 9**  
 DOUGLAS COUNTY, NEVADA

DATE: 08/20/98  
 SCALE:  
 DRAWN BY: RES  
 DESIGNED BY: RES  
 CHECKED BY: RES  
 JOB NO.: 4372.000

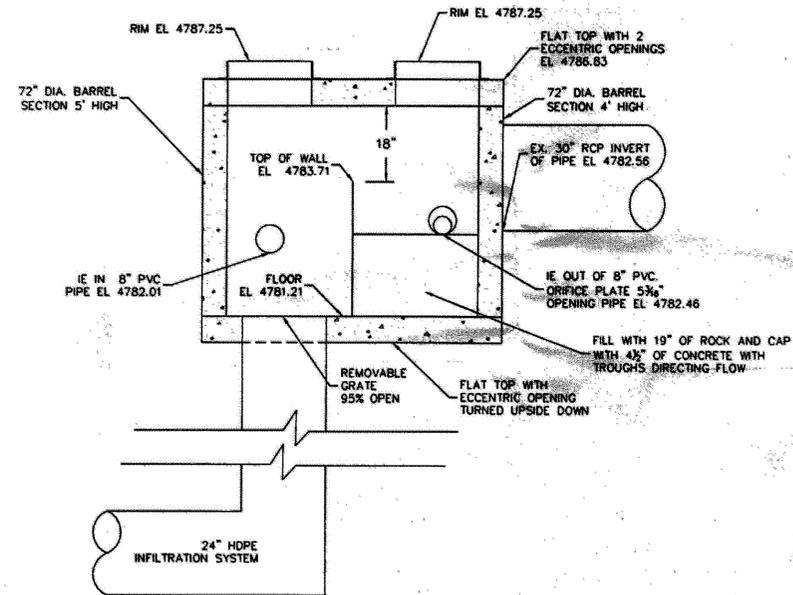
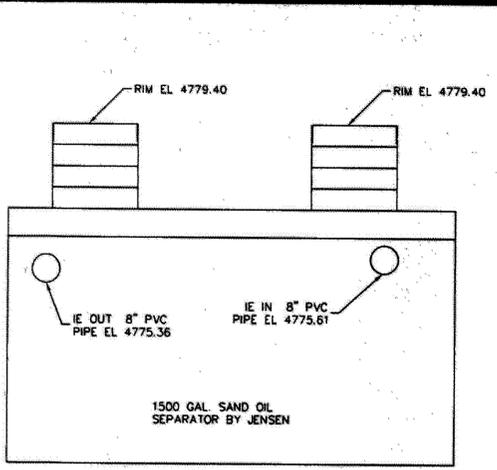
DWG. NO.:  
**C17**  
 SHEET 20 OF 24



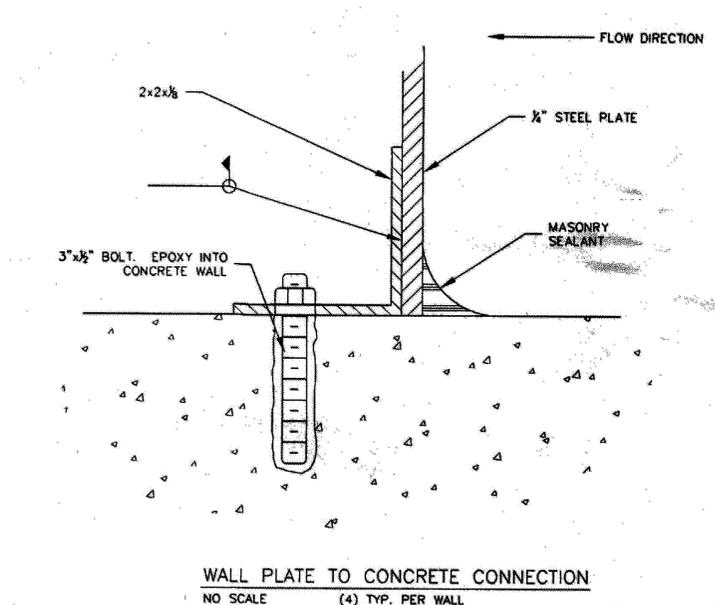
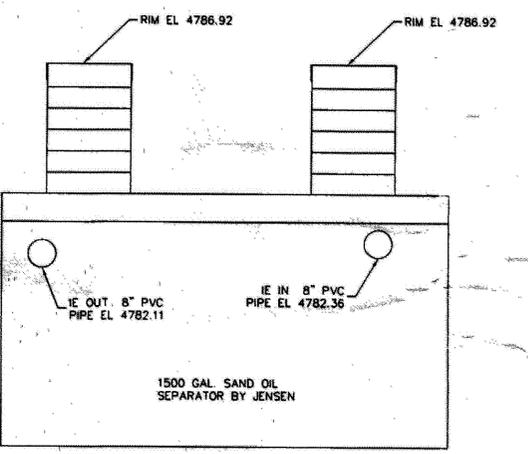
**AUGHT SIX & PLEASANTVIEW SPLITTER BOX**  
SCALE: 1" = 2'



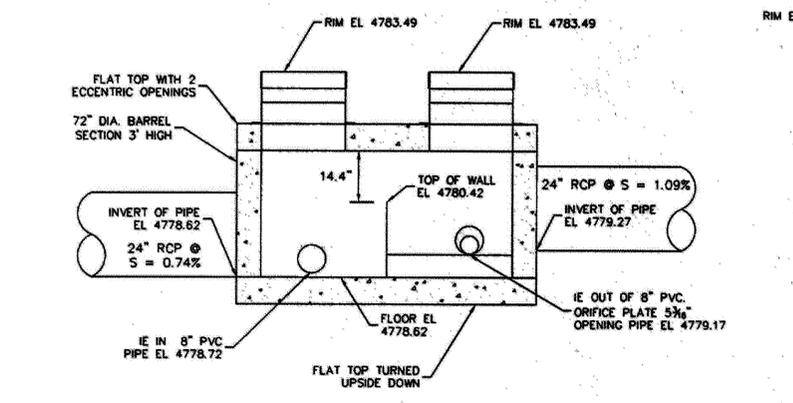
**CENTERFIRE SPLITTER BOX**  
SCALE: 1" = 2'



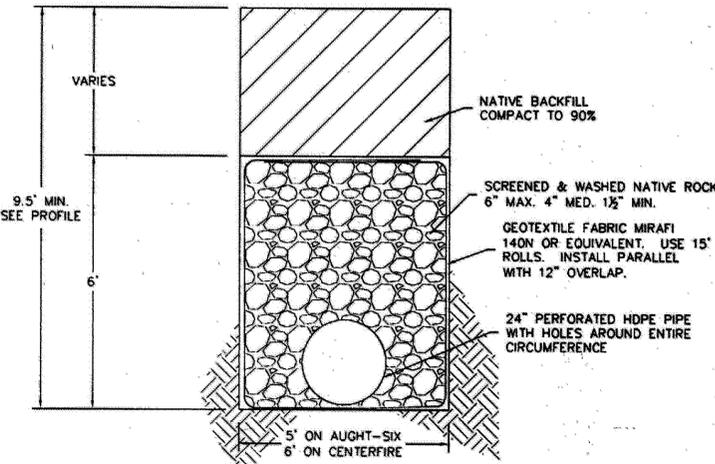
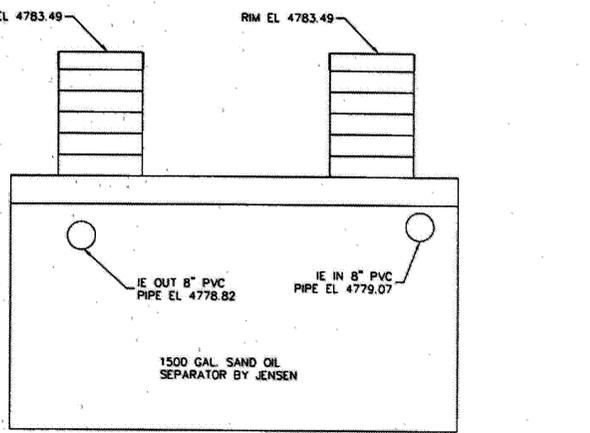
**WINTERGREEN SPLITTER BOX**  
SCALE: 1" = 2'



**WALL PLATE TO CONCRETE CONNECTION**  
NO SCALE (4) TYP. PER WALL



**PLEASANTVIEW SPLITTER BOX**  
SCALE: 1" = 2'



**INFILTRATION TRENCH DETAIL**  
NO SCALE

- NOTE:**
1. ALL FLOW SPLITTER WALLS TO BE 1/4" PLATE STEEL. APPLY MASONRY SEALANT BETWEEN STEEL AND CONCRETE.
  2. ALL FRAMES SHALL INCLUDE CONCRETE COLLARS, 6" MIN.
  3. ORIFACE PLATES SHALL BE CONSTRUCTED WITH 3/8" STEEL PLATE, ATTACH WITH 3/4" BOLTS.

DATE	10/20/00
NO.	1
NO. COMMENTS	REVISED PER ORDER COMMENTS

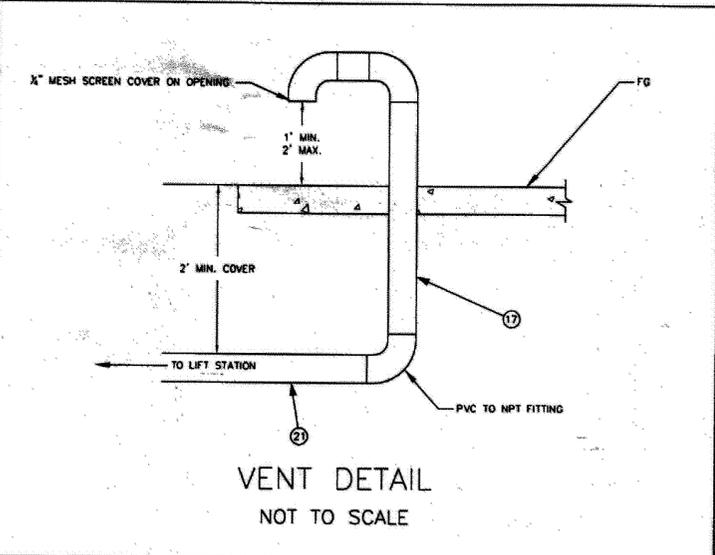
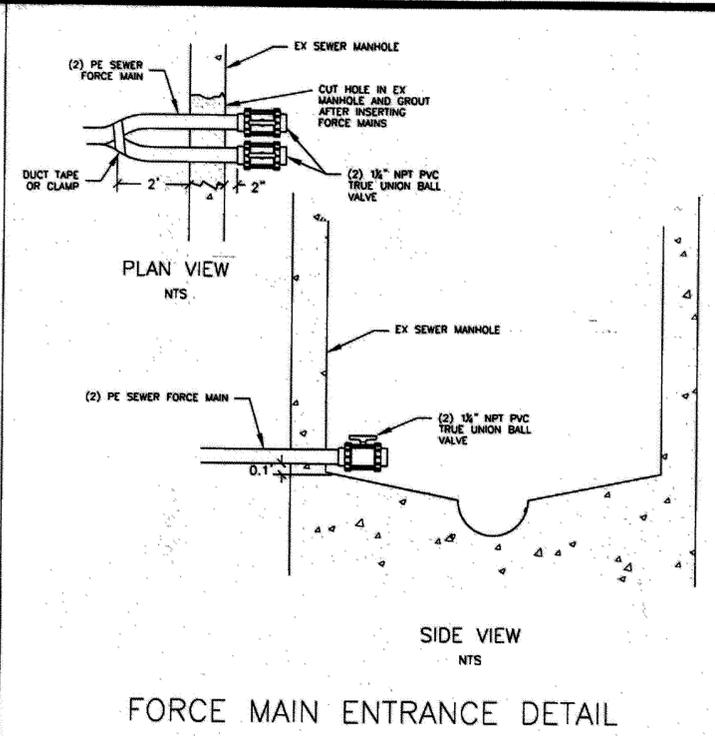
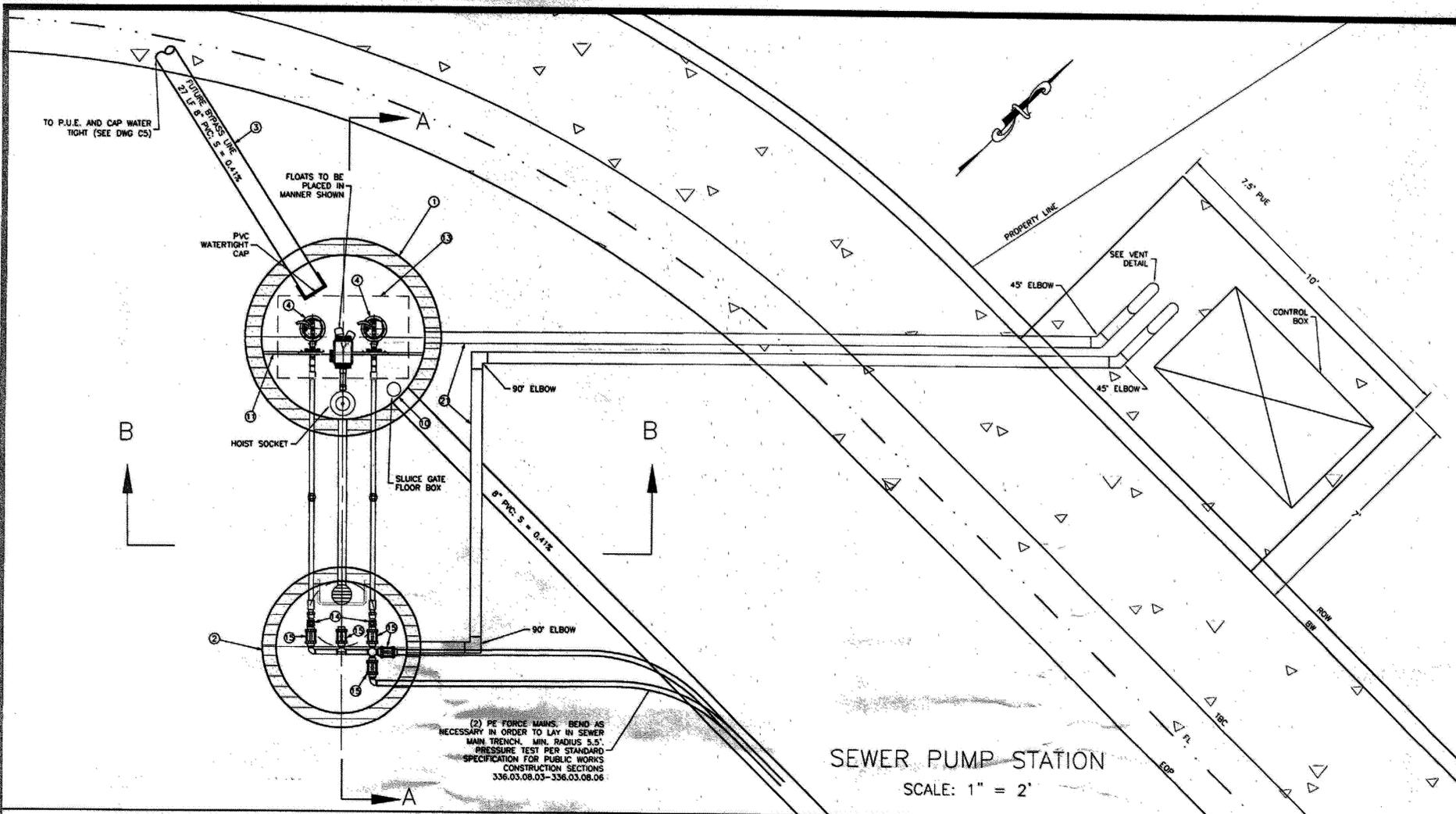


**LUMOS AND ASSOCIATES**  
Civil Engineering - Surveying - Material Testing - Planning  
1478-B 4th Street, Minden, NV 89423 (775) 785-8017

**STORM DRAINAGE DETAILS**  
for  
**PLEASANTVIEW PHASE 9**  
DOUGLAS COUNTY NEVADA

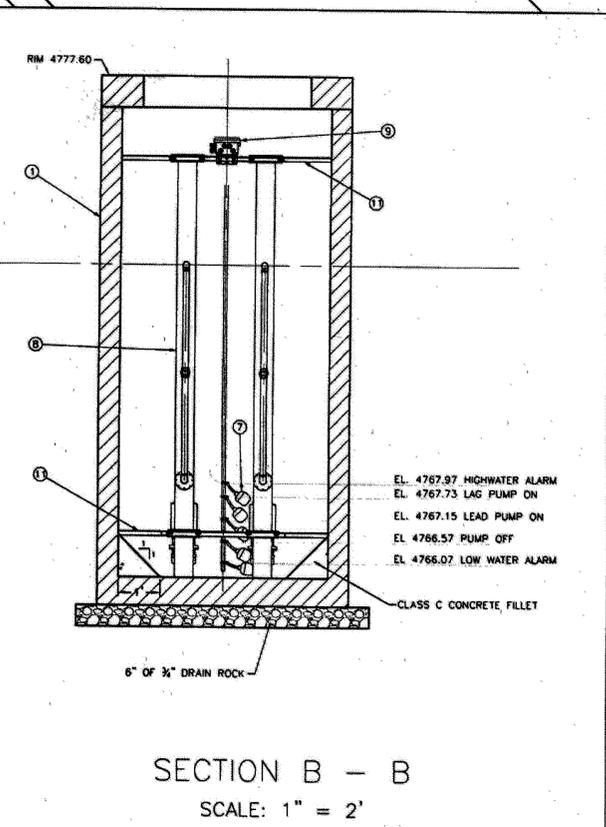
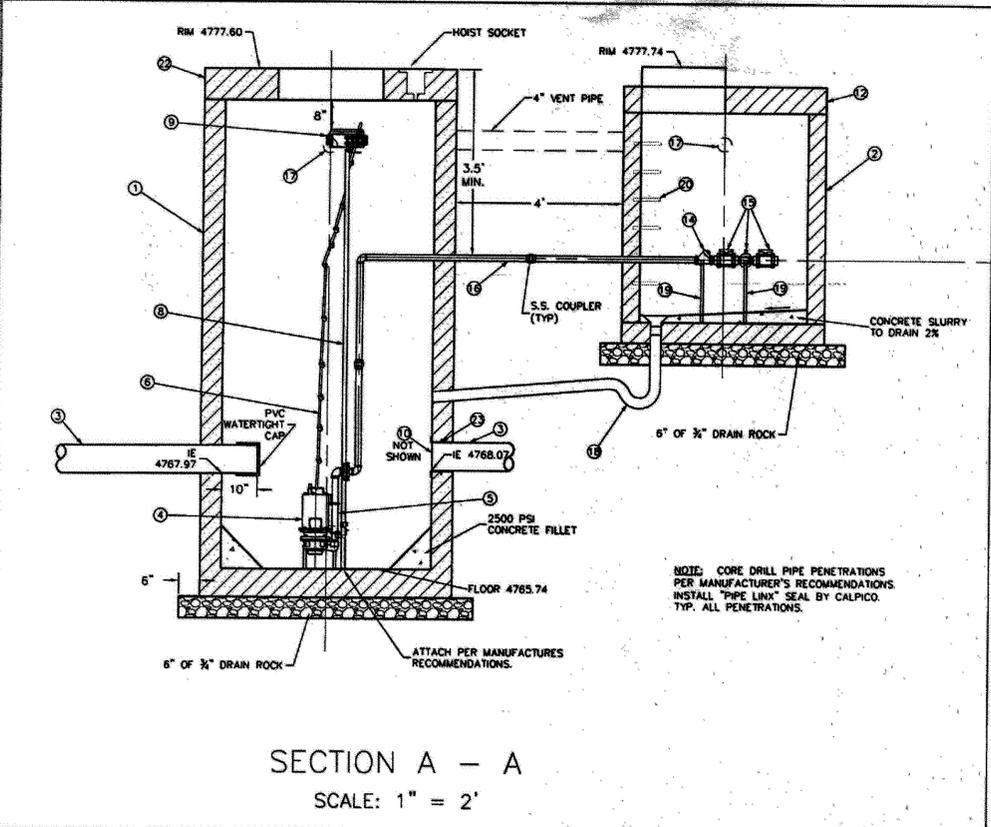
DATE	02/05/00
SCALE	AS SHOWN
DRAWN BY	SES
DESIGNED BY	SOFTVMS
CHECKED BY	SES
JOB NO.	492.000

DWG. NO.: **C18**  
SHEET 21 OF 24

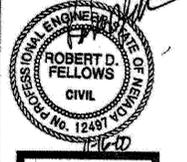


**LIST OF MATERIALS**

- 60" PRECAST CONCRETE MANHOLE. ALL JOINTS TO BE SEALED WITH RAMNEX.
- 48" PRECAST CONCRETE MANHOLE
- 8" PVC PIPE
- SERIES SG 2 HP GRINDER PUMP
- 1/2" NPT S.S. DISCHARGE PIPING INCLUDING NIPPLES, ELBOW AND ANTI-SIPHON PORT. BARNES PART NO. 079919 OR EQUIVALENT.
- POLYPROPYLENE LIFTING ROPE
- (4) PIPE MOUNTED MERCURY LEVEL CONTROLS. BARNES PART NO. 075327 OR EQUIVALENT. SEE E1/E2
- (2) S.S. GUIDE RAIL WITH 1/2" BREAK AWAY FITTING. BARNES PART NO. 086364 OR EQUIVALENT.
- JUNCTION BOX (SEE ELECTRICAL)
- WATERMAN P-32 SLUICE GATE WITH K-2 STEM GUIDE, EXTENSION ARM, FLOOR BOX, AND T-HANDLE, OR EQUIVALENT
- S.S. RAIL SUPPORTS. LH. PART NO. 094792C, RH. PART NO. 094791C, OR EQUIVALENT.
- 48" FLAT TOP WITH ECCENTRIC 24" OPENING, WITH FRAME AND SOLID COVER.
- TRAFFIC RATED ALUMINUM ACCESS DOOR. BARNES PART NO. J45-ND, WITH RECESSED PADLOCK HASP, OR EQUIVALENT.
- (2) 1-1/4" NPT C.I. BALL CHECK VALVES W/ SCH. 40 PVC PLUG
- (5) 1-1/4" NPT PVC TRUE UNION BALL VALVE
- STAINLESS STEEL DISCHARGE LINE
- 4" STAINLESS STEEL VENT PIPE.
- 3" ABS DRAIN PIPE WITH FLOOR DRAIN IN DRY WELL AND P-TRAP.
- FABRICATED PIPE SUPPORT
- GALVANIZED STEEL ACCESS LADDER (EMBEDDED)
- 4" PVC VENT PIPE, MAINTAIN MIN. 2" COVER.
- H20 TRAFFIC RATED FLAT TOP WITH ACCESS DOOR
- WATERMAN "T" TYPE WALL THIMBLE, OR EQUIVALENT. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.



DATE	09/21/09
NO.	107005
COMMENTS	REVISION PER DESK COMMENTS



**LUMOS AND ASSOCIATES**  
 Civil Engineering • Surveying • Material Testing • Planning  
 1478-B 4th Street, Minden, NV 89423 (775) 782-8017

**SEWER PUMP STATION DETAILS**  
 for  
**PLEASANTVIEW PHASE 9**  
 NEVADA  
 DOUGLAS COUNTY

DATE	09/21/09
SCALE	
DRAWN BY	RES
DESIGNED BY	RES/RES
CHECKED BY	RES
JOB NO.	4572000

### DRAWING SCHEDULE

SHEET NUMBER	SHEET TITLE	ORIGINAL ISSUE DATE: 9/27/00	REV	DATE
E1	SYMBOLS LIST, SPECIFICATIONS, DRAWING INDEX, PANEL SCHEDULE AND DETAILS		1	
E2	ELECTRICAL SITE PLAN AND SINGLE LINE DIAGRAM		1	
TOTAL SHEETS THIS ISSUE:		2		

LTS	REC	TYPE	DIRECTORY	LOAD	BKR	CIR	CIR	BKR	LOAD	DIRECTORY	TYPE	REC	LTS
		HEATER	120/20	200	1	2	201	180	RECEPTACLE				
		LIGHT	200	200	3	4	201	500	FAN				
		TELEMETRY	500	201	5	6	201						
				201	7	8	201						
				201	9	10	201						
				201	11	12	201						
				201	13	14	201						
				201	15	16	201						
				201	17	18	201						
				201	19	20	201						
				201	21	22	201						
				201	23	24	201						
				201	25	26	201						
				201	27	28	201						
				201	29	30	201						
				201	31	32	201						
				201	33	34	201						
				201	35	36	201						
				201	37	38	201						
				201	39	40	201						
				201	41	42	201						

VOLTS:  240/120V, 1ø, 3W  240/120V, 1ø, 3W  
 AMPS:  100A  200A  400A   
 MAIN:  MCB  MLO  DR. LURS  
 MTD:  SURFACE  FLUSH  
 BUSS:  COPPER  ALUMINUM

CONNECTED LOAD:  KVA (  A)

NEUTRAL BUS:  100%  200%  
 GROUND BUS:  STANDARD  ISOLATED

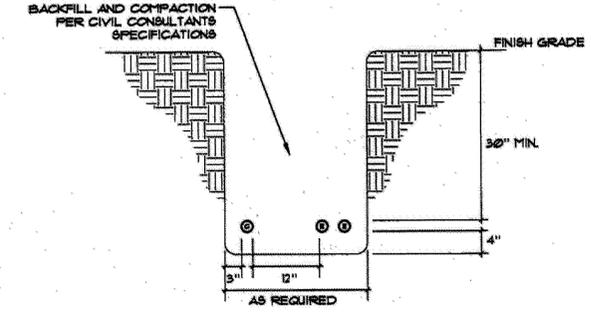
### SPECIFICATIONS

- CODES:** ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES AND ORDINANCES.
- COMPLETE INSTALLATION:** PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, TOOLS, ACCESSORIES, ETC. NECESSARY TO ACCOMPLISH A COMPLETE ELECTRICAL SYSTEM IN ACCORDANCE WITH THE PLANS TOGETHER WITH THE SPECIFICATIONS.
- GROUNDING:** GROUND ALL EQUIPMENT AND SYSTEM NEUTRAL IN ACCORDANCE WITH ARTICLE 250 OF THE NEC.
- CIRCUITING:** ALL WIRING SHALL BE AS SHOWN.
- WIRING:** ALL WIRE SHALL BE COPPER.
- EXISTING CONDITIONS:** CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE HIMSELF WITH ALL EXISTING AND PROPOSED CONDITIONS WHICH MAY AFFECT THE COURSE OF HIS WORK PRIOR TO SUBMITTING A BID ON THIS PROJECT. NO EXTRAS WILL BE ALLOWED FOR FAILURE TO COMPLY WITH THIS REQUIREMENT.
- PERMITS:** OBTAIN AND PAY FOR ALL BUILDING AND WORKING PERMITS AND INSPECTION FEES REQUIRED FOR THIS PROJECT.
- UTILITY SERVICES:** PROVIDE POWER AND COMMUNICATIONS SYSTEM SERVICES IN ACCORDANCE WITH THE REQUIREMENTS OF THE SERVING UTILITIES. PROVIDE EXCAVATION, RACEWAY, STRUCTURES, GROUNDING, ETC. AS DIRECTED. POWER SERVICES AND DISTRIBUTION SYSTEM RATING SHALL EXCEED MAXIMUM AVAILABLE FAULT CURRENT THROUGH UTILITY SERVICE TRANSFORMER. CONTACT SERVING UTILITIES AND OBTAIN THEIR REQUIREMENTS PRIOR TO BID. (UTILITY SERVICE AND LINE EXTENSION CHARGES PAID BY OTHERS).
- EQUIPMENT STANDARDS:** ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND OF THE HIGHEST QUALITY AVAILABLE.
- WARRANTY:** THE COMPLETE ELECTRICAL SYSTEM AND ALL PORTIONS THEREOF SHALL BE GUARANTEED TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE. PROMPTLY REMEDY SUCH DEFECTS AND ANY SUBSEQUENT DAMAGE CAUSED BY THE DEFECTS OR REPAIR THEREOF AT NO EXPENSE TO THE OWNER. LIGHT BULBS ARE EXCEPT FROM THIS GUARANTEE, BUT SHALL BE NEW AND UNUSED AT TIME OF FINAL ACCEPTANCE.
- SUBMITTALS:** SUBMIT SIX COPIES OF FACTORY SHOP DRAWINGS FOR ALL SWITCHGEAR, PANELS, MOTOR CONTROL, WIRING DEVICES, ETC. PROPOSED FOR THIS PROJECT. PROPOSED SUBSTITUTIONS SHALL BE EQUAL OR SUPERIOR TO SPECIFIED ITEMS IN ALL RESPECTS. DETERMINATION OF EQUALITY REST SOLELY WITH ENGINEER.
- IDENTIFICATION:** IDENTIFY ALL EQUIPMENT, SWITCHBOARD CIRCUITS AND ELECTRICALLY-CONNECTED EQUIPMENT BY ENGRAVED NAMEPLATES. PANEL DIRECTORIES SHALL BE TYPED.
- PANELBOARDS:** PANELS SHALL HAVE FLUSH MONO-FLAT TRIM, FLANG HINGED DOORS AND COVER DOOR IN DOOR WITH LOCKABLE MASTER-KEYED FLUSH CATCHES AND BOLT-ON CIRCUIT BREAKERS.
- TAMPER-PROOF:** ALL EQUIPMENT AND CIRCUITING ACCESSIBLE BY THE PUBLIC SHALL BE DEMONSTRATED TO BE TAMPER-PROOF AND VANDAL RESISTANT. OPERABLE DEVICES AND EQUIPMENT SHALL BE PADLOCKABLE.
- SUPPORTS AND HANGERS:** ALL SUPPORTING SYSTEMS AND COMPONENTS SHALL BE RATED FOR FIVE (5) TIMES THE ACTUAL LOAD.

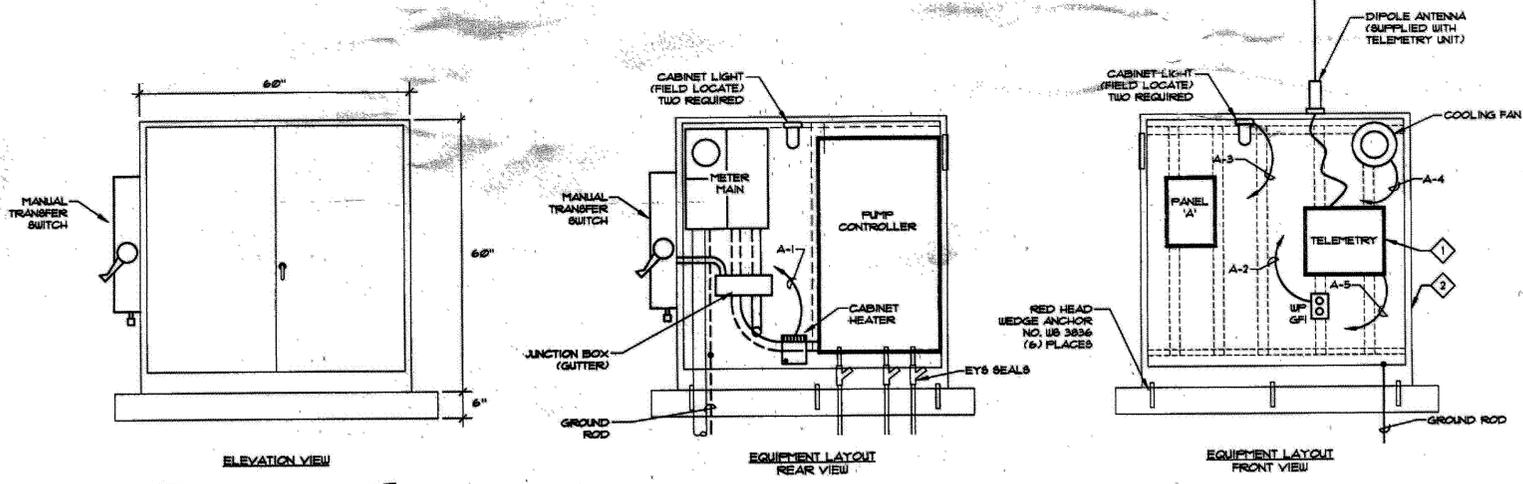
### ELECTRICAL SYMBOL LIST

NOTE: THIS IS A MASTER SCHEDULE. NOT ALL SYMBOLS CONTAINED HEREIN MAY APPEAR ON THE DRAWINGS.

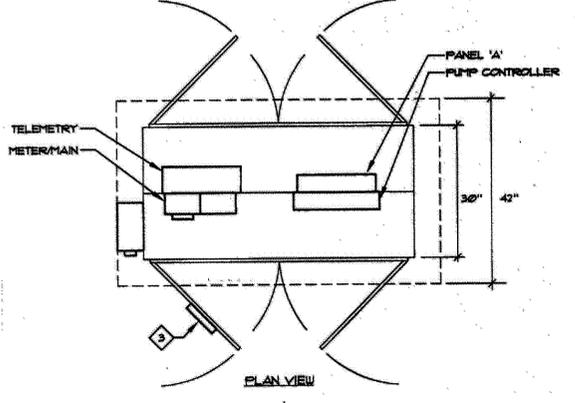
- |  |  |  |                                |
|--|--|--|--------------------------------|
|  | DUPLEX RECEPTACLE W/ INTEGRAL GFCI CIRCUITRY |  | PANELBOARD - SURFACE MOUNTED   |
|  | SINGLE POLE SWITCH                           |  | COPPER GROUND - SIZE PER PLANS |
|  | RIGID GALVANIZED STEEL                       |  | WEATHER PROOF (NEMA 3)         |
|  | FURNISHED BY OTHERS                          |  | EXISTING                       |



(A) TRENCH DETAIL  
E1 NOT TO SCALE



(B) EQUIPMENT CABINET  
E1 NOT TO SCALE



- SHEET NOTES:**
- RADIO TELEMETRY PER HENDERSONVILLE SANITATION DISTRICT REQUIREMENTS (TRANSMIT POWER LOSS AND HIGH LEVEL ALARMS). OBTAIN PRICE AND EQUIPMENT SPECIFICATION SHEETS FROM SIERRA CONTROL SYSTEMS INC. (715) 883-2443.
  - EQUIPMENT MOUNTING CABINET - MANUFACTURED CABINET TO INTERNALLY HOUSE METER MAIN, DISTRIBUTION PANEL, TELEMETRY UNIT, AND PUMP CONTROL PANEL. CABINET TO (1) DUAL DOOR ACCESS, 12 GA. STEEL ENCLOSURE APPROXIMATELY 60" h x 60" w x 30" d, GALVANIZED, GREY ENAMEL FINISH, OPEN BOTTOM, PAD LOCKABLE DOORS WITH HEAVY DUTY THREE POINT LATCH HARDWARE, (4) DOOR STOP DITS, UNISTRUT MOUNTING HARDWARE, ANCHOR HARDWARE FOR ATTACHMENT, WITH 1/2" DIA. THERMOSTAT CONTROLLED HEATER, 30W (MINIMUM) THERMOSTAT CONTROLLED COOLING FAN, AND (2) 120V LIGHTS WITH PROTECTIVE COVERS, 'HOFFMAN' OR 'CIRCLE AW'.
  - SPCCO LOCKED METERING FACILITY BOX. PURCHASE FROM SPCCO. STOCK #25-2420.

### PUMP CONTROLLER AND TELEMETRY OPERATION

- FLUID LEVELS TO BE DETERMINED BY CIVIL ENGINEER
- LEAD LEVEL PUMP STARTS AT 'SET' LEVEL.
  - LAG LEVEL PUMP STARTS AT 'SET' LEVEL.
  - LEAD AND LAG PUMPS OFF AT 'SET' LEVEL WITH CONTACT IN NORMALLY OPEN POSITION.
  - HIGH OR LOW LIQUID LEVEL TO ACTIVATE SITE ALARMS AND TELEMETRY.
  - LOSS OF SITE POWER WILL ACTIVATE TELEMETRY ALARM.

### PUMP CONTROLLER EQUIPMENT SPECIFICATIONS

- BARNES PUMP, INC. (WESTERN NEVADA SUPPLY - 715.359.5800)
- PUMP PANEL (1215000) 2P, DUPLEX, 240V, 1ø, SIZE 0 STARTERS WITH MOTOR CIRCUIT PROTECTION, H.O.A., NEMA-12 ENCLOSURE WITH LIGHTNING ARRESTOR, COMPLETE WITH ALTERNATOR WITH (2) INTRINSICALLY SAFE RELAYS, LAG START RELAY, ALARM BELL WITH SILENCE SWITCH (106-413), (4) DRY ALARM CONTACTS (1213004), ALARM LIGHT (106-4612), SERVICE LIGHT (106-4300), CONDENSATION PREVENTION HEATER (106-4618), UNDER VOLTAGE AND POWER FAILURE RELAY, 500VA CONTROL TRANSFORMER, (2) ELAPSED TIME METERS (106-4616), (2) INTRINSICALLY SAFE RELAYS (106-4403), TIME DELAY RELAY 0-30 SECONDS (POWER ON), TIME DELAY RELAY 0-100 SECONDS (HIGH/LOW ALARM RELAY).
  - LEVEL CONTROLS, MERCURY, PIPE MOUNTED, STAINLESS STEEL, 18V, WITH 50 FOOT CORD (1215321).
  - JUNCTION BOX (1294687)
- PUMP CONTROL SUPPLIER TO PROVIDE CONTROL WIRING DIAGRAM WITH SUBMITTALS.

9/22/00

MSA #200291

MSA ENGINEERING, INC.  
ELECTRICAL CONSULTANTS  
155 Cadillac Place Reno, NV 89502  
TEL: 775-825-4888 FAX: 775-825-4994  
email: msa@msa-reno.com

NO.	COMMENTS	DATE

**LUMOS AND ASSOCIATES**  
Civil Engineering • Surveying • Material Testing • Planning  
1478-B 4th Street, Minden, NV 89423 (775) 782-6017  
LUMOS AND ASSOCIATES

GREG LYNN CONSTRUCTION  
PUMP STATION ELECTRICAL  
for  
PLEASANTVIEW PHASES 9 - 12  
DOUGLAS COUNTY NEVADA

DATE: 09/07/00
SCALE: AS NOTED
DRAWN BY: RLP
DESIGNED BY: JGW
CHECKED BY: JGW
JOB NO.: 4572.000

DWG. NO.: <b>E1</b>
------------------------



# IMPROVEMENT PLANS

for

## RAIN SHADOW RANCH- PHASE 1

### DOUGLAS COUNTY, NEVADA

A.P.N. 1220-17-601-001, 1220-17-610-001 & 1220-17-610-002

### PORTION OF SEC. 17, T.12N., R.20E., MDB&M

Avoid cutting underground utility lines. It's costly.

**CALL**  
**BEFORE YOU**  
**DIG.**  
**1-800-227-2600**  
UNDERGROUND SERVICE ALERT (USA)

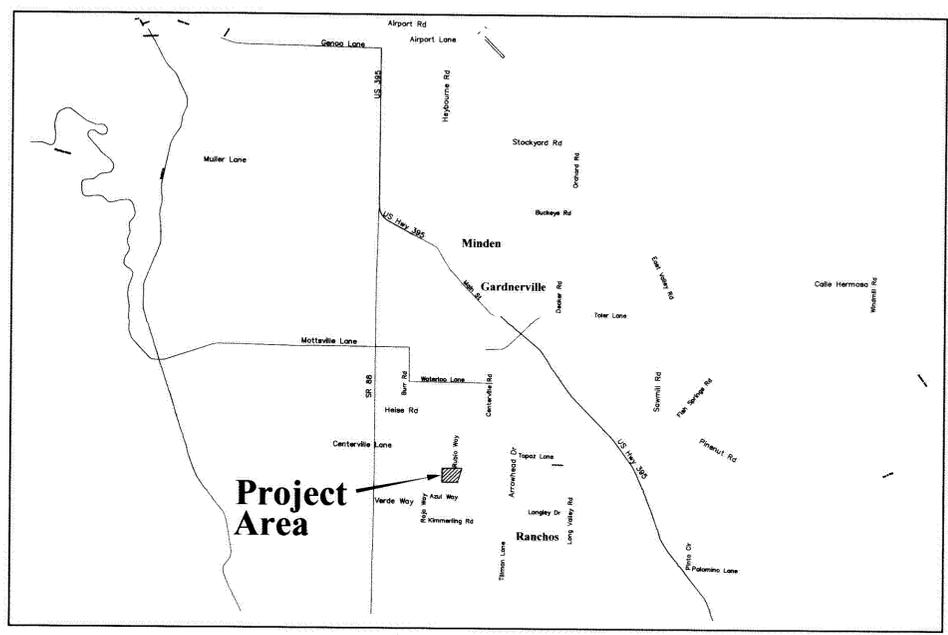
ENGINEERING · PLANNING · RESOURCE MANAGEMENT

## RESOURCE CONCEPTS, INC.

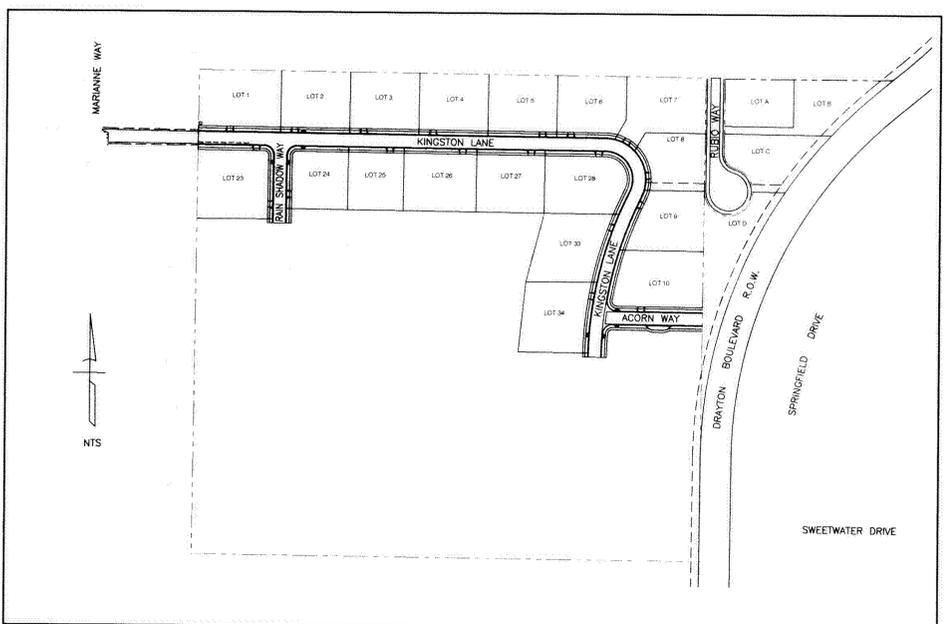
340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
OFFICE: 775-883-1600 · FAX: 775-883-1666 · WEB SITE: www.rci-nv.com

### ABBREVIATIONS

- AC ASPHALTIC CONCRETE
- ADA AMERICANS WITH DISABILITIES ACT
- APPROX. APPROXIMATE
- APT ANGLE POINT
- ATM AUTOMATED TELLER MACHINE
- BC BEGINNING OF CURVE
- BF EXISTING BACKFLOW PREVENTOR
- BLDG BUILDING
- BOW BACK OF SIDEWALK
- C&G CURB AND GUTTER
- C CENTERLINE
- COMP COMPACTION
- CONC CONCRETE
- CU YD CUBIC YARD
- CG DECOMPOSED GRANITE
- DIA DIAMETER
- DWG DRAWING
- EC END OF CURVE
- EL ELEVATION
- EP EDGE OF PAVEMENT
- EX EXISTING
- F.G. FINISHED GRADE
- FT FEET
- G GAS LINE
- GS GROUND SHOT
- HP HIGH POINT
- HYD HYDRANT
- IE INVERT ELEVATION
- MAX MAXIMUM
- M.D.D. MAXIMUM DRY DENSITY
- MIN MINIMUM
- N NORTH
- NEC NECESSARY
- OHP OVERHEAD POWER
- PCC PORTLAND CEMENT CONCRETE
- PCC POINT OF COMPOUND CURVE
- POL POINT ON LINE
- PDC POINT ON CURVE
- PP POWER POLE
- PRC POINT OF REVERSE CURVE
- R RADIUS
- RPBF REDUCED PRESSURE BACKFLOW ASSEMBLY
- SD STORM DRAIN
- SDMH STORM DRAIN MANHOLE
- SHT SHEET
- SS SANITARY SEWER
- SSFM SANITARY SEWER FORCE MAIN
- SSMH SANITARY SEWER MANHOLE
- TBC TOP BACK OF CURB
- TOC TOP OF CURB
- TOW TOP OF WALL
- TYP. TYPICAL
- W WATER
- W/ WITH
- USP UNDERGROUND POWER
- VC VALLEY GUTTER
- ' FEET
- " INCHES
- % PERCENT



**LOCATION MAP**



### LEGEND

- NEW CONSTRUCTION
- EXISTING
- CENTER LINE
- PROPERTY RIGHT-OF-WAY
- LIMITS OF CONSTRUCTION
- FENCING
- SPOT ELEVATION
- CONTOUR ELEVATION
- FLOWLINE
- SLOPE & DIRECTION
- SAWCUT
- TREE W/DIAMETER AT BASE
- DETAIL CALL-OUT
- SHEET REFERENCE

### SHEET INDEX

- CIVIL**
- SHEET 1 - TITLE SHEET
  - SHEET 2 - NOTES AND SPECIFICATIONS
  - SHEET 3 - SHEET INDEX
  - SHEET 4 - EXISTING SITE & SITE CLEARING PLAN
  - SHEET 5 - UTILITY PLAN
  - SHEET 6 - GRADING PLAN - NORTHWEST
  - SHEET 7 - GRADING PLAN - NORTHEAST
  - SHEET 8 - PLAN & PROFILE - 'LINE A'
  - SHEET 9 - PLAN & PROFILE - 'LINE A' & 'LINE E'
  - SHEET 10 - PLAN & PROFILE - 'LINE A'
  - SHEET 11 - PLAN & PROFILE - 'LINE B'
  - SHEET 12 - PLAN & PROFILE - 'LINE C' & 'LINE F'
  - SHEET 13 - PLAN & PROFILE - 'LINE D'
  - SHEET 14 - STREET & UTILITY DETAILS
  - SHEET 15 - WATER DETAILS
  - SHEET 16 - WATER, SEWER & STORM DRAIN DETAILS
  - SHEET 17 - STORM DRAIN & EROSION CONTROL DETAILS
  - SHEET 18 - STORM DRAIN & UTILITY CROSSING DETAILS
  - SHEET 19 - ADDENDUM 1: GRADING PLAN - SS LIFT STATION
  - SHEET 20 - ADDENDUM 2: STORM DRAIN INTERCEPTORS
  - SHEET 21 - ADDENDUM 3: LINE 'E' SANITARY SEWER

NOTE: ALL PREVIOUS PLANS FOR THIS DEVELOPMENT WERE PREPARED AND SUBMITTED UNDER THE NAME OF ALOHA RANCH DEVELOPMENT.

### OWNER:

GREG LYNN CONSTRUCTION  
CONTACT: GREG LYNN  
1222 BOBWIRE LANE  
GARDNERVILLE, NEVADA 89480  
(775) 285-3251

### ENGINEER:

RESOURCE CONCEPTS, INC.  
CONTACT: JOE CACIOPPO, P.E.  
340 NORTH MINNESOTA STREET  
CARSON CITY, NEVADA 89703  
(775) 883-1600

SIP 00454  
RAIN SHADOW RANCH - PH 1  
Sheet 3 of 21

SIP 00454

### RECORD DRAWINGS NOTE:

ALL INFORMATION SHOWN ON THESE PLANS HAS BEEN PREPARED BY, OR UNDER DIRECTION OF, THE UNDERSIGNED PROJECT ENGINEER. ADJUSTMENTS MADE IN THE FIELD DURING CONSTRUCTION ARE INCLUDED HEREIN AND ARE BASED ON FIELD OBSERVATIONS MADE UNDER THE DIRECTION OF, OR BY THE UNDERSIGNED, AND/OR INFORMATION RECEIVED FROM THE PROJECT OWNER, PROJECT CONTRACTORS AND PUBLIC AGENCIES WHEN THE PROJECT ENGINEER IS ADVISED IN WRITING OF SUCH CHANGE. THE PROJECT ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, CHANGES TO THESE PLANS NOT AUTHORIZED BY OR REPORTED TO THE PROJECT ENGINEER.



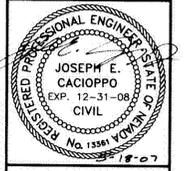
DATE: 5-18-07

JOSEPH E. CACIOPPO, P.E.

REVISION	DATE
RESPOND TO GRID COMMENTS	3/1/06
ADD ADDENDUM SHEETS	6/8/06
RESPOND TO NDEP COMMENTS	6/28/06
RECORD DRAWINGS	5/18/07

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

TITLE SHEET



JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

**SHEET 1 OF 21**

## GENERAL NOTES

- The Contractor shall notify the Project Engineer of any and all discrepancies between the information shown on these plans and the conditions existing in the field. Upon notification of any discrepancies, the Project Engineer shall instruct the Contractor on how to proceed. Any required changes must be approved in writing by the Owner or Project Engineer, in advance of said changes. Any subsequent changes due to the Contractor proceeding without instruction and written approval will be at the Contractor's expense.
- Prior to the start of construction activities, the Contractor shall conduct a pre-construction conference with the Douglas County Community Development, GRGID, the Project Engineer, and the Owner. All parties shall be contacted at least forty-eight (48) hours prior to the scheduled conference, which shall be conducted at least forty-eight (48) hours prior to construction. No work shall be started without first notifying the County and GRGID inspectors at least two (2) working days before work is to commence.
- The Owner and/or Contractor shall contact Douglas County, and GRGID at least twenty-four (24) weekdays hours prior to required inspections and testing, unless otherwise required by the County. The required inspections and testing are listed on the inspection record issued with each permit. The Owner and/or Contractor must have the permit number and the description listed on the inspection record to schedule required inspections and testing.
- All work shall conform to "Standard Specifications for Public Works Construction" (Orange Book), "Standard Details for Public Works Construction," Douglas County Standards, GRGID Standards, State of Nevada Health Division and Division of Environmental Protection, the Occupational Safety and Health Administration (OSHA) requirements for excavation, the Uniform Building Code, special requirements of the project, and as shown on the plans. Violations will result in the stoppage of all work until the violation is corrected.
- In the event of a discrepancy between Douglas County utility standards and GRGID utility Standards, GRGID Standards shall govern.
- The Contractor shall coordinate with the Owner to procure all permits as may be necessary prior to the beginning of construction and shall comply with the requirements of said permits.
- All traffic control and barricading within the County right-of-way shall conform to Section 130 of the Standard Specifications, Part VI of the Manual on Uniform Traffic Control Devices (MUTCD), latest edition, and the Nevada Work Zone Traffic Control Handbook, 1986 Edition. No street closures will be allowed without prior approval of a traffic control plan by the County Engineer.
- All construction shall be performed in compliance with the Air Quality Permit from the State of Nevada, Division of Environmental Protection, concerning Air Pollution Control Regulations. The Contractor shall maintain an on-going dust suppression program using the application of water and/or dust palliative.
- Details not shown on these plans are per Orange Book standards.
- The Contractor shall take all reasonable measures to ensure public safety at and around the project site is maintained, to include off-site transportation routes.
- The Contractor shall support trench sidewalks in accordance with all applicable laws and governing safety regulations. Sheeting, shoring, bracing, and sloping shall be used to protect workers and adjacent structures, and shall conform to appropriate specifications of the OSHA Standards 29 CFR Part 1926, Subpart P.
- The Contractor shall coordinate with the Engineer and Owner during construction to maintain accurate field notes showing all "As-Built" information of the project. Said information shall include, but not necessarily be limited to, any and all changes to the plans, any utility connections, and any existing utilities or structures encountered during construction. Buried connections/utilities and changes shall be measured from at least two physically locatable features (i.e. property or building corner, manhole lid, etc.) and include the depth to said buried connection/utility or change. Refer to the SUBMITTAL REQUIREMENTS of this sheet.
- The Contractor shall maintain a clean project site, to include adjacent streets, properties and storm drain systems, removing or neatly stockpiling construction debris at the end of each activity day. All facilities shall be maintained free of dust and mud caused by grading operations. All operations shall comply with the requirements of the Stormwater Discharge Permit from the Nevada Division of Environmental Protection.
- Temporary erosion control devices, consisting of a minimum of silt fencing and straw bales, shall be in place prior to construction. Protective measures and temporary drainage provisions shall be used to protect adjacent waterways, buildings, landscaping, and properties during construction. Temporary devices shall be in accordance with Douglas County requirements, and these plans.
- A six (6) foot high perimeter fence, or a 24-hour guard, shall be posted on the site by the Contractor whenever the depth of water in any facility exceeds 18 inches.
- All work shall be coordinated with the Project Engineer and Owner. No additional payments for extra work will be made to the Contractor, without prior authorization by the Project Engineer.
- Any work requiring changes to the plans, addendums, or other work shall be submitted to the Project Engineer for review and approval. The Project Engineer will require no less than three (3) working days to prepare modifications and contact the County. The Owner and Contractor need to also anticipate that any modifications will also require review and approval by Douglas County, and/or the State. The three (3) days required by the Project Engineer does not include agency review time. Work performed without written approval by the responsible agency will require removal at the Contractor's expense.
- The Contractor shall acknowledge that the approved plans, permits, and inspection record must be on the project site at all times. The Project Engineer shall not be liable for said documents not being on-site.
- At the completion of construction, the Contractor shall schedule a final walk-through inspection with the Project Engineer, the Owner, the County Inspector, and the GRGID inspector. All construction will be subject to final approval by the Project Engineer, the Owner, Douglas County, and GRGID. At the discretion of the Project Engineer, all improved areas shall be subject to a flow test to ensure constructed grades meet the design and accommodate the intended drainage. Improved areas deviating from these plans that do not drain properly, will be removed and reconstructed at the Contractor's expense.
- A geotechnical report, which also includes pavement and base thickness recommendations, was prepared for this project site by TN & Associates, Inc. November 13, 2002. RCI defers to the geotechnical engineer for any and all geotechnical issues.
- See sheet 5 for: "NDPE Bureau of Safe Drinking Water Vertical Crossing Conflicts Summary-Revised 4/13/06" note.
- Water laterals shall cross at least 18" above sewer mains at points of crossing. Sewer service laterals shall cross at least 12" lower than water mains at points of crossing. If these conditions can not be met, special construction is required. See General Note 21 and utility crossing details on sheet 18.
- Water mains shall be pressure tested according to AWWA Standard C605 and disinfected according to AWWA Standard C651 prior to being introduced into service.

## SURVEY CONTROL

- The basis of bearing and elevation for this project is an aerial survey conducted by AIRMAPS, Inc. conducted on April 24, 2001.

## UTILITY NOTES

The Contractor shall call Underground Service Alert "CALL BEFORE YOU DIG" (1-800-227-2600) at least forty-eight (48) hours prior to the start of construction.

RCI did not perform a survey of any existing underground utilities, nor were any up to date records of existing utilities made available to RCI. Utilities shown are based on a pre-existing survey and follow-up RCI field surveys. The Contractor shall field verify utility locations within and near the construction limits with the respective utility companies prior to beginning construction operations. It shall be the Contractor's responsibility to locate and arrange for the necessary relocation of any utility at least forty eight (48) hours prior to beginning work.

All utilities impacted by improvements shall be raised/lowered, removed, or relocated, as applicable to accommodate intended improvements. Damage to any existing structures or utilities due to construction related activities, shall be repaired or replaced at the Contractor's expense. Repairs and replacements shall be conducted in accordance with all applicable regulations, and shall be subject to inspection and final approval by the Project Engineer.

Construction or other traffic shall not be permitted to cross in-place utilities or structures until a safe minimum depth of fill is applied. Fill shall be at the Contractor's discretion and in accordance with Orange Book standards. Damaged utilities shall be repaired or replaced at the Contractor's sole expense.

All PVC C-900 water mains shall have a minimum rating of Pressure Class 150.

## GRADING NOTES

The extent of clearing, grubbing and stripping operations shall be as required, and as directed by the Project Engineer. All areas to be cleared, grubbed and stripped must first be staked by the Contractor and reviewed by the Project Engineer.

Included in this work shall be the preservation from injury or defacement, and the replacement, in kind, to the satisfaction of the Owner and Project Engineer, any such injured or defaced vegetation or other objects not designated for removal. The Contractor shall assume full responsibility for any and all injured or defaced structures, utilities, or any other objects intended to remain.

Clearing and grubbing shall be accomplished in accordance with all applicable Douglas County standards. Clearing and grubbing shall be performed prior to any other work.

### SHEETING, SHORING BRACING, AND SLOPING

Shoring shall be provided in accordance with Section 305 of the Standard Specifications for Public Works Construction (Orange Book). Shoring shall be required on all structure and trench excavations greater than four (4) feet unless other safe and allowable means, in accordance with all applicable laws and regulations, are implemented for excavation.

The Contractor shall notify the Project Engineer immediately if during construction subsurface conditions are different from those encountered in the analysis conducted by TN & Associates, Inc.

The Contractor is reminded that the Owner has not so delegated, and the Project Engineer does not claim to be a trench or excavation system safety expert, nor is the Project Engineer so engaged in that capacity under this Contract. As such, the Project Engineer has neither the authority nor the responsibility to enforce construction safety laws, rules, regulations, procedures, or to order the stoppage of work for claimed violations of trench or excavation safety. The furnishing by the Project Engineer of resident representation and inspection personnel shall not make the Project Engineer responsible for the enforcement of such laws, rules, regulations, or procedures, nor shall such make the Project Engineer responsible for the construction means, methods, techniques, sequences, procedures, or for the Contractor's failure to properly perform the work necessary for trench and excavation safety.

### SITE GRADING AND EMBANKMENT FILL

Construct only when the weather conditions will not detrimentally affect the quality of the finished work. Any portion of embankments, fills or subgrades that are damaged by the effects of rain, wind, or other weather conditions during any phase of construction shall be aerated if excessively wet, moistened if excessively dry, and reshaped and recompacted by the Contractor to conform to the requirements of the specifications, without additional cost to the Owner.

Site grading shall be completed in conformance with the lines and grades shown on the Contract Drawings, in accordance with these specifications, or as directed by the Project Engineer.

All surfaces shall be graded to a tolerance of plus or minus 0.1 feet.

In the event of an error on these plans, or field conditions that require a change from these plans, the Contractor shall notify the Project Engineer to discuss the issue and determine the appropriate course of action. Refer to General Note 1 on this sheet.

Backfill all depressions and holes below the ground surface with fill material, whether caused by stripping or otherwise, to the ground surface prior to construction of the fill. Blading and rolling shall continue until the surface is smooth, free from waves and irregularities, and in conformance with the elevations shown on the Contract Drawings. If at any time the material is excessively wet, it shall be aerated by means of blade graders, harrows, or other suitable equipment until the moisture content is satisfactory. The surface shall then be compacted and finished as specified in these plans.

### STRUCTURAL EXCAVATION, FILL AND BACKFILL

Structural fill shall be import fill material meeting the following requirements: liquid limit less than 40, a plasticity index less than 12, 100% passing the six (6) inch sieve, a minimum of 70% passing the three-quarter (3/4) inch sieve, and less than 25% passing the #200 sieve. Material shall be free of wood, organic waste, coal, charcoal, or any other extraneous, objectionable, or deleterious material.

Structural backfill shall be suitable native material or Class E Backfill in accordance with Section 200.03.06 of the Standard Specifications for Public Works Construction (Orange Book). On-site native backfill material shall be free from all roots, debris, large stones, organic material and any other deleterious material as determined by the Project Engineer. Project Engineer shall make the determination regarding suitability of the native material.

If the native material is determined to be unsuitable for use as structural backfill, or if there is an inadequate quantity of suitable native material, import fill material shall be used. Import structural backfill shall meet the requirements of these specifications.

Excavation of every description, classification, and of whatever substances encountered within the grading limits of the project shall be performed to the lines and grades indicated on the Contract Drawings, in accordance with applicable local, state and federal safety standards.

The Contractor shall inform the Project Engineer and satisfy himself as to the character, quantity and distribution of all material to be excavated. Should the Contractor excavate below the designated lines and grades without prior permission, he shall replace such excavation with suitable materials, in a satisfactory manner and condition, at his own expense.

The Contractor shall excavate sufficiently to provide adequate, safe working areas between outside structures and the earth banks.

During the process of excavation, the Contractor shall maintain the grade in such condition that it will be drained at all times, and install temporary drains and drainage ditches to intercept or direct surface water which may affect the promotion or condition of the work.

The Project Engineer and Owner shall have complete control over utilization of all excavated material and shall determine the suitability of excavated material to be used as backfill. All unsuitable and excess excavated material shall be wasted, in accordance with local, state, and federal requirements.

If excavated material is deemed suitable as backfill by the Project Engineer at the time of excavation, the Contractor shall separate it from the unsuitable material. The excavated soil shall be stockpiled and protected from weather. If the Contractor does not protect the excavated materials, the Contractor shall replace material that becomes unsuitable at no additional cost to the Owner.

If the subgrade is determined to be unsuitable by the Project Engineer, over-excavation of unsuitable materials shall be coordinated with the Project Engineer. The Contractor shall receive written guidance from the Project Engineer prior to proceeding.

The Contractor shall at all times provide and maintain ample equipment to remove and dispose of all water entering the excavation or other parts of the work, and shall keep said excavation dry and free of frost or ice until the structure to be built therein is completed and backfilled. If water is not removed and disposed of and the excavation not kept dry, over-excavation and backfill with selected materials shall be at the Contractor's expense. The Contractor shall be held responsible for the conditions of any sewers, drains, or other conduits or pipelines, related to construction operations, which may be used for drainage purposes. Such pipes or conduits shall be cleaned and free from sediment after use.

Structural fill shall be placed under structures over the prepared subgrade, as necessary to bring the subgrade to the elevations shown on the Contract Drawings. The entire structure bearing prism, defined as the volume directly beneath the structure and extending downward and outward at a 1:1 slope from the outside base perimeter of the structure to undisturbed suitable or prepared subgrade, shall be structural fill.

Structural fill shall be placed to a tolerance of plus or minus 0.1 feet.

No backfill shall be placed against any cast-in place concrete structure until permission is given by the Project Engineer and preferably not until the cast-in place concrete structure has met 70 percent of the minimum twenty-eight (28) day strength requirements.

The Contractor assumes full responsibility for ensuring base elevations are established. The Contractor shall verify base elevations and thickness before asphaltic concrete is placed. Failure to meet specified grades and thickness will require removal of material and regrading at the Contractor's sole expense.

### TRENCH EXCAVATION AND BACKFILL

The Contractor shall compact the bottom of the excavated trench to provide a firm base. Areas that do not readily compact should be excavated and replaced with compacted trench backfill as directed by the Project Engineer.

In the event, pipelines or utilities are encountered and in need of relocation, bedding shall be placed in level lifts not more than six (6) inches in loose thickness up to spring line, and shall be carefully worked under the pipe haunches with a shovel, vibrator, or other approved procedures.

### SUBGRADE PREPARATION

Subgrade preparation activities include conditioning the existing subgrade material following clearing, grubbing and stripping operations; demolition; and, excavation activities. Subgrade preparation shall take place prior to site grading and fill, structural fill and backfill, and trench backfill.

The Contractor shall drain any standing water. The exposed surface shall be pre-rolled to provide a degree of compaction to near surface soils, and to delineate any soft areas that may be present. Representatives of the Project Engineer and/or Owner shall be present during pre-rolling to verify suitability of areas to receive fill or foundation elements.

The Contractor shall remove and waste all roots, debris, large stones and other objectionable material that would cause interference with compaction of subsequent fill materials. A thin layer of suitable fill material shall be spread over the scarified foundation. Compact the whole area, as required.

Settlement or washing that may occur from the action of the element, or any other cause, prior to acceptance of the work, shall be repaired by the Contractor at his own expense. The Contractor shall also reestablish grades to the elevations and slopes shown on the Contract Drawings without additional cost.

The Contractor assumes full responsibility of ensuring subgrade elevations are established. The Contractor shall verify subgrade elevations before base material is placed. Failure to meet specified grades and thicknesses will require removal of material and regrading at the Contractor's sole expense.

### COMPACTION CONTROL AND TESTING

Compaction control, sampling, and testing will be performed by the geotechnical engineer or the Project Engineer, in accordance with the Standard Specifications for Public Works Construction (Orange Book), except as modified herein. The firm performing compaction control, sampling, and/or testing shall be contacted forty-eight (48) week day hours in advance of needed tests. The Project Engineer will be notified of any and all tests at least twenty-four (24) week day hours in advance of said tests.

If the material being placed should require moisture conditioning in order to compact properly, the Contractor shall bear all costs of water.

Control Tests: For determining maximum dry density (MDD), the Percent Compaction, as used in these specifications, shall be defined pursuant to laboratory test method ASTM D1557. In-place density of compacted backfill shall be determined by ASTM D1556 and ASTM D2216, or by nuclear density test procedures per ASTM D2922 and ASTM D3017.

Frequency of Testing: Testing shall be performed to confirm compliance with these specifications at a frequency determined by the Project Engineer, in accordance with Orange Book standards.

Retesting: If compaction fails to meet the specified requirements, the Contractor shall remove and replace the material at proper density, or shall bring the density up to specified levels by other means acceptable to the Project Engineer at no additional cost to the Owner. Subsequent confirmation tests required to confirm that the reconstructed backfill has been brought up to specified density shall be paid for by the Contractor. Frequency of confirmation tests for remedial work shall be generally doubled of that specified for initial confirmation tests. The cost of confirmation testing will be deducted from the partial payment period in which the retesting was recorded.

Access to Work and Materials: The Contractor shall at all times allow access to materials for testing. Compaction control testing may require stoppage of work while testing is being performed.

Aggregate base and structural fill shall be compacted in 8" loose lifts to a minimum of 95% of the Modified Proctor maximum dry density, in accordance with ASTM D1557. Subgrade and non-structural fill shall be compacted in eight (8) inch loose lifts to 90% maximum dry density. The moisture content of the material shall be within three (3) percent of the material's optimum moisture content. Each lift must be tested and meet the above requirements for compaction and moisture content before the next lift can be placed.

### SURVEYING

Initial construction staking shall be provided by Resource Concepts, Inc. The Contractor shall notify the Project Engineer a minimum of two (2) week days prior to needing stakes to ensure adequate time to schedule surveying. Additional surveying due to lost, damaged, or otherwise unrecordable stakes shall be at the Contractor's sole expense.

The Contractor shall be responsible for all grade checking of subgrade, base, and other structures depicted on these plans.

In the event of a survey discrepancy, the Project Engineer shall be notified and be on-site to view said discrepancy prior to the Contractor or the Owner removing stakes or making field modifications.

The Owner and Project Engineer may spot check subgrade, base, and pavement sections to verify elevations and thicknesses. This does not however alleviate the contractor's responsibility to ensure subgrade, base, and pavement elevations and thicknesses are established per the approved plans.

## CONSTRUCTION MATERIALS

### DEWATERING

The Contractor shall be required to coordinate with the Owner to ensure regulations are adhered to. Required permits shall be addressed in the Contractor's dewatering plan.

All trench excavations shall be dewatered to keep them dry during construction.

The Contractor shall base his bid on the amount of water he anticipates affecting the work, and the nature of the work which will appear. No separate or extra payment of any kind will be made for pumping or otherwise dewatering any excavation, but shall be included in the applicable unit price or lump sum bid prices in the Contractor's proposal.

The Contractor shall be required to comply with all federal, state, and local receiving water quality requirements that may be applicable.

### HOT-MIX ASPHALT PAVING

Asphaltic concrete shall be Type 3, AC-20, in accordance with Orange Book Standards, unless otherwise determined by the Geotechnical Engineer.

Work covered in this section shall consist of, but not be limited to, one (1) or more courses of bituminous mixture constructed on the prepared foundation in accordance with the lines and grades shown on the Contract Drawings. This work shall consist of adding mineral filler (hydrated lime or Portland cement) to bituminous mixtures, as necessary, and include general requirements that are applicable to all types of bituminous pavements of the plantmix type irrespective of gradation of aggregate, kind and amount of bituminous material, or pavement use. Work shall be in accordance with the Contract Drawings, these specifications, Standard Specifications for Public Works Construction (Orange Book), and Douglas County standards.

The following Orange Book specification sections contain requirements that relate to this section. Additional sections, not necessarily listed below may contain requirements related to this project. The Contractor shall be responsible for adhering to all applicable sections of the Orange Book and Douglas County standards.

Section 201 - Bituminous material  
Section 315 - Prime Coat  
Section 316 - Tack coat  
Section 317 - Seal coats  
Section 318 - Slurry seals  
Section 319 - Roadmix bituminous surface  
Section 321 - Plantmix bituminous open-road pavement  
Section 322 - Hot plantmix recycled bituminous pavement  
Section 324 - Painting, pavement striping, and marking

The bituminous plantmix shall be composed of a mixture of aggregate and bituminous material. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the jobmix formula, which will be based upon the approved mix design. The proposed formula submitted shall include definite single values for:

- The percentage of aggregate passing into each specified sieve.
- The percentage of bitumen to be added (to one-tenth (0.1) percent).
- The temperature of the mixture leaving the mixer.
- The temperature of the mixture in the hopper of the paving machine.

Plantmix bituminous pavements consisting of materials as specified in Section 321 of the Orange Book shall be used in the construction of the areas to be paved. If conflicts arise between these specifications and the Orange Book specifications, the Orange Book specifications shall have jurisdiction.

Asphalt paving shall be constructed to a minimum depth of three (3) inches and shall comply with all applicable sections of the Orange Book and Douglas County standards.

Prime coat shall be applied to all shoulders to receive asphalt paving in accordance with Section 315 "Prime Coat" of the Orange Book.

Seal Coat shall be applied to a compacted and bonded bituminous surface in accordance with Section 317 "Seal Coats" of the Orange Book.

No cold joints shall be allowed in the asphalt paving. The Contractor shall ensure all underground improvements, catch basins, curb inlets, and all other items affecting asphalt are complete and the lines and grades meet those depicted on the Contract Drawings.

Asphaltic concrete shall be rolled or otherwise compacted to ensure a minimum compaction of 95% MDD is achieved.

AC paving edges shall be straight and compacted to the standards specified on these plans. Jagged or loose edges shall not be acceptable.

Adjacent concrete, or other surfaces, shall be protected from fog seal operations. Excessive oil stains shall be cleaned immediately upon observation to the satisfaction of the Project Manager and Owner.

### CONCRETE

The Contractor shall comply with all Douglas County and Orange Book standards, and the Manual of Standard Practice for Detailing Reinforced Concrete Structures, ACI 315 and Manual of Standard Practice, Concrete Reinforcing Steel Institute.

Materials shall comply with the following quality assurance regulations:

Recommended Practice for Concrete Formwork, ACI 437;  
Uniform Building Code, most current County-accepted edition;  
U.S. Product Standard PD1 for plywood.

On delivery to the job site, the Contractor shall place materials in an area protected from weather. The materials shall be stored above ground on a framework of blocking with a cover of protective waterproof material, providing adequate air circulation and ventilation.

Unexposed plywood surfaces, new or in new condition, shall be APA B-B Plyform Class 1 and 11 Exterior.

Exposed plywood surfaces, new or in new condition, shall be APA High Density Overlay Plyform Class 1 and 11.

Steel forms shall be of sufficient thickness to prevent noticeable deflection and be galvanized and/or coated to prevent rust and staining.

Design and formwork shall be such that it safely supports vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Vertical and lateral loads shall be carried by the formwork system to the ground, or to in-place construction that has attained adequate strength for that purpose.

The Contractor shall provide shores and struts with positive means of adjustment, capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. The Contractor shall provide trussed supports when adequate foundations for shores and struts cannot be secured.

Form facing materials shall be supported by structural members spaced to prevent deflection. Provide camber in formwork, as required, for anticipated deflections.

Formwork shall be readily removable without impact, shock, or damage to cast-in-place concrete surfaces requiring bond with concrete.

The Contractor shall keep oil or other agents from getting on reinforcing steel, embedded items, or other surfaces requiring bond with concrete.

Before concrete is placed in any form, the Contractor shall verify horizontal and vertical form position, and correct all inaccuracies. All wedging and bracing shall be completed in advance of placing of concrete.

When setting form ties, the Contractor shall not allow metal to remain in wall closer than 1-1/2 inches from surface. Ties shall fit tight to prevent mortar leakage at holes in forms. Ties shall be protected from rusting at all times. No wires or wood spreaders will be permitted. Cutting ties back from concrete face will not be permitted.

At construction joints, anchor forms by using an adequate number of form ties in the new pour, a few inches from the construction joints. Do not rely on ties to any of the horizontal or vertical joints used in previous placements.

All dirt, chips, sawdust, mud, water and other foreign matter shall be removed from within the forms or within the excavation areas before any concrete is deposited therein.

Any form movement or deflection during construction or finished surface variations in excess of 0.1 inch will be a basis for rejection, at the Contractor's expense.

Do not remove forms and supports until concrete has attained sufficient strength to support anticipated loads. 70% of the 28-day strength is the minimum strength requirement, and may be increased based on the anticipated loads.

Concrete shall all be fiber reinforced per the detail sheets included in these plans.

## STORM DRAIN STRUCTURES

Storm drain structure locations are fixed and cannot be moved to accommodate pipe manufacturing or laying, unless approved in writing by the Project Engineer.

Inlets shall be pre-cast reinforced concrete sections, unless otherwise specified, conforming to the requirements on these plans, Carson city, and ASTM standards. All joints between pre-cast sections shall be joined with a jointing compound with primer as recommended by the manufacturer. Con Seal, Rammed, or approved equal. Inlets shall be watertight, and stubs or fittings shall have approved elastomeric seals conforming to ASTM F-477 or ASTM C-923.

Any time during, or at the completion of the storm drainage system installation, and prior to the placement of base and paving, the Contractor shall notify the Project Engineer. The Project Engineer shall have all grate, cover and invert elevations surveyed to ensure all structures are accurately set. At that time, a flow test may also be performed. Any structures not set to the grades specified on these plans shall be reset at the Contractor's sole expense.

## SUBMITTAL REQUIREMENTS

All materials proposed for civil construction, with no exception, shall be submitted to the Project Engineer by the Contractor in ample time to serve its purpose and function. The Contractor shall submit to the Project Engineer five (5) copies of all information, catalogue data, drawings, diagrams, samples, etc., concerning the materials, equipment, etc., that is intended for use in construction. All materials, equipment, etc. must be approved in writing by the Project Engineer prior to their use in construction.

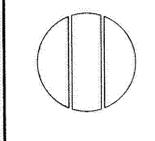
The Contractor should anticipate the Project Engineer requiring no less than three (3) working days to review and return submitted information. Return of submittal information to the Contractor does not guarantee approval by the Project Engineer.

AS-BUILT Mapping: The Contractor shall transfer all field notes onto one approved 24-inch by 36-inch clean plan set for submittal to the Project Engineer, within two-weeks after the completion of construction. The Project Engineer shall prepare Record Drawings for submittal to the County, as well as GRGID (one set of mylar & one disk copy in autocad format) for water and sewer improvements. Information supplied by the Contractor shall be in accordance with General Note 12 of this sheet, and also include the Contractor's name, address, phone number, person responsible for maintaining as-built information, period of construction, and all changes from the approved plans. As-built information shall be clearly labeled on the appropriate sheet of the clean plan set. Additional sheets or details prepared by the Contractor may be attached if required for clarity.

## RECORD DRAWINGS

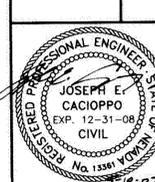
DATE	5/18/07	ENGINEER INITIAL	JEC
------	---------	------------------	-----

ENGINEERING • PLANNING • RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
340 N. MINNESOTA ST. • CARSON CITY, NEVADA 89703-4162  
OFFICE: 775-969-1600 • FAX: 775-969-1656 • WEB SITE: www.rci-nv.com

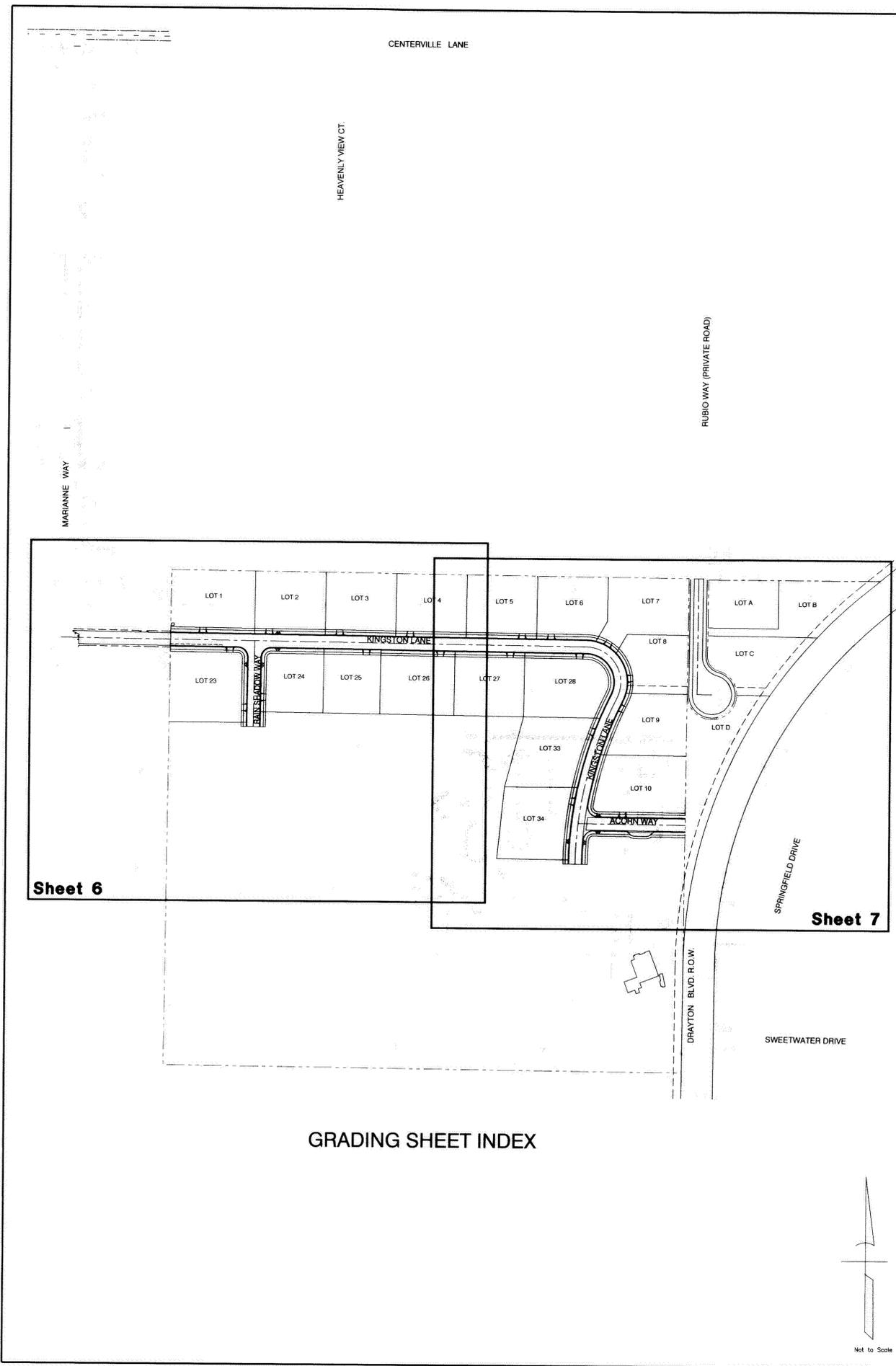


REVISION	DATE	DESCRIPTION
1	3/1/06	RESPOND TO GRGID COMMENTS
2	6/28/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

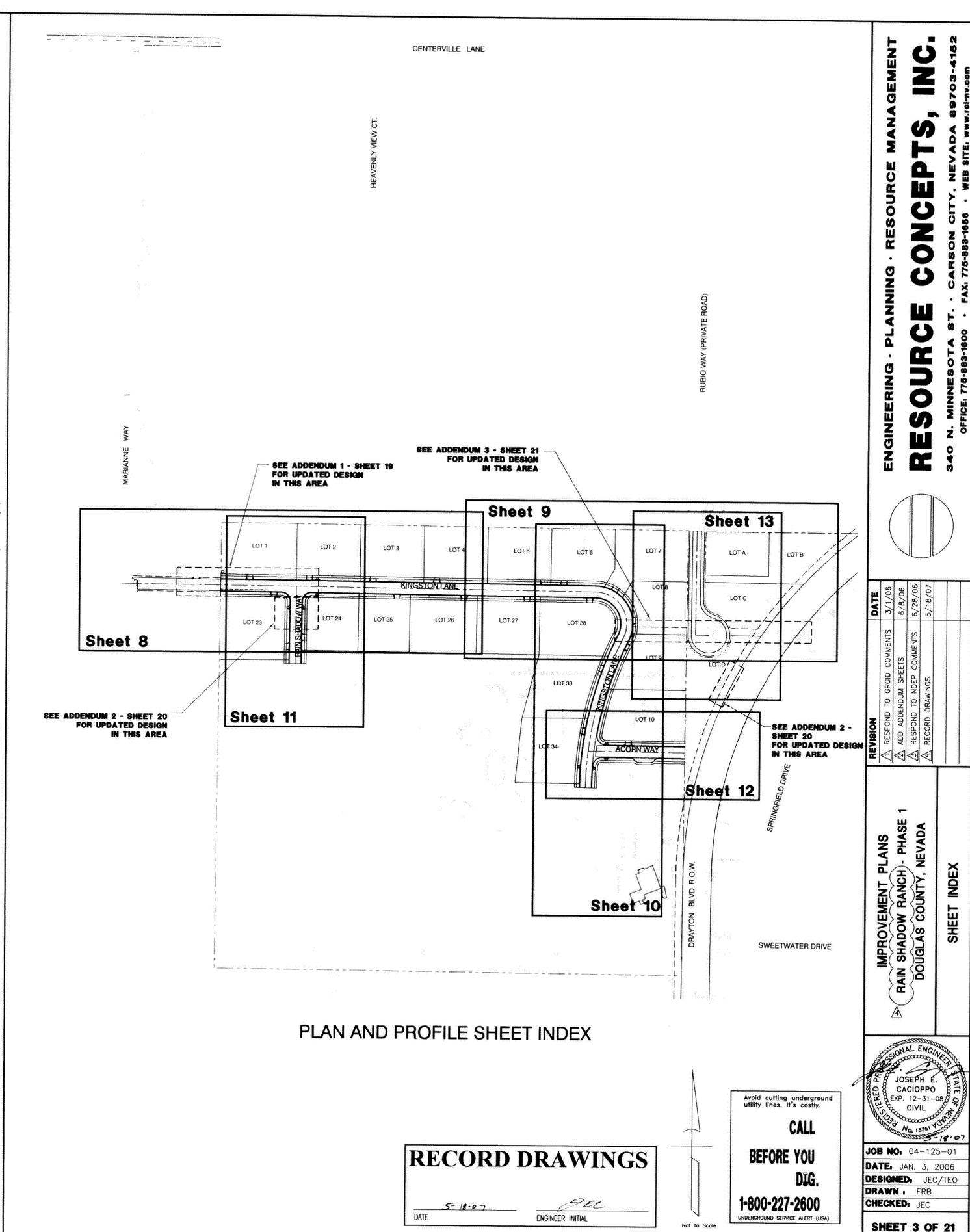
IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA  
NOTES AND SPECIFICATIONS



JOB NO.	04-125-01
DATE	JAN. 3, 2006
DESIGNED	JEC/TEO
DRAWN	FRB
CHECKED	JEC
SHEET	2 OF 21



GRADING SHEET INDEX

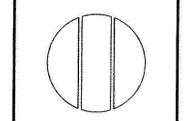


PLAN AND PROFILE SHEET INDEX

**RECORD DRAWINGS**  
 DATE: 5-18-07 ENGINEER INITIAL: JEC

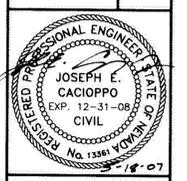
CALL BEFORE YOU DIG.  
 1-800-227-2600  
 UNDERGROUND SERVICE ALERT (USA)

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
 OFFICE: 775-883-1800 · FAX: 775-883-1866 · WEB SITE: www.rci-nv.com

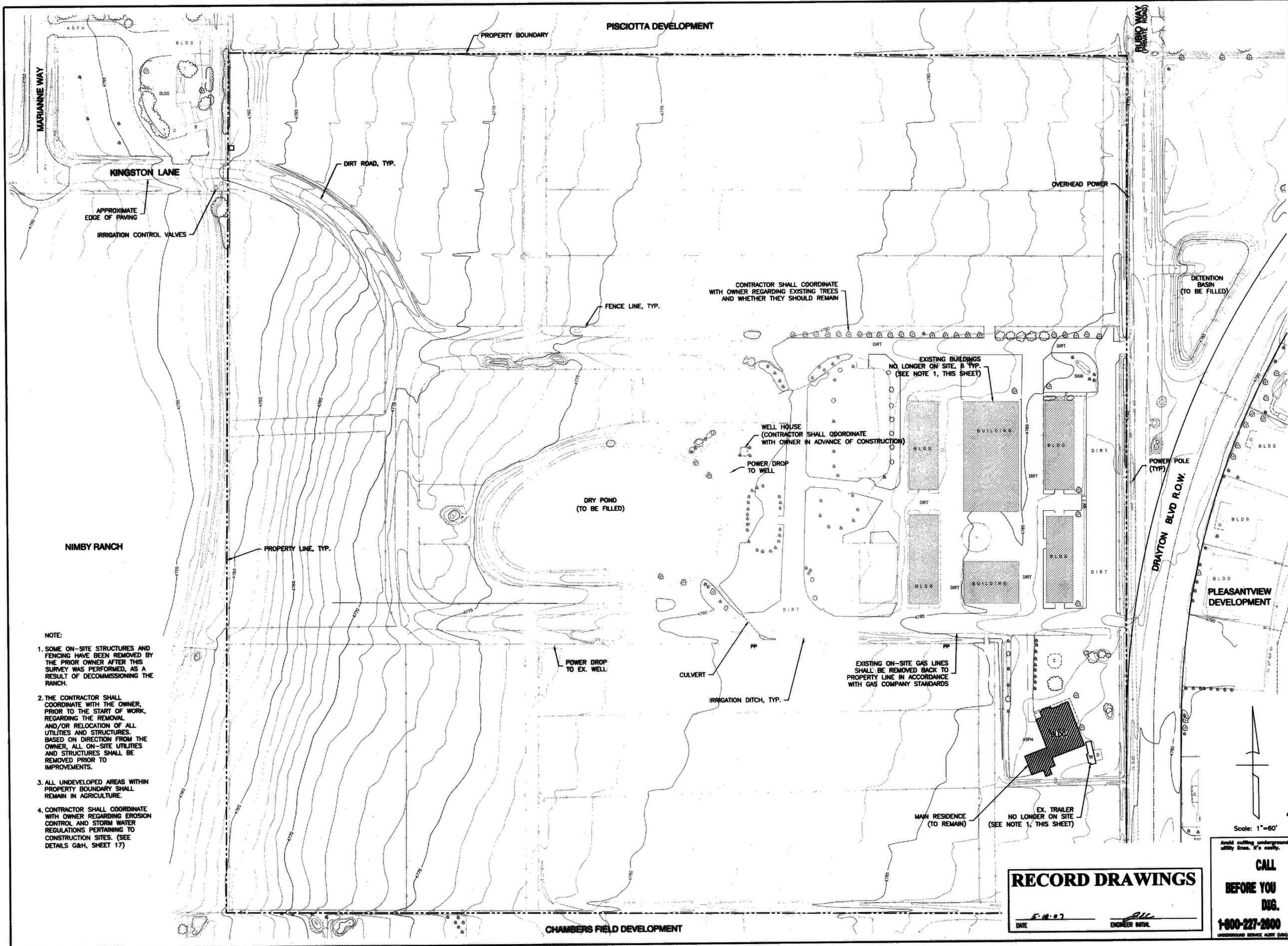


REVISION	DATE
RESPOND TO GRID COMMENTS	3/7/06
ADD ADDENDUM SHEETS	6/8/06
RESPOND TO NDEP COMMENTS	8/28/06
RECORD DRAWINGS	5/18/07

IMPROVEMENT PLANS  
 RAIN SHADOW RANCH - PHASE 1  
 DOUGLAS COUNTY, NEVADA  
 SHEET INDEX

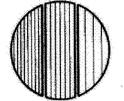


JOB NO: 04-125-01  
 DATE: JAN. 3, 2006  
 DESIGNED: JEC/TEO  
 DRAWN: FRB  
 CHECKED: JEC  
 SHEET 3 OF 21



- NOTE:
- SOME ON-SITE STRUCTURES AND FENCING HAVE BEEN REMOVED BY THE PRIOR OWNER AFTER THIS SURVEY WAS PERFORMED, AS A RESULT OF DECOMMISSIONING THE RANCH.
  - THE CONTRACTOR SHALL COORDINATE WITH THE OWNER, PRIOR TO THE START OF WORK, REGARDING THE REMOVAL AND/OR RELOCATION OF ALL UTILITIES AND STRUCTURES. BASED ON DIRECTION FROM THE OWNER, ALL ON-SITE UTILITIES AND STRUCTURES SHALL BE REMOVED PRIOR TO IMPROVEMENTS.
  - ALL UNDEVELOPED AREAS WITHIN PROPERTY BOUNDARY SHALL REMAIN IN AGRICULTURE.
  - CONTRACTOR SHALL COORDINATE WITH OWNER REGARDING EROSION CONTROL AND STORM WATER REGULATIONS PERTAINING TO CONSTRUCTION SITES. (SEE DETAILS G&H, SHEET 17)

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 2440 N. MINNESOTA ST. · CARSON CITY, NEVADA 89709-4152  
 OFFICE: 775-889-1600 · FAX: 775-889-1655 · WEB SITE: www.rcm-inc.com



REVISION	DATE
RESPOND TO ORCID COMMENTS	3/1/06
ADD ADDENDUM SHEETS	5/8/06
RESPOND TO NDEP COMMENTS	5/28/06
RECORD DRAWINGS	5/19/07

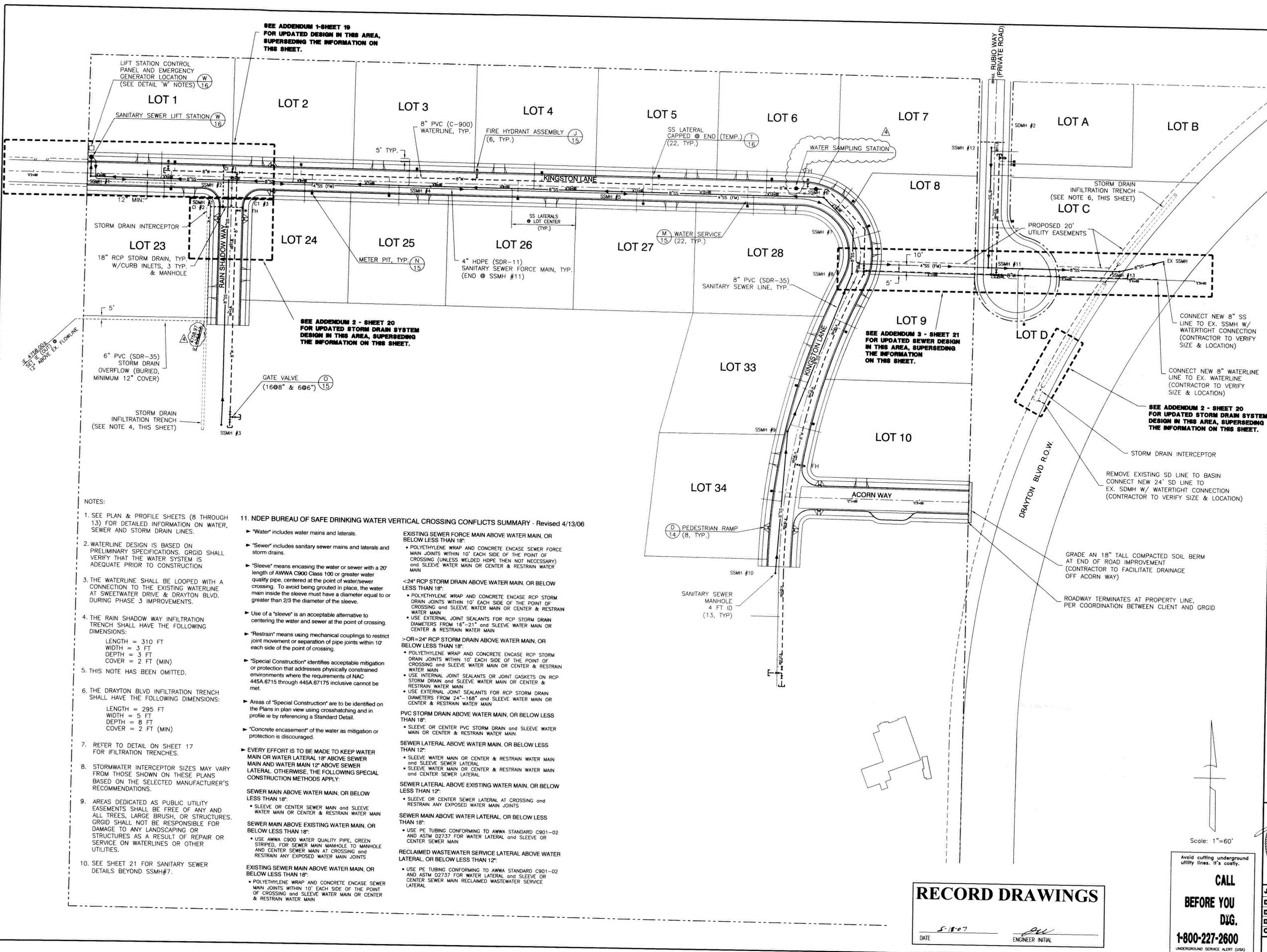
IMPROVEMENT PLANS  
 RAIN SHADOW RANCH - PHASE 1  
 DOUGLAS COUNTY, NEVADA  
 EXISTING SITE & SITE CLEARING PLAN



JOB NO. 04-125-01  
 DATE: JAN. 3, 2006  
 DESIGNED: JEC/TEO  
 DRAWN: FRB  
 CHECKED: JEC  
 SHEET 4 OF 21

**RECORD DRAWINGS**  
 DATE: 1/3/07  
 ENGINEER: FRB

Scale: 1"=60'  
 CALL BEFORE YOU DIG.  
 1-800-227-2800  
 UNDERGROUND SERVICE ALERT (USA)



SEE ADDENDUM 1-SHEET 10 FOR UPDATED DESIGN IN THIS AREA, SUPERSEDING THE INFORMATION ON THIS SHEET.

SEE ADDENDUM 2 - SHEET 20 FOR UPDATED STORM DRAIN SYSTEM DESIGN IN THIS AREA, SUPERSEDING THE INFORMATION ON THIS SHEET.

SEE ADDENDUM 3 - SHEET 21 FOR UPDATED SEWER DESIGN IN THIS AREA, SUPERSEDING THE INFORMATION ON THIS SHEET.

SEE ADDENDUM 2 - SHEET 20 FOR UPDATED STORM DRAIN SYSTEM DESIGN IN THIS AREA, SUPERSEDING THE INFORMATION ON THIS SHEET.

NOTES:

- SEE PLAN & PROFILE SHEETS (8 THROUGH 13) FOR DETAILED INFORMATION ON WATER, SEWER AND STORM DRAIN LINES.
- WATERLINE DESIGN IS BASED ON PRELIMINARY SPECIFICATIONS. GRGID SHALL VERIFY THAT THE WATER SYSTEM IS ADEQUATE PRIOR TO CONSTRUCTION.
- THE WATERLINE SHALL BE LOOPED WITH A CONNECTION TO THE EXISTING WATERLINE AT SWEETWATER DRIVE & DRAYTON BLVD. DURING PHASE 3 IMPROVEMENTS.
- THE RAIN SHADOW WAY INFILTRATION TRENCH SHALL HAVE THE FOLLOWING DIMENSIONS:  
LENGTH = 310 FT  
WIDTH = 3 FT  
DEPTH = 3 FT  
COVER = 2 FT (MIN)
- THIS NOTE HAS BEEN OMITTED.
- THE DRAYTON BLVD INFILTRATION TRENCH SHALL HAVE THE FOLLOWING DIMENSIONS:  
LENGTH = 295 FT  
WIDTH = 5 FT  
DEPTH = 8 FT  
COVER = 2 FT (MIN)
- REFER TO DETAIL ON SHEET 17 FOR INFILTRATION TRENCHES.
- STORMWATER INTERCEPTOR SIZES MAY VARY FROM THOSE SHOWN ON THESE PLANS BASED ON THE SELECTED MANUFACTURER'S RECOMMENDATIONS.
- AREAS DEDICATED AS PUBLIC UTILITY EASEMENTS SHALL BE FREE OF ANY AND ALL TREES, LARGE BRUSH, OR STRUCTURES. GRGID SHALL NOT BE RESPONSIBLE FOR DAMAGE TO ANY LANDSCAPING OR STRUCTURES AS A RESULT OF REPAIR OR SERVICE ON WATERLINES OR OTHER UTILITIES.
- SEE SHEET 21 FOR SANITARY SEWER DETAILS BEYOND SSMH#7.

11. NDEP BUREAU OF SAFE DRINKING WATER VERTICAL CROSSING CONFLICTS SUMMARY - Revised 4/13/06

- "Water" includes water mains and laterals.
- "Sewer" includes sanitary sewer mains and laterals and storm drains.
- "Sleeve" means encasing the water or sewer with a 20' length of AWWA C900 Class 100 or greater water quality pipe, centered at the point of water/sewer crossing. To avoid being grouted in place, the water main inside the sleeve must have a diameter equal to or greater than 2/3 the diameter of the sleeve.
- Use of a "sleeve" is an acceptable alternative to centering the water and sewer at the point of crossing.
- "Restrain" means using mechanical couplings to restrict joint movement or separation of pipe joints within 10' each side of the point of crossing.
- "Special Construction" identifies acceptable mitigation or protection that addresses physically constrained environments where the requirements of NAC 445A.6715 through 445A.67175 inclusive cannot be met.
- Areas of "Special Construction" are to be identified on the Plans in plan view using crosshatching and in profile by referencing a Standard Detail.
- "Concrete encasement" of the water as mitigation or protection is discouraged.
- EVERY EFFORT IS TO BE MADE TO KEEP WATER MAIN OR WATER LATERAL 18" ABOVE SEWER MAIN AND WATER MAIN 12" ABOVE SEWER LATERAL. OTHERWISE, THE FOLLOWING SPECIAL CONSTRUCTION METHODS APPLY:  
**SEWER MAIN ABOVE WATER MAIN, OR BELOW LESS THAN 18":**
  - SLEEVE OR CENTER SEWER MAIN and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN**SEWER MAIN ABOVE EXISTING WATER MAIN, OR BELOW LESS THAN 18":**
  - USE AWWA C900 WATER QUALITY PIPE, GREEN STRIPED, FOR SEWER MAIN MANHOLE TO MANHOLE AND CENTER SEWER MAIN AT CROSSING and RESTRAIN ANY EXPOSED WATER MAIN JOINTS**EXISTING SEWER MAIN ABOVE WATER MAIN, OR BELOW LESS THAN 18":**
  - POLYETHYLENE WRAP AND CONCRETE ENCASE SEWER MAIN JOINTS WITHIN 10' EACH SIDE OF THE POINT OF CROSSING AND SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN**SEWER MAIN ABOVE WATER LATERAL, OR BELOW LESS THAN 12":**
  - SLEEVE OR CENTER SEWER LATERAL AT CROSSING and RESTRAIN ANY EXPOSED WATER MAIN JOINTS**SEWER LATERAL ABOVE EXISTING WATER MAIN, OR BELOW LESS THAN 12":**
  - SLEEVE OR CENTER SEWER LATERAL AT CROSSING and RESTRAIN ANY EXPOSED WATER MAIN JOINTS**SEWER MAIN ABOVE WATER LATERAL, OR BELOW LESS THAN 18":**
  - USE PE TUBING CONFORMING TO AWWA STANDARD C901-02 AND ASTM D2737 FOR WATER LATERAL and SLEEVE OR CENTER SEWER MAIN**RECLAIMED WASTEWATER SERVICE LATERAL ABOVE WATER LATERAL, OR BELOW LESS THAN 12":**
  - USE PE TUBING CONFORMING TO AWWA STANDARD C901-02 AND ASTM D2737 FOR WATER LATERAL and SLEEVE OR CENTER SEWER MAIN RECLAIMED WASTEWATER SERVICE LATERAL

EXISTING SEWER FORCE MAIN ABOVE WATER MAIN, OR BELOW LESS THAN 18":

- POLYETHYLENE WRAP AND CONCRETE ENCASE SEWER FORCE MAIN JOINTS WITHIN 10' EACH SIDE OF THE POINT OF CROSSING (UNLESS WELDED HDPE THEN NOT NECESSARY) and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN

<24" RCP STORM DRAIN ABOVE WATER MAIN, OR BELOW LESS THAN 18":

- POLYETHYLENE WRAP AND CONCRETE ENCASE RCP STORM DRAIN JOINTS WITHIN 10' EACH SIDE OF THE POINT OF CROSSING and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN
- USE EXTERNAL JOINT SEALANTS FOR RCP STORM DRAIN DIAMETERS FROM 16"-21" and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN

>OR=24" RCP STORM DRAIN ABOVE WATER MAIN, OR BELOW LESS THAN 18":

- POLYETHYLENE WRAP AND CONCRETE ENCASE RCP STORM DRAIN JOINTS WITHIN 10' EACH SIDE OF THE POINT OF CROSSING and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN
- USE INTERNAL JOINT SEALANTS OR JOINT GASKETS ON RCP STORM DRAIN and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN
- USE EXTERNAL JOINT SEALANTS FOR RCP STORM DRAIN DIAMETERS FROM 24"-168" and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN

PVC STORM DRAIN ABOVE WATER MAIN, OR BELOW LESS THAN 18":

- SLEEVE OR CENTER PVC STORM DRAIN and SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN

SEWER LATERAL ABOVE WATER MAIN, OR BELOW LESS THAN 12":

- SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN and SLEEVE SEWER LATERAL
- SLEEVE WATER MAIN OR CENTER & RESTRAIN WATER MAIN and CENTER SEWER LATERAL

SEWER LATERAL ABOVE EXISTING WATER MAIN, OR BELOW LESS THAN 12":

- SLEEVE OR CENTER SEWER LATERAL AT CROSSING and RESTRAIN ANY EXPOSED WATER MAIN JOINTS

SEWER MAIN ABOVE WATER LATERAL, OR BELOW LESS THAN 18":

- USE PE TUBING CONFORMING TO AWWA STANDARD C901-02 AND ASTM D2737 FOR WATER LATERAL and SLEEVE OR CENTER SEWER MAIN

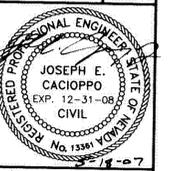
RECLAIMED WASTEWATER SERVICE LATERAL ABOVE WATER LATERAL, OR BELOW LESS THAN 12":

- USE PE TUBING CONFORMING TO AWWA STANDARD C901-02 AND ASTM D2737 FOR WATER LATERAL and SLEEVE OR CENTER SEWER MAIN RECLAIMED WASTEWATER SERVICE LATERAL

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
 OFFICE: 775-883-1600 · FAX: 775-883-1656 · WEB SITE: www.rcnrv.com

REVISION	DATE	DESCRIPTION
1	3/1/06	RESPOND TO GRGID COMMENTS
2	6/29/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
 RAIN SHADOW RANCH - PHASE 1  
 DOUGLAS COUNTY, NEVADA  
 UTILITY PLAN



JOB NO: 04-125-01  
 DATE: JAN. 3, 2006  
 DESIGNED: JEC/TEO  
 DRAWN: FRB  
 CHECKED: JEC  
 SHEET 5 OF 21

**RECORD DRAWINGS**

DATE: 5-18-07  
 ENGINEER INITIAL: JEC

Scale: 1"=60'  
 Avoid cutting underground utility lines. If a costly.  
**CALL BEFORE YOU DIG.**  
 1-800-227-2600  
 UNDERGROUND SERVICE ALERT (USA)

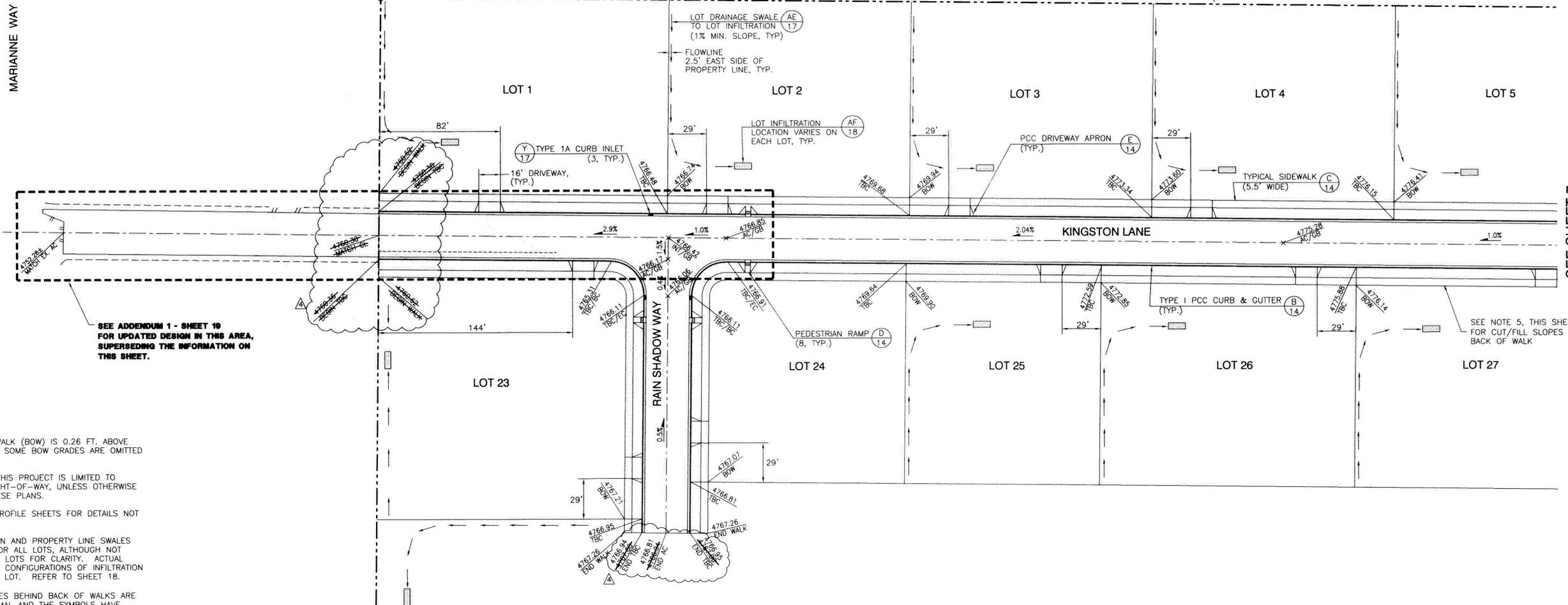
MARIANNE WAY

N 4641837.12  
E 2290105.10

PROPERTY BOUNDARY (TYP)

LOT GRADING WILL OCCUR PRIOR TO AND DURING HOUSE CONSTRUCTION AND IS NOT INCLUDED ON THIS PLAN SET. (ALL LOTS WILL DRAIN TO LOT INFILTRATION - CROSS LOT DRAINAGE IS NOT ALLOWED)

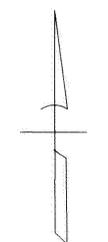
SEE SHEET 7



SEE ADDENDUM 1 - SHEET 19 FOR UPDATED DESIGN IN THIS AREA, SUPERSEDING THE INFORMATION ON THIS SHEET.

SEE NOTE 5, THIS SHEET, FOR CUT/FILL SLOPES AT BACK OF WALK

- NOTES:
1. BACK OF SIDEWALK (BOW) IS 0.26 FT. ABOVE TBC. AS SUCH, SOME BOW GRADES ARE OMITTED FOR CLARITY.
  2. GRADING FOR THIS PROJECT IS LIMITED TO WITHIN THE RIGHT-OF-WAY, UNLESS OTHERWISE SHOWN ON THESE PLANS.
  3. SEE PLAN & PROFILE SHEETS FOR DETAILS NOT SHOWN HEREIN.
  4. LOT INFILTRATION AND PROPERTY LINE SWALES ARE TYPICAL FOR ALL LOTS, ALTHOUGH NOT SHOWN ON ALL LOTS FOR CLARITY. ACTUAL LOCATIONS AND CONFIGURATIONS OF INFILTRATION WILL VARY PER LOT. REFER TO SHEET 18.
  5. CUT/FILL SLOPES BEHIND BACK OF WALKS ARE TYPICALLY MINIMAL AND THE SYMBOLS HAVE BEEN OMITTED FOR CLARITY. SLOPES SHALL NOT EXCEED 3:1, TYP.
  6. SEE SHEET 19 FOR LIFT STATION GRADING, AND CURB & GUTTER AT WEST PROPERTY BOUNDARY.



Scale: 1"=40'

Avoid cutting underground utility lines. It's costly.

**CALL BEFORE YOU DIG.**

**1-800-227-2600**

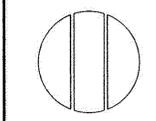
UNDERGROUND SERVICE ALERT (USA)

CONTRACTOR SHALL COORDINATE W/OWNER REGARDING WHETHER THIS POND WILL BE FILLED IN AS A PART OF THE PHASE 1 CONSTRUCTION. ALL FILL SHALL BE IN ACCORDANCE WITH THE PROJECTS GEOTECHNICAL ENGINEER AND THE GRADING NOTES ON SHEET 2 OF THIS PLAN SET.

ENGINEERING · PLANNING · RESOURCE MANAGEMENT

**RESOURCE CONCEPTS, INC.**

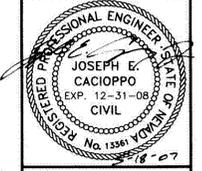
340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
OFFICE: 775-883-1800 · FAX: 775-883-1866 · WEB SITE: WWW.RC-NV.COM



REVISION	DATE
RESPOND TO GRGD COMMENTS	3/1/06
ADD ADDENDUM SHEETS	6/8/06
RESPOND TO NDEP COMMENTS	6/28/06
RECORD DRAWINGS	5/18/07

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

GRADING PLAN - NORTHWEST

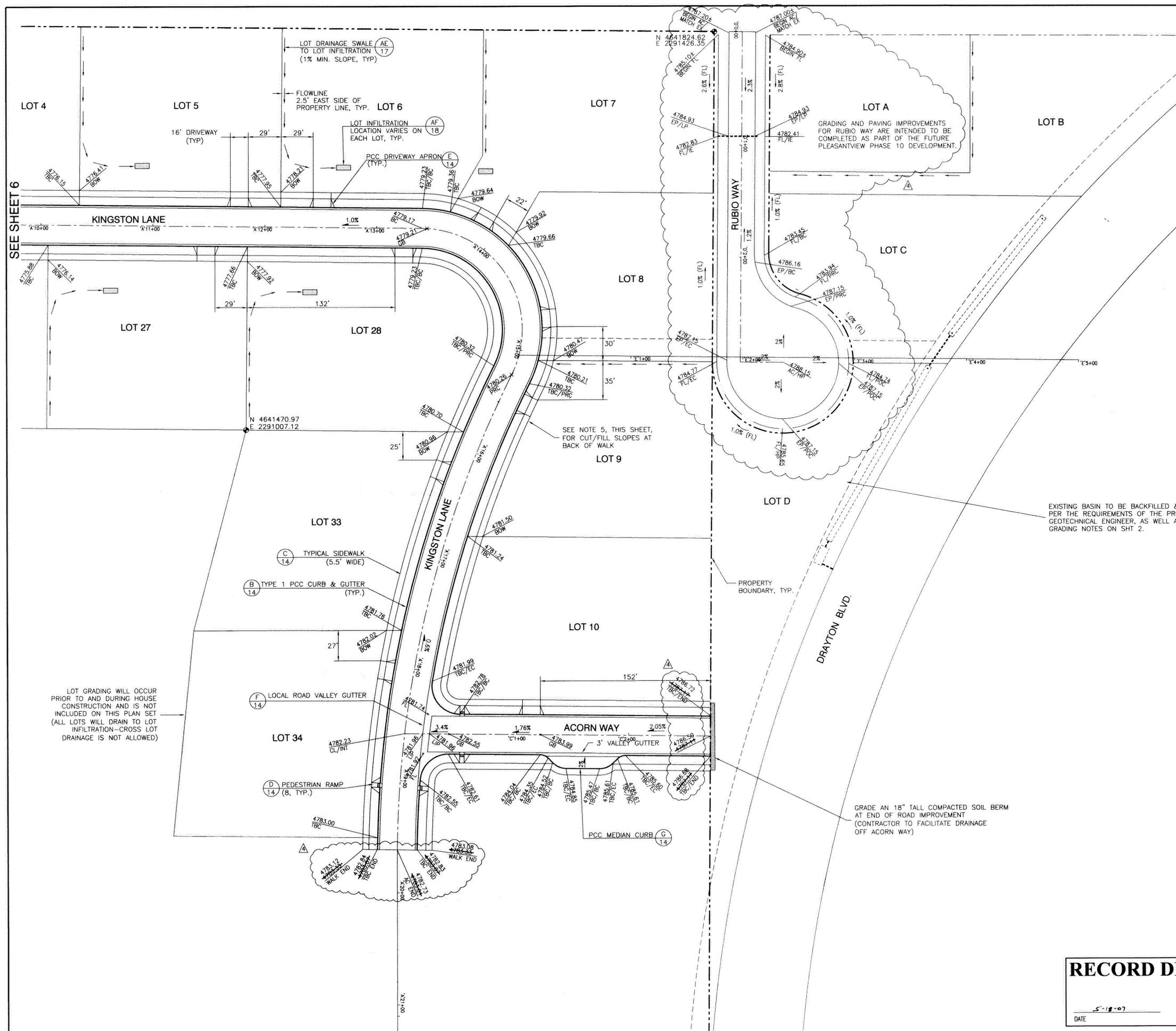


**RECORD DRAWINGS**

DATE: 5-18-07 ENGINEER INITIAL: JEC

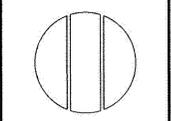
JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

**SHEET 6 OF 21**



- NOTES:
1. BACK OF SIDEWALK (BOW) IS 0.26 FT. ABOVE T.B.C. AS SUCH, SOME BOW GRADES ARE OMITTED FOR CLARITY.
  2. GRADING FOR THIS PROJECT IS LIMITED TO WITHIN THE RIGHT-OF-WAY, UNLESS OTHERWISE SHOWN ON THESE PLANS.
  3. SEE PLAN & PROFILE SHEETS FOR DETAILS NOT SHOWN HEREIN.
  4. LOT INFILTRATION AND PROPERTY LINE SWALES ARE TYPICAL FOR ALL LOTS, ALTHOUGH NOT SHOWN ON ALL LOTS FOR CLARITY. ACTUAL LOCATIONS AND CONFIGURATIONS OF INFILTRATION WILL VARY PER LOT. REFER TO SHEET 18.
  5. CUT/FILL SLOPES BEHIND BACK OF WALKS ARE TYPICALLY MINIMAL AND THE SYMBOLS HAVE BEEN OMITTED FOR CLARITY. SLOPES SHALL NOT EXCEED 3:1, TYP.

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
 OFFICE: 775-889-1800 · FAX: 775-889-1666 · WEB SITE: www.rcnrv.com



REVISION	DATE
RESPOND TO GRID COMMENTS	3/1/06
ADD ADDENDUM SHEETS	6/8/06
RESPOND TO NDEP COMMENTS	6/28/06
RECORD DRAWINGS	5/18/07

IMPROVEMENT PLANS  
 RAIN SHADOW RANCH - PHASE 1  
 DOUGLAS COUNTY, NEVADA  
 GRADING PLAN - NORTHEAST



JOB NO.	04-125-01
DATE	JAN. 3, 2006
DESIGNED	JEC/TEO
DRAWN	FRB
CHECKED	JEC

SHEET 7 OF 21

EXISTING BASIN TO BE BACKFILLED & COMPACTED PER THE REQUIREMENTS OF THE PROJECT GEOTECHNICAL ENGINEER, AS WELL AS THE GRADING NOTES ON SHT 2.

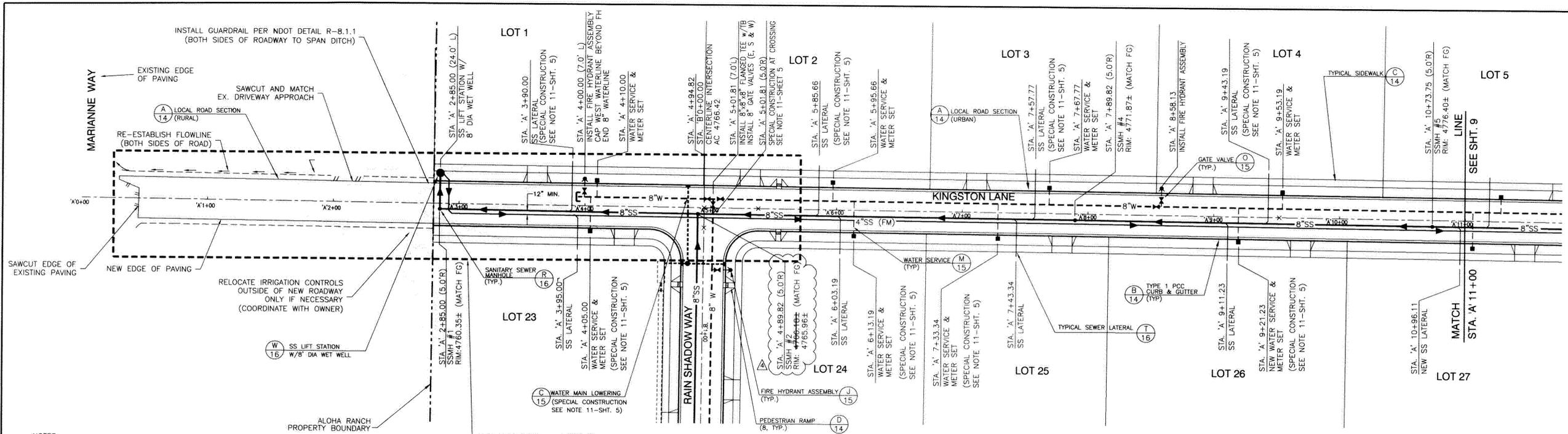
GRADE AN 18" TALL COMPACTED SOIL BERM AT END OF ROAD IMPROVEMENT (CONTRACTOR TO FACILITATE DRAINAGE OFF ACORN WAY)

LOT GRADING WILL OCCUR PRIOR TO AND DURING HOUSE CONSTRUCTION AND IS NOT INCLUDED ON THIS PLAN SET (ALL LOTS WILL DRAIN TO LOT INFILTRATION-CROSS LOT DRAINAGE IS NOT ALLOWED)

**RECORD DRAWINGS**

DATE: 5-18-07 ENGINEER INITIAL: JEC

Scale: 1"=40'  
 Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
 1-800-227-2600  
 UNDERGROUND SERVICE ALERT (USA)



- NOTES:
1. URBAN ROAD STANDARDS SHALL APPLY TO ALL PROPOSED ON-SITE ROADWAYS. RURAL STANDARDS ONLY PERTAIN TO RUBIO WAY AND TO THAT SECTION OF KINGSTON LANE BETWEEN MARIANNE WAY AND THE WEST PROPERTY BOUNDARY.
  2. WATER SERVICES AND SS LATERALS OMITTED IN PROFILE FOR CLARITY. SEE PLAN VIEW. INVERT DETAILS OMITTED IN PLAN VIEW FOR CLARITY. SEE PROFILE.
  3. IN THE EVENT OF A DISCREPANCY BETWEEN GRID AND DOUGLAS COUNTY UTILITY DETAILS, GRID UTILITY DETAILS SHALL GOVERN.
  4. 4" HDPE (SDR-11) SSFM SHALL HAVE WELDED JOINTS. MINIMUM RADII FOR THE SSFM SHALL BE IN ACCORDANCE WITH THE PIPE AND PUMP MANUFACTURER'S SPECIFICATIONS.
  5. ALL UTILITIES AND IMPROVEMENTS ARE NEW, TO BE INSTALLED BY CONTRACTOR AS A PART OF THIS PROJECT, UNLESS SPECIFICALLY STATED OTHERWISE HEREIN.
  6. SPECIAL CONSTRUCTION SHALL BE REQUIRED (SEE NOTE 11-SHEET 5) FOR THE FOLLOWING, AS IDENTIFIED ON THIS SHEET.

SEE ADDENDUM 1 - SHEET 10 FOR UPDATED DESIGN IN THIS AREA, SUPERSEDING THE INFORMATION ON THIS SHEET.

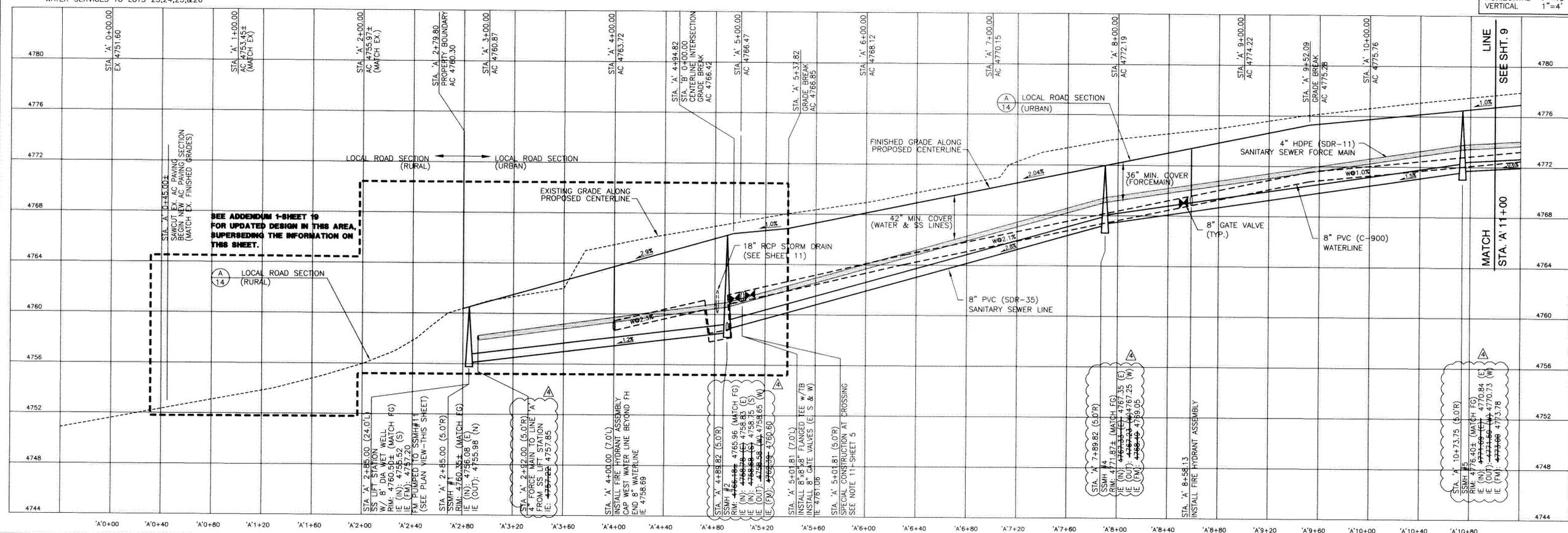
SEE SHEET 11

**RECORD DRAWINGS**

DATE: 5-18-07  
ENGINEER INITIAL: JEC

CALL BEFORE YOU DIG.  
1-800-227-2600  
UNDERGROUND SERVICE ALERT (USA)

SCALE: HORIZONTAL 1"=40'  
VERTICAL 1"=4'



ENGINEERING · PLANNING · RESOURCE MANAGEMENT

# RESOURCE CONCEPTS, INC.

340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
OFFICE: 775-883-1600 · FAX: 775-883-1656 · WEB SITE: www.rci-nv.com

REVISION	DATE	COMMENTS
1	3/1/06	RESPOND TO GRID COMMENTS
2	6/8/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

PLAN AND PROFILE - LINE 'A'

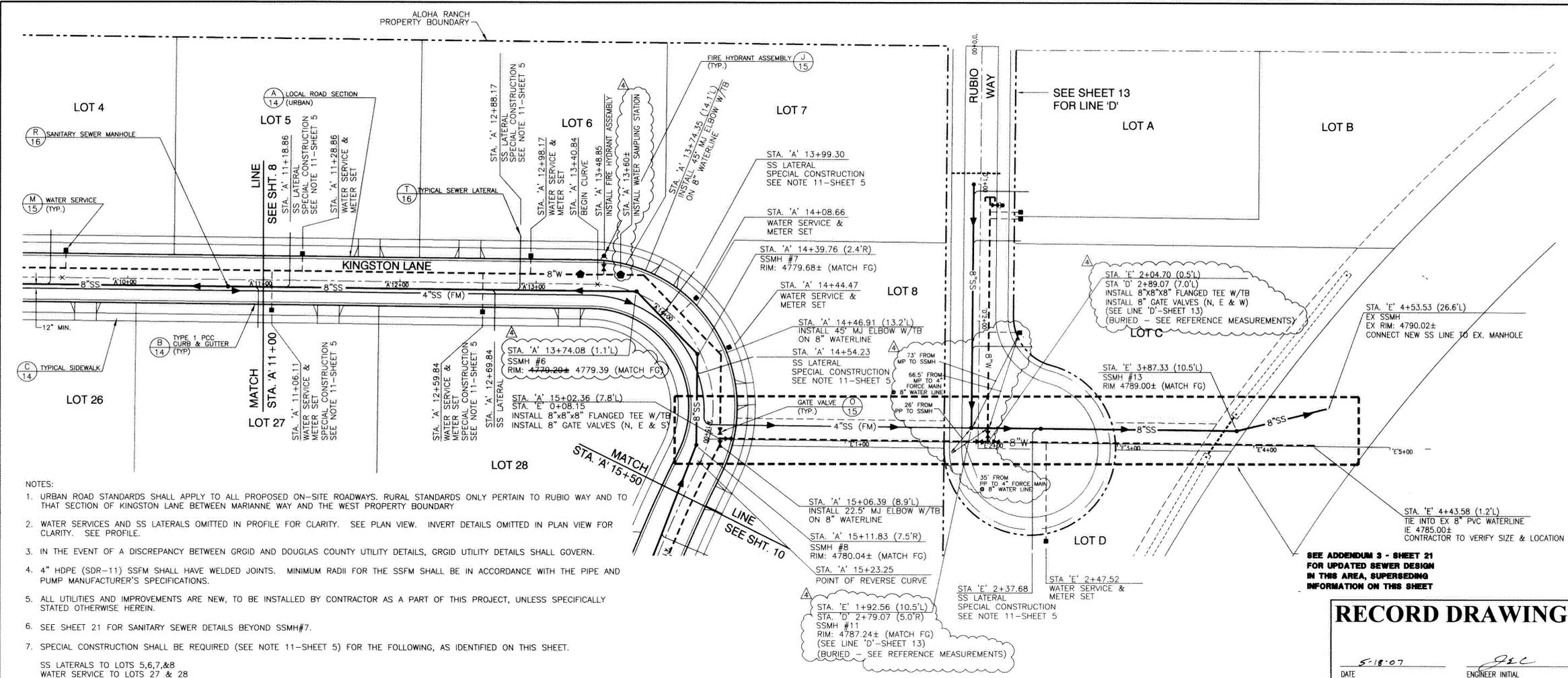
JOSEPH E. CACIOPPO  
REGISTERED PROFESSIONAL ENGINEER  
EXP. 12-31-08  
CIVIL

JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

SHEET 8 OF 21

Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
**1-800-227-2600**  
 UNDERGROUND SERVICE ALERT (USA)

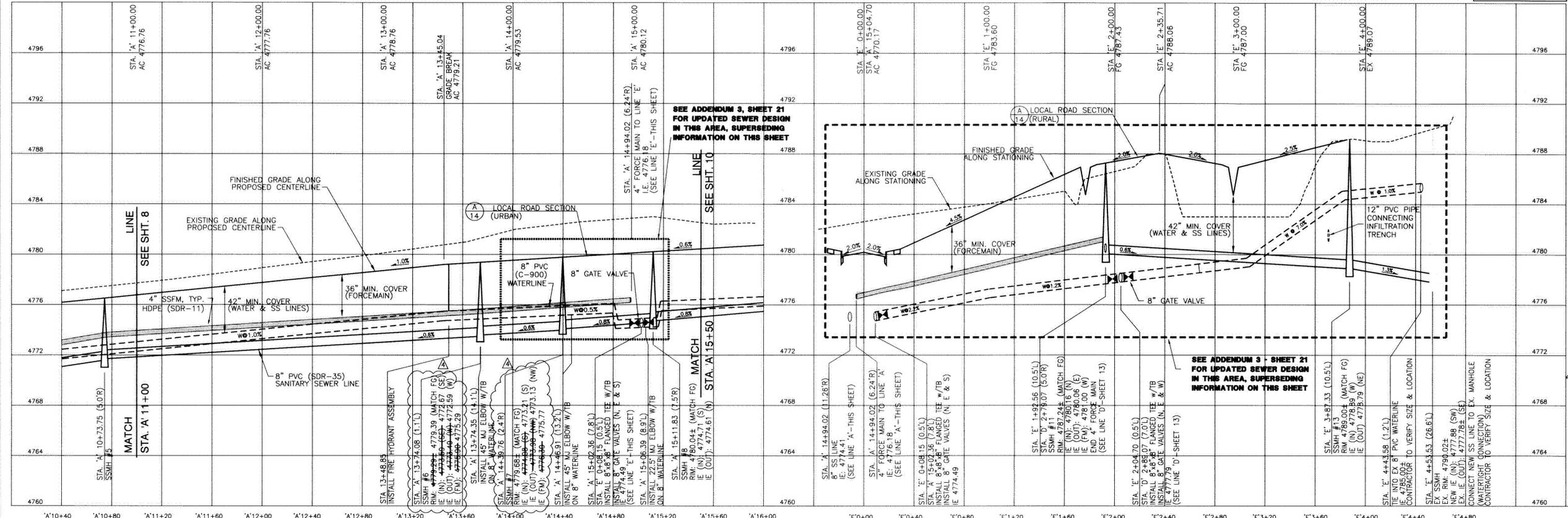
ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
 OFFICE: 775-883-1800 · FAX: 775-883-1800 · WEB SITE: www.rci-nv.com



- NOTES:
- URBAN ROAD STANDARDS SHALL APPLY TO ALL PROPOSED ON-SITE ROADWAYS. RURAL STANDARDS ONLY PERTAIN TO RUBIO WAY AND TO THAT SECTION OF KINGSTON LANE BETWEEN MARIANNE WAY AND THE WEST PROPERTY BOUNDARY.
  - WATER SERVICES AND SS LATERALS OMITTED IN PROFILE FOR CLARITY. SEE PLAN VIEW. INVERT DETAILS OMITTED IN PLAN VIEW FOR CLARITY. SEE PROFILE.
  - IN THE EVENT OF A DISCREPANCY BETWEEN GRGD AND DOUGLAS COUNTY UTILITY DETAILS, GRGD UTILITY DETAILS SHALL GOVERN.
  - 4" HDPE (SDR-11) SSFM SHALL HAVE WELDED JOINTS. MINIMUM RADII FOR THE SSFM SHALL BE IN ACCORDANCE WITH THE PIPE AND PUMP MANUFACTURER'S SPECIFICATIONS.
  - ALL UTILITIES AND IMPROVEMENTS ARE NEW, TO BE INSTALLED BY CONTRACTOR AS A PART OF THIS PROJECT, UNLESS SPECIFICALLY STATED OTHERWISE HEREIN.
  - SEE SHEET 21 FOR SANITARY SEWER DETAILS BEYOND SSMH#7.
  - SPECIAL CONSTRUCTION SHALL BE REQUIRED (SEE NOTE 11-SHEET 5) FOR THE FOLLOWING, AS IDENTIFIED ON THIS SHEET.
- SS LATERALS TO LOTS 5,6,7,&8  
 WATER SERVICE TO LOTS 27 & 28

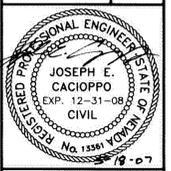
**RECORD DRAWINGS**  
 DATE: 5-18-07  
 ENGINEER INITIAL: JEC

SCALE:  
 HORIZONTAL 1"=40'  
 VERTICAL 1"=4'



REVISION	DATE	COMMENTS
1	3/1/06	RESPOND TO GRGD COMMENTS
2	6/9/06	ADD ADDENDUM SHEETS
3	6/29/06	RESPOND TO INDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
 RAIN SHADOW RANCH - PHASE 1  
 DOUGLAS COUNTY, NEVADA  
 PLAN AND PROFILE - LINE 'A' & LINE 'E'



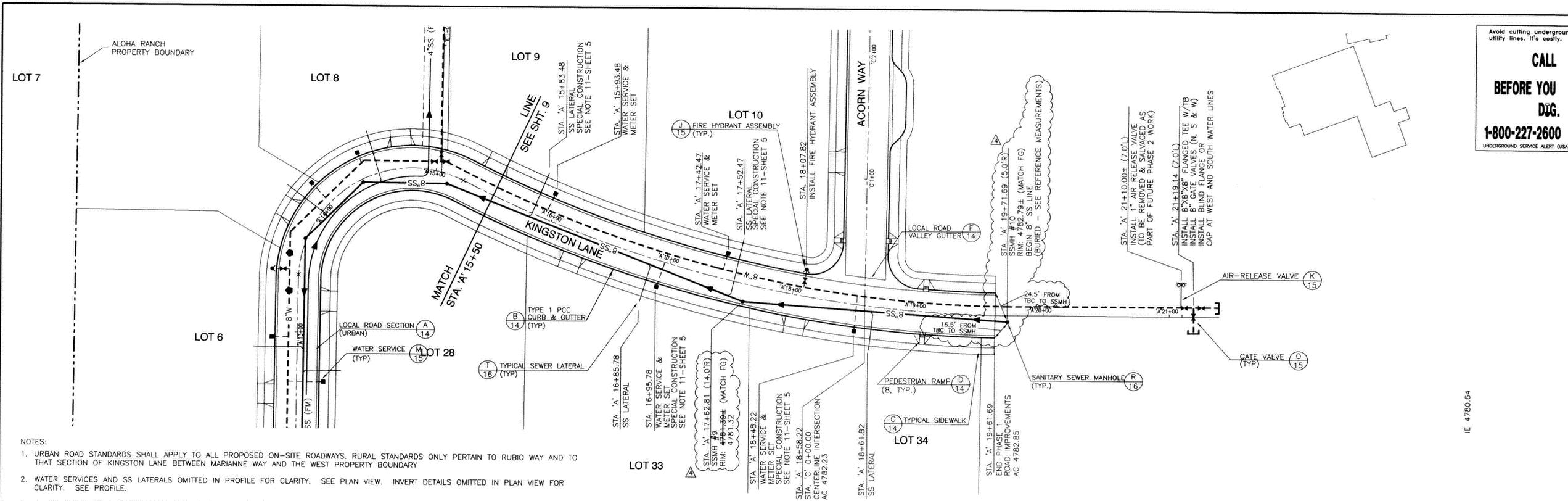
JOB NO: 04-125-07  
 DATE: JAN. 3, 2006  
 DESIGNED: JEC/TEO  
 DRAWN: FRB  
 CHECKED: JEC  
**SHEET 9 OF 21**

SEE ADDENDUM 3 - SHEET 21 FOR UPDATED SEWER DESIGN IN THIS AREA, SUPERSEDING INFORMATION ON THIS SHEET

SEE ADDENDUM 3, SHEET 21 FOR UPDATED SEWER DESIGN IN THIS AREA, SUPERSEDING INFORMATION ON THIS SHEET

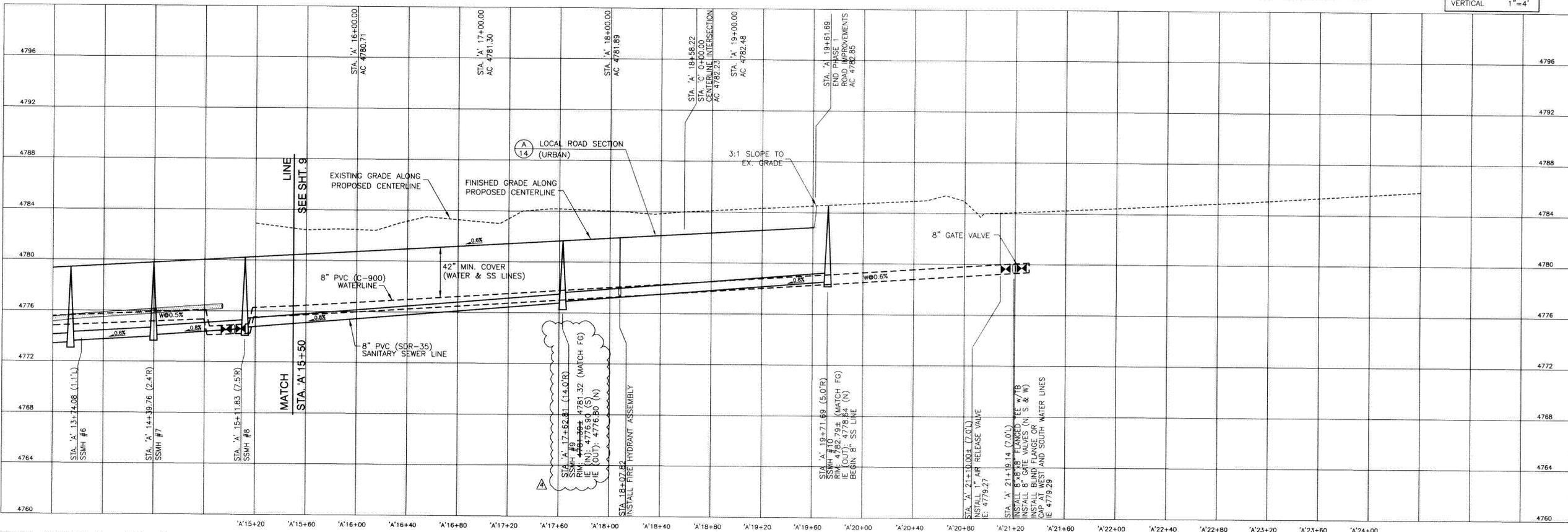
SEE SHT. 10

SEE SHEET 13 FOR LINE 'D'



- NOTES:
1. URBAN ROAD STANDARDS SHALL APPLY TO ALL PROPOSED ON-SITE ROADWAYS. RURAL STANDARDS ONLY PERTAIN TO RUBIO WAY AND TO THAT SECTION OF KINGSTON LANE BETWEEN MARIANNE WAY AND THE WEST PROPERTY BOUNDARY
  2. WATER SERVICES AND SS LATERALS OMITTED IN PROFILE FOR CLARITY. SEE PLAN VIEW. INVERT DETAILS OMITTED IN PLAN VIEW FOR CLARITY. SEE PROFILE.
  3. IN THE EVENT OF A DISCREPANCY BETWEEN GRID AND DOUGLAS COUNTY UTILITY DETAILS, GRID UTILITY DETAILS SHALL GOVERN.
  4. 4" HDPE (SDR-11) SSFM SHALL HAVE WELDED JOINTS. MINIMUM RADI FOR THE SSFM SHALL BE IN ACCORDANCE WITH THE PIPE AND PUMP MANUFACTURER'S SPECIFICATIONS.
  5. ALL UTILITIES AND IMPROVEMENTS ARE NEW, TO BE INSTALLED BY CONTRACTOR AS A PART OF THIS PROJECT, UNLESS SPECIFICALLY STATED OTHERWISE HEREIN.
  6. SEE SHEET 21 FOR SANITARY SEWER DETAILS BEYOND SSMH#7.
  7. SPECIAL CONSTRUCTION SHALL BE REQUIRED (SEE NOTE 11 - SHEET 5) FOR THE FOLLOWING, AS IDENTIFIED ON THIS SHEET.

SS LATERALS TO LOTS 9 & 10  
WATER SERVICES TO LOTS 33 & 34



Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
**1-800-227-2600**  
UNDERGROUND SERVICE ALERT (USA)

**RECORD DRAWINGS**  
DATE: 5-18-07  
ENGINEER INITIAL: JEC

SCALE:  
HORIZONTAL 1"=40'  
VERTICAL 1"=4'

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
OFFICE: 775-883-1800 · FAX: 775-883-1886 · WEB SITE: www.rcn-inc.com

REVISION	DATE	COMMENTS
1	3/1/06	RESPOND TO GRID COMMENTS
2	6/8/06	ADD APPENDIX SHEETS
3	6/28/06	RESPOND TO NEEP COMMENTS
4	5/18/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

PLAN AND PROFILE - LINE 'A'

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA  
JOSEPH E. CACIOPPO  
EXP. 12-31-08  
CIVIL  
No. 13561 YOWSON  
12-07

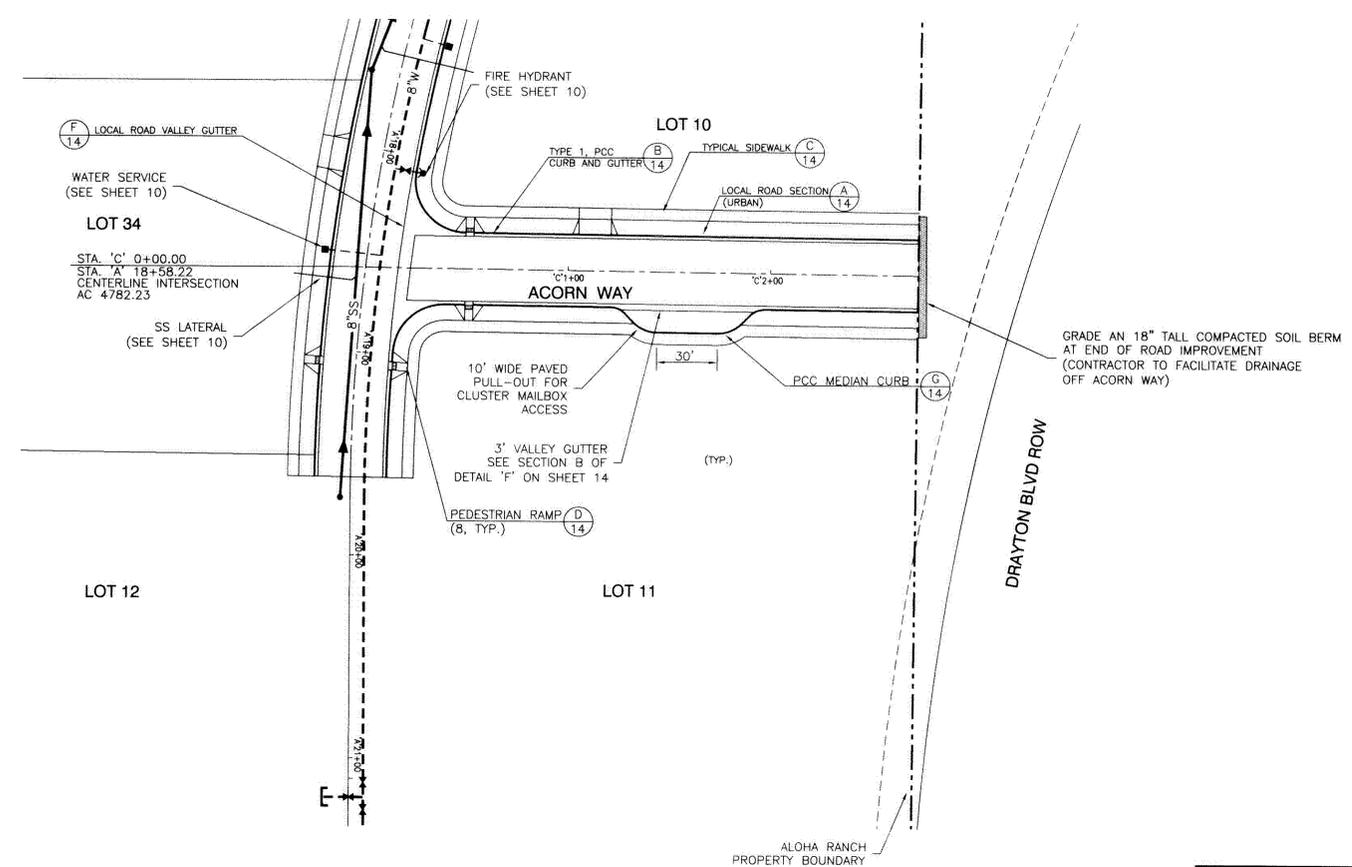
JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

**SHEET 10 OF 21**



Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
**1-800-227-2600**  
UNDERGROUND SERVICE ALERT (USA)

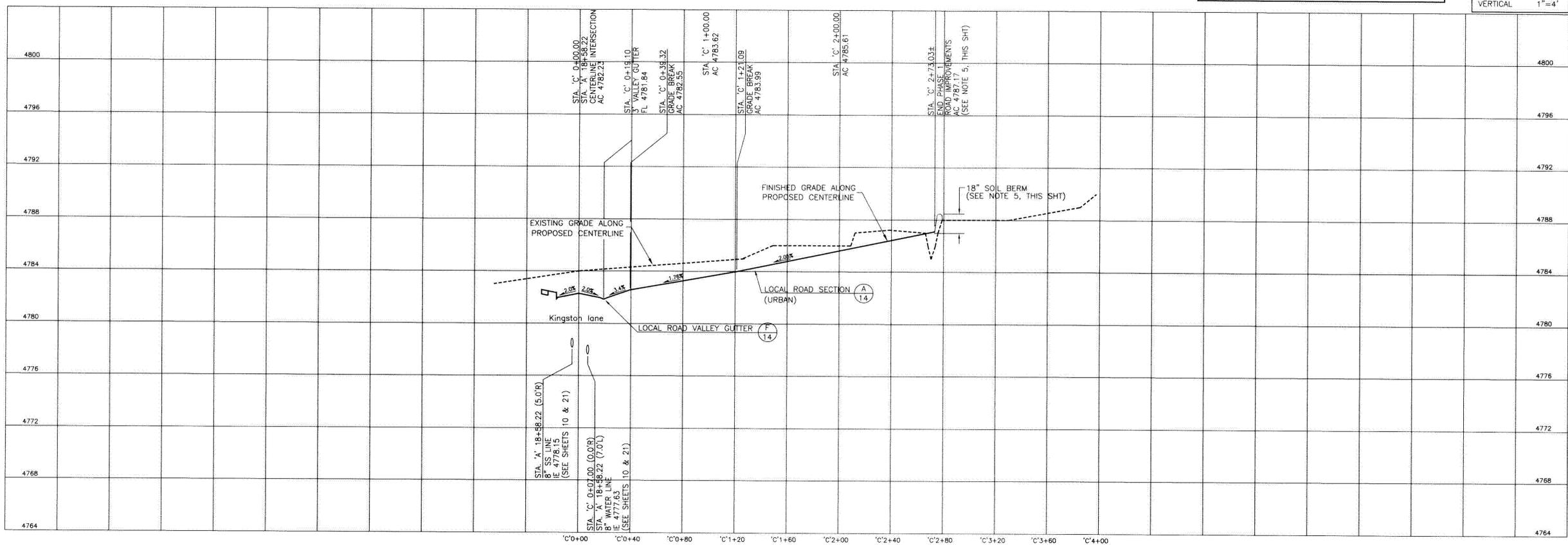
ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
 OFFICE: 775-883-1600 · FAX: 775-883-1656 · WEB SITE: www.rcn-nv.com



- NOTES:
1. URBAN ROAD STANDARDS SHALL APPLY TO ALL PROPOSED ON-SITE ROADWAYS. RURAL STANDARDS ONLY PERTAIN TO RUBIO WAY AND TO THAT SECTION OF KINGSTON LANE BETWEEN MARIANNE WAY AND THE WEST PROPERTY BOUNDARY, UNLESS OTHERWISE HEREIN.
  2. WATER SERVICES AND SS LATERALS OMITTED IN PROFILE FOR CLARITY. SEE PLAN VIEW. INVERT DETAILS OMITTED IN PLAN VIEW FOR CLARITY. SEE PROFILE.
  3. IN THE EVENT OF A DISCREPANCY BETWEEN GRID AND DOUGLAS COUNTY UTILITY DETAILS, GRID UTILITY DETAILS SHALL GOVERN.
  4. ALL UTILITIES AND IMPROVEMENTS ARE NEW, TO BE INSTALLED BY CONTRACTOR AS A PART OF THIS PROJECT, UNLESS SPECIFICALLY STATED OTHERWISE HEREIN.
  5. THE ACTUAL TERMINATION OF ACORN WAY ROAD IMPROVEMENTS MIGHT VARY IN PHASE 1 TO MAINTAIN EXISTING DITCH OPERATIONS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER.

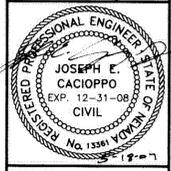
**RECORD DRAWINGS**  
 DATE: 5-18-07  
 ENGINEER INITIAL: JEC

SCALE:  
 HORIZONTAL 1"=40'  
 VERTICAL 1"=4'



REVISION	DATE	COMMENTS
1	3/17/06	RESPOND TO GRID COMMENTS
2	6/8/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/19/07	RECORD DRAWINGS

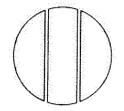
IMPROVEMENT PLANS  
**RAIN SHADOW RANCH - PHASE 1**  
 DOUGLAS COUNTY, NEVADA  
 PLAN AND PROFILE - LINE 'C' & LINE 'F'



JOB NO: 04-125-01  
 DATE: JAN. 3, 2006  
 DESIGNED: JEC/TEO  
 DRAWN: FRB  
 CHECKED: JEC  
**SHEET 12 OF 21**

Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
 1-800-227-2600  
UNDERGROUND SERVICE ALERT (USA)

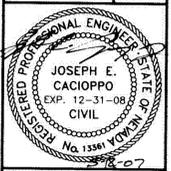
ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
 OFFICE: 775-883-1600 · FAX: 775-883-1656 · WEB SITE: www.rci-nv.com



**RECORD DRAWINGS**  
 DATE: 5/18/07  
 ENGINEER INITIAL: JEC

REVISION	DATE	COMMENTS
1	3/7/06	RESPOND TO GRGD COMMENTS
2	6/9/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/19/07	RECORD DRAWINGS

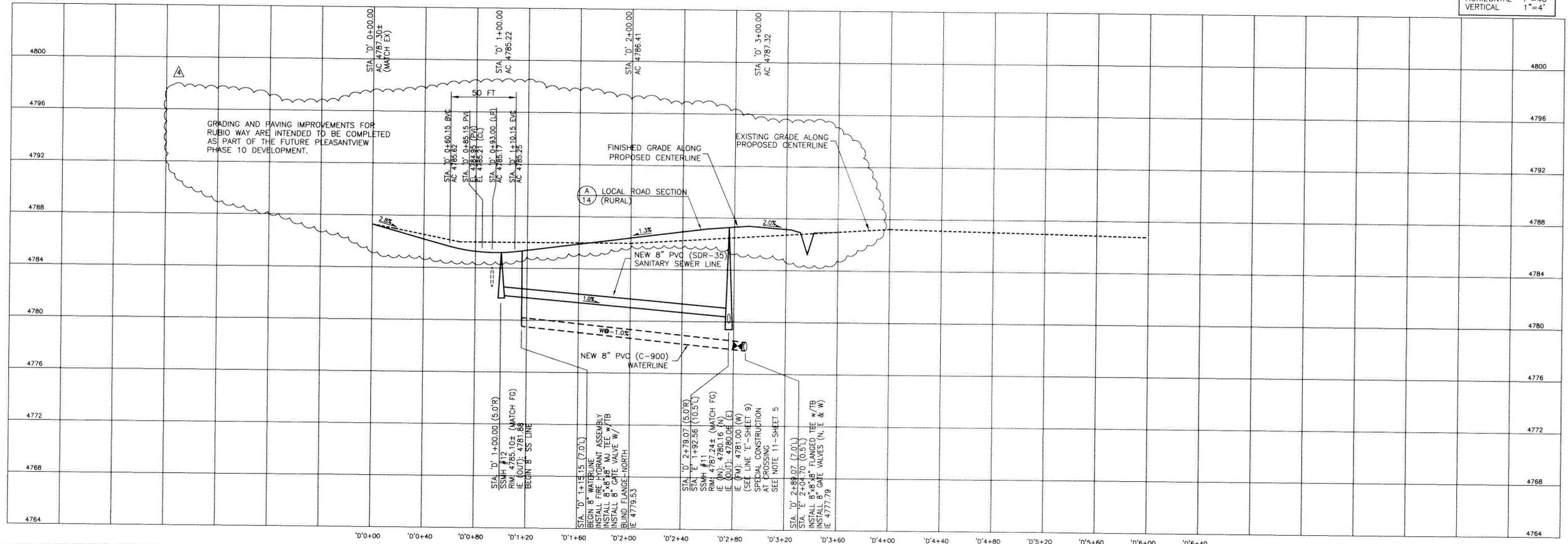
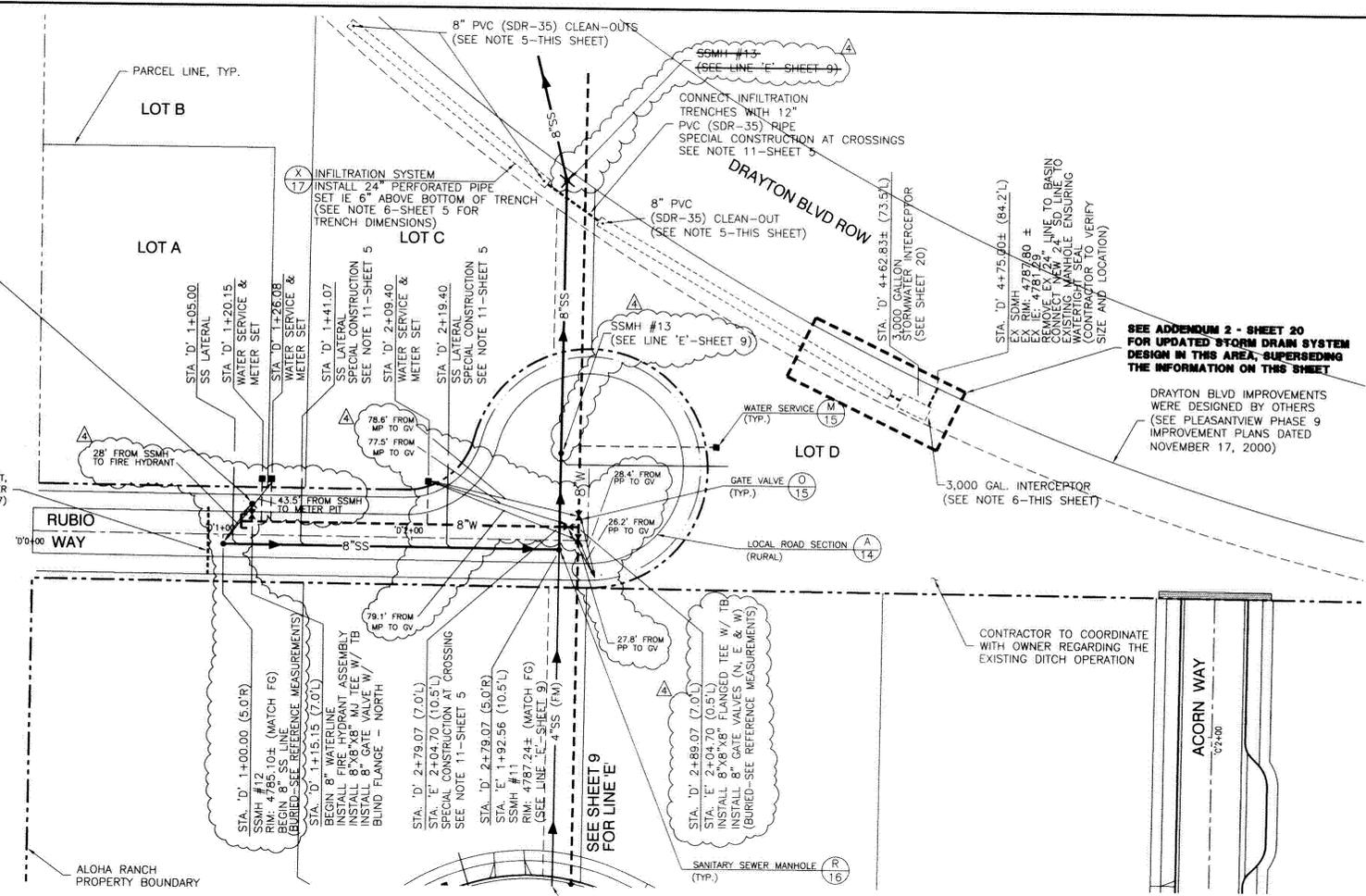
IMPROVEMENT PLANS  
**RAIN SHADOW RANCH - PHASE 1**  
 DOUGLAS COUNTY, NEVADA  
 PLAN AND PROFILE - LINE 'D'



JOB NO. 04-125-01  
 DATE: JAN. 3, 2006  
 DESIGNED: JEC/TEO  
 DRAWN: FRB  
 CHECKED: JEC  
**SHEET 13 OF 21**

CRADING AND PAVING IMPROVEMENTS FOR RUBIO WAY ARE INTENDED TO BE COMPLETED AS PART OF THE FUTURE PLEASANTVIEW PHASE 10 DEVELOPMENT.

- NOTES:
- URBAN ROAD STANDARDS SHALL APPLY TO ALL PROPOSED ON-SITE ROADWAYS. RURAL STANDARDS ONLY PERTAIN TO RUBIO WAY AND TO THAT SECTION OF KINGSTON LANE BETWEEN MARIANNE WAY AND THE WEST PROPERTY BOUNDARY.
  - WATER SERVICES AND SS LATERALS OMITTED IN PROFILE FOR CLARITY. SEE PLAN VIEW. INVERT DETAILS OMITTED IN PLAN VIEW FOR CLARITY. SEE PROFILE.
  - IN THE EVENT OF A DISCREPANCY BETWEEN GRGD AND DOUGLAS COUNTY UTILITY DETAILS, GRGD UTILITY DETAILS SHALL GOVERN.
  - ALL UTILITIES AND IMPROVEMENTS ARE NEW, TO BE INSTALLED BY CONTRACTOR AS A PART OF THIS PROJECT, UNLESS SPECIFICALLY STATED OTHERWISE HEREIN.
  - A MINIMUM OF ONE 8" PVC (SDR-35) CLEAN-OUT SHALL BE INSTALLED IN EACH INFILTRATION TRENCH AND CONNECTED TO THE 24" PERFORATED PIPE TO ALLOW FLUSHING FOR REMOVAL OF SILTS.
  - INTERCEPTOR DIMENSIONS OF 7'8"W X 16'7"L X 7'11"H WERE USED. ACTUAL DETAILS FOR THE INTERCEPTORS WERE NOT MADE AVAILABLE TO THE ENGINEER DURING THE DESIGN PROCESS. CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER PRIOR TO CONSTRUCTION REGARDING INSTALLATION.
  - STORMWATER INTERCEPTOR SIZES MAY VARY FROM THOSE SHOWN ON THESE PLANS BASED ON MANUFACTURER RECOMMENDATIONS. SEE SHEET 20 FOR DETAILS.
  - SPECIAL CONSTRUCTION SHALL BE REQUIRED (SEE NOTE 11 - SHEET 5) FOR THE FOLLOWING, AS IDENTIFIED ON THIS SHEET:  
 SS LATERALS TO LOTS B & C

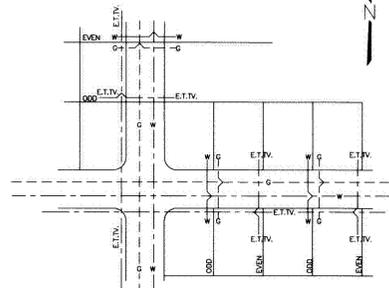




UTILITY LOCATION

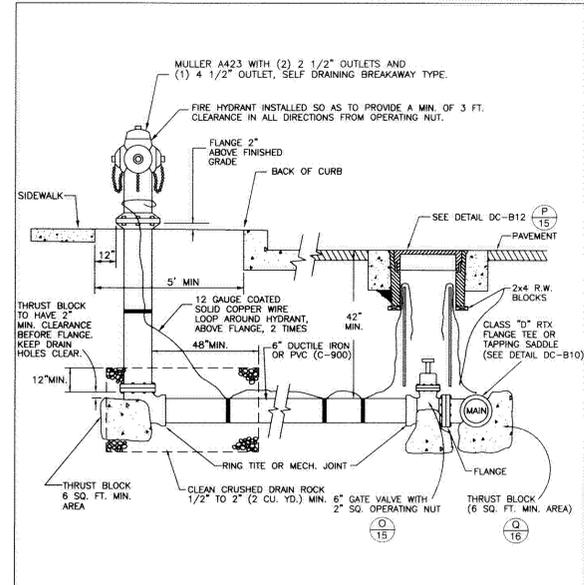
GENERAL NOTES

- Sanitary sewer lateral to be installed on the low side of the lot (changes may be permitted upon approval of the sewer utility).
- Common lot corners are defined as odd or even as counted North or East from the preceding street intersection.
- Water services shall be placed on odd lot corners on East-West streets and on even lot corners on North-South streets. Additionally, water services shall be one foot West or North of the respective lot line (see sketch).
- Gas services shall be placed on the same lot corners as the water described above—except that it shall be four feet East or South of the respective lot line (opposite side of water) (see sketch).
- Electricity, telephone, and cable t.v. shall be placed on even lot corners on East-West street and on odd lot corners on North-South streets.
- For main location see detail DC-A17.



NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			TYPICAL UTILITY LATERALS LOCATION	DRAWING NO. DC-A18 DATE 9/6/2001 PAGE A-04

DETAIL I

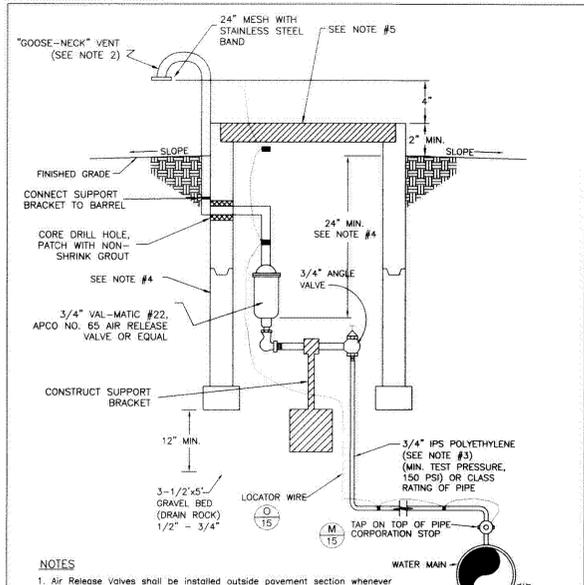


- GENERAL NOTES
- HYDRANT COLOR SHALL BE BASED ON FIRE FLOW TEST RESULTS AS DETERMINED BY FIRE AUTHORITY.
  - OPERATING NUT SHALL BE 1 1/2" PENTAGON.
  - INSPECTION BY GRID SHALL BE REQUIRED PRIOR TO BACKFILLING.
  - IF SIDEWALK NOT PRESENT, SET HYDRANT SO THAT OPERATING NUT IS 3' 6" BEHIND BACK OF CURB.
  - NO FENCES SHALL BE ALLOWED WITHIN 3' OF ANY PORTION OF A FIRE HYDRANT.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION GARDNERVILLE RANCHOS GID
			FIRE HYDRANT ASSEMBLY DETAIL	DRAWING NO. X DATE X/X/XX PAGE X

DETAIL J

9,10,11,13

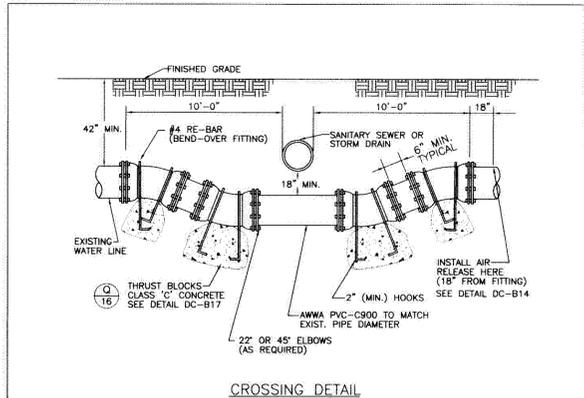


- NOTES
- Air Release Valves shall be installed outside pavement section whenever possible. Slope ground away from valve box or construct curbing to protect from flooding by surface waters.
  - When constructed in street section, construct air release tube to side of roadway and construct "goose-neck" above surrounding grade as directed by the Water Utility.
  - All pipes shall be sloped up to air release valve.
  - 24" Use : Jensen N36 Precast Box or equivalent.  
>24" Use : Jensen precast 48" I.D. Manhole Barrel or equivalent.
  - Use N36-610 steel checked plate cover marked "WATER" w/ hold down bolts or Jensen Precast 48" I.D. flat top w/ 3/8" opening and lid as required.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			AIR - RELEASE VALVE DETAIL	DRAWING NO. DC-B14 DATE 9/6/2001 PAGE B-18

DETAIL K

11



- GENERAL NOTES
- WATER LINES 12" AND LARGER SHALL REQUIRE SPECIAL DESIGN.
  - UPON APPROVAL OF THE WATER UTILITY, THE ABOVE ASSEMBLY MAY BE REPLACED WITH A WELDED STEEL "SPOON" OF EQUIVALENT DIAMETER, PRIMED AND WRAPPED (10 MILS MIN.) CONNECT TO EXISTING LINES USING MECHANICAL JOINTS. STEEL SPOON SHALL BE CONSTRUCTED BY A CERTIFIED WELDER AND PRESSURE CHECKED IN ACCORDANCE WITH SPECIFICATIONS. ALL BOLTS TO BE TAR COATED.
  - CONCRETE FOR THRUST BLOCKS SHALL NOT INTERFERE WITH THE REMOVAL OF BOLTED ASSEMBLIES.
  - AIR-RELEASE TO BE INSTALLED ON BOTH SIDES OF CROSSING. (18" MIN. FROM ANY FITTING). ONE AIR RELEASE MAY BE USED WITH ONE LINE TO EACH SIDE OF CROSSING. SEE DETAIL DC-B14.
  - ROUTING WATER LINE OVER SEWER LINE OR "ROPING" UNDER SEWER LINE REQUIRES APPROVAL BY THE WATER UTILITY.
  - FOR PURPOSES OF SEPARATION AND PROTECTION OF THE WATER SUPPLY, RECLAIMED WATER SHALL BE CONSIDERED A SEWER LINE.
  - SPECIAL CONSTRUCTION. SEE NOTE 11 ON SHEET 5.

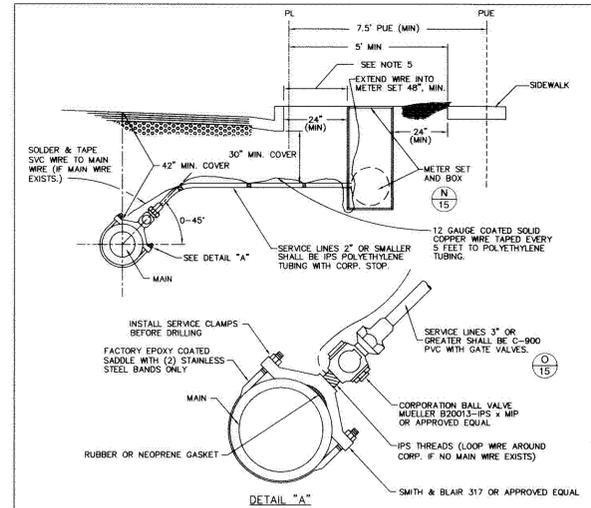
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			LOWERING WATER MAINS	DRAWING NO. DC-B19 DATE 4/98 PAGE B-23

DETAIL C

8

RECORD DRAWINGS

DATE 5-18-07  
ENGINEER INITIAL JEC

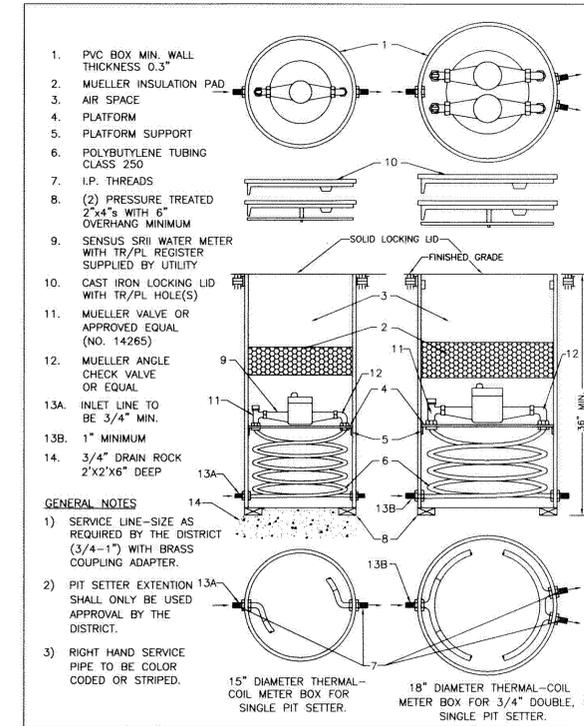


- GENERAL NOTES
- ALL SERVICE LINE COUPLING FITTINGS SHALL BE MUELLER IPS COMP. x MIP OR APPROVED EQUAL.
  - ALL SERVICE VALVES SHALL BE SAME SIZE AS SERVICE LINES (ON 3" SERVICE, USE 4" GATE VALVE AND PIPE.)
  - SERVICE CLAMPS SHALL BE FACTORY COATED EPOXY WITH (2) STAINLESS STEEL BAND.
  - MINIMUM DISTANCE BETWEEN TAPS AND MAINLINE FITTINGS, INCLUDING BELLS SHALL BE 24".
  - ALL METER SETS TO BE PLACED 1' FROM BACK FACE OF CURB. IN AREAS WHERE NO SIDEWALK IS PRESENT, THE FRONT OF THE METER IS TO BE SET AS DIRECTED BY THE DISTRICT. ALL METER SETS SHALL BE PLACED WITHIN THE PUBLIC RIGHT OF WAY OR PUBLIC UTILITY EASEMENT.
  - TAPPING SADDLES 3" OR LARGER SHALL BE STAINLESS STEEL, HAVE A FULL CIRCUMFERENTIAL SEAL AND HAVE EITHER A STAINLESS STEEL OR DUCTILE IRON FLANGE.
  - UPON ABANDONING OF SERVICE OF TAP, THE DISTRICT SHALL BE NOTIFIED SO THAT THE METER CAN BE REMOVED.
  - ENTITY REQUESTING ABANDONMENT SHALL REMOVE EXISTING METER BOX AND EXPOSE CORP STOP FOR SHUT-OFF. ALL PLUMBING SHALL BE DISCONNECTED FROM CORP AND PLUGGED AT BOTH ENDS. WATER UTILITY SHALL BE NOTIFIED FOR INSPECTION OF CORP ASSEMBLY PRIOR TO BACKFILLING.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION GARDNERVILLE RANCHOS GID
			WATER SERVICE TAP	DRAWING NO. XX DATE X/X/XX PAGE 2-B

DETAIL M

9,10,11,13,15

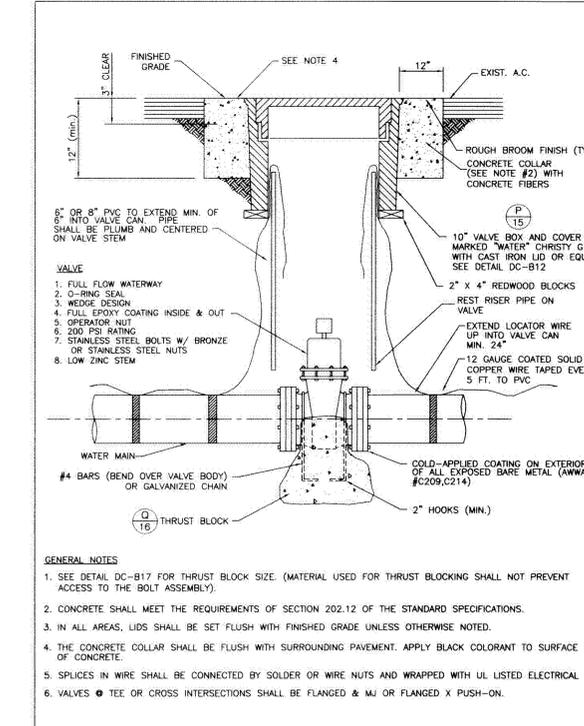


- GENERAL NOTES
- SERVICE LINE—SIZE AS REQUIRED BY THE DISTRICT (3/4"-1") WITH BRASS COUPLING ADAPTER.
  - PIT SETTER EXTENSION 13A SHALL ONLY BE USED APPROVAL BY THE DISTRICT.
  - RIGHT HAND SERVICE PIPE TO BE COLOR CODED OR STRIPPED.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION GARDNERVILLE RANCHOS GID
			3/4" METER DOUBLE & SINGLE PIT SETTER, 1" METER SINGLE PIT SETTER	DRAWING NO. PIT-SETTER.DWG DATE X/X/XX PAGE 3

DETAIL N

9,10,11,13,15

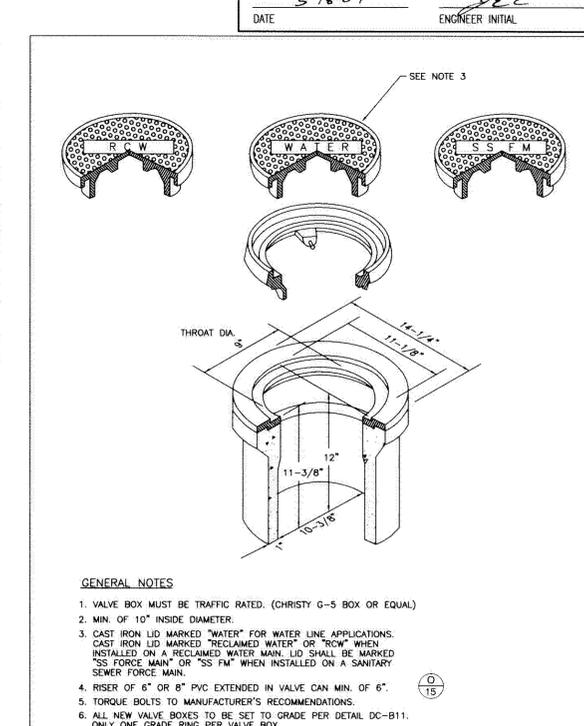


- GENERAL NOTES
- SEE DETAIL DC-B17 FOR THRUST BLOCK SIZE. (MATERIAL USED FOR THRUST BLOCKING SHALL NOT PREVENT ACCESS TO THE VALVE ASSEMBLY).
  - CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 202.12 OF THE STANDARD SPECIFICATIONS.
  - IN ALL AREAS, LIDS SHALL BE SET FLUSH WITH FINISHED GRADE UNLESS OTHERWISE NOTED.
  - THE CONCRETE COLLAR SHALL BE FLUSH WITH SURROUNDING PAVEMENT. APPLY BLACK COLORANT TO SURFACE OF CONCRETE.
  - SPICES IN TEE SHALL BE CONNECTED BY SOLDER OR WIRE NUTS AND WRAPPED WITH UL LISTED ELECTRICAL TAPE.
  - VALVES @ TEE OR CROSS INTERSECTIONS SHALL BE FLANGED & M/J OR FLANGED X PUSH-ON.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION GARDNERVILLE RANCHOS GID
			VALVE DETAIL	DRAWING NO. XX DATE X/X/XX PAGE X

MODIFIED DETAIL O

9,10,11,13,15



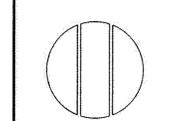
- GENERAL NOTES
- VALVE BOX MUST BE TRAFFIC RATED. (CHRISTY G-5 BOX OR EQUAL)
  - MIN. OF 10" INSIDE DIAMETER.
  - CAST IRON LID MARKED "WATER" FOR WATER LINE APPLICATIONS. CAST IRON LID MARKED "RECLAIMED WATER" OR "ROW" WHEN INSTALLED ON A RECLAIMED WATER MAIN. LID SHALL BE MARKED "SS FORCE MAIN" OR "SS FM" WHEN INSTALLED ON A SANITARY SEWER FORCE MAIN.
  - RISER OF 6" OR 8" PVC EXTENDED IN VALVE CAN MIN. OF 6".
  - TORQUE BOLTS TO MANUFACTURER'S RECOMMENDATIONS.
  - ALL NEW VALVE BOXES TO BE SET TO GRADE PER DETAIL DC-B11. ONLY ONE GRADE RING PER VALVE BOX.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			VALVE BOX DETAIL	DRAWING NO. DC-B12 DATE 10/96 PAGE B-16

DETAIL P

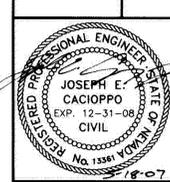
15

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
OFFICE: 775-883-1600 · FAX: 775-883-1666 · WEB SITE: www.rci-nv.com

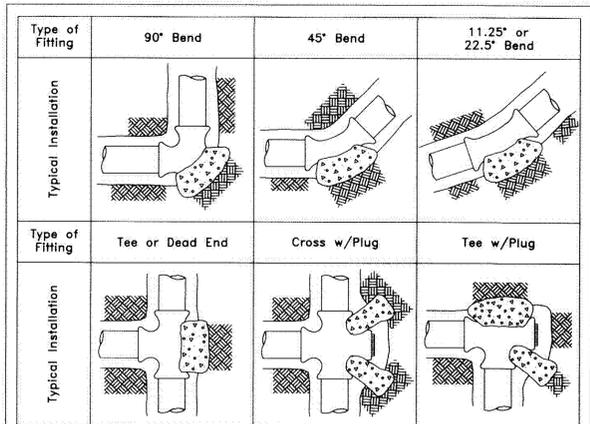


REVISION	DATE	COMMENTS
1	3/1/06	RESPOND TO GRID COMMENTS
2	6/9/06	ADD ADDENDUM SHEETS
3	8/28/06	RESPOND TO IDEP COMMENTS
4	5/19/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA



JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC  
SHEET 15 OF 21



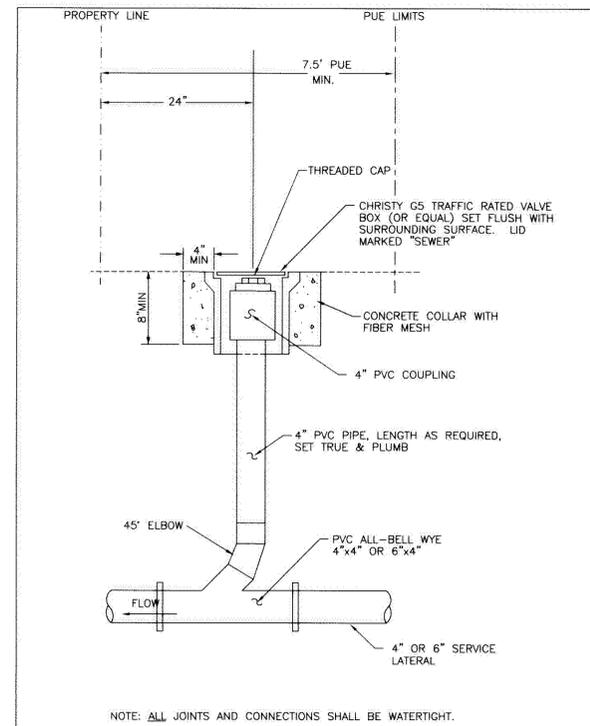
Thrust Block Bearing Area - Square Feet

Type of Fitting	90° Bend	45° Bend	11.25° or 22.5° Bend	Tee or Cross w/Plug	Tee w/Plug
4"	2	1	1	2	2
6"	5	3	2	4	5
8"	8	5	3	6	8
10"	13	7	4	9	13
12"	18	10	5	13	18
14"	25	13	7	17	25
16"	32	17	9	23	32

- NOTE:
- CONCRETE FOR THRUST BLOCKS SHALL CONFORM TO SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED SOIL.
  - JOINTS AND FACE OF PLUGS SHALL BE KEPT CLEAR OF CONCRETE.
  - THRUST BLOCK BEARING AREAS ARE FOR A 150 PSI TEST PRESSURE WITH 2000 PSF BEARING CAPACITY, NOMINAL PIPE DIAMETER, AND A FACTOR OF SAFETY OF 1.5 INSTALLATIONS USING DIFFERENT TEST PRESSURES, AND/OR SOIL TYPES SHALL BE ADJUSTED BY THE DESIGN ENGINEER.

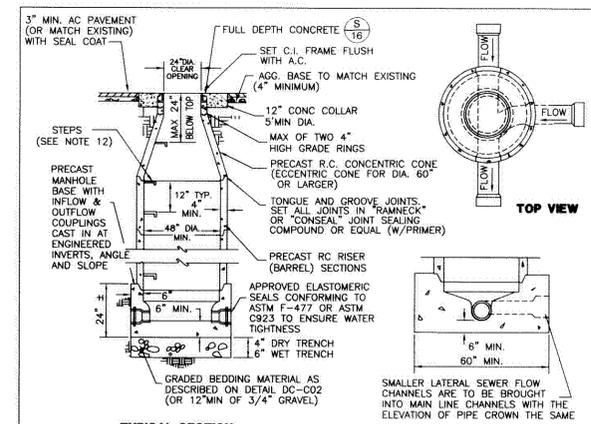
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY DRAWING NO. DC-B17 DATE 10/96 PAGE 8-21

DETAIL Q  
15



NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION GARDNERVILLE RANCHOS QID DRAWING NO. X DATE X/X/X PAGE X

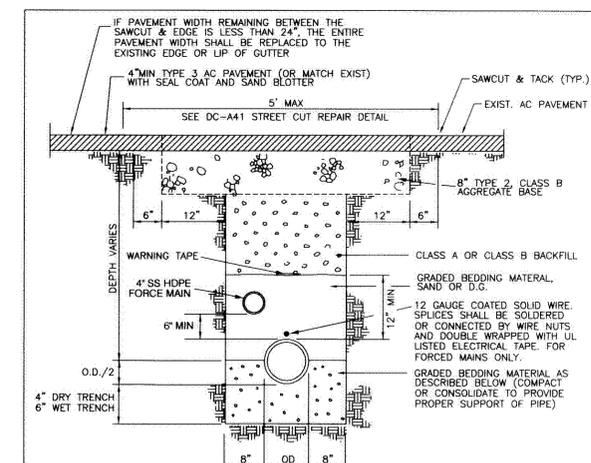
DETAIL U  
16



- NOTE:
- CONTRACTOR SHALL CONTACT AND COORDINATE WITH THE SEWER UTILITY AND ALL OTHER UTILITIES 48 HOURS PRIOR TO CONSTRUCTION.
  - ALL CONSTRUCTION SHALL CONFORM TO DOUGLAS COUNTY STANDARDS AND NO BACKFILLING WILL BE ALLOWED UNTIL INSPECTED AND APPROVED BY THE SEWER UTILITY.
  - MANHOLE SHALL BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE SECTIONS CONFORMING TO ASTM DESIGNATION C478.
  - EDUCATION FOR MANHOLE MUST BE MADE TO A MINIMUM OF ONE FOOT OUTSIDE OF THE MANHOLE WALL TO PROVIDE FOR ADEQUATE WORKSPACE SPACE OUTSIDE OF THE MANHOLE SHALL BE BACKFILLED WITH ACCEPTABLE MATERIAL IN UNIFORM LAYERS NOT EXCEEDING 8" IN DEPTH. EACH LAYER SHALL BE THOROUGHLY COMPACTED TO THE BENEATH OF THE LAYER IN THE ADJACENT TRENCH SECTIONS. (MIN. 90% IN EXISTING OR PROPOSED STREET OR ALLEY RIGHT-OF-WAY)
  - CAST IRON FRAME AND COVER SHALL BE 24" DIAMETER (CLEAR OPENING) AND SHALL BE MANUFACTURED FROM GRAY CAST IRON CONFORMING TO ASTM DESIGNATION A 48, CLASS 50 AND DESIGNED FOR A MINIMUM 85-20 TRAFFIC LOADING. COVERS AND FRAMES SHALL BE MATCH-MARKED IN PAIRS AND SEATING SURFACES MARKED SO THAT COVER AND FRAME COINCIDE. COVERS SHALL HAVE ONE PICK HOLE AND ONE CENTRALLY LOCATED 1" DIA. HOLE. COVERS SHALL HAVE NO THRU HOLES.
  - ALL INVERTS MUST BE PRECAST UNLESS OTHERWISE APPROVED BY THE SEWER UTILITY.
  - ALL JOINTS AND CONNECTIONS TO NEW OR EXISTING MANHOLES SHALL BE WATER TIGHT.
  - CONCRETE FOR CAST-IN-PLACE MANHOLE BASE, IF APPROVED BY THE SEWER UTILITY FOR USE, SHALL CONFORM TO SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - SEWER STUBS FOR FUTURE EXTENSION SHALL BE NO MORE THAN 5 FEET IN LENGTH.
  - THE TOP OF INCOMING LATERAL SEWERS SHALL ENTER THE MANHOLE AT AN ELEVATION EQUAL TO THE TOP OF THE MAIN LINE SECTIONS ONLY BY PRIOR SEWER UTILITY APPROVAL.
  - INVERTS SHALL BE FORMED DIRECTLY IN CONCRETE OF MANHOLE BASE AND SHALL BE SMOOTH AND ACCURATELY SHAPED TO A SEMI-CIRCULAR BOTTOM CONFORMING TO THE INSIDE OF THE ADJACENT SEWER SECTION.
  - STEPS ARE REQUIRED WHERE MANHOLE DEPTH IS 54" (4'-6" TOLERANCE) AND HORIZONTAL (0.5" TOLERANCE) SO AS TO FORM A CONTINUOUS LADDER AND SHALL CONFORM WITH THE DESIGN REQUIREMENTS OF THE STATE OF NEVADA OSHA STANDARD, SECTION 1910.127 (DEPTH 5' MIN. ELEV. TO TOP OF PIPE).
  - WHERE MANHOLES ARE NOT LOCATED IN STREETS, PLACE TOP OF MANHOLE 6" ABOVE EXISTING GROUND UNLESS OTHERWISE REQUIRED BY M.S.D. APPROVAL. THE COVER FRAME AND EXTEND A MINIMUM OF 9" BENEATH THE CURB OR EXISTING GROUND SURFACE. TAPER THE CONCRETE COLLAR FROM TOP TO BOTTOM AT A 1:1 SLOPE OR FLATTER.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY DRAWING NO. DC-C01 DATE 9/6/2001 PAGE C-01

DETAIL R  
8,9  
10,11,13

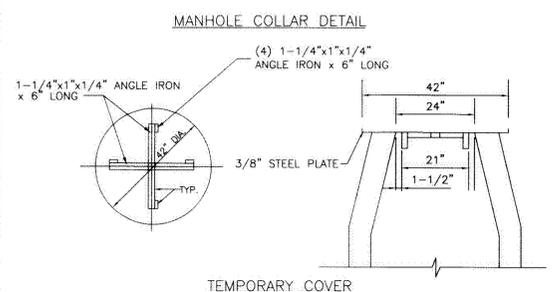
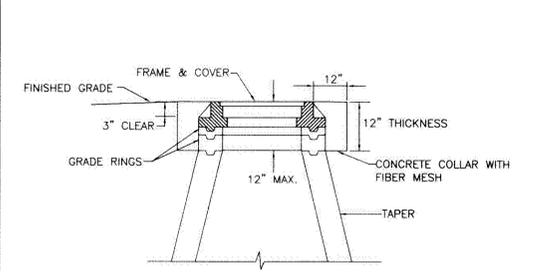


- THE FOLLOWING GRADED BEDDING MATERIAL MAY BE USED IN WET OR DRY TRENCHES.
- | U.S. STANDARD SIEVE SIZE | PERCENT BY WEIGHT PASSING | U.S. STANDARD SIEVE SIZE | PERCENT BY WEIGHT PASSING |
|--------------------------|---------------------------|--------------------------|---------------------------|
| 1-1/2"                   | 100%                      | 1/2"                     | 100%                      |
| 3/4"                     | 90-100%                   | NO. 4                    | 90-100%                   |
| 3/8"                     | 30-70%                    | NO. 16                   | 30-75%                    |
| NO. 4                    | 10-40%                    | NO. 200                  | 0-10%                     |
| NO. 200                  | 5-25%                     |                          |                           |
|                          | 0-10%                     |                          |                           |
- NOTE:
- ALL REQUIREMENTS OF THE SEWER UTILITY ORDINANCE MUST BE MET.
  - ANY VARIATION IN BEDDING GRADATIONS SHALL ONLY BE ALLOWED IF GRADATION OF ALTERNATIVE MATERIAL IS SUBMITTED TO AND APPROVED BY THE SEWER UTILITY ENGINEER PRIOR TO CONSTRUCTION.
  - TYPE 2 CLASS B AGGREGATE BASE SHALL CONFORM TO SECTION 200 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, AND SHALL BE MECHANICALLY COMPACTED IN CONFORMANCE WITH SECTION 308.05 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - CLASS A AND CLASS B BACKFILL AND BEDDING MATERIAL SHALL CONFORM TO SECTION 200 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. BEDDING AND BACKFILL SHALL BE MECHANICALLY COMPACTED IN CONFORMANCE WITH SECTION 305.10 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - PLACE WARNING TAPE 1" ABOVE SEWER PIPE.
  - SEWER PIPE COLOR SHALL BE GREEN FOR GRAVITY SEWER AND PURPLE FOR RECLAIMED WATER.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY DRAWING NO. DC-C02 DATE 9/6/2001 PAGE C-02

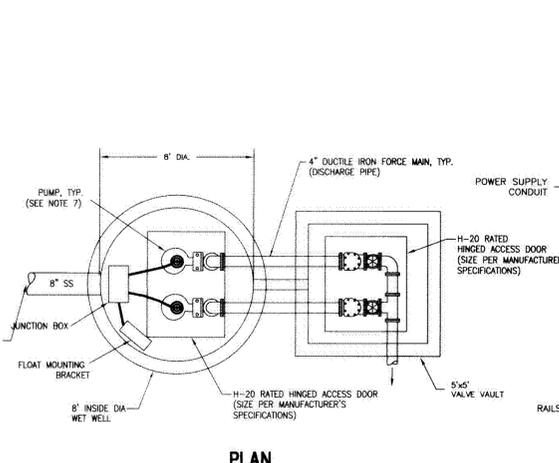
DETAIL V  
8,9  
10,11

- GENERAL NOTES
- EXISTING PAVEMENT TO BE MATCHED SHALL BE NEATLY CUT.
  - CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 202.12 OF THE STANDARD SPECIFICATIONS.
  - IN ALL AREAS, COVERS SHALL BE SET FLUSH WITH FINISHED GRADE UNLESS OTHERWISE NOTED.
  - APPLY BLACK COLORANT TO SURFACE OF P.C.C. COLLAR.



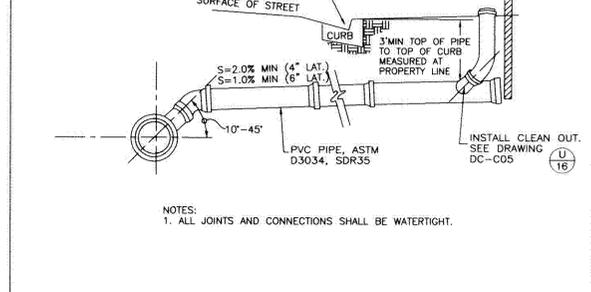
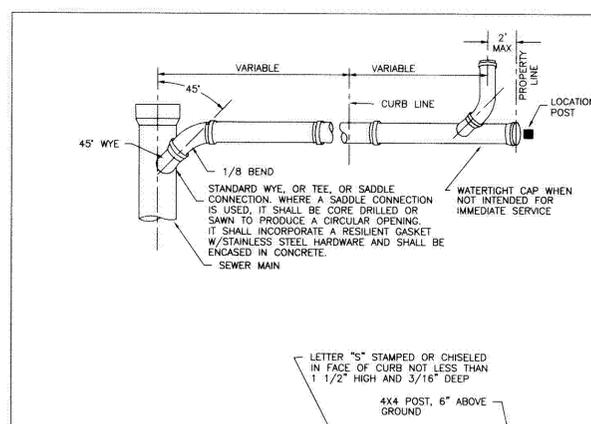
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION GARDNERVILLE RANCHOS QID DRAWING NO. X DATE X/X/X PAGE X

DETAIL S  
16



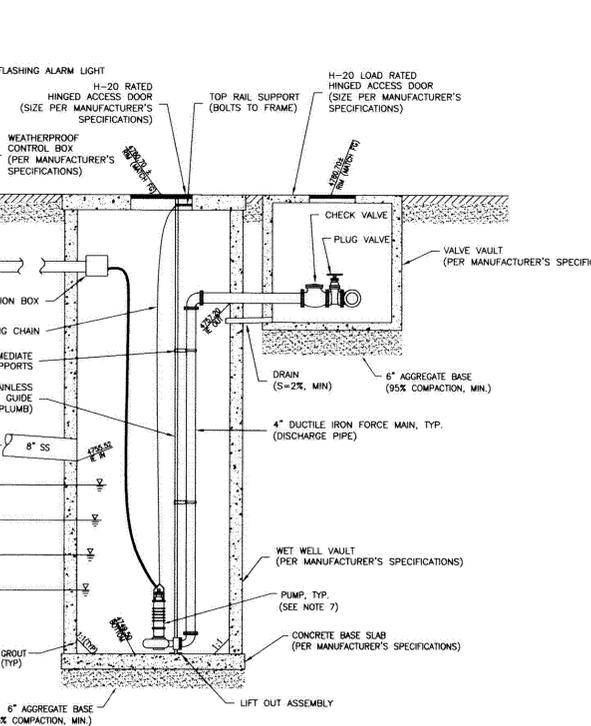
- NOTE:
- THE SS LIFT STATION SHALL CONFORM TO THE RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES (TEN STATES STANDARDS), THE GRID POLICES AND PROCEDURE MANUAL, AND THE MANUFACTURER'S RECOMMENDATIONS.
  - ALL HARDWARE INSIDE WET WELL SHALL BE STAINLESS STEEL.
  - FITTINGS INSIDE WET WELL SHALL HAVE AN EXTERIOR CORROSION PROTECTIVE LINING/COATING.
  - WET WELL WALLS SHALL BE PER MANUFACTURER'S SPECIFICATIONS. ALL JOINTS SHALL HAVE WATER TIGHT SEALS.
  - ALL WALL PENETRATIONS SHALL HAVE WATER TIGHT SEALS.
  - VENTS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
  - PUMPS SHALL BE SUBMERSIBLE PUMPS, RATED FOR 100 GPM AT 38' TDH.
  - 2 FT. MINIMUM CLEAR SPACE SHALL BE PROVIDED ON TWO SIDES OF THE PIPE TRAIN IN THE VALVE VAULT FOR SERVICEABILITY.
  - THE SS LIFT STATION SHALL BE INSTALLED WITH APPROPRIATE TELEMETRY AND CONNECTION TO THE GRID'S SCADA SYSTEM.
  - ON-SITE LIGHTING SHALL BE PROVIDED AT THE LIFT STATION.
  - A NON-FREEZE AND LOCKABLE YARD HYDRANT SHALL BE INSTALLED WITHIN THE FENCED LIFT STATION AREA.
  - STANDBY POWER SHALL BE PROVIDED, ONAN GAS GENERATOR OR APPROVED EQUAL.
  - CONTRACTOR TO COORDINATE W/ OWNER IN ADVANCE OF CONSTRUCTION.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY DRAWING NO. DC-C02 DATE 9/6/2001 PAGE C-02



NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY DRAWING NO. DC-C04 DATE 8/20/98 PAGE C-04

DETAIL T  
5,8  
9,10,11



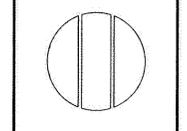
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY DRAWING NO. DC-C02 DATE 9/6/2001 PAGE C-02

DETAIL W  
6,8

ENGINEERING · PLANNING · RESOURCE MANAGEMENT

# RESOURCE CONCEPTS, INC.

340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
OFFICE: 775-885-1600 · FAX: 775-885-1656 · WEB SITE: www.rci-nv.com



REVISION	DATE	COMMENTS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

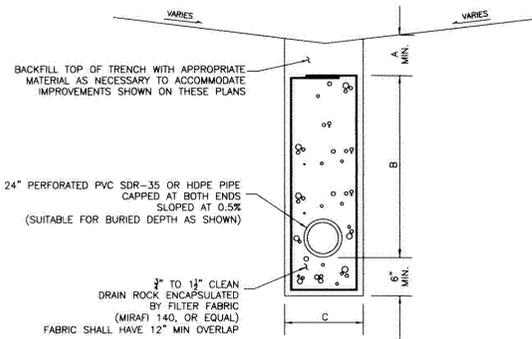
WATER, SEWER & STORM DRAIN DETAILS



JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

RECORD DRAWINGS

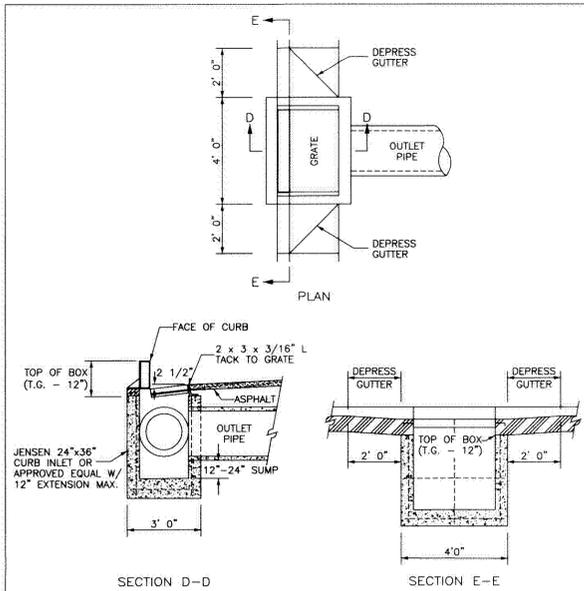
DATE: 5-18-07  
ENGINEER INITIAL: JEC



TRENCH DIMENSIONS			
LOCATION	A	B	C
Kingston Lane	2.0 FT	2.5 FT	3.0 FT
DRAYTON BLVD.	2.0 FT	7.5 FT	5.0 FT

**INFILTRATION TRENCH**  
NO SCALE

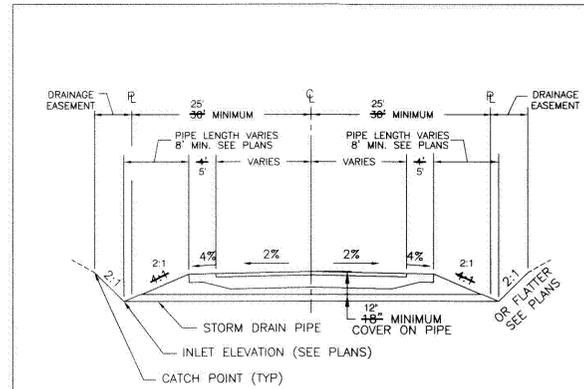
DETAIL **(X)**  
11  
13



- NOTE:
- SUBGRADE SHALL BE COMPACTED IN CONFORMANCE WITH SECTION 302 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - A MINIMUM OF 6 INCHES OF GRADED BEDDING MATERIAL AS DESCRIBED ON DETAIL DC-C02 SHALL BE CONSTRUCTED.
  - CONCRETE BOX SHALL BE DESIGNED FOR H-20 TRAFFIC LOAD.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			<b>TYPE 1A CURB INLET</b>	DRAWING NO. DC-D03 DATE 9/6/2001 PAGE D-03

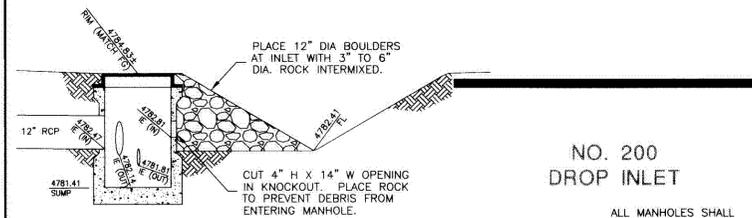
DETAIL **(Y)**  
6,11



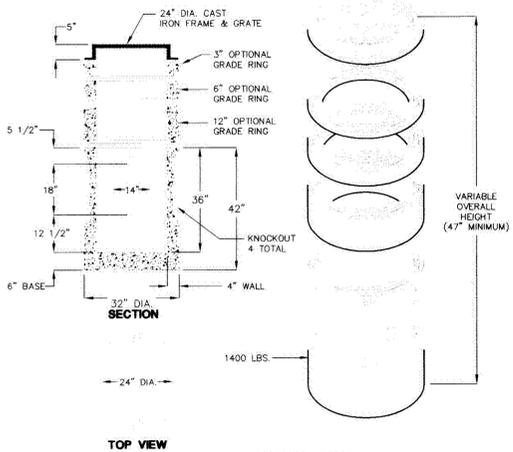
- SEE PLANS FOR INVERT ELEVATIONS.
- SEE PLANS FOR REQUIRED INLET AND/OR OUTLET PROTECTION.
- MINIMUM COVER OVER PIPE SHALL BE 18" IN THE ROADWAY AND SHOULDER AREAS.
- SEE PLANS FOR EASEMENT LIMITS WHERE REQUIRED TO ACCOMMODATE CONSTRUCTION OF THE ROADWAY AND DRAINAGE FACILITIES.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			<b>ROADWAY CULVERT DETAIL (RURAL ROADS ONLY)</b>	DRAWING NO. DC-D15 DATE 9/6/2001 PAGE D-12

MODIFIED  
DETAIL **(Z)**  
13



**RUBIO WAY SECTION**



**NO. 200 DROP INLET**

TOP VIEW

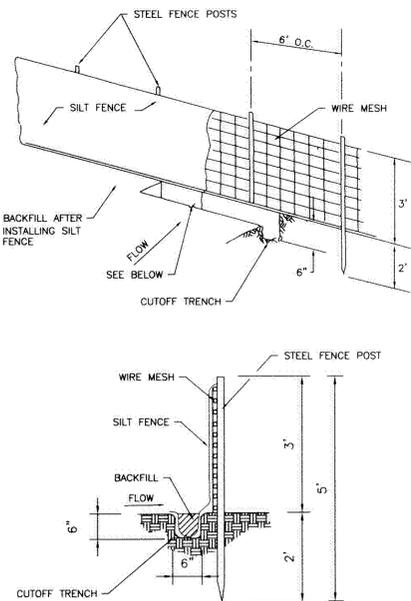
DESCRIPTION	APPROX. WT.
2432 GR-03 GRADE RING	92 LBS.
2432 GR-06 GRADE RING	183 LBS.
2432 GR-12 GRADE RING	366 LBS.

DESIGN LOAD:  
H-20 TRAFFIC  
FOR COMPLETE DESIGN  
AND PRODUCT INFORMATION,  
CONTACT JENSEN PRECAST.

9/30/05  
02000 Rev  
© 2002 Jensen Precast

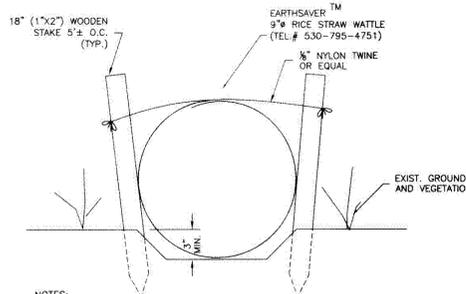
**JENSEN PRECAST**

DETAIL **(AB)**  
5  
11,13



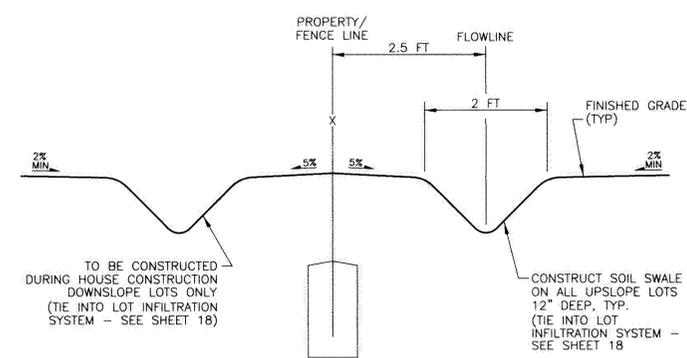
**TYPICAL SILT FENCE**  
NO SCALE

DETAIL **(AC)**  
4



**STRAW WATTLE DETAIL**  
NO SCALE

DETAIL **(AD)**  
4



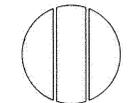
**LOT DRAINAGE SWALE**  
NO SCALE

DETAIL **(AE)**  
6,7

**RECORD DRAWINGS**

DATE: 5-18-07 ENGINEER INITIAL: JEC

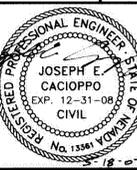
ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
OFFICE: 775-883-1600 · FAX: 775-883-1666 · WEB SITE: www.rci-nv.com



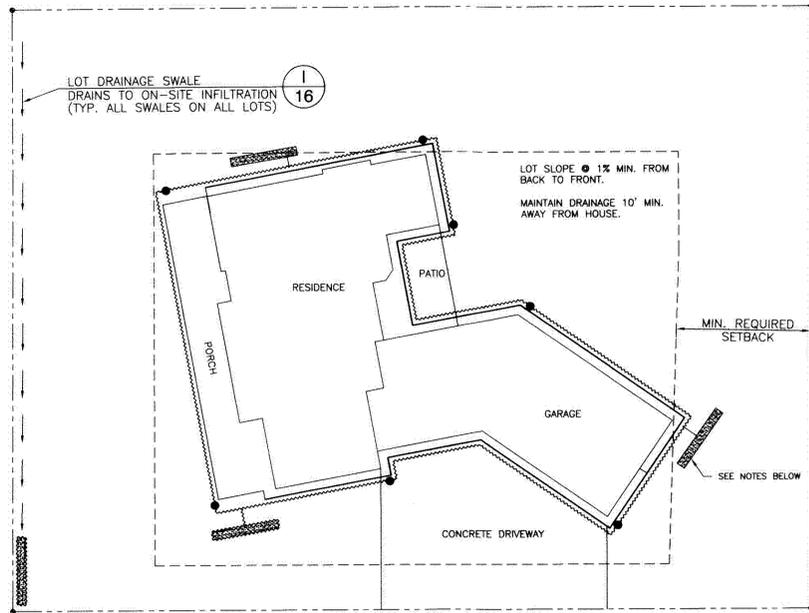
REVISION	DATE
RESPOND TO GRGD COMMENTS	3/7/06
ADD ADDENDUM SHEETS	6/8/06
RESPOND TO NDEP COMMENTS	6/28/06
RECORD DRAWINGS	5/18/07

IMPROVEMENT PLANS  
**RAIN SHADOW RANCH - PHASE 1**  
DOUGLAS COUNTY, NEVADA

STORM DRAIN & EROSION CONTROL DETAILS



JOB NO: 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC  
SHEET 17 OF 21



LEGEND

- INDICATES FRENCH DRAIN ROUTING
- INDICATES GUTTER DOWN SPOUT LOCATION
- INDICATES APPROX. DRYWELL LOCATION (ACTUAL LOCATION & CONFIGURATION WILL VARY)

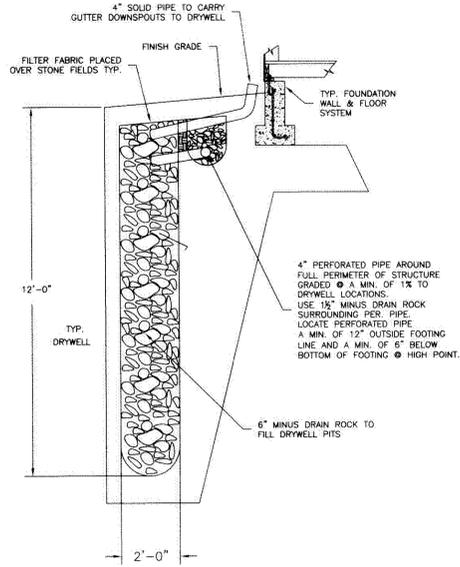
NOTES:

1. LOT SLOPE 1% MIN. FROM BACK TO FRONT.
2. MAINTAIN DRAINAGE 10' MIN. AWAY FROM HOUSE.
3. REFER TO DRAINAGE REPORT FOR FURTHER INFORMATION.
4. RETAINING WALLS TO BE CONSTRUCTED AT THE BACK OF SIDEWALK ARE INTENDED TO PREVENT LOT DRAINAGE FROM ENTERING THE STREET. CONTRACTOR TO COORDINATE WITH OWNER ON WALLS.

TYPICAL LOT INFILTRATION

NO SCALE

DETAIL AF 6.7

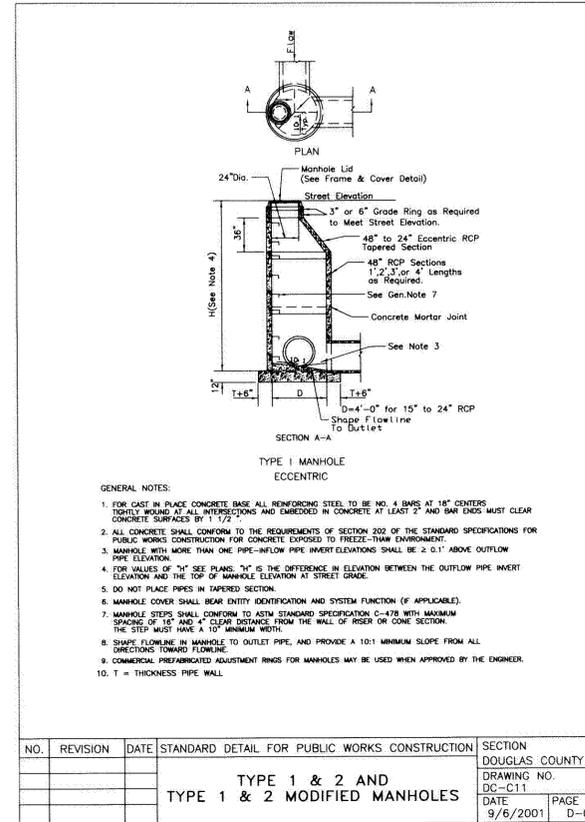


TYPICAL FRENCH DRAIN & DRYWELL CONFIGURATION

NO SCALE

NOTE:

THE TOTAL REQUIRED LENGTH OF INFILTRATION TRENCH FOR EACH LOT IS 10 FT PER THE INFILTRATION SYSTEM DESIGN FOR LOTS REVISED ON MAY 10, 2006. AS SHOWN ON THE ABOVE TYPICAL LOT INFILTRATION DETAIL, AS MANY AS THREE INFILTRATION TRENCHES MAY BE CONSTRUCTED ON SITE. THE SUM OF ALL CONSTRUCTED TRENCHES ON EACH LOT SHALL BE EQUAL TO OR GREATER THAN THE REQUIRED 10 FT LENGTH.

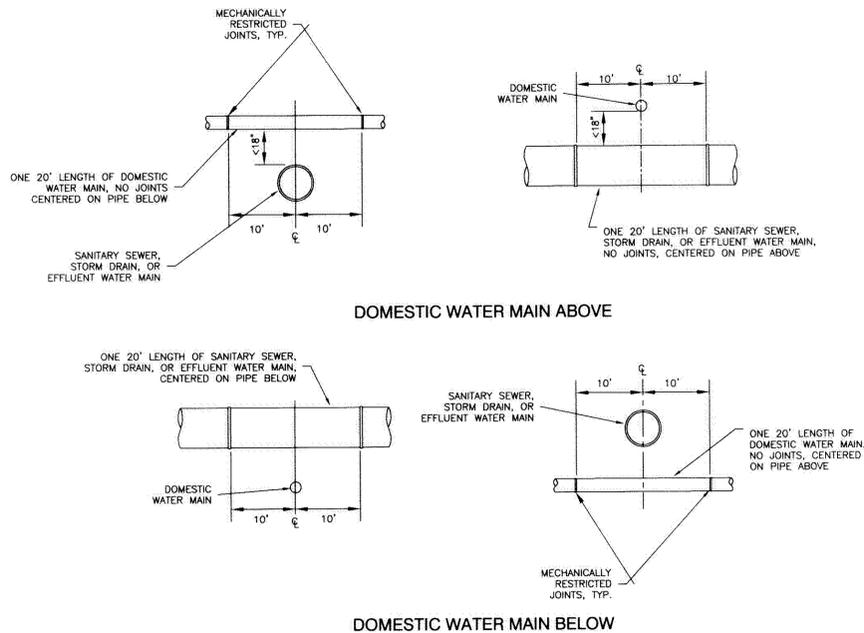


GENERAL NOTES:

1. FOR CAST IN PLACE CONCRETE BASE ALL REINFORCING STEEL TO BE NO. 4 BARS AT 18" CENTERS TIGHTLY WOUND AT ALL INTERSECTIONS AND EMBEDDED IN CONCRETE AT LEAST 2" AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 1/2".
2. ALL CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION FOR CONCRETE EXPOSED TO FREEZE-THAW ENVIRONMENT.
3. MANHOLE WITH MORE THAN ONE PIPE-INFLOW PIPE INVERT ELEVATIONS SHALL BE 2.0' ABOVE OUTFLOW PIPE ELEVATION.
4. FOR VALUES OF "Y" SEE PLANS. "Y" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.
5. DO NOT PLACE PIPES IN TAPERED SECTION.
6. MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION (IF APPLICABLE).
7. MANHOLE STEPS SHALL CONFORM TO ASTM STANDARD SPECIFICATION C-478 WITH MAXIMUM SPACING OF 16" AND 4" CLEAR DISTANCE FROM THE WALL OF RISE ON CONE SECTION. THE STEP MUST HAVE A 10" MINIMUM WIDTH.
8. SHAPE FLOWLINE IN MANHOLE TO OUTLET PIPE, AND PROVIDE A 10:1 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARD FLOWLINE.
9. COMMERCIAL PREFABRICATED ADJUSTMENT RINGS FOR MANHOLES MAY BE USED WHEN APPROVED BY THE ENGINEER.
10. T = THICKNESS PIPE WALL.

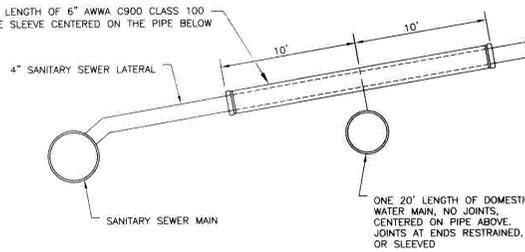
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			TYPE 1 & 2 AND TYPE 1 & 2 MODIFIED MANHOLES	DRAWING NO. DC-C11
				DATE 9/6/2001 PAGE D-01

DETAIL AG 11 13



UTILITY CROSSING DETAILS

NO SCALE  
DETAIL AH 2.5

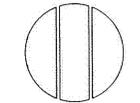


WATER CROSSING UNDER DOMESTIC SEWER LATERAL

RECORD DRAWINGS

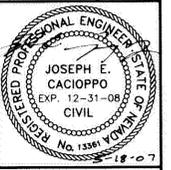
DATE 5-18-07 ENGINEER INITIAL JEC

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
OFFICE 775-883-1600 · FAX: 775-883-1666 · WEB SITE: www.rcnrv.com



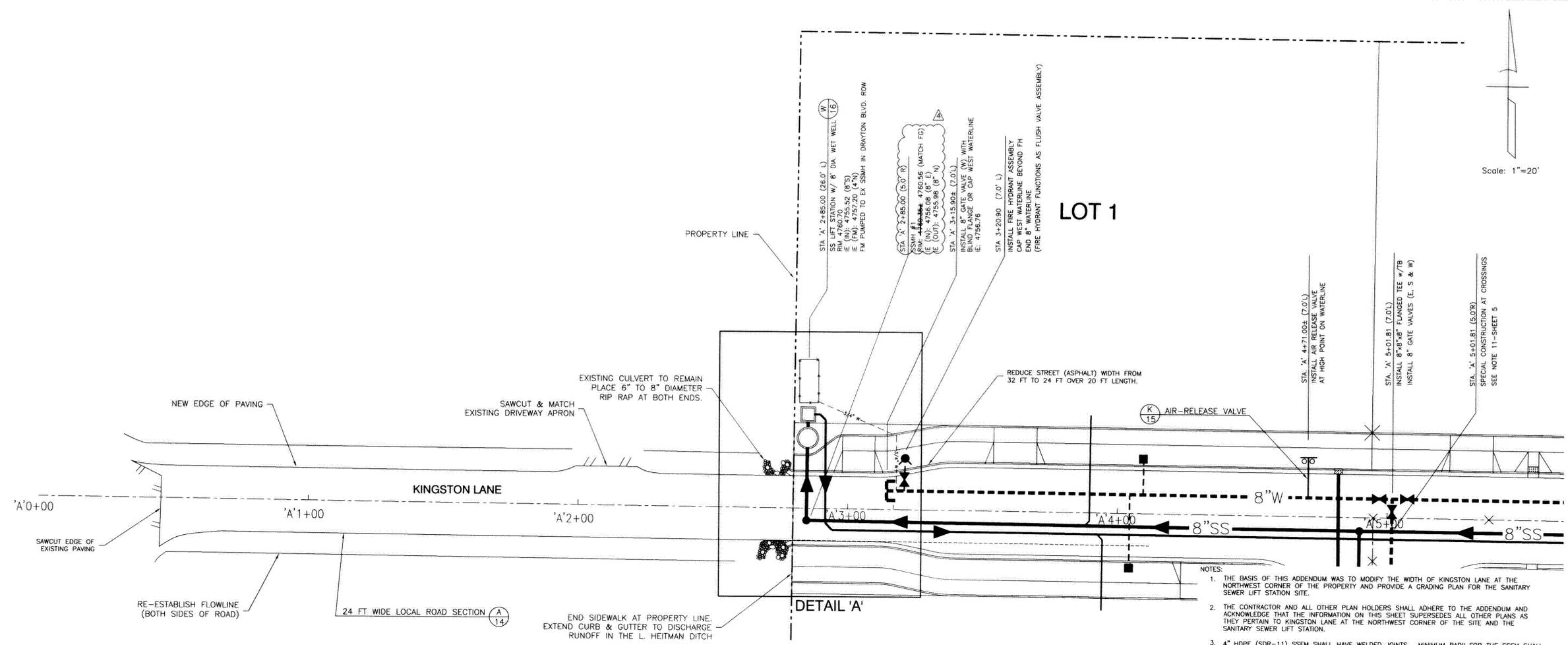
REVISION	DATE	COMMENTS
1	3/1/06	RESPOND TO GRID COMMENTS
2	6/8/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA  
STORM DRAIN AND UTILITY CROSSING DETAILS

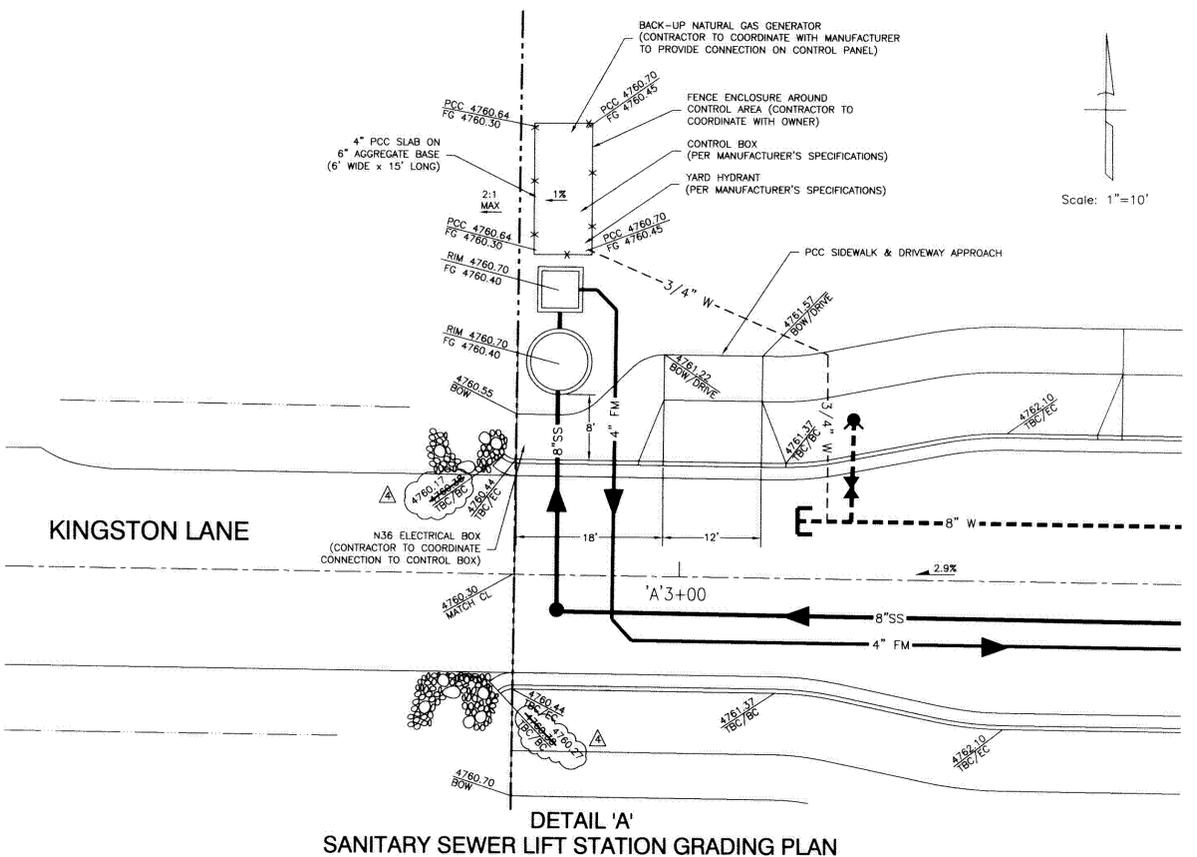


JOB NO. 04-125-01  
DATE: JAN. 3, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

SHEET 18 OF 21

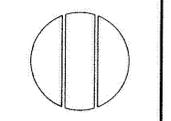


- NOTES:
1. THE BASIS OF THIS ADDENDUM WAS TO MODIFY THE WIDTH OF KINGSTON LANE AT THE NORTHWEST CORNER OF THE PROPERTY AND PROVIDE A GRADING PLAN FOR THE SANITARY SEWER LIFT STATION SITE.
  2. THE CONTRACTOR AND ALL OTHER PLAN HOLDERS SHALL ADHERE TO THE ADDENDUM AND ACKNOWLEDGE THAT THE INFORMATION ON THIS SHEET SUPERSEDES ALL OTHER PLANS AS THEY PERTAIN TO KINGSTON LANE AT THE NORTHWEST CORNER OF THE SITE AND THE SANITARY SEWER LIFT STATION.
  3. 4" HDPE (SDR-11) SSFM SHALL HAVE WELDED JOINTS. MINIMUM RADI FOR THE SSFM SHALL BE IN ACCORDANCE WITH THE PIPE AND PUMP MANUFACTURER'S SPECIFICATIONS.



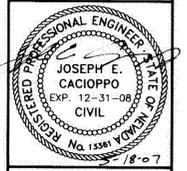
DETAIL 'A'  
SANITARY SEWER LIFT STATION GRADING PLAN

ENGINEERING · PLANNING · RESOURCE MANAGEMENT  
**RESOURCE CONCEPTS, INC.**  
 340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
 OFFICE: 775-883-1600 · FAX: 775-883-1686 · WEB SITE: www.rcn-rm.com



REVISION	DATE	COMMENTS
1	3/1/06	RESPOND TO GRID COMMENTS
2	6/8/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

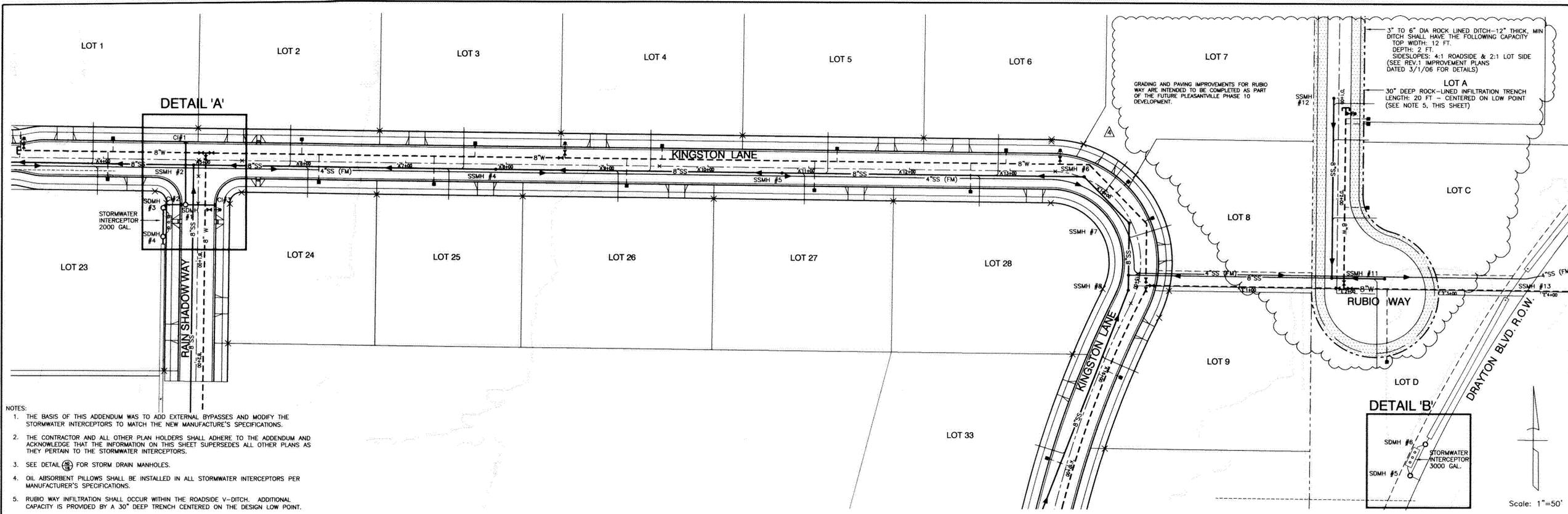
IMPROVEMENT PLANS  
 RAIN SHADOW RANCH - PHASE 1  
 DOUGLAS COUNTY, NEVADA  
 ADDENDUM 1  
 GRADING PLAN - SS LIFT STATION



**RECORD DRAWINGS**  
 DATE: 5-18-07  
 ENGINEER INITIAL: JEC

Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
 1-800-227-2600  
 UNDERGROUND SERVICE ALERT (USA)

JOB NO:	04-125-01
DATE:	MAY 16, 2006
DESIGNED:	JEC/TEO
DRAWN:	FRB
CHECKED:	JEC
<b>SHEET 19 OF 21</b>	

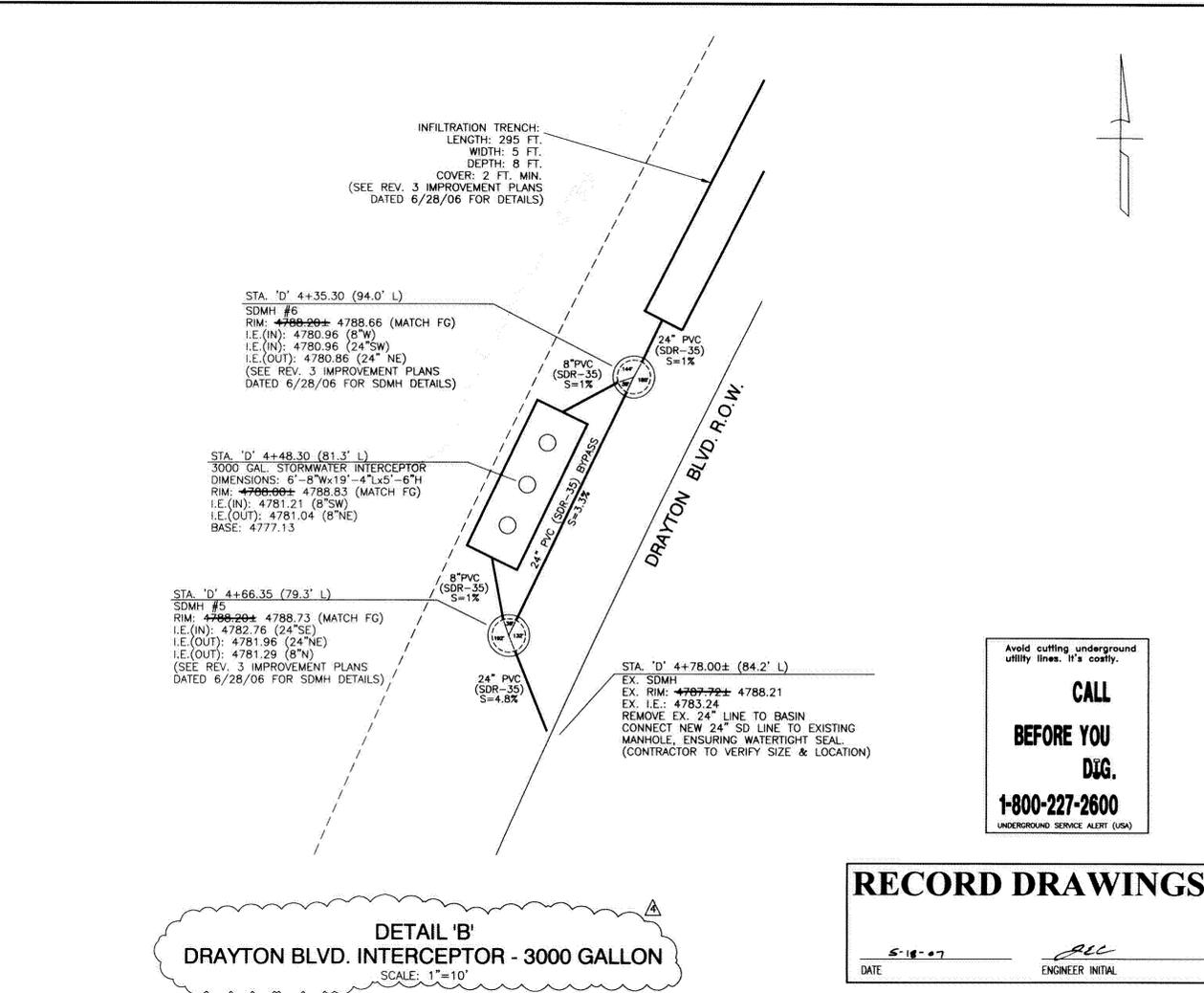
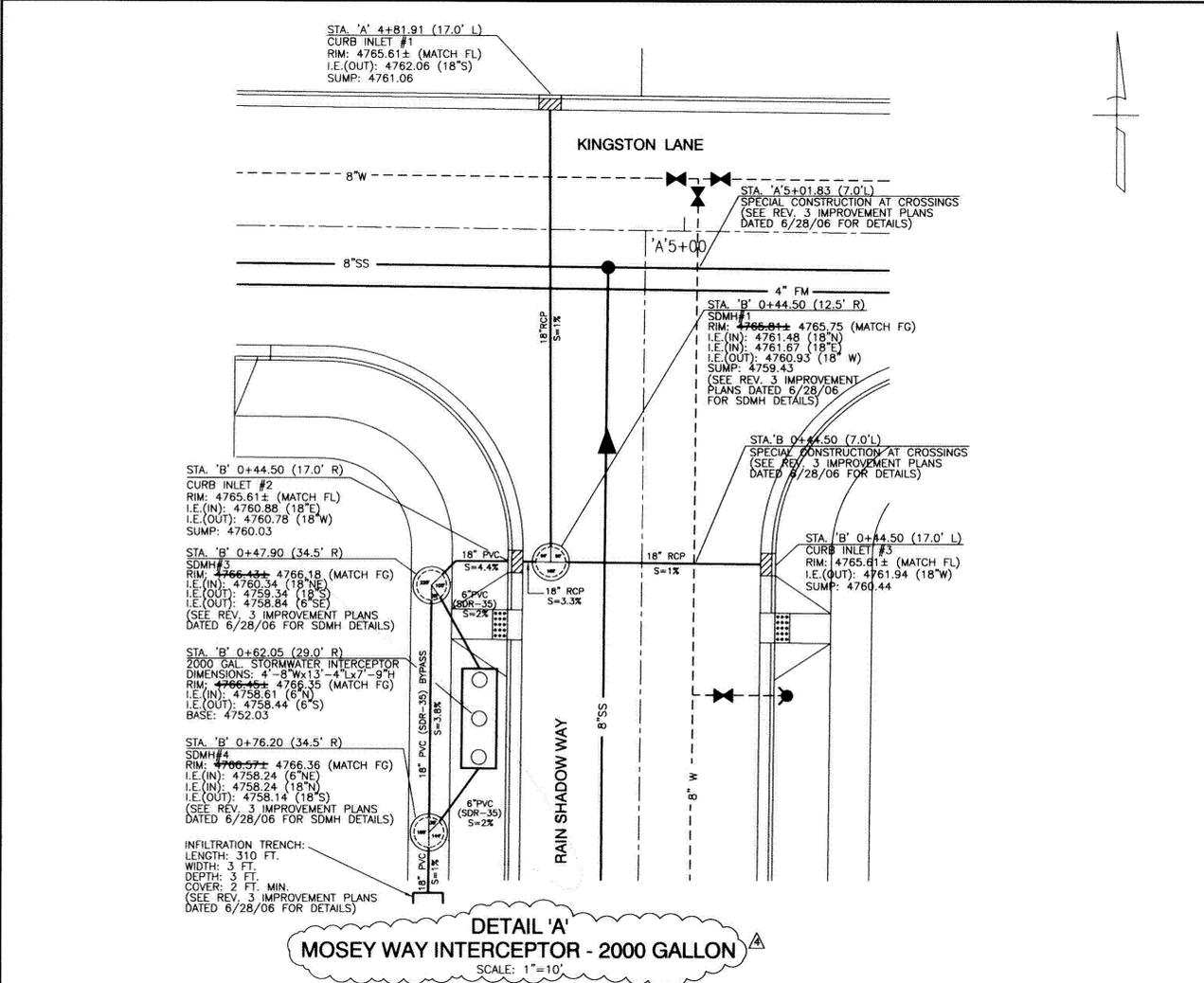


- NOTES:
1. THE BASIS OF THIS ADDENDUM WAS TO ADD EXTERNAL BYPASSES AND MODIFY THE STORMWATER INTERCEPTORS TO MATCH THE NEW MANUFACTURER'S SPECIFICATIONS.
  2. THE CONTRACTOR AND ALL OTHER PLAN HOLDERS SHALL ADHERE TO THE ADDENDUM AND ACKNOWLEDGE THAT THE INFORMATION ON THIS SHEET SUPERSEDES ALL OTHER PLANS AS THEY PERTAIN TO THE STORMWATER INTERCEPTORS.
  3. SEE DETAIL (A) FOR STORM DRAIN MANHOLES.
  4. OIL ABSORBENT PILLOWS SHALL BE INSTALLED IN ALL STORMWATER INTERCEPTORS PER MANUFACTURER'S SPECIFICATIONS.
  5. RUBIO WAY INFILTRATION SHALL OCCUR WITHIN THE ROADSIDE V-DITCH. ADDITIONAL CAPACITY IS PROVIDED BY A 30" DEEP TRENCH CENTERED ON THE DESIGN LOW POINT.

ENGINEERING · PLANNING · RESOURCE MANAGEMENT

# RESOURCE CONCEPTS, INC.

340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4152  
OFFICE: 775-883-1600 · FAX: 775-883-1656 · WEB SITE: www.rci-nv.com



REVISION	DATE	DESCRIPTION
1	3/1/06	RESPOND TO GRID COMMENTS
2	6/8/06	ADD ADDENDUM SHEETS
3	6/28/06	RESPOND TO NDEP COMMENTS
4	5/18/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

ADDENDUM 2  
STORM DRAIN INTERCEPTORS

CALL BEFORE YOU DIG.  
1-800-227-2600  
UNDERGROUND SERVICE ALERT (USA)

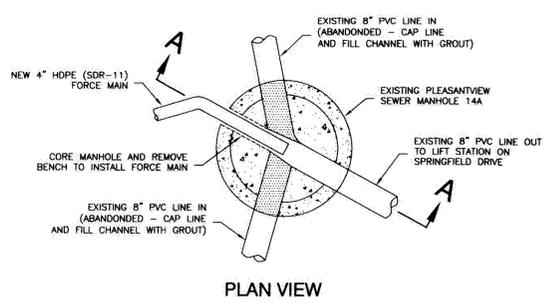
PROFESSIONAL ENGINEER  
JOSEPH E. CACIOPPO  
EXP. 12-31-08  
CIVIL

JOB NO: 04-125-01  
DATE: MAY 18, 2006  
DESIGNED: JEC/TEO  
DRAWN: FRB  
CHECKED: JEC

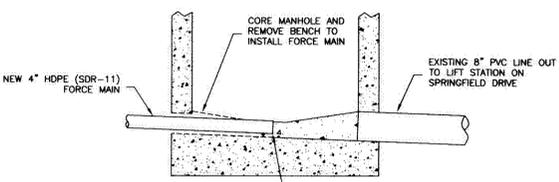
SHEET 20 OF 21

RECORD DRAWINGS

DATE: 5-18-07  
ENGINEER INITIAL: JEC



PLAN VIEW

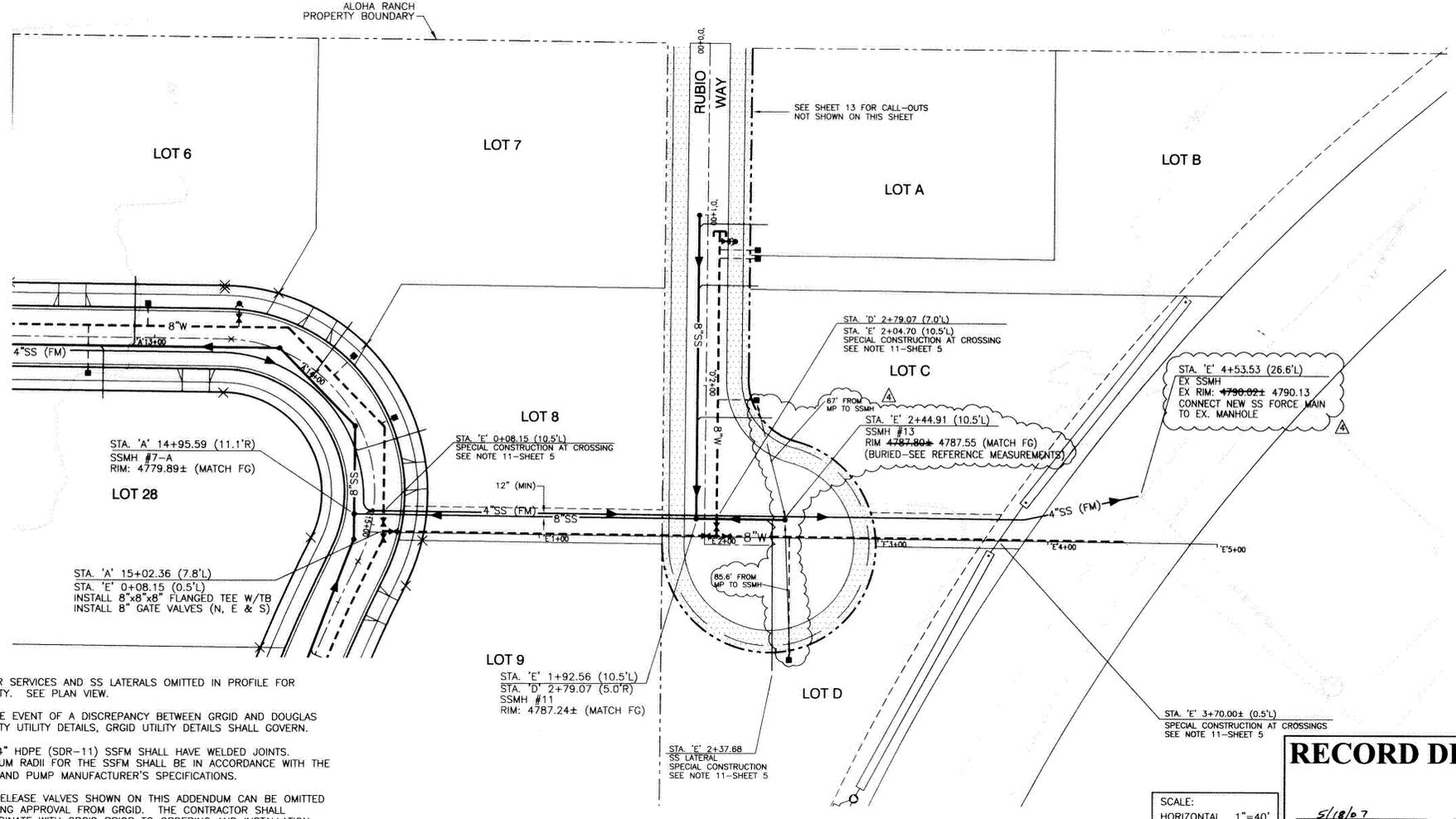


SECTION A-A

FORCE MAIN ENTRANCE DETAIL  
NOT TO SCALE

NOTES:

- THE BASIS OF THIS ADDENDUM WAS TO MODIFY THE SEWER SYSTEM ALONG LINE 'E' TO COMPENSATE FOR UNEXPECTED CONDITIONS ENCOUNTERED IN THE FIELD. THE LOTS LOCATED ON RUBIO WAY SHALL BE CONVEYED TO THE LIFT STATION AT THE NORTH-WEST CORNER OF THE ALOHA DEVELOPMENT VIA A GRAVITY SYSTEM. THE FORCE MAIN SHALL DISCHARGE INTO THE EXISTING MANHOLE IN THE DRAYTON BLVD. RIGHT-OF-WAY.
- THE CONTRACTOR AND ALL OTHER PLAN HOLDERS SHALL ADHERE TO THE ADDENDUM AND ACKNOWLEDGE THAT THE INFORMATION ON THIS SHEET SUPERSEDES ALL OTHER PLANS AS THEY PERTAIN TO THE SANITARY SEWER ALONG LINE 'E'.
- FOR CLARITY, ONLY THE DETAILS OF UTILITIES BEING MODIFIED AS PART OF THIS ADDENDUM ARE SHOWN. SSMH'S 5,6,7 & 8 HAVE BEEN UPDATED TO REFLECT THE SANITARY SEWER REVISIONS DATED 4/06. REFER TO THE REVISION 1 IMPROVEMENT PLANS DATED 1/06 FOR ADDITIONAL INFORMATION.
- WATER SERVICES AND SS LATERALS OMITTED IN PROFILE FOR CLARITY. SEE PLAN VIEW.
- IN THE EVENT OF A DISCREPANCY BETWEEN GRGD AND DOUGLAS COUNTY UTILITY DETAILS, GRGD UTILITY DETAILS SHALL GOVERN.
- THE 4" HDPE (SDR-11) SSFM SHALL HAVE WELDED JOINTS. MINIMUM RADII FOR THE SSFM SHALL BE IN ACCORDANCE WITH THE PIPE AND PUMP MANUFACTURER'S SPECIFICATIONS.
- AIR RELEASE VALVES SHOWN ON THIS ADDENDUM CAN BE OMITTED PENDING APPROVAL FROM GRGD. THE CONTRACTOR SHALL COORDINATE WITH GRGD PRIOR TO ORDERING AND INSTALLATION.

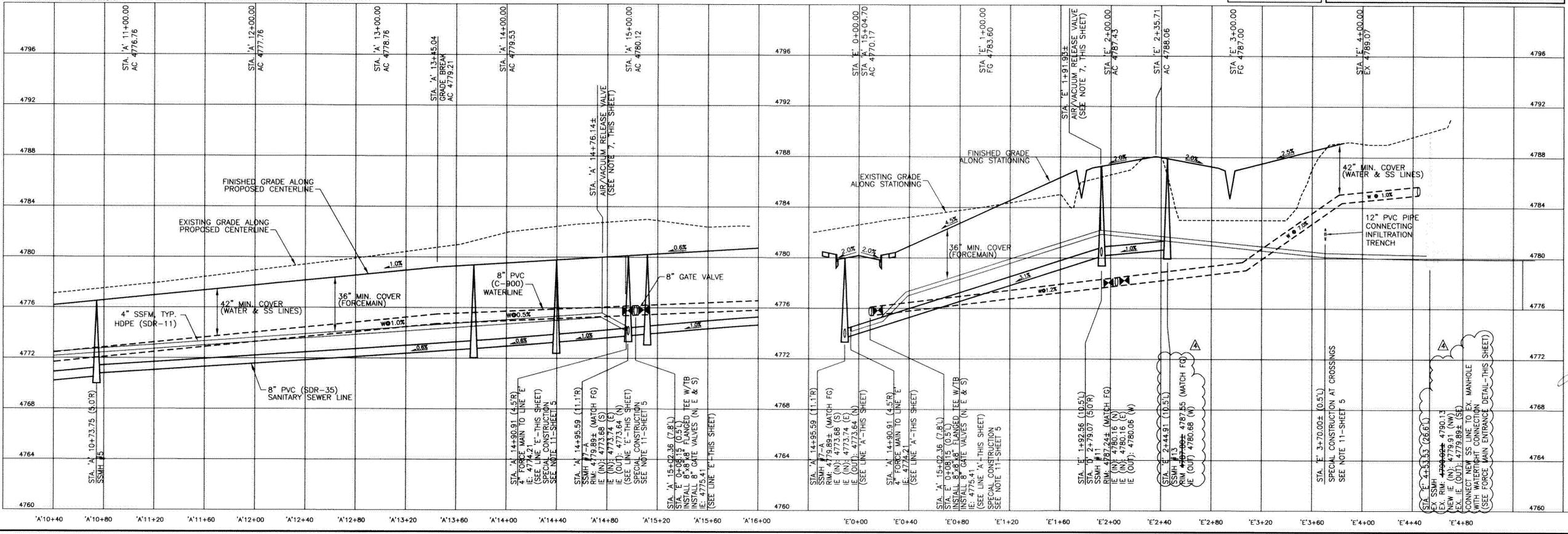


Avoid cutting underground utility lines. It's costly.  
**CALL BEFORE YOU DIG.**  
1-800-227-2600  
UNDERGROUND SERVICE ALERT (USA)

RECORD DRAWINGS

SCALE:  
HORIZONTAL 1"=40'  
VERTICAL 1"=4'

DATE: 5/10/07  
ENGINEER INITIAL: JEC



ENGINEERING · PLANNING · RESOURCE MANAGEMENT

# RESOURCE CONCEPTS, INC.

340 N. MINNESOTA ST. · CARSON CITY, NEVADA 89703-4162  
OFFICE: 775-883-1800 · FAX: 775-883-1868 · WEB SITE: www.rcn-ny.com

REVISION	DATE	DESCRIPTION
1	3/1/06	RESPOND TO GRGD COMMENTS
2	6/8/06	ADD ADDENDUM SHEETS
3	9/28/06	RESPOND TO NECP COMMENTS
4	5/19/07	RECORD DRAWINGS

IMPROVEMENT PLANS  
RAIN SHADOW RANCH - PHASE 1  
DOUGLAS COUNTY, NEVADA

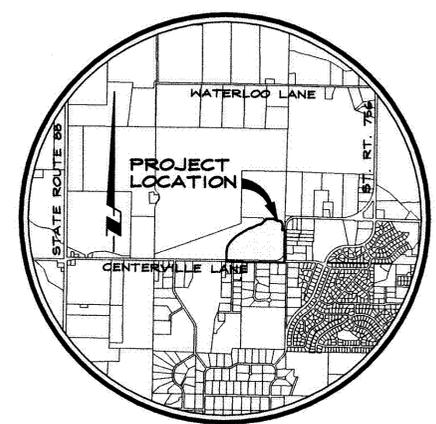
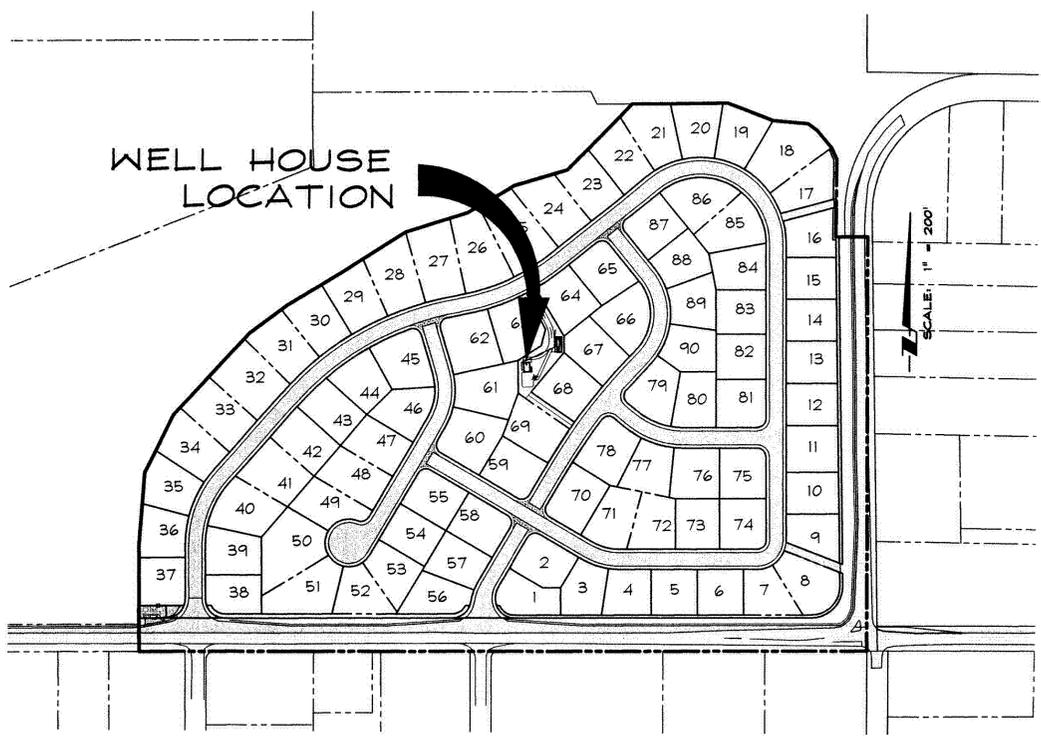
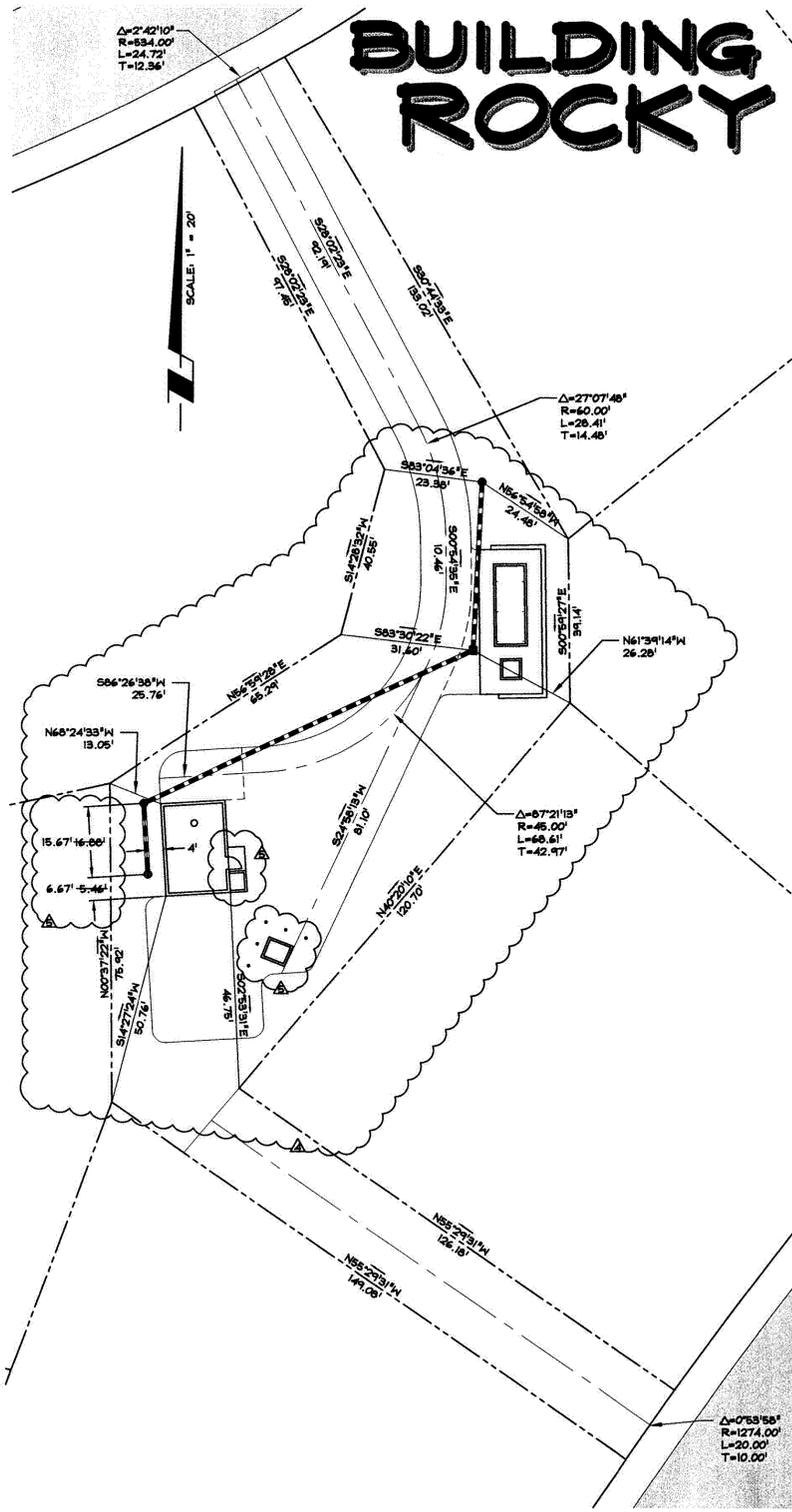
APPENDUM 3  
LINE 'E' SANITARY SEWER

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA  
JOSEPH E. CACIOPPO  
EXP. 12-31-08  
CIVIL  
NO. 15381

JOB NO. 04-125-01  
DATE: MAY 23, 2006  
DESIGNED: JEC/TEO  
DRAWN: TEO  
CHECKED: JEC

SHEET 21 OF 21

# ROCKY TERRACE BUILDING PERMIT PLANS FOR WELL HOUSE ROCKY TERRACE ESTATES, LLC



RECORD INFORMATION  
AS NOTED

### PROJECT INDEX

W01	COVER SHEET
W02	SITE AND GRADING PLAN
W03	WATER SYSTEM LAYOUT AND DETAILS
W04	BUILDING ELEVATIONS
W05	BUILDING PLANS & DETAILS
W06	DETAILS: STORM DRAIN AND WELL

NO.	DATE	REVISION BLOCK	BY
Δ	02/03/06	VARIOUS REVISIONS TO SHEET PER GRGID REVIEW COMMENTS	GHS
Δ	03/03/06	DELETE FENCE/ADD PAVEMENT PER GRGID REVIEW COMMENTS	GHS
Δ	07/06/06	REVISED PLAN TO SHOW NEW GENERATOR LOCATION	GHS
Δ	07/10/06	REVISED PLAN TO RESTORE PAVING EXTENTS	GHS
Δ	10/23/06	REVISED PLAN SET FOR RECORD INFORMATION	GHS

**R|O|Anderson**  
1609 ESHERALDA AVENUE / POST OFFICE BOX 2229  
TRINIDAD, NEVADA 89435  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE WELL HOUSE**  
**ROCKY TERRACE ESTATES, L.L.C.**

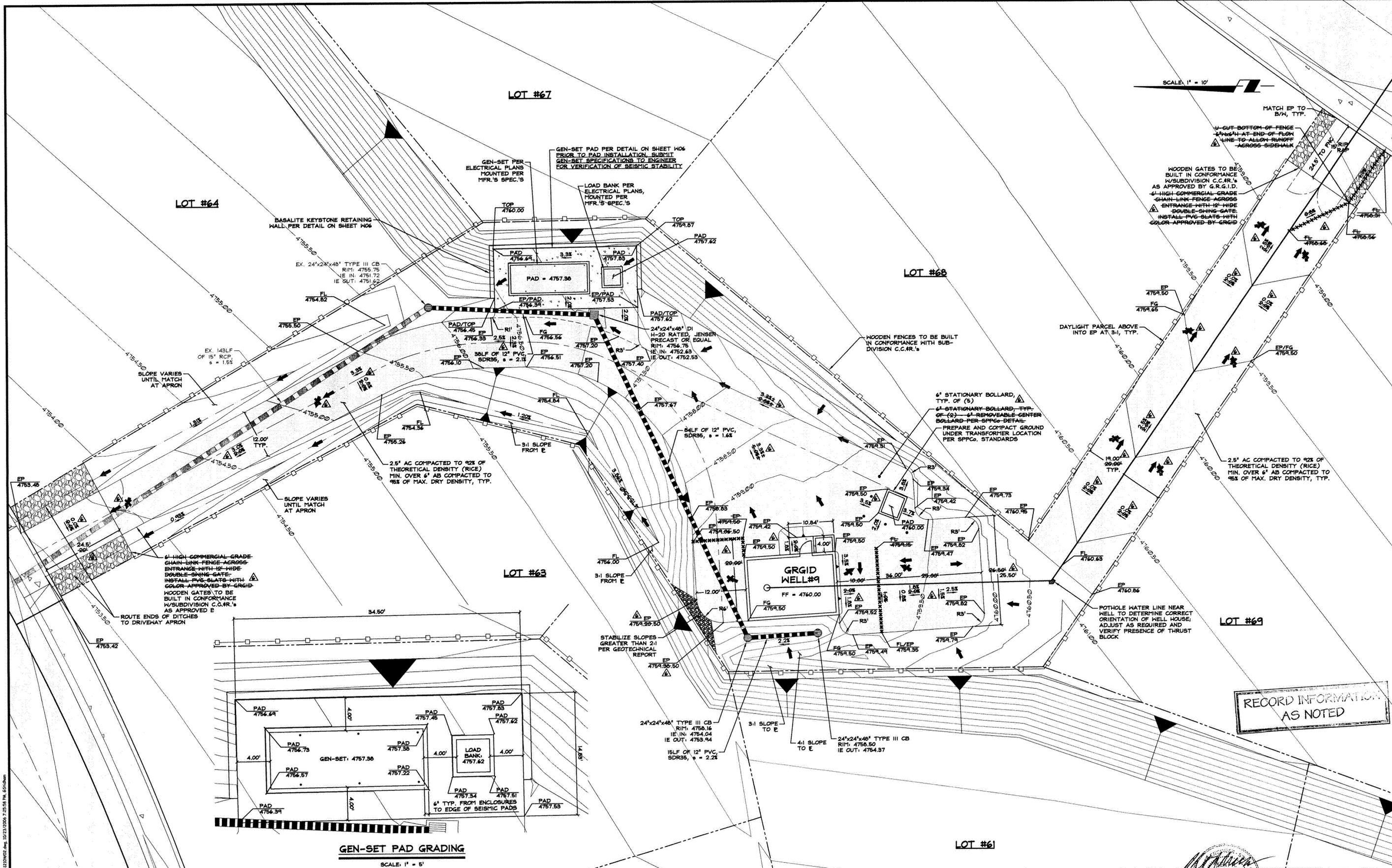
COVER SHEET

10-24-06

DRAWN: CHG, JRC, JMR, NOS  
ENGINEER: ROA  
SCALE: AS NOTED  
DATE: 10/23/06

JOB: 0412-010  
DRAWING: 41210W01  
SHEET: W01  
OF: W06 SHEETS

Z:\PROJECTS\41210W01.dwg, 10/23/2006, 4:14:42 PM, G:\admin



NO.	DATE	REVISION BLOCK	BY
1	02/03/06	VARIOUS REVISIONS TO SHEET PER GRGD REVIEW COMMENTS	GWS
2	03/03/06	DELETED GEN-SET FENCE AND ADDED PAVEMENT PER GRGD	GWS
3	03/21/06	VARIOUS REVISIONS PER GRGD & FIRE DEPT. REVIEW	GWS
4	06/21/06	REVISED SHEET TO MOVE GENERATOR AND REDUCE PAVING	GWS
5	07/10/06	REVISED SHEET TO RESTORE ORIGINAL PAVING EXTENTS	GWS
6	10/23/06	REVISED PLAN SET FOR RECORD INFORMATION	GWS

**R|O Anderson**  
 1403 EMERALDA AVENUE / POST OFFICE BOX 2229  
 RENO, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

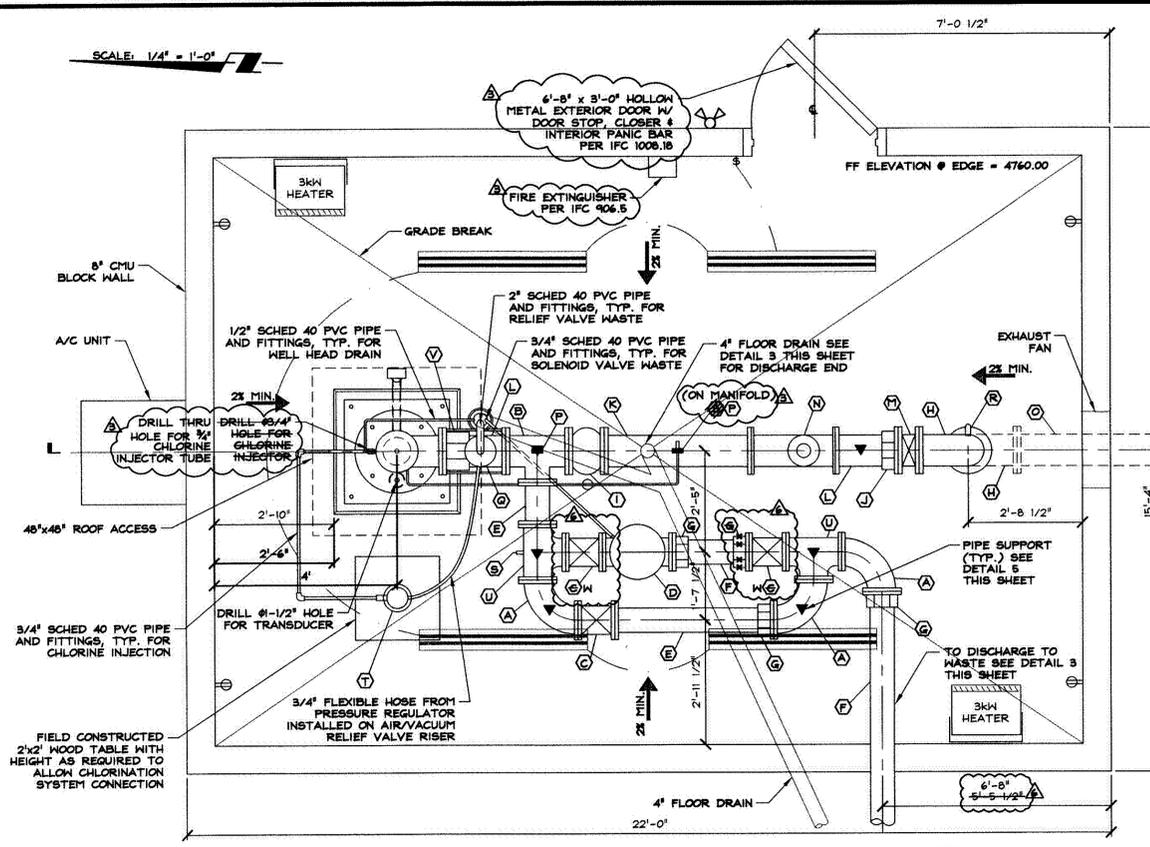
**ROCKY TERRACE WELL HOUSE**  
**ROCKY TERRACE ESTATES, LLC**

**SITE AND GRADING PLAN**



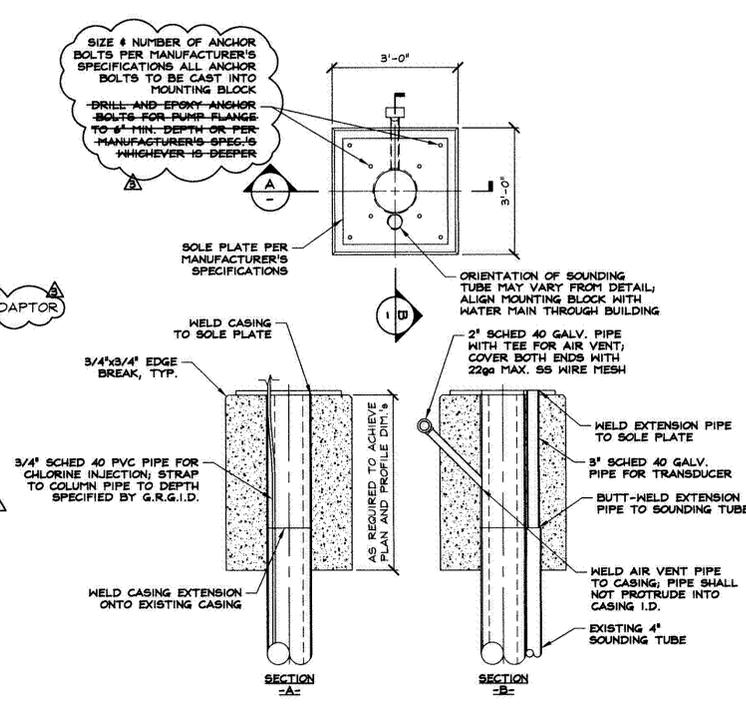
DRAWN: JRC	JOB: 0412-010
ENGINEER: ROA	DRAWING: 41210W02
SCALE: 1" = 10'	SHEET: W02
DATE: 10/23/06	OF: W06 SHEETS

SCALE: 1/4" = 1'-0"

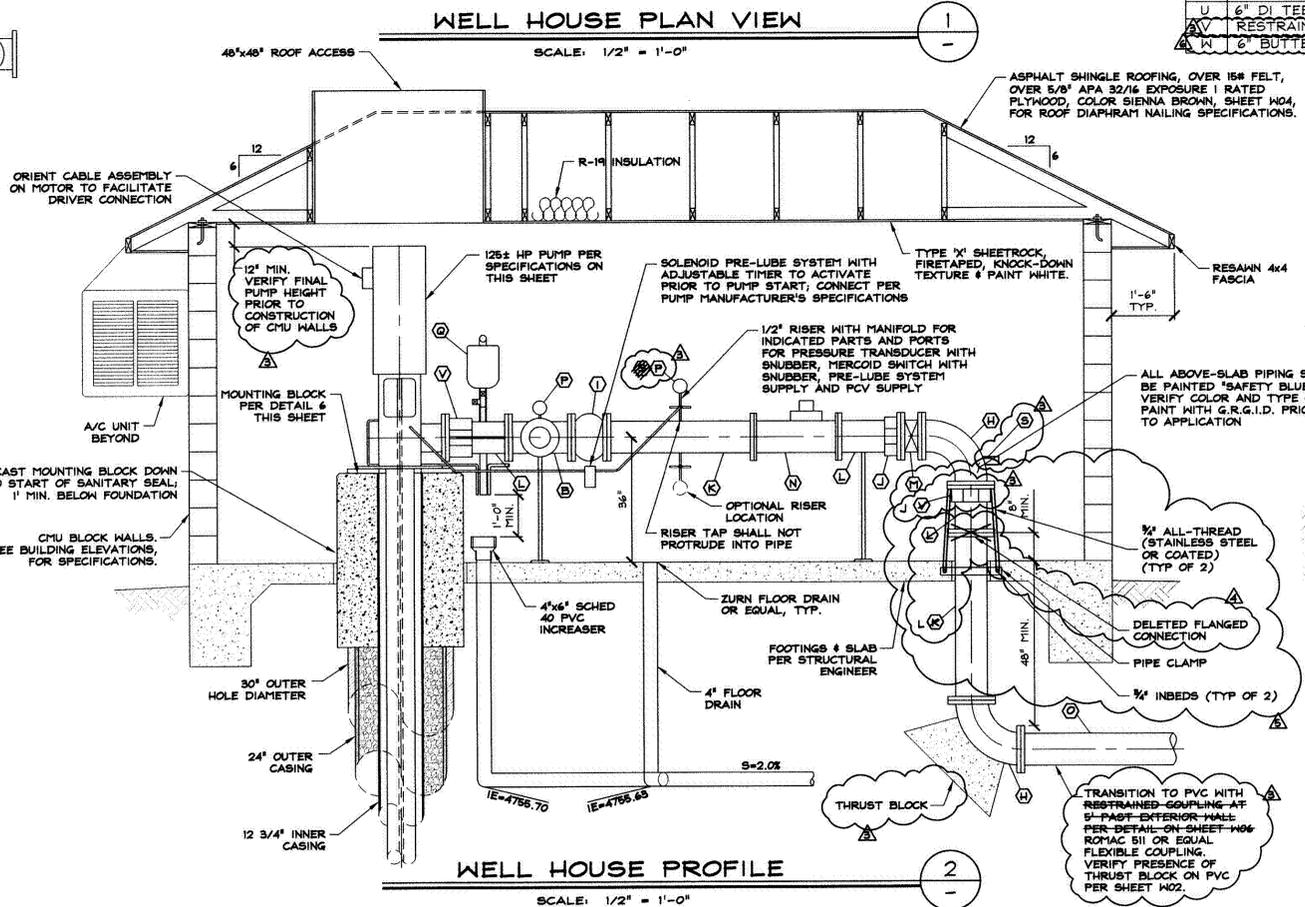


ELECTRICAL SYMBOLS	
DUPLX RECEPTACLE	⊖
LIGHT WITH PHOTO SENSOR	☼
FLUSH MOUNT FLUORESCENT LIGHT	⊖
WALL SWITCH	⊖
ELECTRICAL PANEL	⊖

ITEM	DESCRIPTION
A	6" 90° DI LONG RADIUS BEND - FLXFL
B	8"x8"x6" DI TEE - FLXFL
C	6" GATE VALVE - (MUELLER A-2360 OR EQUAL) - FLXFL
D	6" PUMP CONTROL VALVE (CLA-VAL 61-02 OR EQUAL) - FLXFL
E	6" DI SPOOL - FLXFL
F	6" DI SPOOL - FLXPE
G	6" RESTRAINED F.C.A. (FORD METER BOX CO. UNI-FLANGE OR EQUAL)
H	8" 90° DI LONG RADIUS BEND - FLXFL
I	8" GLOBE STYLE SILENT CHECK VALVE (APCO 608 OR EQUAL) - FLXFL
J	8" RESTRAINED F.C.A. (FORD METER BOX CO. UNI-FLANGE OR EQUAL) (MEGAFLANGE SERIES 2100 OR EQUAL)
K	8" DI SPOOL - FLXFL
L	8" DI SPOOL - FLXPE
M	8" BUTTERFLY VALVE (MUELLER LINESEAL XP OR EQUAL) - FLXFL
N	8" TUBE METER (WATER SPECIALTIES ML-04D OR EQUAL, MIN. WORKING PRESS. 150psi) - FLXFL
O	8" WATER MAIN PER SUBDIVISION SITE IMPROVEMENT PLAN AND PROFILE SHEETS
P	PRESSURE GAUGE, 1/4" TAP, 1", NIPPLE, VALVES & SNUBBER
Q	2" AIR/VACUUM VALVE (APCO 144 OR EQUAL), w/ TAP & SADDLE, 2" GV & GALVANIZED PIPING
R	3/4" HOSE BIB AND VACUUM BREAKER w/ 3/4" TAP
S	1/2" THREADED SAMPLE TAP, NIPPLE AND HAND VALVE
T	ACCU-TAB 3012 CHLORINATOR
U	6" DI TEE - FLXFL ADAPTOR
V	RESTRAINED FLEXIBLE COUPLING PER DETAIL 7
W	8" BUTTERFLY VALVE (MUELLER LINESEAL XP OR EQUAL) - FLXFL

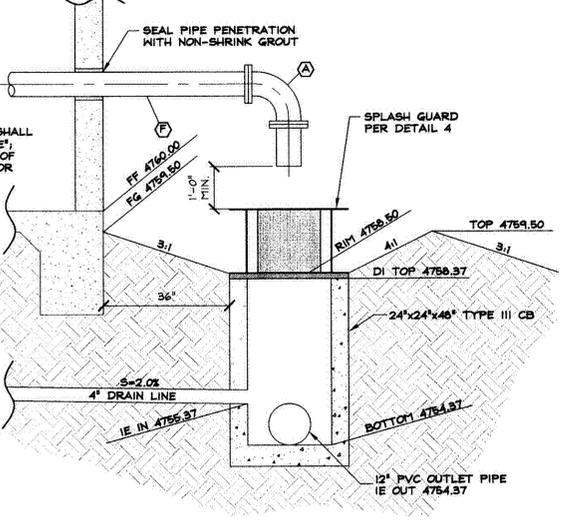


MOUNTING BLOCK DETAIL 6

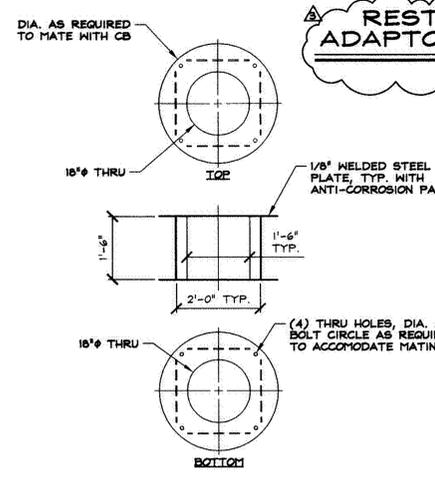


**PERFORMANCE POINTS:**  
 400gpm @ 428.61' TDH  
 800gpm @ 459.46' TDH

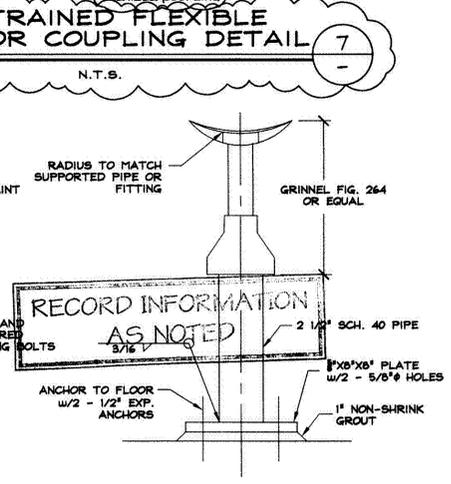
**PUMP SPECIFICATIONS:**  
 WEIR-FLOWAY MODEL 10DKH PUMP (3-STAGE) WITH 125HP RATED (115 SERVICE FACTOR) PREMIUM-EFFICIENT 1,800rpm SYNCHRONOUS SPEED MOTOR SUITABLE FOR HIGH-ALTITUDE SERVICE AND VFD CONTROL. APPROXIMATE DIAMETER OF PUMP BOWLS SHALL BE 10" WITH AN 8" WATER COLUMN. LINESHAFT SHALL HAVE A DIAMETER OF 1.25" MINIMUM. SUBSTITUTES ALLOWED WITH ENGINEER'S APPROVAL ONLY.



DISCHARGE TO STORM DRAIN 3



SPLASH GUARD DETAIL 4



PIPE SUPPORT DETAIL 5



RESTRAINED FLEXIBLE ADAPTOR COUPLING DETAIL 7

**RECORD INFORMATION**  
 AS NOTED

2 1/2" SCH. 40 PIPE  
 8/16"

ANCHOR TO FLOOR w/2 - 1/2" EXP. ANCHORS  
 1" NON-SHRINK GROUT

NO.	DATE	REVISION BLOCK	BY
1	02/03/06	VARIOUS REVISIONS TO SHEET PER GRID REVIEW COMMENTS	GWS
2	03/03/06	VARIOUS REVISIONS PER GRID & NDEP REVIEW COMMENTS	GWS
3	03/21/06	VARIOUS REVISIONS PER GRID & FIRE DEPARTMENT REVIEW	GWS
4	04/11/06	REVISED PIPING (DELETED FLANGED CONNECTION)	KRN
5	04/11/06	REVISIONS PER GRID	KRN
6	10/23/06	REVISED PLAN SET FOR RECORD INFORMATION	GWS

**R|O Anderson**  
 1403 ESTHERALDA AVENUE / POST OFFICE BOX 2224  
 78104, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

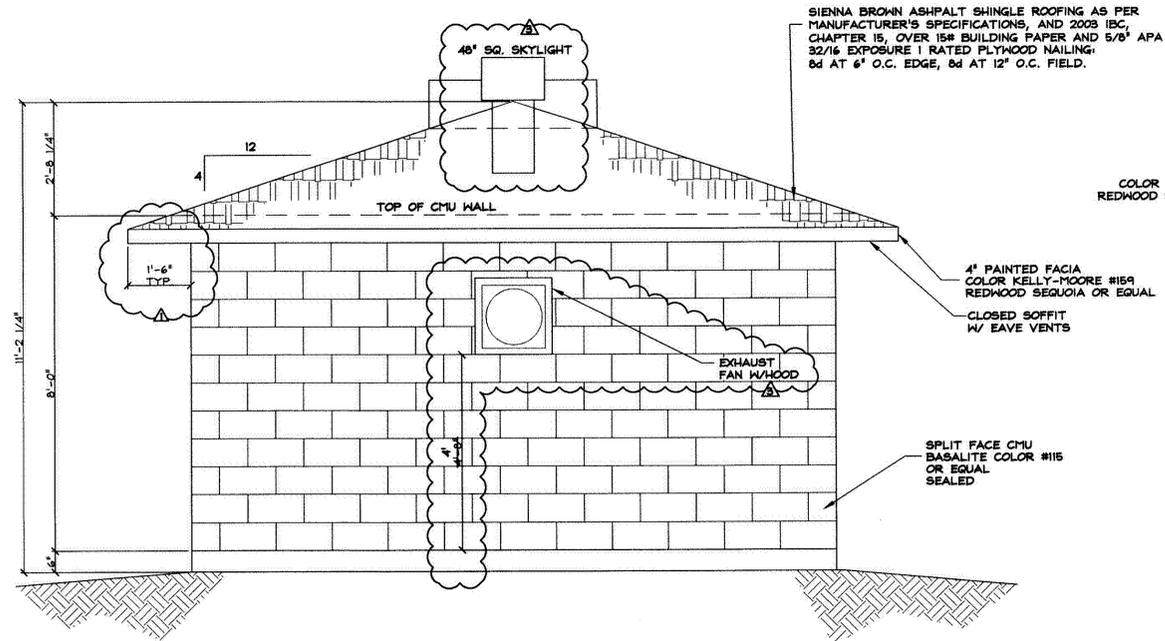
**ROCKY TERRACE WELL HOUSE**  
**ROCKY TERRACE ESTATES, LLC**

**WATER SYSTEM LAYOUT AND DETAILS**

10-24-06

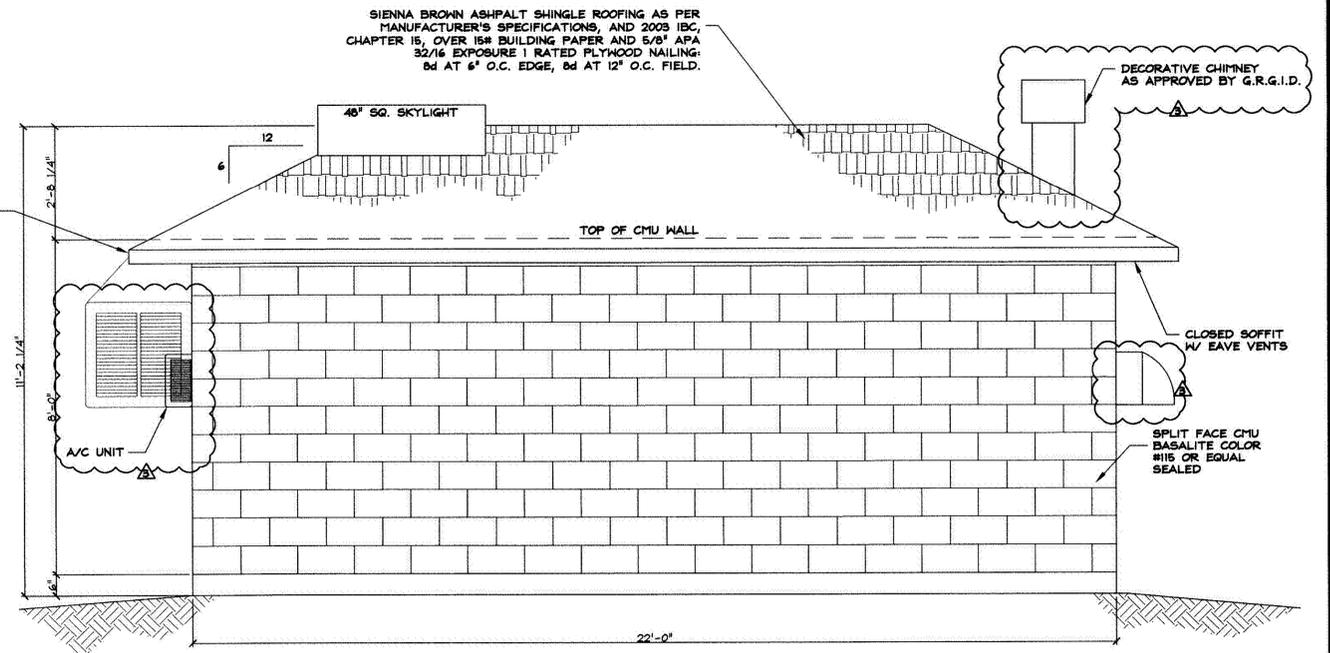
DRAWN: JRC  
 ENGINEER: ROA  
 SCALE: AS NOTED  
 DATE: 10/23/06

JOB: 0412-010  
 DRAWING: 41210W03  
 SHEET: W03  
 OF: W06 SHEETS



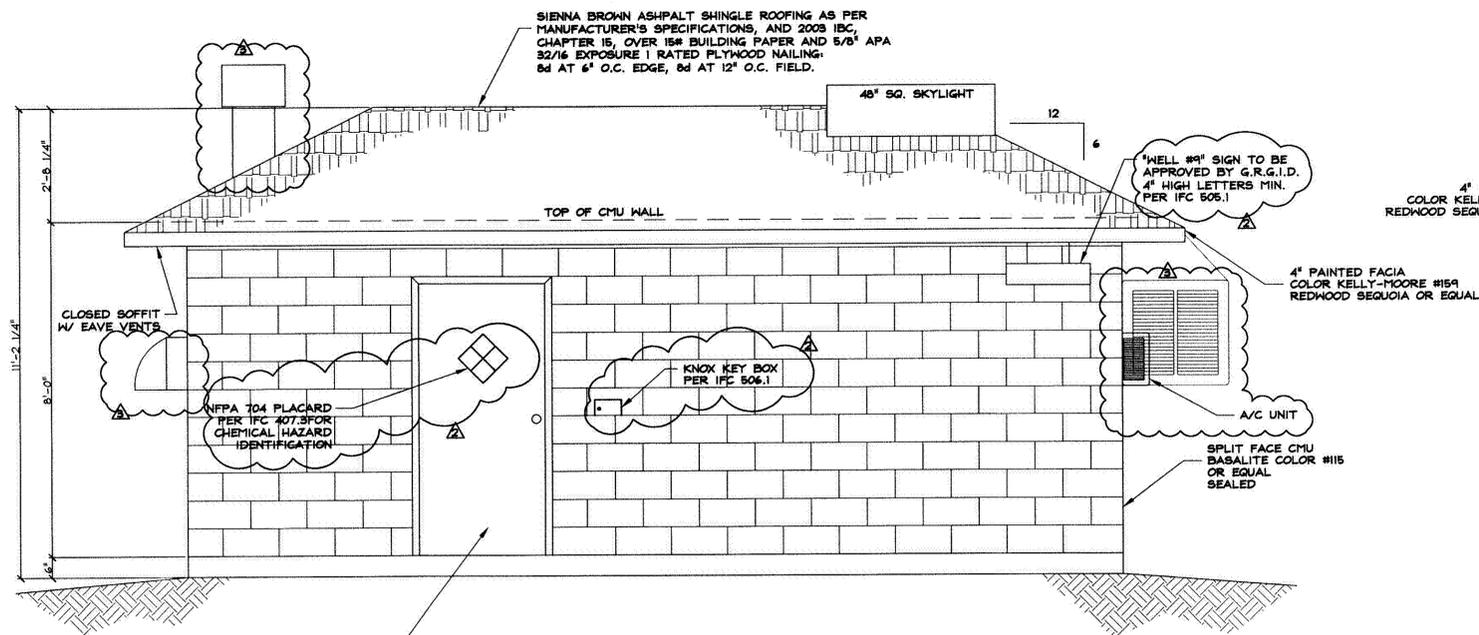
**SOUTH ELEVATION**

SCALE: 1/2" = 1'-0"



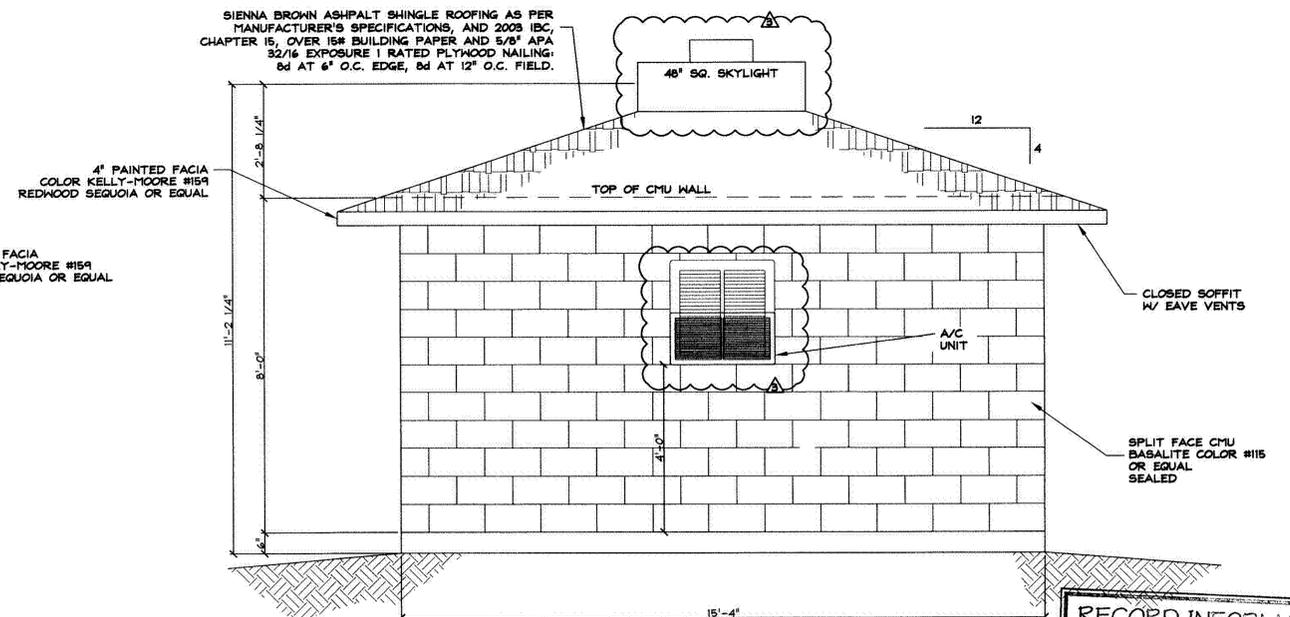
**WEST ELEVATION**

SCALE: 1/2" = 1'-0"



**EAST ELEVATION**

SCALE: 1/2" = 1'-0"



**NORTH ELEVATION**

SCALE: 1/2" = 1'-0"

**RECORD INFORMATION**  
AS NOTED

Z:\PROJECTS\14120\New Well.dwg, 10/23/2006, 7:17:33 PM, 65969mm

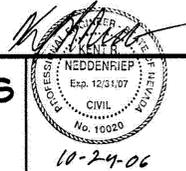
NO.	DATE	REVISION BLOCK	BY
1	03/09/06	DECREASE EYES TO 10" TO IMPROVE WELL ACCESS	GHS
2	03/22/06	VARIOUS REVISIONS PER FIRE DEPARTMENT REVIEW	GHS
3	10/23/06	REVISED PLAN SET FOR RECORD INFORMATION	GHS

**R|O|Anderson**

1603 ESMERALDA AVENUE / POST OFFICE BOX 2229  
PRINCE, NEVADA 89433  
PHONE: (775) 782-2922 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE WELL HOUSE**  
**ROCKY TERRACE ESTATES, LLC**

**BUILDING ELEVATIONS**



DRAWN:	JRC	JOB:	0412-010
ENGINEER:	ROA	DRAWING:	41210W04
SCALE:	1/2" = 1'-0"	SHEET:	W04
DATE:	10/23/06	OF: W06 SHEETS	

**102 APPLICABLE CODES AND STANDARDS**  
 CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF THESE STRUCTURAL SPECIFICATIONS AND THE REQUIREMENTS CONTAINED IN THE FOLLOWING CODES AND STANDARDS. WHEN A DIFFERENCE EXISTS BETWEEN THESE SPECIFICATIONS AND ANY OTHER GOVERNING CODE, THE MORE STRINGENT SHALL CONTROL. ANY OTHER ITEMS NOT COVERED THEREIN SHALL BE COMMENSURATE WITH SOUND ENGINEERING AND STANDARD CONSTRUCTION PRACTICE.

102.1 2003 INTERNATIONAL BUILDING CODE AND APPLICABLE LOCAL BUILDING DEPARTMENT STANDARDS.

102.2 ASCE MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES - ASCE 7-02

102.3 AMERICAN WOOD COUNCIL - NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION - 2001 EDITION WITH 2001 SUPPLEMENT

102.4 ACI BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE - ACI 318-02

102.5 2002 MASONRY STANDARDS JOINT COMMITTEE CODE, SPECIFICATIONS AND COMMENTARIES. ACI 530-02/ASCE 5-02/TMS 402-02

**103 DESIGN LOADS**  
 THIS STRUCTURE HAS BEEN DESIGNED FOR THE FOLLOWING LOADS. DESIGN LOADS INDICATED ARE IN POUNDS PER SQUARE FOOT UNLESS NOTED OTHERWISE. IF ANY PERMANENT MATERIALS EXCEED THESE LOADS, R.O. ANDERSON ENGINEERING, INC. SHALL BE CONTACTED TO REVISE THE STRUCTURAL DESIGN AND CONSTRUCTION DOCUMENTS.

103.1 ALL DESIGN LOADS ARE PER ASCE 7-02, U.N.O.

103.2 SNOW LOADING AS PER LOCAL ORDINANCE AND ASCE 7-02 CHAPTER 7.0

103.3 SNOW LOADS IN EXCESS OF 30 PSF WILL BE REDUCED AS PER ASCE 7-02 WHEN COMBINED WITH DEAD LOADS DURING SEISMIC.

103.4 DEAD LOADS: HEIGHT OF STRUCTURE AND ALL THINGS PERMANENTLY ATTACHED ROOF - 15 PSF (COMPOSITE SHINGLES)

103.5 LIVE LOADS:  
 ROOF (SNOW) - 30 PSF  
 WIND SPEED (3 SEC. GUST) - 105 MPH  
 SEISMIC DESIGN CATEGORY - E

103.6 WHERE APPLICABLE, ALLOWABLE STRESSES HAVE BEEN INCREASED 15% FOR SNOW, 33% FOR SEISMIC AND 60% FOR WIND AND SEISMIC CONNECTIONS (TIMBER).

**200 CONVENTIONAL SPREAD FOOTING FOUNDATION**  
 THE FOUNDATION SHALL BE CONSTRUCTED IN COMPLIANCE WITH THE GEOTECHNICAL ENGINEERING REPORT INDICATED BELOW. FOR COMPLETE FOUNDATION AND DRAINAGE REQUIREMENTS, SEE THIS REPORT.

200.1 GEOTECHNICAL ENGINEER - BLACK EAGLE CONSULTING, INC. REPORT NUMBER - 0733-01-1. REPORT DATE - JULY 8, 2004.

200.2 FOUNDATION SUPPORT SHALL CONSIST OF CONVENTIONAL SPREAD FOOTINGS, INSTALLED TO MEET THE DIMENSIONS, THICKNESSES AND LOCATIONS SHOWN ON THE STRUCTURAL PLANS. THE MINIMUM CONSTRUCTION REQUIREMENTS SHALL BE FOLLOWED UNLESS PLANS SPECIFY MORE STRINGENT REQUIREMENT.

200.3 BUILDING SITES ARE ASSUMED TO BE DRAINED AND FREE OF CLAY OR EXPANSIVE SOIL. ANY OTHER CONDITIONS ENCOUNTERED MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

200.4 PROJECT CALCULATIONS ASSUME STABLE, UNDISTURBED SOILS AND LEVEL OR STEPPED FOOTINGS. ANY OTHER CONDITIONS SHOULD BE REPORTED TO THE ENGINEER.

200.5 ALL FOOTINGS SHALL BEAR ON UNDISTURBED SOIL WITH A FOOTING DEPTH BELOW FROST LINE. FINISHED GRADE SHALL SLOPE AWAY FROM FOUNDATION.

200.6 ALL FINISHED GRADES SHALL SLOPE A MINIMUM OF 2% AWAY FROM FOUNDATION FOR A MINIMUM OF 10'-0".

200.7 FOOTING CROSSBARS, CONSISTING OF #4 BARS, SHALL BE PROVIDED IN ALL FOOTINGS EXCEEDING 24" IN WIDTH. CROSSBARS SHALL BE SPACED AT 18" ON CENTER, TIED TO LONGITUDINAL REINFORCING.

200.8 FOOTING DOWELS SHALL BE PROVIDED AT 32" O.C. AND SHALL CONSIST OF #4 BARS. (REFER TO FOUNDATION WALL SECTIONS). FOOTING DOWELS MAY BE TIED IN PLACE OR WET-STABBED DURING CONCRETE PLACEMENT. EPOXY DOWELS SHALL NOT BE PERMITTED UNLESS SPECIFICALLY APPROVED IN WRITING BY R.O. ANDERSON ENGINEERING, INC.

200.9 ALL LOOSE MATERIAL OR SOFT ROCKETS OF SOIL WITHIN THE LOADED DEPTH OF THE FOOTINGS SHALL BE REMOVED AND REPLACED WITH MATERIAL APPROVED BY THE ENGINEER OR EXTENDED TO LOWER, MORE COMPETENT SOILS. COMPACTION OF REPLACEMENT MATERIAL SHALL BE CONDUCTED TO A MINIMUM OF 95% RELATIVE COMPACTION. EXTENSION OF THE BOTTOM OF WALL SHALL NOT BE PERFORMED WITHOUT REVIEW AND APPROVAL OF R.O. ANDERSON ENGINEERING, INC.

200.10 REFER TO SECTION 202 OF THESE SPECIFICATIONS FOR ADDITIONAL CONCRETE AND REINFORCING REQUIREMENTS OF CONVENTIONAL SPREAD FOOTINGS.

200.11 FOOTINGS HAVE BEEN DESIGNED USING THE FOLLOWING REQUIREMENTS (ALL CRITERIA HAS BEEN STATED IN POUNDS PER SQUARE FOOT).  
 MAXIMUM BEARING PRESSURE - 2500 PSF (DEAD+ORDINARY LIVE)  
 FROST DEPTH - 18"

200.12 R.O. ANDERSON ENGINEERING, INC. RECOMMENDS THAT A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER OBSERVE THE EXCAVATION TO VERIFY SOIL PROPERTIES AT FOOTING BEARING DEPTHS.

**201 FILL AND BACKFILL**  
 201.1 FILL MATERIAL SHALL BE FREE FROM DEBRIS, VEGETATION AND OTHER FOREIGN SUBSTANCES.

201.2 BACKFILL AT FOUNDATION WALLS SHALL BE COMPACTED TO 90% RELATIVE DENSITY. U.N.O.

201.3 USE 4" DIAMETER PERFORATED PIPE SUB-DRAIN BEHIND ALL RETAINING WALLS. SLOPE PIPE TO DRAIN TO DAYLIGHT.

**202 REINFORCED CONCRETE**  
 202.1 ALL CONCRETE SHALL DEVELOP A 28-DAY MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

202.2 ALL CONCRETE NOT IN CONTACT WITH SOIL SHALL BE TYPE II.

202.3 ALL REINFORCING SHALL BE CONTINUOUS AROUND CORNERS AND ACROSS STEP-DOWNS

202.4 REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.

202.5 ALL REINFORCING STEEL AND ANCHOR BOLTS SHALL BE ACCURATELY LOCATED AND ADEQUATELY SECURED IN POSITIONS BEFORE AND DURING PLACEMENT OF CONCRETE.

202.6 PROVIDE MINIMUM CONCRETE COVER FOR ALL REINFORCING IN ACCORDANCE WITH ACI 318-02:  
 3" CAST AGAINST EARTH  
 1 1/2" FORMED, EXPOSED TO EARTH OR WEATHER, #5'S AND SMALLER  
 1 1/2" U.N.O.

202.7 ALL REINFORCING LAP SPLICES SHALL MEET OR EXCEED THE VALUES LISTED IN THE MINIMUM LAP SPLICE REQUIREMENTS TABLE ON THIS SHEET.

202.8 DETAIL BARS IN ACCORDANCE WITH THE LATEST EDITIONS OF ACI DETAILING MANUAL AND ACI BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.

202.9 PROVIDE ALL ACCESSORIES NECESSARY TO SUPPORT REINFORCING AT POSITIONS SHOWN ON THE PLANS.

202.10 PROVIDE SLEEVES FOR ALL PIPES PLACED THROUGH CONCRETE BEAMS, WALLS, COLUMNS OR STRUCTURAL SLABS. NO OPENINGS OTHER THAN THOSE FOR PIPES OR OTHERWISE SHOWN ON STRUCTURAL DRAWINGS WILL BE PERMITTED WITHOUT APPROVAL PRIOR TO PLACEMENT OF REINFORCING STEEL.

202.11 NO CHLORINE ADMIXTURES SHALL BE ADDED TO CONCRETE WITHOUT ENGINEERS APPROVAL.

202.12 CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING OF ALL CONCRETE FOUNDATION WALLS PRIOR TO BACKFILL, AND UNTIL FLOOR OR ROOF DIAPHRAGMS AT OR BELOW THE TOP OF FOUNDATION WALL ARE COMPLETE.

202.13 ALL CONCRETE CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE ACI MANUAL OF CONCRETE PRACTICE. CONTRACTOR IS ADVISED TO HAVE THIS DOCUMENT EITHER ON SITE OR READILY ACCESSIBLE FOR REFERENCE AT ALL TIMES DURING STAGES OF CONSTRUCTION CONCERNING CONCRETE PLACEMENT AND CURING.

202.14 ALL CONCRETE TO BE PERMANENTLY EXPOSED TO WEATHER TO BE NOT LESS THAN 5% NOR MORE THAN 7% AIR ENTRAINMENT.

202.15 CONCRETE SHALL HAVE WATER/CEMENT RATIO = .52 MAXIMUM. MINIMUM OF FIVE SACKS PORTLAND CEMENT PER CUBIC YARD.

**203 SLABS**  
 203.1 SLABS ON GRADE SHALL HAVE A MINIMUM THICKNESS OF 6" AND SHALL BE PLACED OVER 6" MINIMUM OF FREE DRAINING AGGREGATE BASE COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION.

203.2 SLABS SHALL BE REINFORCED WITH #6x10 W/MESH AS PER ASTM A105 OR WITH FIBERMESH AS PER MANUFACTURER'S SPECIFICATIONS U.N.O. WATERPROOFING OF ANY GARAGE SLAB OVER TIMBER FRAMING SYSTEM IS THE RESPONSIBILITY OF THE OWNER OR CONTRACTOR.

203.3 CONTRACTOR MAY POUR SLAB ON GRADE CONTINUOUS AND SAW CUT JOINTS. JOINTS SHALL BE SPACED 12 FEET MAX. AND SAW CUT 1/2" WIDE x 1" DEEP WITHIN 12 HOURS OF PLACEMENT. JOINTS SHALL BE LOCATED ON COLUMN CENTERLINES, WALL CORNERS, AND IN BETWEEN AS REQUIRED TO MAINTAIN SPACING.

203.4 STRUCTURAL SLABS TO BE BUILT IN CONFORMANCE WITH ACI 318-02, AND REINFORCED WITH GRADE 60 STEEL.

**303 PRE-ENGINEERED LUMBER COMPONENTS (TRUSSES)**  
 303.1 WHERE TRUSSES BEAR ON EXTERIOR WALLS OR EXTERIOR BEAMS, THE TRUSSES SHALL BE CONNECTED TO THE WALL OR BEAM WITH SIMPSON H2.5 CLIPS (OR EQUIVALENT) UNLESS NOTED OTHERWISE ON PLANS, OR MORE STRINGENT REQUIREMENTS ARE SPECIFIED BY THE TRUSS SUPPLIER OR DESIGNER.

303.2 THE TRUSS MANUFACTURER SHALL PROVIDE SHOP DRAWINGS FOR APPROVAL BY THE ENGINEER AND SHALL BE RESPONSIBLE FOR THE DESIGN AND CRITERIA OF THE TRUSSES.

303.3 IT IS THE RESPONSIBILITY OF THE TRUSS MANUFACTURER TO CONFORM TO THE TRUSS DESIGN ACCORDING TO THE LOADING CONDITIONS AS CALLED FOR IN THE STRUCTURAL CALCULATIONS.

**305 PRE-MANUFACTURED FRAMING CONNECTORS**  
 305.1 FRAMING CONNECTORS TO BE MANUFACTURED BY SIMPSON STRONG TIE INC. THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR THE VERIFICATION OF THE SPECIFIED CONNECTORS.

305.2 ALL HANGERS ARE TO BE INSTALLED PER MANUFACTURERS SPECIFICATIONS.

305.3 ALL HANGERS ARE TO BE INSTALLED BEFORE LOAD IS APPLIED TO THE CONNECTED MEMBERS.

305.4 ALL HOLD-DOWNS ARE TO BE INSTALLED WITH A MINIMUM OF 2-2X END POSTS OR REQUIREMENTS OF HOLD-DOWN MANUFACTURER UNLESS NOTED OTHERWISE.

305.5 IF SPECIFIED HANGERS DO NOT MEET CONSTRUCTION REQUIREMENTS FOR ANY REASON, CONTRACTOR SHALL CONTACT THIS OFFICE FOR REVISED SPECIFICATION. PRIOR TO PROCEEDING WITH ERECTION OF CONNECTED MEMBERS.

305.6 R.O. ANDERSON ENGINEERING INC. HAS ASSUMED THAT THE CONTRACTOR IS FAMILIAR WITH INSTALLATION PROCEDURES AND SPECIFICATIONS OF HANGER MANUFACTURER.

**306 HARDWARE/STRUCTURAL STEEL**  
 306.1 BOLTS SHALL BE ASTM A307, U.N.O.

306.2 ALL NAILS SHALL BE COMMON OR GREEN SINKERS AS SPECIFIED. WHERE EXPOSED TO WEATHER, NAILS SHALL BE GALVANIZED.

306.3 ANCHOR BOLTS EMBEDDED IN CONCRETE SHALL BE ASTM A307 UNLESS NOTED OTHERWISE ON PLANS.

306.4 PROVIDE 3x3x1/4" PLATE WASHERS ON ALL FOUNDATION ANCHOR BOLTS.

**500 MASONRY**  
 500.1 ALL MASONRY TO BE CONSTRUCTED IN CONFORMANCE WITH ACI 530-02.

500.2 CONCRETE MASONRY UNITS TO HAVE A MINIMUM F<sub>m</sub> = 1500 PSI.

500.3 TYPE M OR S MORTAR TO BE USED UNLESS NOTED OTHERWISE. ALL MORTAR TO BE IN CONFORMANCE WITH ACI 530.1-02. MORTAR SHALL CONFORM WITH ASTM C260, AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI.

500.4 GROUT MATERIALS ARE TO CONFORM TO ASTM C476, AND OBTAIN A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. DO NOT USE ADMIXTURES UNLESS APPROVED BY ENGINEER.

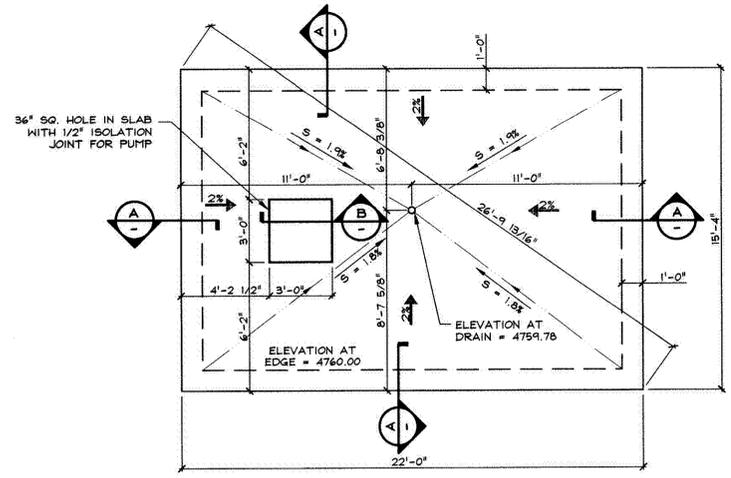
500.5 REINFORCING SHALL BE IN CONFORMANCE WITH ASTM A615, GRADE 60.

500.6 ADDITIONAL REINFORCING SHOULD BE PROVIDED AS FOLLOWS: 1-#5 BAR AT ALL SIDES OF AND ADJACENT TO ANY OPENINGS THAT EXCEEDS 24" IN ANY DIRECTION. EXTEND VERTICAL BARS FULL HEIGHT OF THE WALL. EXTEND HORIZONTAL BARS 24" ON EACH SIDE OF OPENING.

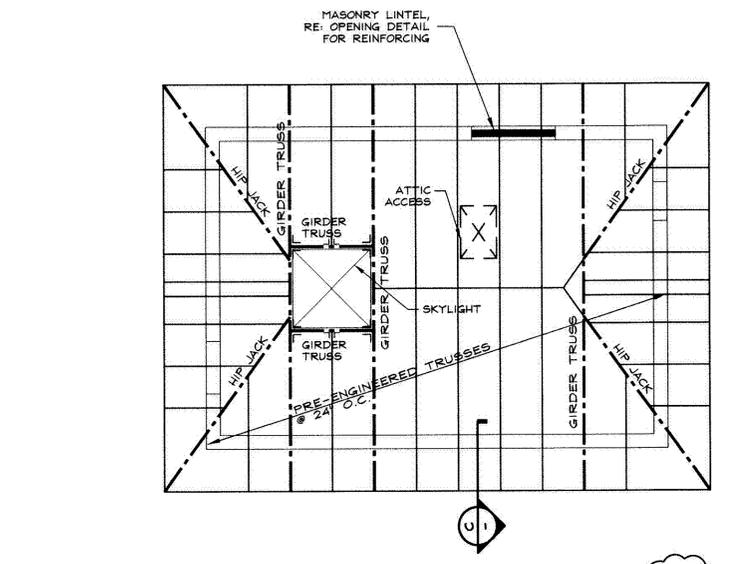
500.7 PROVIDE A THICKENED CONCRETE SLAB UNDER ALL MASONRY WALLS ON SLABS.

500.8 MASONRY CELLS SHALL BE IN VERTICAL ALIGNMENT. DOWELS IN FOOTINGS OR GRADE BEAMS SHALL BE SET TO ALIGN WITH CORES CONTAINING STEEL.

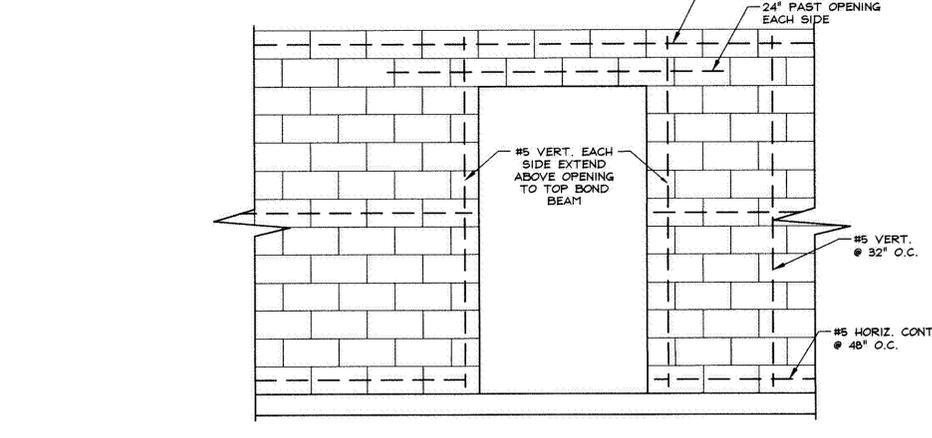
500.9 CONTROL JOISTS SHALL BE PROVIDED WHERE SHOWN ON THE DESIGN DRAWINGS (OR 15'-0" MINIMUM SPACING WHEN NOT SHOWN).



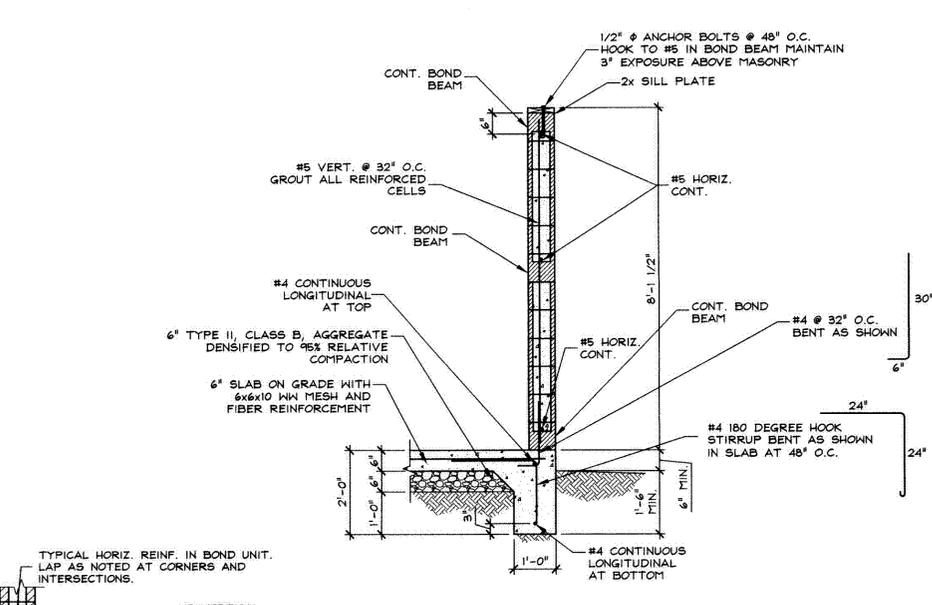
**FOUNDATION PLAN**  
 SCALE: 1/4" = 1'-0"



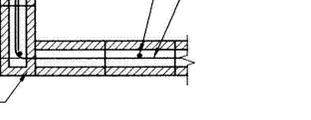
**ROOF FRAMING PLAN**  
 SCALE: 1/4" = 1'-0"



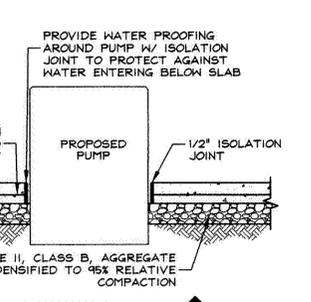
**OPENING DETAIL**  
 N.T.S.



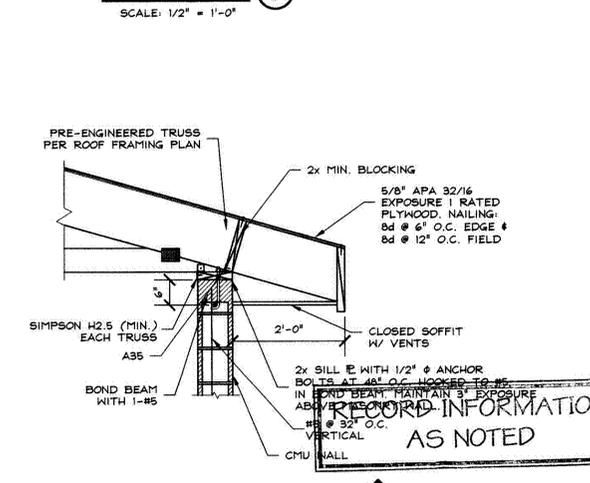
**SECTION**  
 SCALE: 1/2" = 1'-0"



**MASONRY CORNER DETAIL**  
 N.T.S.



**SECTION**  
 SCALE: 1/2" = 1'-0"



**EAVE DETAIL**  
 N.T.S.

**MINIMUM LENGTHS FOR BARS IN MASONRY**  
 (LENGTH IN INCHES)

BAR SIZE	LAP SPLICE	HOOKS
3	18	6
4	24	7
5	30	9
6	36	10

**MINIMUM LAP SPLICE REQUIREMENTS TABLE**  
 (LENGTH IN INCHES)

BAR SIZE	F <sub>c</sub> =2500 psi		F <sub>c</sub> =3000 psi	
	TOP	OTHER	TOP	OTHER
3	19	14	17	16
4	25	19	23	17
5	31	24	28	22
6	37	28	34	26

**NOTES:**  
 1. TOP BARS ARE ALL HORIZONTAL BARS SO PLACED THAT MORE THAN 1/2" OF FRESH CONCRETE IS CAST BELOW THE DEVELOPMENT LENGTH OR SPLICE.  
 2. TABULATED SPLICE LENGTHS SHALL BE USED FOR ALL REINFORCING ON SLABS, WALLS, AND BEAMS. COMPRESSION LAP SPLICES IN COLUMNS MAY BE 30 TIMES THE BAR DIAMETER.  
 3. SPLICE LENGTHS ARE BASED ON CENTER TO CENTER BAR SPACING GREATER THAN TWICE THE CONCRETE COVER PLUS ONE BAR DIAMETER, 1 1/2" COVER, AND TYPE B LAP CLASS.

**REVISION BLOCK**

NO.	DATE	REVISION	BY
02	02/09/06	CORRECTED CONFLICTING NOTES PER GRID REVIEW	GWS
03	03/03/06	CORRECTED CONFLICTING NOTES PER NDEP REVIEW	GWS
04	03/23/06	CORRECTED TYPO	GWS
05	10/23/06	REVISED PLAN SET FOR RECORD INFORMATION	GWS

**R|O|Anderson**  
 1608 EMERALDA AVENUE / POST OFFICE BOX 2229  
 HENDEN, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE WELL HOUSE**  
**ROCKY TERRACE ESTATES, LLC**

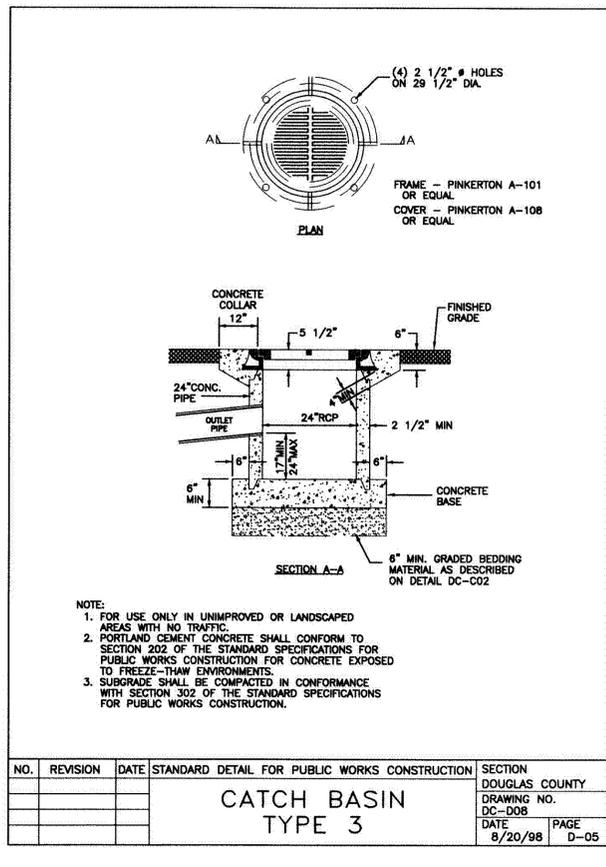
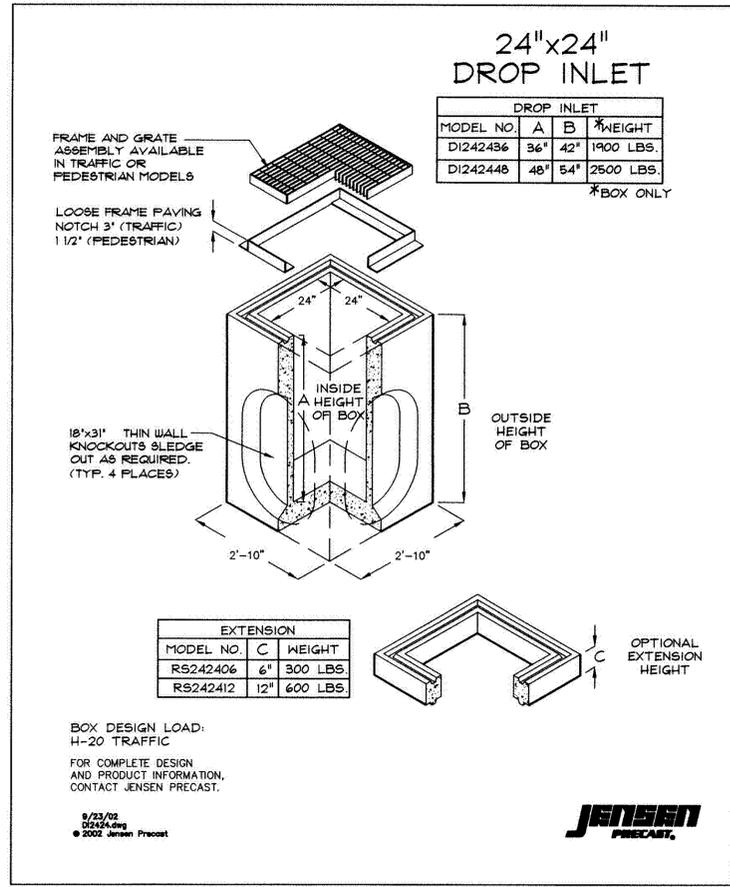
**BUILDING PLANS & DETAILS**

**RECORD INFORMATION AS NOTED**

10-2-7-06

DRAWN: GWS	JOB: 0412-010
ENGINEER: ROA	DRAWING: 41210W05
SCALE: AS NOTED	SHEET: W05
DATE: 10/23/06	OF: W06 SHEETS

Z:\PROJECTS\11210\11210W05.dwg, 10/24/2006, 8:02:39 AM, 631dshun



### PADMOUNTED APPARATUS BARRIER POST RESIDENTIAL AND COMMERCIAL

#### 1.0 INDEX

- INDEX
- PURPOSE
- BARRIER POST GUIDELINES
- BARRIER POST INSTALLATION
- TRANSFORMER AND SWITCH PAD REQUIREMENTS

#### 2.0 PURPOSE

This Standard provides information on the placement of barrier posts for the protection of pad mounted apparatus both in residential and commercial applications.

#### 3.0 BARRIER POST GUIDELINES

- If padmounted apparatus is to be located in an area subject to vehicular traffic, suitable barrier posts are to be supplied and installed by the customer in accordance with this Standard.
- Apparatus located in an area which will not ultimately be subject to vehicular traffic, but is in the path of construction equipment, requires temporary barriers complying with these Standards. **Temporary barriers must be provided by the customer until the hazard of the apparatus being struck no longer exists.**

#### 4.0 BARRIER POST INSTALLATION

- Barrier posts will be installed a minimum of 24" away from the side of the transformer and switch pads, see Details 1 & 2, Sheet 20.
- Barrier posts will be installed 36" away from the front and back of switch pads, see Detail 2.
- Residential area posts will be a minimum 4" OD steel pipe (well casing), primed and painted yellow. SPPC Stock #95-0931 (permanent), #95-0932 (removable).
- Commercial area posts will be minimum 6" OD steel pipe (well casing), primed and painted yellow. SPPC Stock #95-0930 (permanent), #95-0929 (removable).

Sierra Pacific  
POWER COMPANY

ENGINEERING & CONSTRUCTION STANDARD  
**PADMOUNTED APPARATUS  
BARRIER POST- RESIDENTIAL  
& COMMERCIAL**

SHEET 19 OF 48  
VOLUME 12  
DRAWING NUMBER  
**PE0009U**

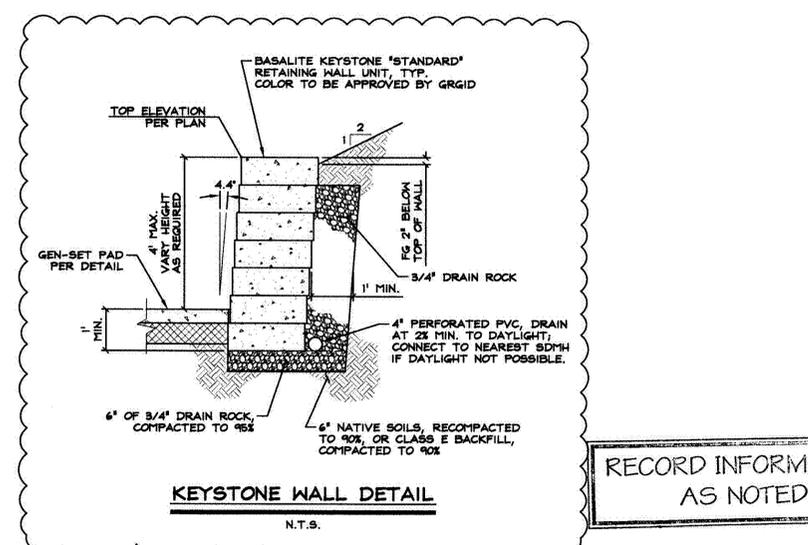
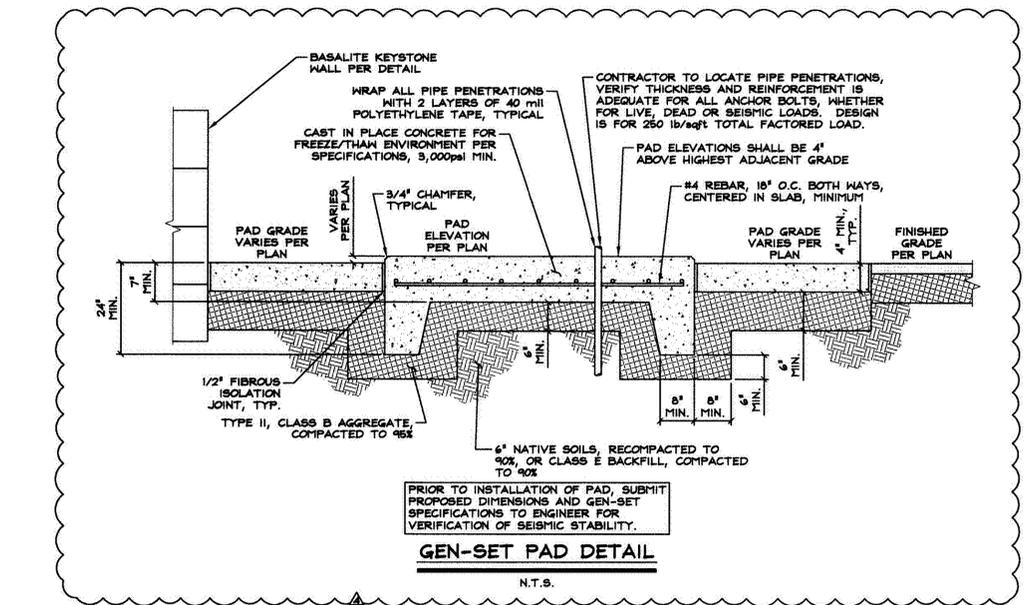
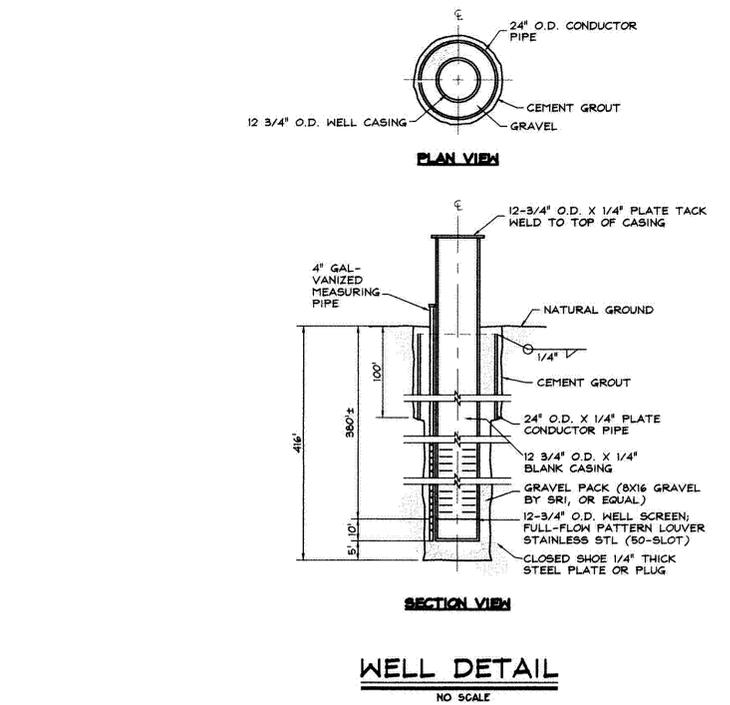
### 5.0 TRANSFORMER & SWITCH PAD REQUIREMENTS

- If traffic free zone is a building, fence, or electrical panel, the back or side of the transformer pad shall maintain a minimum 3'-0" clearance for transformers 1000 kva or less and a 3'-6" clearance for transformers greater than 1000 kva.
- If front of transformer pad faces a building, fence, or electrical panel, a 10'-0" clear and level area must be maintained for the safe operation of the equipment.
- If traffic free zone is a building, fence, or electrical panel, the side of the switch pad shall maintain a minimum 3'-0" clearance.
- If front/back of switch pad faces a building, fence, or electrical panel, a 10'-0" clear and level area must be maintained for the safe operation of the equipment.

Sierra Pacific  
POWER COMPANY

ENGINEERING & CONSTRUCTION STANDARD  
**PADMOUNTED APPARATUS  
BARRIER POST- RESIDENTIAL  
& COMMERCIAL**

SHEET 20 OF 48  
VOLUME 12  
DRAWING NUMBER  
**PE0009U**



RECORD INFORMATION  
AS NOTED

NO.	DATE	REVISION BLOCK	BY
1	02/09/06	REVISED WELL DETAILS PER GRID REVIEW COMMENTS	GHS
2	03/09/06	ADDED DETAILS FOR BOLLARD, GEN-SET PAD AND DI/PVC COUPLING	GHS
3	03/23/06	DELETED UNNECESSARY DETAIL FOR PVC CONNECTION, SEE SHEET W03	GHS
4	07/09/06	DELETED UNNECESSARY DETAIL, REVISED DETAIL FOR BOLLARDS, ADDED DETAIL FOR RETAINING WALLS	GHS
5	10/23/06	DELETED UNNECESSARY DETAIL FOR PVC CONNECTION, SEE SHEET W03	GHS

**R/O Anderson**

1605 ESPIERALDA AVENUE / POST OFFICE BOX 2229  
PRIDEN, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**DETAILS  
STORM DRAIN  
AND WELL**

10-29-06

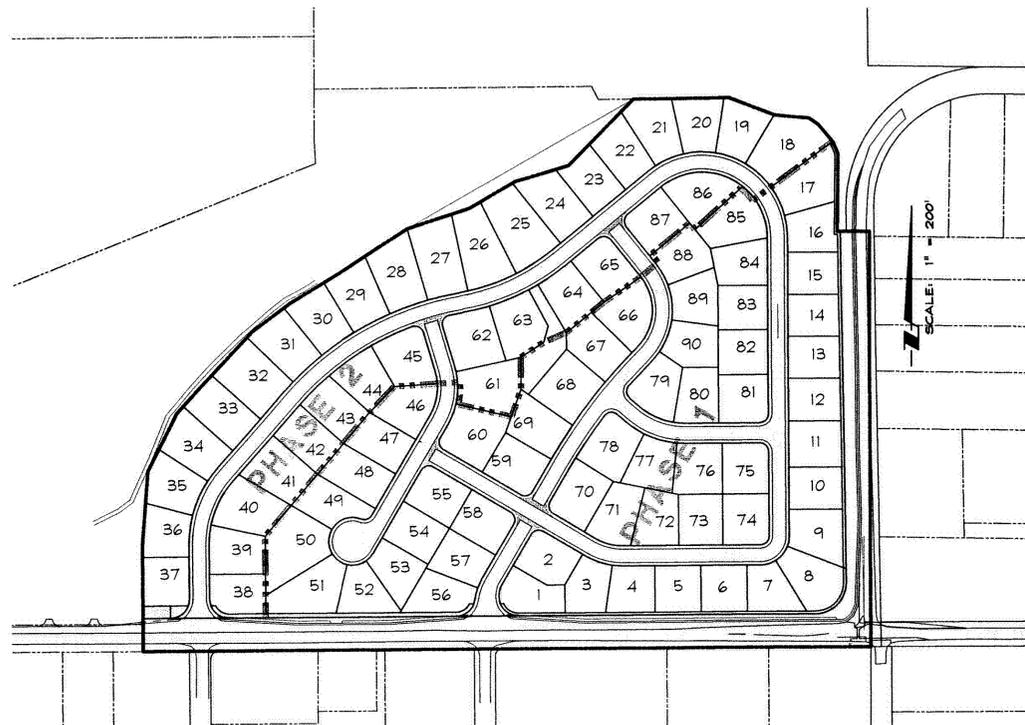
DRAWN: JRC JOB: 412-10  
ENGINEER: KRN DRAWING: 41210W06  
SCALE: N.T.S. SHEET: W06  
DATE: 10/23/06 OF: W06 SHEETS

Z:\PROJECTS\41210\W06\W06.dwg 10/24/2006 8:04:35 AM G:\gshdm

# ROCKY TERRACE

## IMPROVEMENT PLANS FOR

# ROCKY TERRACE ESTATES, LLC



### PROJECT INDEX

C1	COVER SHEET
C2	LEGEND, ABBREVIATIONS AND NOTES
C3	EXISTING SITE CONDITIONS
C4	EROSION CONTROL PLAN
C5	COMPREHENSIVE SITE PLAN
C6	COMPREHENSIVE UTILITY PLAN
C7	COMPREHENSIVE GRADING & DRAINAGE PLAN
C8	COMPREHENSIVE GRADING & DRAINAGE PLAN
C9	PLAN & PROFILE: ROCKY TERRACE DRIVE 0+00 TO 9+50
C10	PLAN & PROFILE: ROCKY TERRACE DRIVE 9+50 TO 19+00
C11	PLAN & PROFILE: ROCKY TERRACE DRIVE 19+00 TO 29+50
C12	PLAN & PROFILE: ROCKY TERRACE DRIVE 29+50 TO 38+00
C13	PLAN & PROFILE: COBBLESTONE DRIVE 0+00 TO 5+50
C14	PLAN & PROFILE: COBBLESTONE DRIVE 5+50 TO 12+50
C15	PLAN & PROFILE: KEYSTONE COURT 0+00 TO 7+50
C16	PLAN & PROFILE: LOST RIVER LANE 0+00 TO 5+50
C17	PLAN: CENTERVILLE LANE (EAST-WEST) 37+50 TO 47+50
C18	PLAN & PROFILE: CENTERVILLE LANE (EAST-WEST) 47+50 TO 55+50
C19	PLAN & PROFILE: CENTERVILLE LANE (EAST-WEST) 55+50 TO 65+59.23
C20	PLAN: CENTERVILLE LANE (NORTH-SOUTH) 65+59.23 TO 75+50
C21	PLAN & PROFILE: PLEASANTVIEW DRIVE 65+59.23 TO 71+50
C22	PLAN & PROFILE: PLEASANTVIEW DRIVE 71+50 TO 79+50
C23	SANITARY SEWER LIFT STATION: GRADING & SITE PLAN
C24	PLAN & PROFILE: STORM DRAIN
C25	PLAN & PROFILE: STORM DRAIN
C26	DETAILS: SITE IMPROVEMENT
C27	DETAILS: SITE IMPROVEMENT
C28	DETAILS: WATER
C29	DETAILS: WATER & STORM DRAIN
C30	DETAILS: SEWER
C31	DETAILS: STORM WATER PONDS
C32	DETAILS: DETENTION POND
C33	DETAILS: NDOT & STORM DRAIN
C34	DETAILS: MASONRY WALL
C35	DETAILS: RETAINING WALL
C36	DETAILS: LIFT STATION

### PROJECT SUMMARY

A.P.N.: 1220-08-002-021 (40.99 Ac) SERVICES:

OWNER: ROCKY TERRACE ESTATES, LLC  
P.O. BOX 1233  
MINDEN, NV 89423

ENGINEER: R.O. ANDERSON ENGINEERING, INC.  
P.O. BOX 2229  
MINDEN, NV 89423  
(775) 782-2322

WATER & SEWER: GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
431 MITCH DRIVE  
GARDNERVILLE, NV 89460  
(775) 265-2048

ELECTRIC: SIERRA PACIFIC POWER COMPANY  
875 E. LONG STREET  
CARSON CITY, NV 89775  
(775) 834-2950

TELEPHONE: VERIZON  
1520 CHURCH STREET  
GARDNERVILLE, NV 89410  
(775) 782-0764

GAS: SOUTHWEST GAS CORPORATION  
400 EAGLE STATION LANE  
CARSON CITY, NV 89701  
(775) 882-2126

LEGAL DESCRIPTION: PARCEL LOCATED WITHIN A PORTION OF THE SOUTHEAST 1/4 OF SECTION 8, TOWNSHIP 12 NORTH, RANGE 20 EAST, MOUNT DIABLO MERIDIAN.

EXISTING ZONING: AGRICULTURAL - 19 AC MIN. PARCEL SIZE  
PROPOSED ZONING: A-19 - PLANNED DEVELOPMENT OVERLAY  
MASTER PLAN: RECEIVING AREA  
FLOOD ZONE: AE, SHADED X AND UNSHADED X PER MAP PANEL 92006C0248 F DATED 11/8/99  
TOTAL AREA: 36.48 Ac (TO BE DEVELOPED)  
TOTAL PROPOSED LOTS: 90 - 12,000# MIN.  
DENSITY UNITS PER ACRE: 2.46  
LOT AREA: 27.96 Ac (76.66%)  
ROADWAYS: 8.01 Ac (21.96%)  
PROPOSED NEW ROADS: 5,977 LF OF 32' LOCAL RURAL ROAD - 60' R.O.W.  
PROPOSED SETBACKS: 20' FRONT, 10' SIDE, 20' REAR, 15' STREET SIDE YARD  
ACCESS RESTRICTIONS: ALL ACCESS LIMITED TO CENTERVILLE LANE

W.C.A.C. INFORMATION: CARSON RIVER CLAIM #281 - 19 Ac (SCHROEDER DITCH)  
CARSON RIVER CLAIM #273 - 21 Ac (THOLKE DITCH)

CONTOUR INFORMATION: BASED UPON A FIELD SURVEY PERFORMED BY R.O. ANDERSON ENGINEERING ON DECEMBER 1, 2003.

### RECORD INFORMATION

CONTRACTOR OF RECORD:  
WILSON CONSTRUCTION  
NV LICENSE NO. 175255A  
812 SHORT COURT  
GARDNERVILLE, NV 89460  
PHONE: (775) 265-2230  
FAX: (775) 265-8029

ENGINEER OF RECORD:  
R.O. ANDERSON ENGINEERING, INC.  
1603 ESHERALDA AVENUE  
P.O. BOX 2229  
MINDEN, NV 89423  
PHONE: (775) 782-2322  
FAX: (775) 782-7084

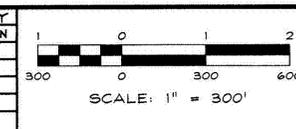
PERIOD OF CONSTRUCTION:  
SUMMER 2005 - SPRING 2006

### APPROVALS

SIGNATURE	PRINTED NAME	DATE
	DOUGLAS COUNTY ENGINEER	
	ROBERT SPELLBERG	5/4/05
	GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT	
	EAST FORK FIRE PROTECTION DISTRICT	

RECORD INFORMATION AS NOTED

NO.	DATE	REVISION	BLOCK	BY



ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC

COVER SHEET



DRAWN: CMC, JRG, JMR, NGS  
ENGINEER: KRN  
SCALE: 1" = 300'  
DATE: 03/18/05

JOB: 0412-010-04  
DRAWING: 41210C01  
SHEET: C1  
OF: C36 SHEETS

**SYMBOLS**

**EXISTING NEW**

	AIR RELEASE VALVE		WELL
	CONIFEROUS TREE		YIELD SIGN
	DIRECTION OF NORTH		GRADE ELEVATION
	DECIDUOUS TREE		CENTERLINE MONUMENT
	FIRE HYDRANT		DIRECTION OF DRAINAGE FLOW
	GAS MANHOLE		CONTOUR LINE MAJOR INTERVAL
	GAS RISER		CONTOUR LINE MINOR INTERVAL
	GAS VALVE		PIPE JOINT RESTRAINT
	GAS METER		
	HANDICAPPED ACCESSIBLE SPACE		
	IDENTIFICATION OF SECTION POINTING IN THE DIRECTION IN WHICH THE SECTION IS VIEWED		
	SHEET NUMBER THAT THE SECTION APPEARS ON		
	IDENTIFICATION OF DETAIL		
	SHEET NUMBER THAT THE DETAIL APPEARS ON		
	INTERSECTION SIGN		
	MERGING TRAFFIC SIGN		
	PARKING LIGHT		
	PEDESTRIAN CROSSING SIGN		
	PERCOLATION TEST PIT LOCATION		
	POWER GUY ANCHOR		
	POWER GUY POLE		
	POWER HAND HOLE		
	POWER MANHOLE		
	POWER METER		
	POWER POLE		
	POWER RISER		
	REVISION NUMBER		
	SANITARY SEWER CLEAN OUT		
	SANITARY SEWER MANHOLE		
	SANITARY SEWER MANHOLE		
	SCHOOL ZONE SIGN		
	SPEED LIMIT SIGN		
	STOP SIGN		
	STORM DRAIN CATCH BASIN		
	STORM DRAIN CATCH INLET		
	STORM DRAIN CULVERT INVERT		
	STORM DRAIN DROP INLET		
	STORM DRAIN MANHOLE		
	STREET SIGN		
	STREET LIGHT		
	SURVEY CONTROL POINT		
	TELEPHONE GUY ANCHOR		
	TELEPHONE GUY POLE		
	TELEPHONE HAND HOLE		
	TELEPHONE MANHOLE		
	TELEPHONE POLE		
	TELEPHONE RISER		
	TELEVISION GUY ANCHOR		
	TELEVISION HAND HOLE		
	TELEVISION MANHOLE		
	TELEVISION RISER		
	TRAFFIC HAND HOLE		
	TRAFFIC LIGHT		
	TRAFFIC MANHOLE		
	UTILITY GUY ANCHOR		
	UTILITY GUY POLE		
	UTILITY POLE		
	WATER GATE VALVE		
	BUTTERFLY VALVE		
	WATER MANHOLE		
	WATER METER PIT		
	WATER RISER		

NOTE: NOT ALL SYMBOLS, ABBREVIATIONS, LINE TYPES AND GENERAL NOTES LISTED MAY BE APPLICABLE TO THIS PROJECT.

**ABBREVIATIONS**

AASHTO.....	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	M.....	METER
AB.....	AGGREGATE BASE	MAX.....	MAXIMUM
AC.....	ASPHALT CONCRETE	MGD.....	MILLION GALLONS PER DAY
ADA.....	AMERICANS WITH DISABILITIES ACT OF 1990	MINDEN.....	MINDEN GARDNERVILLE SANITATION DISTRICT
ADT.....	AVERAGE DAILY TRAFFIC	MH.....	MANHOLE
ALT.....	ALTITUDE	MIN.....	MINIMUM
ANSI.....	AMERICAN NATIONAL STANDARDS INSTITUTE	MISC.....	MISCELLANEOUS
APN.....	ASSESSOR'S PARCEL NUMBER	MPH.....	MILES PER HOUR
APPROX.....	APPROXIMATELY	MUTCD.....	MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES
APWA.....	AMERICAN PUBLIC WORKS ASSOCIATION	N.....	NORTH
ARV.....	AIR RELEASE VALVE	NAC.....	NEVADA ADMINISTRATIVE CODE
ASCE.....	AMERICAN SOCIETY OF CIVIL ENGINEERS	NDEP.....	NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
ASTM.....	AMERICAN SOCIETY OF TESTING AND MATERIALS	NDOT.....	NEVADA DEPARTMENT OF TRANSPORTATION
AT.....	AT	NE.....	NORTHEAST
AWS.....	AMERICAN WELDING SOCIETY	NFIP.....	NATIONAL FLOOD INSURANCE PROGRAM
AWMA.....	AMERICAN WATER WORKS ASSOCIATION	NSF.....	NATIONAL SANITATION FOUNDATION
BC.....	BEGIN CURVE	NOAA.....	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
BFE.....	BASE FLOOD ELEVATION	NRCRS.....	NATIONAL RESOURCE CONSERVATION SERVICE
BLD.....	BUILDING	NRS.....	NEVADA REVISED STATUTES
BOM.....	BOTTOM OF HALL	NTS.....	NOT TO SCALE
BS.....	BOTH SIDES	NW.....	NORTHWEST
BW.....	BACK OF WALK	NWS.....	NATIONAL WEATHER SERVICE
BW.....	BARBED WIRE	OC.....	ON CENTER
CAP.....	CORRUGATED ALUMINUM PIPE	OD.....	OUTER DIAMETER
CAPA.....	CORRUGATED ALUMINUM PIPE ARCH	OSHA.....	OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970
CARG.....	CURB AND GUTTER	O/H.....	OVERHEAD
CB.....	CATCH BASIN	±.....	PLUS OR MINUS
CC.....	CARSON CITY	P.....	POWER
CC.....	CUBIC CITY	PC.....	POINT OF CURVATURE
CD.....	CHAIN LINK	PDL.....	PADDLE
CI.....	CURB INLET (THROUGH)	PE.....	PROFESSIONAL ENGINEER LICENSED BY THE STATE OF NEVADA
CL.....	CENTER LINE	PED.....	PEDESTAL
CM.....	CORRUGATED METAL PIPE	PEDX.....	PEDESTRIAN CROSSING
CO.....	CLEAN OUT	P.....	PERCENT
COMP.....	COMPACTION	P/L.....	PROPERTY LINE
CON.....	CONCRETE	PF.....	PROBABLE MAXIMUM FLOOD POINT
CORN.....	CROWN OF ROAD	PNT.....	PAINT MARK
CSP.....	CORRUGATED STEEL PIPE	PO.....	PUSH ON
CUL.....	CULVERT	PS.....	POUNDS PER SQUARE INCH
CT.....	CUBIC YARD	PT.....	POINT OF TANGENCY
D.....	DEGREES	PUE.....	PUBLIC UTILITY EASEMENT
D.....	DIRT	PVC.....	POLYVINYL CHLORIDE
DCD.....	DOUGLAS COUNTY COMMUNITY DEVELOPMENT	R.....	RADIUS
DEC.....	DECIDUOUS	R.....	RIBBER
DE.....	DECOMPOSED GRANITE	RB.....	RIVER BED
DI.....	DROP INLET	RCB.....	REINFORCED CONCRETE BOXED CULVERT
DI(Ø).....	DIAMETER	RCPC.....	REINFORCED CONCRETE PIPE
E.....	EAST	RC.....	RIGHT OF WAY
EA.....	EACH	RTC.....	REGIONAL TRANSPORTATION COMMISSION OF DOUGLAS COUNTY
EA.....	END CURVE	S.....	SIGN
ED.....	EDGE	S.....	SLOPE
EGL.....	ENERGY GRADE LINE	SAD.....	SURFACE AREA DISTURBANCE
EL.....	ELECTRIC	SD.....	STORM DRAIN
ELEV.....	ELEVATION	SDMH.....	STORM DRAIN MANHOLE
EP.....	EDGE OF PAVEMENT	SDR.....	STANDARD DIMENSION RATIO
EPA.....	ENVIRONMENTAL PROTECTION AGENCY	SE.....	SOUTHEAST
EVC.....	END VERTICAL CURVE	SET.....	SET MONUMENT, CORNER OR CONTROL POINT
EW.....	EDGE OF WATER	SF.....	SQUARE FOOT (FEET)
EX.....	EXISTING	SPP.....	STRUCTURAL PLATE PIPE
F.....	FAHRENHEIT	SPPA.....	STRUCTURAL PLATE PIPE ARCH
F.....	FACE OF CURB	SERV.....	SERVICE
FC.....	FIRE CONNECTION	SS.....	SANITARY SEWER
FEMA.....	FEDERAL EMERGENCY MANAGEMENT AGENCY	SSMH.....	SANITARY SEWER MANHOLE
FF.....	FINISHED FLOOR	ST.....	STATION
FG.....	FINISHED GRADE	STB.....	STUB
FI.....	FIRE HYDRANT	STD.....	STANDARD
FL.....	FLOWLINE	SN.....	SOUTH
FNC.....	FENCE	SNW.....	SOUTHWEST
FND.....	FOUND MONUMENT, CORNER OR CONTROL POINT	S/N.....	SIDEMALK
FS.....	FIRE STUB	SNPPP.....	STORMWATER POLLUTION PREVENTION PLAN
FT(°).....	FOOT (FEET)	T.....	TELEPHONE
G.....	GAS	TBC.....	TOP BACK OF CURB
G.....	GATE	TC.....	TOP OF CURB
GA.....	GUY ANCHOR	TRB.....	TRANSPORTATION RESEARCH BOARD
GB.....	GRADE BREAK	TOE.....	TOE OF SLOPE
GID.....	GENERAL IMPROVEMENT DISTRICT	TOP.....	TOP OF SLOPE
GP.....	GUY POLE	TON.....	TOP OF HALL
GPM.....	GALLONS PER MINUTE	TR.....	TREE
GR.....	GRAVEL	TRF.....	TRAFFIC CONTROL
GS.....	GROUND SHOT	TV.....	TELEVISION
H.....	HAND HOLE	TYP.....	TYPICAL
H.....	HORIZONTAL	U.....	UTILITY
H.....	HOG WIRE	UBC.....	UNIFORM BUILDING CODE
ID.....	INNER DIAMETER	UG.....	UNDERGROUND
IE.....	INVERT ELEVATION	UMC.....	UNIFORM MECHANICAL CODE
INCH.....	INCH	UNO.....	UNLESS NOTED OTHERWISE
INC.....	INCORPORATED	UPC.....	UNIFORM PLUMBING CODE
INTX.....	INTERSECTION	USACE.....	UNITED STATES ARMY CORPS OF ENGINEERS
IRRIG.....	IRRIGATION	USBR.....	UNITED STATES BUREAU OF RECLAMATION
ITE.....	INSTITUTE OF TRANSPORTATION ENGINEERS	USGS.....	UNITED STATES GEOLOGICAL SURVEY
LAT.....	LATERAL	V.....	VALVE
LOS.....	LEVEL OF SERVICE	VAL.....	VAULT
LS.....	LUMP SUM	VC.....	VERTICAL CURVE
LT.....	LIGHT	VG.....	VALLEY GUTTER
LC.....	LOT CORNER	VERT.....	VERTICAL
M.....	METER	VPC.....	VERTICAL POINT OF CURVATURE
MAX.....	MAXIMUM	VPT.....	VERTICAL POINT OF TANGENCY
MGD.....	MILLION GALLONS PER DAY	W.....	WEST
MINDEN.....	MINDEN GARDNERVILLE SANITATION DISTRICT	W.....	W/TH
MH.....	MANHOLE	WEF.....	WATER ENVIRONMENT FEDERATION
		W.....	WALL
		WK.....	WALKWAY
		WV.....	WATER GATE VALVE
		YR.....	YEAR

**GENERAL NOTES**

- ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, DOUGLAS COUNTY, NEVADA, LATEST EDITION; OSHA REQUIREMENTS, THE 1997 UNIFORM BUILDING CODE, DOUGLAS COUNTY DESIGN CRITERIA AND IMPROVEMENT STANDARDS, AND SPECIFIC CONDITIONS OF THE PERMITS. NO UTILITY BACKFILLING WILL BE ALLOWED UNTIL INSPECTED AND APPROVED BY THE GOVERNING AGENCY. VIOLATIONS MAY RESULT IN THE STOPPAGE OF ALL WORK UNTIL THE VIOLATION IS CORRECTED.
- ALL WORK IS SUBJECT TO THE APPROVAL OF R.O. ANDERSON ENGINEERING.
- ALL WORK SHALL CONFORM TO DOUGLAS COUNTY DESIGN CRITERIA AND IMPROVEMENT STANDARDS. THE OWNER SHALL OBTAIN A PERMIT FROM DOUGLAS COUNTY COMMUNITY DEVELOPMENT PRIOR TO THE START OF CONSTRUCTION.
- ALL TRAFFIC CONTROL AND BARRICADING WITHIN THE PUBLIC RIGHTS-OF-WAY SHALL CONFORM TO PART VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION, AND THE NEVADA WORK ZONE TRAFFIC CONTROL HANDBOOK, LATEST EDITION. NO STREET CLOSURES WILL BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL OF A TRAFFIC CONTROL PLAN BY THE DOUGLAS COUNTY ENGINEERING DIVISION AND/OR THE NEVADA DEPARTMENT OF TRANSPORTATION.
- THE CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT "CALL BEFORE YOU DIG" (1-800-227-2600) FORTY-EIGHT (48) HOURS PRIOR TO START OF CONSTRUCTION.
- THE CONTRACTOR SHALL CALL DOUGLAS COUNTY ENGINEERING DIVISION AND GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT (782-9006) FORTY-EIGHT (48) HOURS PRIOR TO START OF CONSTRUCTION. THE CONTRACTOR SHALL CALL TWENTY-FOUR (24) HOURS PRIOR TO REQUIRED INSPECTIONS AND TESTING. THE REQUIRED INSPECTIONS AND TESTING ARE LISTED ON THE INSPECTION RECORD ISSUED WITH EACH PERMIT. THE CONTRACTOR MUST HAVE THE PERMIT NUMBER AND THE DESCRIPTION LISTED ON THE INSPECTION RECORD TO SCHEDULE REQUIRED INSPECTIONS AND TESTING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE GENERAL SAFETY DURING CONSTRUCTION AND ALL WORK SHALL CONFORM TO PERTINENT SAFETY REGULATIONS AND CODES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND/OR PROTECTION OF ALL EXISTING AND PROPOSED UTILITIES, STRUCTURES, ADJACENT STREETS, AND IMPROVEMENTS DURING THE PERIOD OF CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION AND SHORING PROCEDURES.
- PRIOR TO ANY EARTHWORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF AND COMPLY WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT PREPARED BY BLACK EAGLE CONSULTING, INC. TITLED "GEOTECHNICAL INVESTIGATION, ROCKY TERRACE RESIDENTIAL SUBDIVISION, IN THE EVENT OF A DISCREPANCY BETWEEN THE SOILS REPORT AND NOTES HEREIN, THE SOILS REPORT SHALL PREVAIL.
- PRIOR TO ANY EARTHWORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF AND COMPLY WITH THE REQUIREMENTS OF THE STORMWATER PREVENTION PLAN (SNPPP) AND THE STORMWATER DISCHARGE PERMIT AND SURFACE AREA DISTURBANCE PERMIT ISSUED BY THE NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION (NDEP)
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE ENGINEER OF ANY DISCREPANCIES IN THE IMPROVEMENT PLANS.
- THE CONTRACTOR SHALL SUPPLY R.O. ANDERSON ENGINEERING, A SET OF REPRODUCIBLE AS BUILT DRAWINGS.
- OBSERVATION BY THE GEOTECHNICAL ENGINEER SHALL BE SUBSTANTIALLY CONTINUOUS DURING ALL FILL AND COMPACTING OPERATION. THE GRADING CONTRACTOR SHALL GIVE AT LEAST 24 HOURS NOTICE PRIOR TO SUCH OPERATIONS TO ALLOW SCHEDULING OF THE WORK.
- THE PAVEMENT SURFACE WHEN COMPLETED, SHALL BE SMOOTH, DENSE, WELL BONDED AND OF UNIFORM TEXTURE AND APPEARANCE. ALL AREAS SHALL DRAIN AND BE FREE OF STANDING WATER.
- SLOPES SHALL BE NO STEEPER THAN 2 HORIZONTAL TO 1 VERTICAL, OR AS DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY THE COUNTY.
- THE GEOTECHNICAL ENGINEER SHALL PROVIDE THE COUNTY AND GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT WITH COPIES OF ALL TEST RESULTS ON A WEEKLY BASIS AND A BOUND REPORT OF THE TEST RESULTS AND INSPECTION REPORTS, ARRANGED IN CHRONOLOGICAL ORDER, AT THE COMPLETION OF THE PROJECT. THE ENGINEER SHALL PROVIDE THE COUNTY WITH AN OPINION REGARDING THE CONSTRUCTION SIMILAR TO THE FOLLOWING:  
I HEREBY CERTIFY THAT I AM A LICENSED ENGINEER IN THE STATE OF NEVADA. TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF, THE PROJECT WAS CONSTRUCTED IN GENERAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS, AND IN MY PROFESSIONAL OPINION, IS IN COMPLIANCE WITH APPLICABLE LAWS, CODES AND ORDINANCES.
- FILL AREAS SHALL BE CLEARED OF VEGETATION AND DEBRIS, SCARIFIED, AND BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACING OF FILL.
- PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS SHALL BE USED TO PREVENT EXCESSIVE PONDING, EROSION AND TO PROTECT ADJOINING PROPERTIES DURING CONSTRUCTION OF IMPROVEMENTS.
- DUST SHALL BE CONTROLLED BY THE CONTRACTOR TO THE SATISFACTION OF THE COUNTY AND GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT, AND IN ACCORDANCE WITH THE SURFACE AREA DISTURBANCE PERMIT FROM THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION.
- ALL STREETS SHALL BE MAINTAINED FREE OF DUST AND MUD CAUSED BY GRADING OPERATIONS.
- THE DEVELOPER'S ENGINEER OR SURVEYOR SHALL SET GRADE STAKES FOR ALL DRAINAGE DEVICES AND THE CONTRACTOR SHALL OBTAIN INSPECTION BEFORE PLACING CONCRETE.
- THE GEOTECHNICAL ENGINEER SHALL APPROVE ALL GRADING INCLUDING COMPACTION REQUIREMENTS, THE SUITABILITY OF SUBGRADE, AND THE STABILITY OF SLOPES AND STABLE EXISTING OR REPAIRING.
- IN THE EVENT OF CHANGES ARISING DURING CONSTRUCTION, THE OWNER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISIONS TO THE PLANS FOR REVIEW AND APPROVAL BY THE COUNTY AND GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT. NO CHANGES IN THE DESIGN WILL BE PERMITTED UNLESS WRITTEN APPROVAL IS GIVEN BY THE REVIEWING AGENCIES.
- UPON COMPLETION OF THE PROJECT, SEED ALL DISTURBED AREAS, EXCEPT AREAS OF AGGREGATE BASE, DITCHES AND LOTS INTENDED FOR START OF CONSTRUCTION WITHIN 30 DAYS OF SUBSTANTIAL COMPLETION. THE FOLLOWING SEEDING PROCEDURE IS TO BE USED UNLESS THE CONTRACTOR PROPOSES AN ALTERNATE THAT IS ACCEPTABLE TO BOTH DOUGLAS COUNTY AND THE ENGINEER.  
1) BROADCAST 8 POUNDS PER ACRE SIBERIAN CRESTED WHEATGRASS AND 8 POUNDS PER ACRE NORDANS CRESTED WHEATGRASS SEED.  
2) LIGHTLY RAKE OR DRAG WITH A CONTOUR HARROW OR CHAINLINK MAT.  
3) SPREAD 1 TON PER ACRE HAY OR STRAW AS MULCH.  
4) ANCHOR HAY OR STRAW AND ROUGHEN SURFACES THAT HAVE SLOPES GREATER THAN 5:1 WITH HORIZONTAL GROOVES PARALLEL TO THE CONTOUR. GROOVES MAY BE CREATED BY TRAVERSING WITH TRACKED EQUIPMENT OR HEAVY ROLLING COULTER OR OTHER APPROVED METHODS.
- THE APPROVED PLAN, PERMIT AND INSPECTION RECORD MUST BE ON THE JOB SITE AT ALL TIMES.
- ALL WATER/SEWER CROSSINGS, INCLUDING LATERALS SHALL BE CONSTRUCTED IN ACCORDANCE WITH NAC 446A.6715 TO 446A.6718 INCLUSIVE. THESE PLANS MAKE NO REPRESENTATION REGARDING THE LOCATION OF ALL CROSSINGS REQUIRING ADDITIONAL PROTECTION IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO IDENTIFY CROSSINGS REQUIRING PROTECTION PRIOR TO, OR DURING CONSTRUCTION AND PROVIDE ADEQUATE PROTECTION.
- WHERE CONDITIONS ARE SUCH THAT RUNNING OR STANDING WATER OCCURS IN THE TRENCH BOTTOM, THE CONTRACTOR SHALL FURNISH, INSTALL AND OPERATE PUMPS, PIPES APPLIANCES AND EQUIPMENT OF SUFFICIENT CAPACITY TO KEEP THE TRENCH FREE OF WATER UNTIL BACKFILLED. WATER, IF COOLESS AND STABLE, MAY BE DISCHARGED INTO AN EXISTING STORM DRAIN OR CHANNEL. WHEN REQUIRED BY THE ENGINEER, OR DOUGLAS COUNTY, A MEANS SHALL BE PROVIDED FOR DESILTING THE WATER BEFORE DISCHARGING IT.
- EACH LOT SHALL HAVE A 7.5' PUBLIC UTILITY EASEMENT ALONG THE FRONT OF THE LOT ADJACENT TO THE STREET ROW AND A 5.0' PUBLIC UTILITY EASEMENT ADJACENT TO EACH SIDE AND REAR PROPERTY LINE.
- ALL UNSPECIFIED CONCRETE SHALL BE 4000 PSI WITH 6% AIR ENTRAINMENT ±1.5%.
- NOTIFY DOUGLAS COUNTY AND GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT 24 HOURS PRIOR TO ANY UNDERGROUND WORK ASSOCIATED WITH THE STORM DRAIN SYSTEM IMPROVEMENTS.
- ALL WATER LINES SHALL BE PVC C900 CLASS 150 PIPE WITH A MINIMUM OF 42" OF COVER.

- ASPHALTIC CONCRETE PAVEMENT SHALL BE PLANTMIX WITH AC-20 WITH LIME ASPHALT CEMENT IN QUANTITIES OF BETWEEN FIVE TO SEVEN PERCENT (5%-7%) IN CONFORMANCE WITH THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS. ASPHALT CONCRETE PAVING SHALL UTILIZE TYPE 3 PLANTMIX AGGREGATE IN ACCORDANCE WITH DOUGLAS COUNTY STANDARDS. SUBMIT MIX DESIGN FOR DOUGLAS COUNTY AND GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT AND ENGINEER'S APPROVAL.
- ALL AC PAVEMENT MUST STRICTLY BE IN ACCORDANCE WITH THE ORANGE BOOK SPECIFICATIONS ESPECIALLY SECTION 320.06, SURFACE TOLERANCES. ADDITIONALLY, THE SURFACE PRIOR TO APPLICATION OF THE SEAL COAT SHALL BE SMOOTH AND UNIFORM AND FREE OF ALL ROCK POCKETS AND LOOSE AGGREGATE.
- SEAL ASPHALT CONCRETE PAVING WITH A FOG SEAL. APPLY FOG SEAL AT THE APPROXIMATE RATE OF 0.08 TO 0.11 GALLONS PER SQUARE YARD OF 95-H ASPHALT EMULSION. ASPHALT EMULSION SHALL BE APPLIED ON A DRY, CLEAN PAVEMENT SURFACE WHEN ATMOSPHERIC TEMPERATURES ARE ABOVE 50°F WITH A PRESSURE DISTRIBUTOR AND EMULSION TEMPERATURES OF 75°F TO 130°F.
- NOTIFY THE AFFECTED UTILITY AND UTILITY USERS 24 HOURS IN ADVANCE OF MAKING ANY NEW CONNECTIONS TO EXISTING UTILITIES OR DISRUPTION IN SERVICE.
- CONTRACTOR SHALL CONDUCT A PRECONSTRUCTION CONFERENCE 48 HOURS PRIOR TO THE START OF CONSTRUCTION WITH THE FOLLOWING AGENCIES PRESENT: DOUGLAS COUNTY ENGINEERING DIVISION, GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT, R.O. ANDERSON ENGINEERING, INC., THE GEOTECHNICAL ENGINEER, AND ALL OTHER UTILITIES.
- EXISTING UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHALL DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION.
- NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN AND THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITY LOCATIONS.
- INSTALL TELEPHONE CONDUIT AND VAULTS PER VERIZON TELEPHONE PLANS.
- INSTALL POWER CONDUIT, VAULTS, PADS, AND STREET LIGHT BASES PER SIERRA PACIFIC POWER COMPANY PLANS.
- INSTALL CABLE TV CONDUIT PER CHARTER COMMUNICATIONS PLAN.
- COORDINATE WITH SOUTHWEST GAS FOR GAS INSTALLATION.
- THE CONTRACTOR SHALL MAINTAIN A CLEAN PROJECT SITE, REMOVING CONSTRUCTION DEBRIS AT THE END OF EACH ACTIVITY DAY. THE CONTRACTOR SHALL MAINTAIN DEBRIS FREE CONSTRUCTION ROUTES, ADJACENT STREETS AND STORM DRAIN SYSTEMS.
- ALL SEWER FORCE MAIN PIPES SHALL BE GREEN PVC 900 OR CLASS 150 PIPE WITH 42" MINIMUM COVER.
- MANHOLE BASE(S) MUST BE PRECAST UNLESS OTHERWISE APPROVED BY GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT. NO FIELD MODIFICATIONS TO PRECAST BASES SHALL BE ALLOWED.
- NON-FLEXIBLE TRANSITION COUPLINGS ARE REQUIRED WHEN CONNECTING SEWER MAINS TO EXISTING MAINS. COUPLINGS SHALL BE ROMAC INDUSTRIES INC., STYLE 501 STRAIGHT AND TRANSITION COUPLINGS FOR SEWER OR APPROVED EQUAL WHEN CONNECTING PVC TO NON-PVC MAINS.
- THE CONTRACTOR SHALL INSTALL A PLUG AT THE POINT OF EXTENSION OF A SEWER MAIN PRIOR TO THE START OF CONSTRUCTION. THE PLUG SHALL REMAIN IN PLACE UNTIL ALL LINES HAVE BEEN INSPECTED, TESTED, CLEANED AND FLUSHED.
- SEWER LINES SHALL BE TESTED PER SECTION 336.09.07 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1992 EDITION. AN AIR PRESSURE TEST AND AN ALIGNMENT TEST AND A DEFLECTION TEST PER SECTION 336.09.04 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION SHALL BE PERFORMED ON ALL SEWER LINES.
- MARKING TAPE SHALL BE INSTALLED 12" ABOVE ALL SEWER MAINS AND LATERALS. TAPE WIDTH SHALL BE THREE (3) INCHES; THICKNESS SHALL BE FOUR (4) MIL OR GREATER AND SHALL BE GREEN AND BEAR LARGE PRINTING DENOTING "CAUTION BURIED SEWER LINE BELOW" OR EQUIVALENT WORDING.
- ALL SANITARY SEWER MANHOLES SHALL BE ADJUSTED TO MATCH FINISHED GRADE IN ACCORDANCE WITH DOUGLAS COUNTY STANDARD DETAILS.

ALL CATCH BASINS SHALL BE TYPE 4R CURB INLETS THE NUMBER OF GRATES REQUIRED AT EACH CATCH BASIN LOCATION IS SPECIFIED ON THE PROFILE.

**SURVEY CONTROL**

**BASIS OF BEARING**  
S00°32'58"E - WEST LINE OF PARCEL 1 AS SHOWN ON THE RECORD OF SURVEY FOR JAMES A. AND GERALDINE LAWRENCE NEVADA TRUST ETAL RECORDED AUGUST 16, 2002 AS DOCUMENT NO. 549590.

**DATUM**

THE VERTICAL DATUM IS NGVD. IT IS BASED ON USC&G BRASS CAP STAMPED A323 AND LISTED AS RM34 ON FEMA FIRN PANEL 105 AS MAP NUMBER 32005C0105 F DATED JUNE 5, 1997.

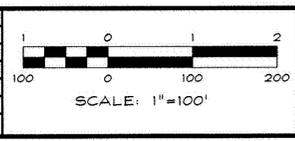
**LINE TYPES**

EXISTING	NEW	
		BUILDING ENVELOPE
		CENTERLINE OF RIGHT-OF-WAY
		CONTOUR - FIVE FOOT INTERVAL
		CONTOUR - ONE FOOT INTERVAL
		EASEMENT
		EDGE OF PAVEMENT AND/OR CURB
		FLOW LINE
		GAS LINE
		OVERHEAD POWER
		UNDERGROUND POWER
		SANITARY SEWER MAIN



RECORD INFORMATION  
AS NOTED

NO.	DATE	REVISION	BLOCK	BY



**Anderson**  
ENGINEERING INC.  
1603 ESPERALDA AVENUE / POST OFFICE BOX 2229  
PRINDEN, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

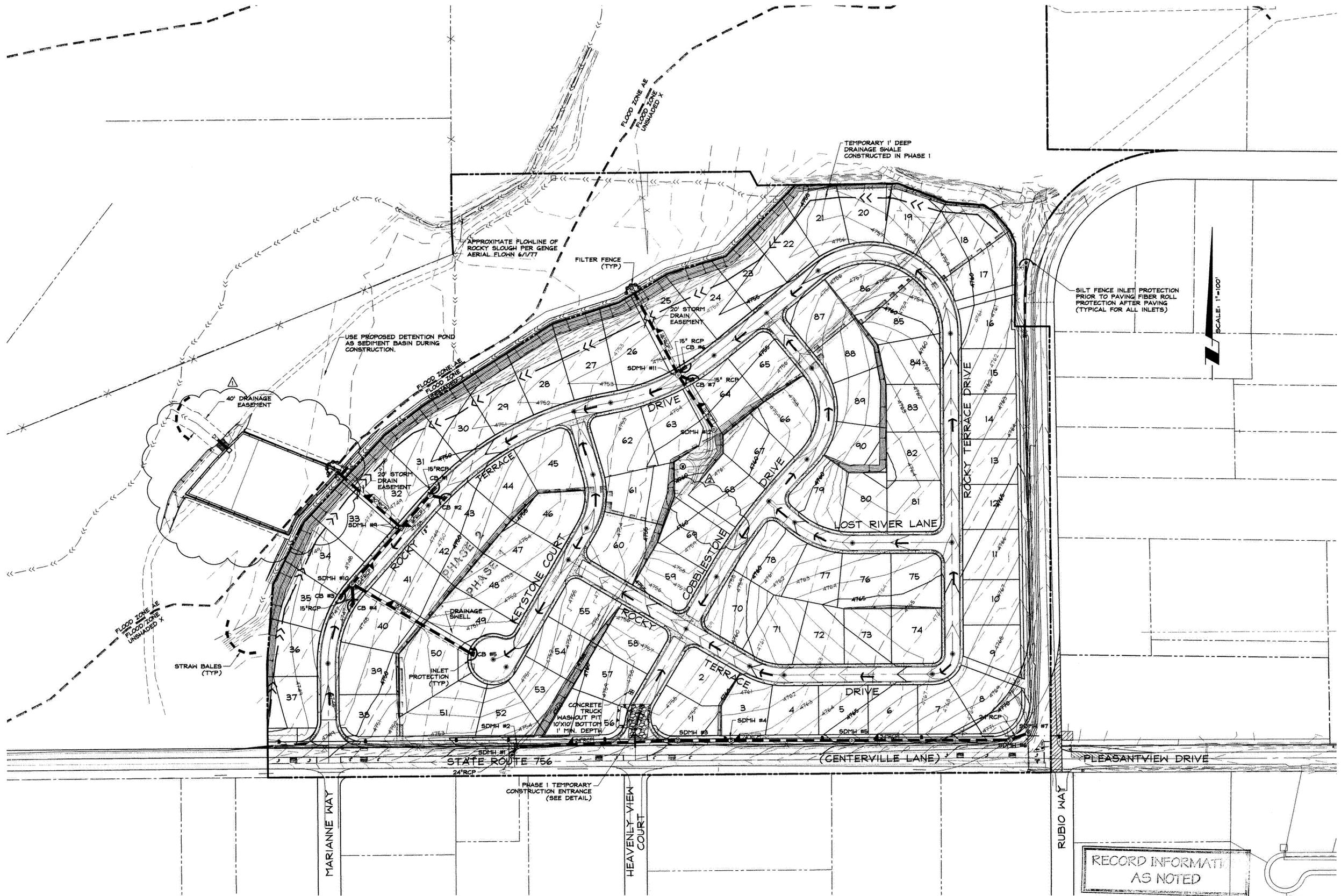
**EXISTING SITE  
CONDITIONS**

**PROFESSIONAL SEAL**  
KENT R. NEDDENRIEP  
Exp. 12-31-05  
CIVIL  
No. 10020

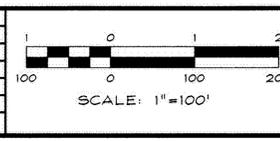
DRAWN: CMC, JRC, JMR, NOS  
ENGINEER: KRN  
SCALE: 1"=100'  
DATE: 03/18/05

JOB: 0412-010-04  
DRAWING: 41210C03  
SHEET: **C3**  
OF: C36 SHEETS

4-18-05



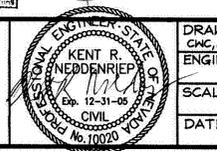
NO.	DATE	REVISION	BLOCK	BY
1	09/20/05	REVISED POND		CNC
2	09/20/05	REVISED LOT LINE		RSF



**Anderson**  
ENGINEERING INC  
1609 ESMERALDA AVENUE / POST OFFICE BOX 2229  
PRINDEN, NEVADA 89429  
PHONE: (775) 782-2322 / FAX: (775) 782-1084  
WEB SITE: WWW.ANDERSON.COM

**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**EROSION CONTROL**  
**PLAN**

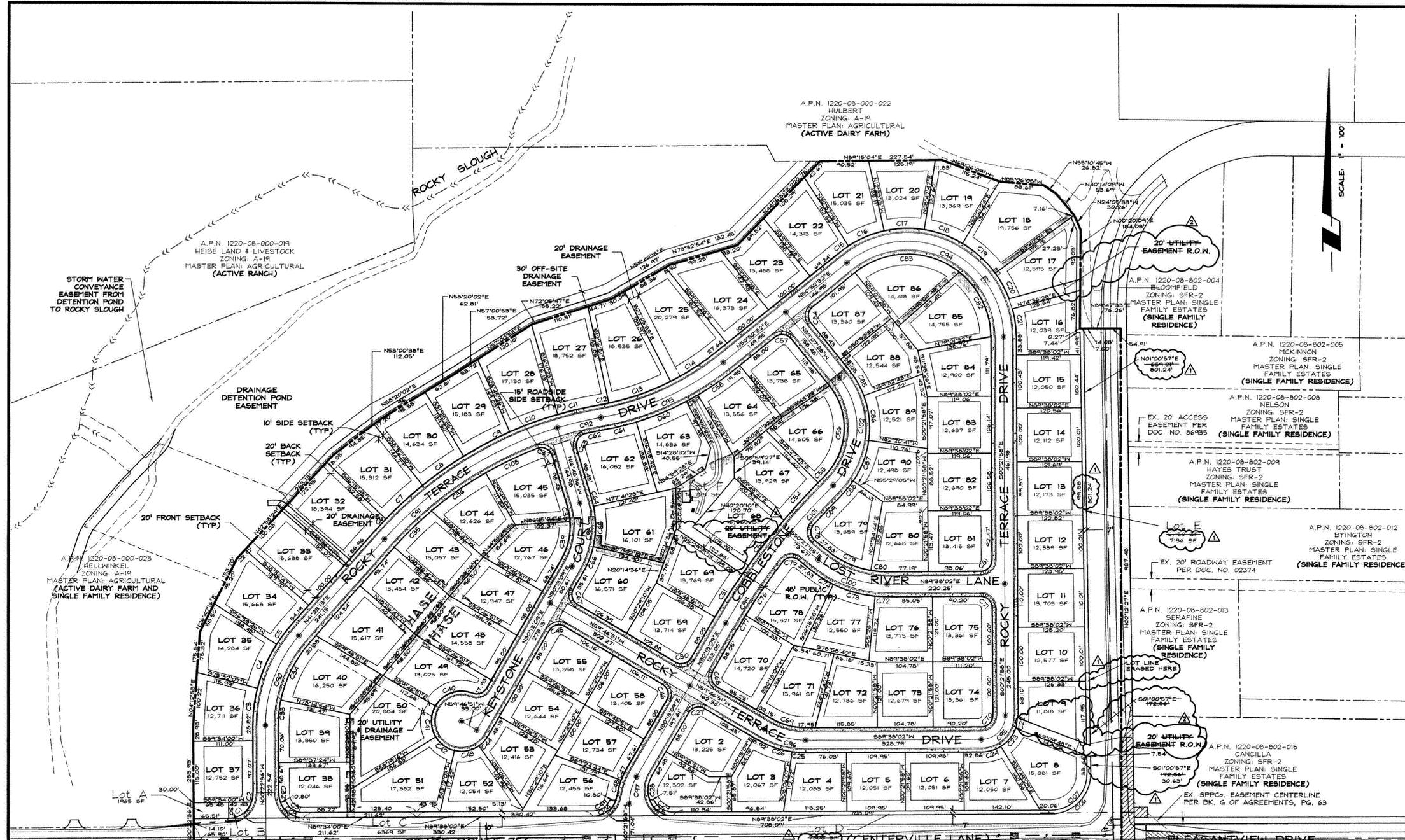


DRAWN: JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C04
SCALE: 1"=100'	SHEET: C4
DATE: 03/18/05	OF: C36 SHEETS

RECORD INFORMATION  
AS NOTED

9-20-05

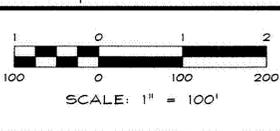
Z:\PROJECTS\41210\Drawings\Improvement Plans\41210C04.dwg, 9/20/2005 9:25:58 AM, rffitcher



CURVE	DELTA	RADIUS	LENGTH	TANGENT	CH BRG.	CH DIST.
C1	70°31'44"	45.00'	55.39'	31.82'	N64°18'08"E	51.94'
C2	14°34'54"	53.50'	18.28'	9.23'	N07°24'50"E	18.20'
C3	14°50'24"	274.00'	70.97'	35.61'	S07°02'36"W	70.78'
C4	18°33'42"	274.00'	88.77'	44.77'	S23°44'44"W	88.38'
C5	8°21'34"	274.00'	34.98'	20.09'	S37°12'24"W	34.95'
C6	2°21'02"	274.00'	24.70'	14.88'	S42°33'44"W	24.70'
C7	7°29'03"	274.00'	33.31'	19.72'	S47°25'47"W	33.25'
C8	7°27'04"	274.00'	34.15'	19.74'	S45°52'52"W	34.09'
C9	7°40'10"	274.00'	36.91'	21.24'	S42°24'24"W	36.84'
C10	7°34'03"	274.00'	35.63'	20.88'	S70°01'36"W	35.56'
C11	6°15'52"	274.00'	28.74'	16.41'	S76°55'33"W	28.70'
C12	2°14'20"	476.00'	18.29'	9.65'	N78°52'44"E	18.29'
C13	14°58'42"	476.00'	123.05'	61.87'	N70°18'45"E	122.71'
C14	12°01'55"	476.00'	99.96'	50.16'	N56°53'30"E	98.78'
C15	6°10'13"	204.00'	21.97'	11.00'	S53°57'34"W	21.96'
C16	20°24'00"	204.00'	72.63'	36.71'	S67°14'46"W	72.25'
C17	21°21'02"	204.00'	76.02'	38.45'	S88°07'16"W	75.58'
C18	21°33'37"	204.00'	76.76'	38.84'	N70°25'26"W	76.31'
C19	23°45'20"	204.00'	82.00'	42.08'	N47°58'44"W	81.54'
C20	15°10'50"	204.00'	54.52'	27.43'	N00°42'31"W	54.36'
C21	15°10'54"	204.00'	53.50'	26.90'	N07°52'45"W	53.35'
C22	4°21'12"	69.00'	5.24'	2.62'	N01°48'38"E	5.24'
C23	37°20'34"	69.00'	25.32'	12.66'	N48°30'34"E	25.32'
C24	31°27'11"	69.00'	27.88'	13.93'	N78°54'27"E	27.40'
C25	8°28'05"	174.00'	25.72'	12.88'	S86°07'56"E	25.64'
C26	22°07'01"	174.00'	47.17'	24.01'	S70°24'50"E	46.78'
C27	9°00'00"	21.00'	32.94'	21.00'	S75°13'04"W	29.70'
C28	50°10'21"	53.50'	46.85'	25.05'	S05°07'54"W	46.37'
C29	66°45'02"	38.00'	44.27'	25.03'	S56°54'27"E	41.81'
C30	90°38'54"	68.00'	107.54'	68.78'	N44°18'33"E	96.71'
C31	92°37'23"	38.00'	39.48'	22.14'	S80°07'56"E	37.42'
C32	14°33'54"	53.50'	18.27'	9.22'	S10°23'24"E	18.18'
C33	12°07'42"	226.00'	47.84'	24.01'	S05°41'15"W	47.75'
C34	23°38'07"	226.00'	116.90'	54.79'	S26°34'04"W	115.60'
C35	8°12'23"	676.00'	96.82'	48.49'	S45°33'13"W	96.74'
C36	10°31'31"	676.00'	124.18'	62.27'	S54°55'11"W	124.01'
C37	38°56'22"	21.00'	34.49'	22.50'	N63°46'47"W	30.70'
C38	33°02'40"	126.00'	28.72'	14.22'	N10°14'46"W	28.44'
C39	33°58'05"	126.00'	74.70'	38.48'	N18°14'07"E	73.61'
C40	81°04'00"	57.00'	80.73'	48.81'	S70°47'40"W	74.15'
C41	61°53'53"	57.00'	61.58'	34.18'	S00°43'47"E	58.63'
C42	45°07'13"	57.00'	44.84'	23.68'	S54°14'21"E	43.74'
C43	48°18'15"	57.00'	48.05'	25.56'	N74°02'56"E	46.64'
C44	24°55'20"	21.00'	34.48'	22.14'	N42°33'24"E	24.36'
C45	90°00'00"	21.00'	32.94'	21.00'	S75°13'04"W	29.70'
C46	90°00'00"	21.00'	32.94'	21.00'	N14°46'51"W	29.70'
C47	93°7'54"	124.00'	20.84'	10.45'	S25°24'12"W	20.82'
C48	13°30'23"	124.00'	23.23'	11.68'	S13°50'04"W	23.16'
C49	64°37'23"	95.00'	39.48'	22.14'	N75°19'21"E	37.42'
C50	90°00'00"	21.00'	32.94'	21.00'	N75°13'04"W	29.70'
C51	41°17'14"	1274.00'	95.36'	47.70'	S32°21'44"W	95.34'
C52	5°45'50"	1274.00'	128.16'	64.14'	S37°23'24"W	103.25'
C53	4°15'54"	1274.00'	94.66'	47.45'	S42°24'18"W	94.84'
C54	0°43'50"	1274.00'	16.25'	8.12'	S44°54'13"W	16.25'
C55	0°43'50"	1274.00'	16.25'	8.12'	S44°54'13"W	16.25'
C56	54°59'45"	126.00'	185.08'	115.77'	N03°11'16"E	185.84'
C57	90°00'00"	21.00'	32.94'	21.00'	N80°07'56"W	29.70'
C58	8°22'55"	524.00'	76.66'	38.40'	N58°03'54"E	76.58'
C59	2°42'10"	524.00'	24.72'	12.36'	N60°36'32"E	24.72'
C60	11°06'41"	524.00'	101.62'	50.97'	N67°30'58"E	101.46'
C61	6°58'11"	524.00'	63.74'	31.91'	N76°33'23"E	63.70'
C62	2°54'42"	676.00'	34.95'	17.18'	S78°35'08"W	34.95'
C63	33°58'05"	126.00'	34.48'	17.24'	S50°08'56"W	30.70'
C64	4°30'08"	174.00'	15.67'	7.84'	N14°33'44"W	15.67'
C65	26°16'21"	174.00'	76.75'	39.01'	N00°19'38"E	76.13'
C66	17°15'21"	174.00'	52.40'	26.40'	N21°35'24"E	52.21'
C67	90°00'00"	21.00'	32.94'	21.00'	S14°46'51"E	29.70'
C68	90°00'00"	21.00'	32.94'	21.00'	S14°46'51"E	29.70'
C69	54°59'45"	126.00'	185.08'	115.77'	S80°07'56"W	185.84'
C70	90°00'00"	21.00'	32.94'	21.00'	S75°13'04"W	29.70'
C71	90°00'00"	21.00'	32.94'	21.00'	N45°21'56"W	29.70'
C72	5°48'14"	224.00'	22.64'	11.36'	S67°27'51"E	22.68'
C73	20°52'38"	224.00'	81.62'	41.27'	S74°07'24"E	81.17'
C74	18°13'10"	224.00'	51.68'	25.96'	S57°04'30"E	51.57'
C75	42°02'05"	21.00'	33.77'	21.00'	S65°27'53"W	30.25'
C76	5°41'17"	1226.00'	121.71'	60.91'	S34°33'02"W	121.64'
C77	12°24'14"	1226.00'	31.83'	15.91'	S30°57'47"W	31.82'
C78	92°08'25"	21.00'	33.77'	21.00'	S04°23'43"E	30.25'
C79	24°57'22"	176.00'	92.02'	47.04'	S45°26'36"E	90.97'
C80	9°56'42"	176.00'	30.55'	15.31'	S85°23'37"E	30.51'
C81	90°00'00"	21.00'	32.94'	21.00'	N44°38'02"E	29.70'
C82	90°00'00"	21.00'	32.94'	21.00'	N44°38'02"E	29.70'
C83	77°24'43"	156.00'	210.77'	125.01'	S69°34'53"W	195.10'
C84	90°00'00"	21.00'	32.94'	21.00'	S05°52'52"W	29.70'
C85	18°40'11"	174.00'	56.70'	28.60'	N29°47'23"W	56.45'
C86	28°06'36"	174.00'	85.37'	43.56'	N06°23'54"W	84.51'
C87	26°51'56"	174.00'	81.67'	41.55'	N21°05'07"E	80.83'
C88	10°46'13"	174.00'	32.44'	16.38'	N59°53'32"E	32.41'
C89	3°35'58"	1226.00'	76.90'	38.46'	S43°28'04"E	76.84'
C90	41°45'50"	250.00'	182.23'	95.38'	S20°30'18"W	178.22'
C91	31°48'11"	700.00'	388.55'	194.42'	S57°17'14"W	383.58'
C92	6°51'04"	700.00'	83.70'	41.90'	S76°36'57"W	83.65'
C93	24°04'57"	500.00'	254.52'	130.08'	N65°27'50"E	251.78'
C94	128°15'01"	180.00'	404.51'	378.34'	N54°44'43"W	324.60'
C95	90°00'00"	45.00'	70.64'	45.00'	N44°38'02"E	65.64'
C96	30°35'07"	150.00'	80.07'	41.01'	S75°04'24"E	79.13'
C97	30°35'07"	150.00'	80.07'	41.01'	S75°04'24"E	79.13'
C98	47°01'45"	150.00'	123.12'	65.27'	N06°42'17"E	119.64'
C99	41°18'56"	1250.00'	203.23'	101.84'	S34°52'37"W	203.01'
C100	34°44'03"	200.00'	139.28'	72.60'	S70°24'50"E	136.48'
C101	5°44'03"	1250.00'	125.10'	62.60'	S42°24'07"W	125.05'
C102	84°23'36"	150.00'	220.94'	136.00'	N05°04'20"E	201.80'
C103	70°31'44"	45.00'	55.34'	31.82'	S55°10'08"E	51.96'
C104	70°31'44"	45.00'	55.34'	31.82'	N54°22'10"E	51.96'
C105	70°31'44"	45.00'	55.34'	31.82'	S55°06'06"E	51.96'
C106	90°38'54"	75.00'	118.66'	75.86'	N44°18'33"E	106.67'
C107	90°38'54"	68.00'	107.54'	68.78'	N44°18'33"E	96.71'
C108	90°40'06"	676.00'	106.94'	53.61'	S44°42'54"W	106.88'

RECORD INFORMATION AS NOTED

NO.	DATE	REVISION BLOCK	BY
1	05/05/05	CORRECTED INFORMATION FOR LOTS D & E	JRC
2	04/15/05	REVISED LOT LINE	RSF



**Anderson**  
ENGINEERING INC  
1608 ESPIRADO AVENUE / POST OFFICE BOX 2204  
HINDEN, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ANDERSON.COM

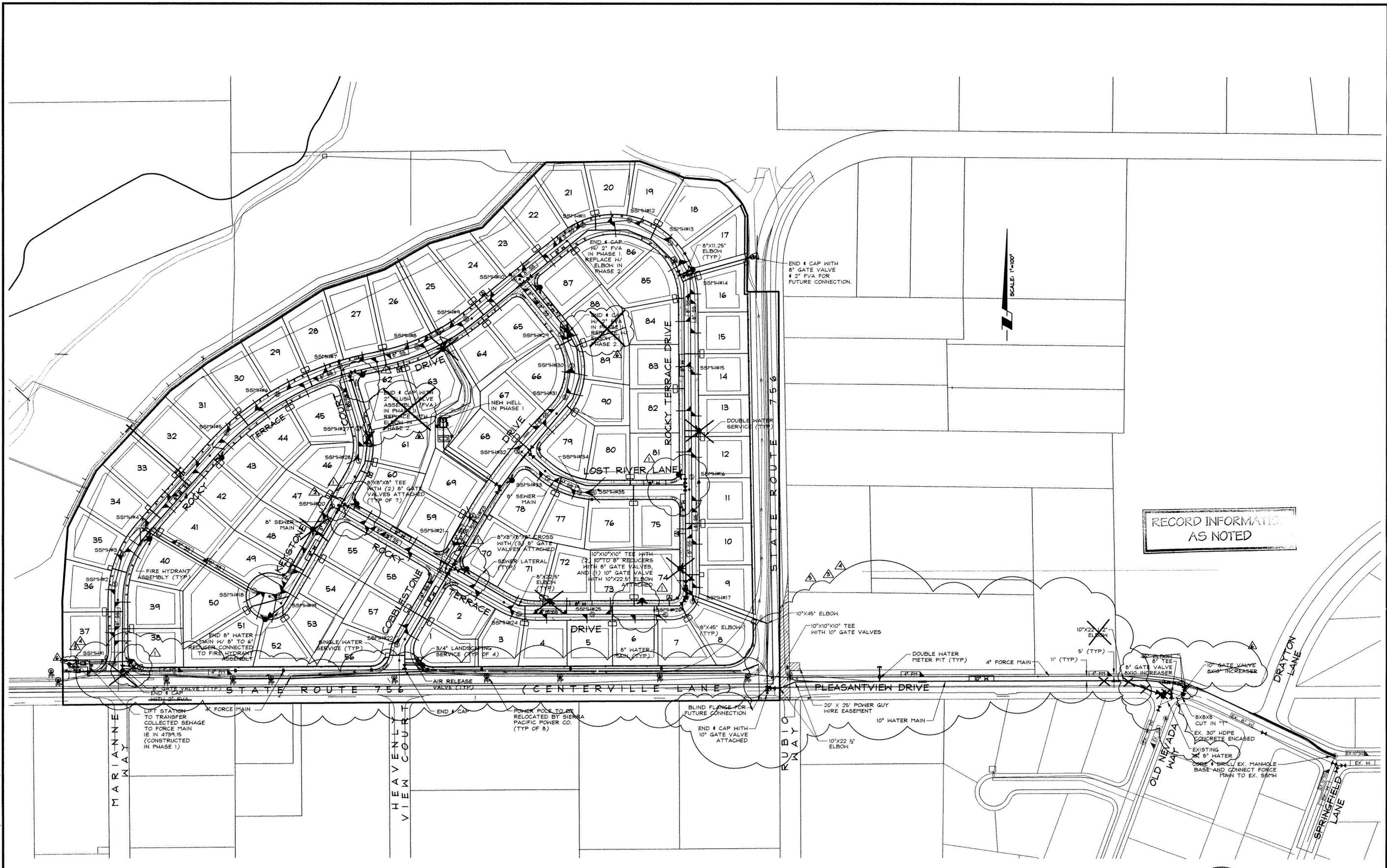
**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**COMPREHENSIVE**  
**SITE PLAN**



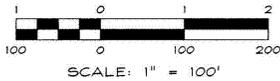
DRAWN: CMC, JRC, JMR, NOS  
ENGINEER: KRN  
SCALE: 1" = 100'  
DATE: 06/15/05  
JOB: 0412-010-04  
DRAWING: 41210C05  
SHEET: C5  
OF: C36 SHEETS

9-15-05



RECORD INFORMATION  
AS NOTED

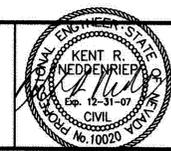
NO.	DATE	REVISION BLOCK	BY
1	05/11/06	RELOCATED FIRE HYDRANTS	RFJ
2	06/15/05	ADDED PIPE RESTRAINT	RFJ
3	06/15/05	ADDED POWER GUY WIRE EASEMENT, RELOCATED WATER & SEWER & REVISED SANIT	RFJ
4	08/04/05	REVISED SEWER & WATER LOCATIONS, DELETED SEWER T'S	RFJ
5	09/20/05	RELOCATED FORCE MAIN & WATER. ADDED PIPE JOINT RESTRAINT	RFJ
6	05/23/06	RECORD INFORMATION	JFR



**ROAnderson**  
1603 ESHERALDA AVENUE / POST OFFICE BOX 2224  
PRINCE, NEVADA 89428  
PHONE: (775) 782-2922 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

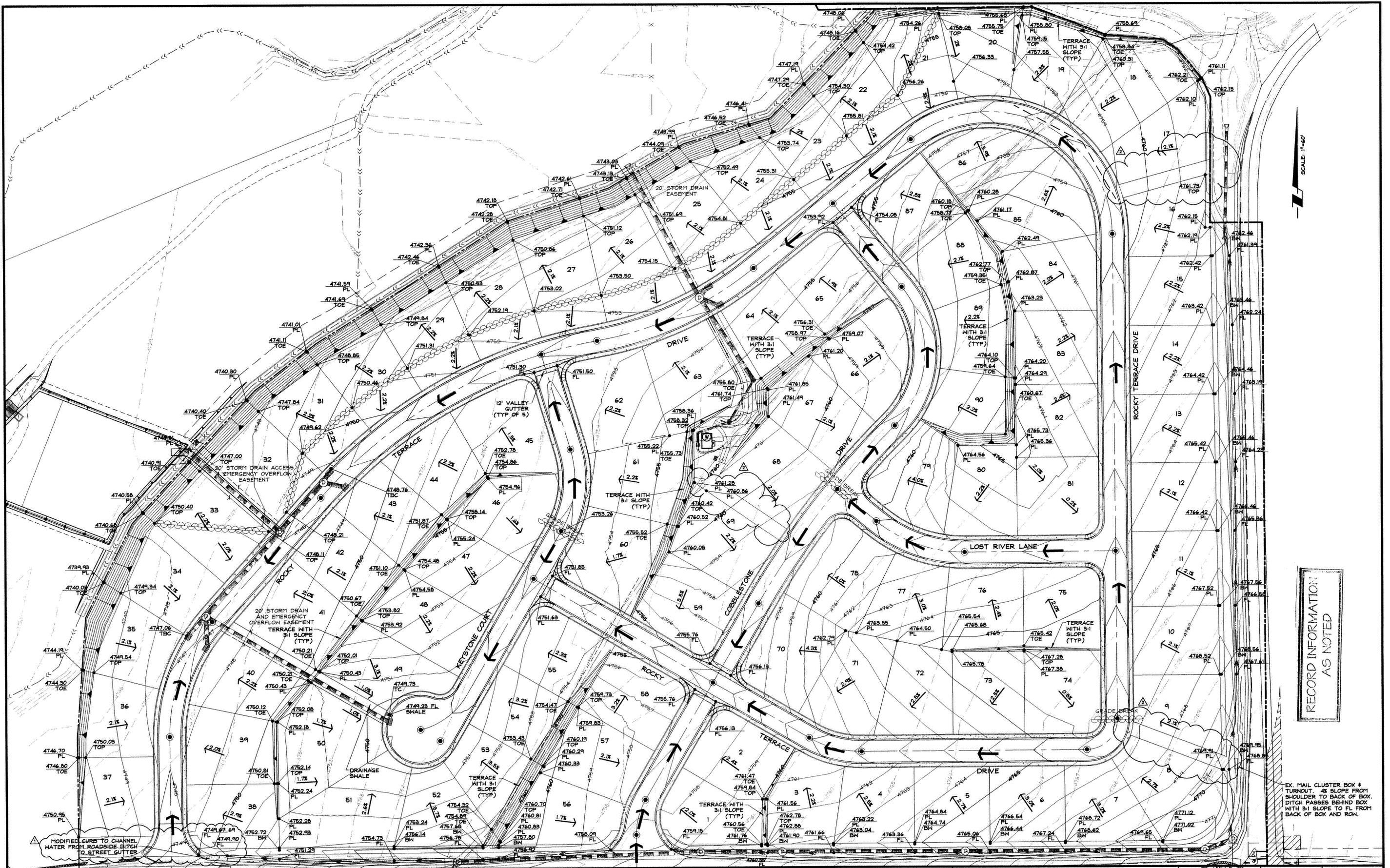
**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**COMPREHENSIVE  
UTILITY PLAN**



DRAWN: GNC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: ROA	DRAWING: 41210C06
SCALE: 1" = 100'	SHEET: C6
DATE: 06/16/05	OF: C36 SHEETS

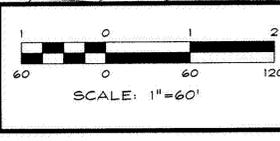




RECORD INFORMATION AS NOTED

EX. MAIL CLUSTER BOX & TURNOUT AS SLOPE FROM SHOULDER TO BACK OF BOX. DITCH PASSES BEHIND BOX WITH 3:1 SLOPE TO FL FROM BACK OF BOX AND ROW.

NO.	DATE	REVISION BLOCK	BY
1	05/05/05	MODIFICATIONS TO ROADSIDE DRAINAGE DESIGN	JRC
2	09/15/05	REVISED LOT LINES	RSF



**Anderson**  
ENGINEERING INC  
1603 ESPERANZA AVENUE / POST OFFICE BOX 2224  
HENDER, NEVADA 89025  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

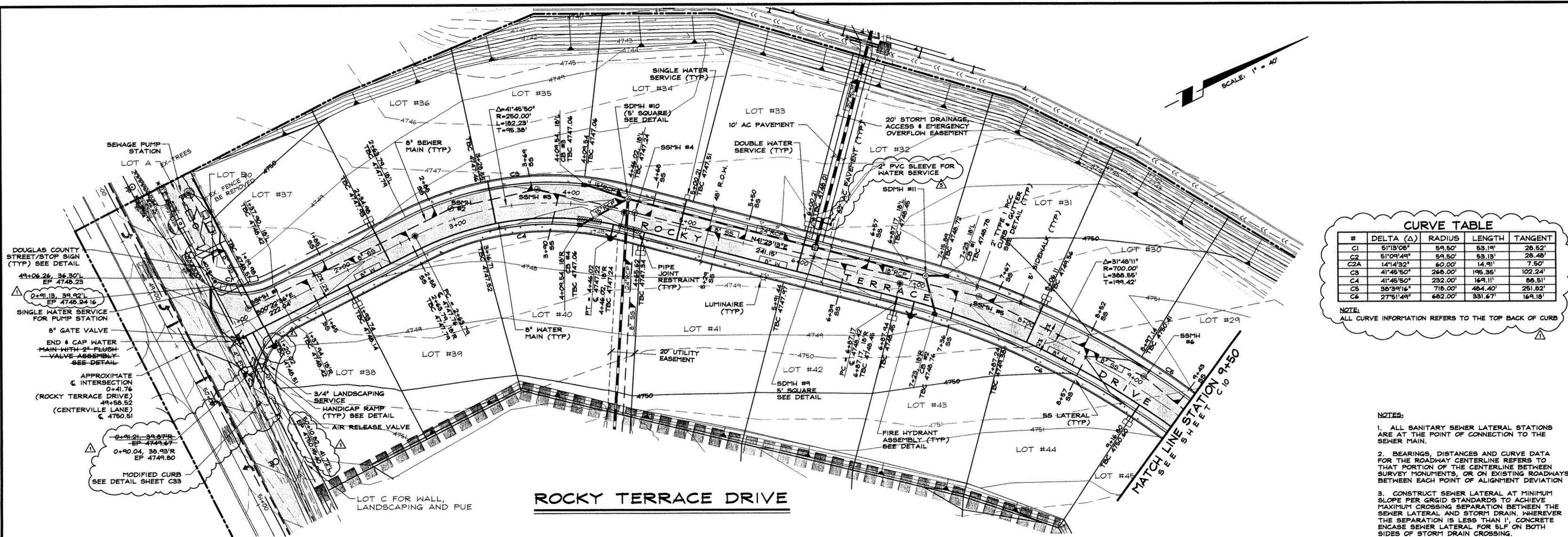
**GRADING & DRAINAGE PLAN**

ENGINEER: STATE OF NEVADA  
KENT R. WEDDERBURN  
CIVIL  
No. 10070

DRAWN: GNC, JRC, JMR, NGS  
ENGINEER: KRN  
SCALE: 1"=60'  
DATE: 05/05/05

JOB: 0412-010-04  
DRAWING: 41210C08  
SHEET: C8  
OF: C36 SHEETS

9-15-05

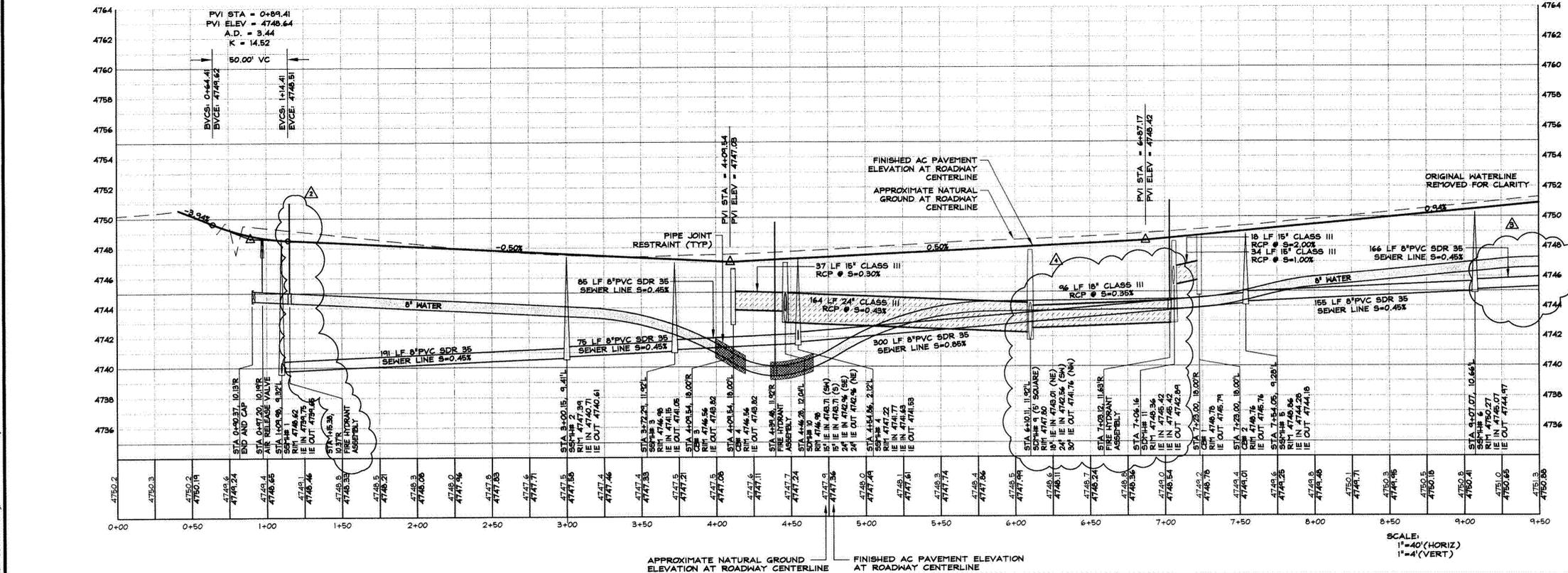


**CURVE TABLE**

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C1	51°13'08"	59.50'	53.19'	28.52'
C2	51°09'49"	59.50'	53.19'	28.48'
C2A	141°14'32"	60.00'	14.91'	7.50'
C3	41°45'50"	266.00'	196.35'	102.24'
C4	41°45'50"	232.00'	169.11'	88.51'
C5	38°39'16"	718.00'	484.40'	251.82'
C6	27°51'49"	682.00'	331.67'	169.18'

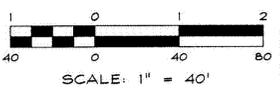
NOTE: ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

- NOTES:**
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN, WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES' 1600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COULPLINGS INSTEAD OF SLEEVING.



RECORD INFORMATION AS NOTED

NO.	DATE	REVISION BLOCK	BY
1	05/05/05	MADE MODIFICATIONS TO ROADSIDE DRAINAGE DESIGN	JRC
2	05/12/05	RELOCATED FIRE HYDRANTS	RSF
3	05/12/05	REVISED WATERLINE	RSF
4	11/03/05	REVISED STORM DRAIN	KRN
5	11/15/05	ADDED 2" PVC SLEEVE TO WATER SERVICE	KRN



**R|O Anderson**  
 1609 ESPERANZA AVENUE / POST OFFICE BOX 2209  
 LAS VEGAS, NEVADA 89423  
 PHONE: (775) 752-3922 / FAX: (775) 752-7094  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

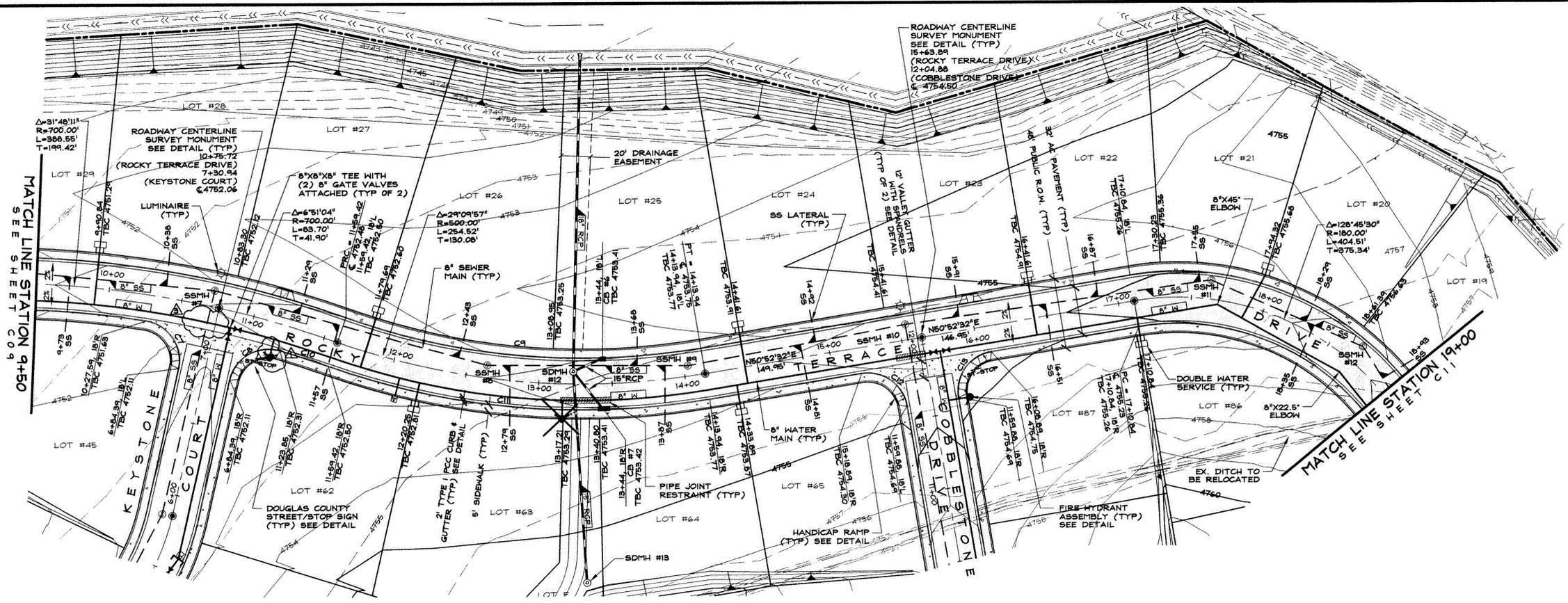
**PLAN & PROFILE**  
**ROCKY TERRACE DRIVE**  
**STA 0+00 TO 9+50**

ENGINEER STATE OF NEVADA  
 KENT R. ANDERSON  
 No. 12-31-05  
 CIVIL  
 EXPIRES 12/31/07

DRAWN: GNC, JRC, JMR, NOS  
 ENGINEER: KRN  
 SCALE: 1" = 40'  
 DATE: 05/12/05

JOB: 0412-010-04  
 DRAWING: 41210C09  
 SHEET: C9  
 OF: C36 SHEETS

11-15-05



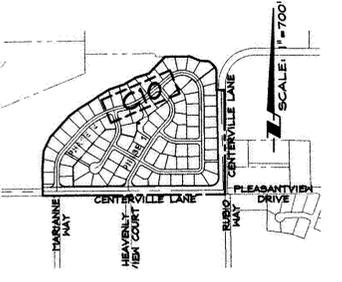
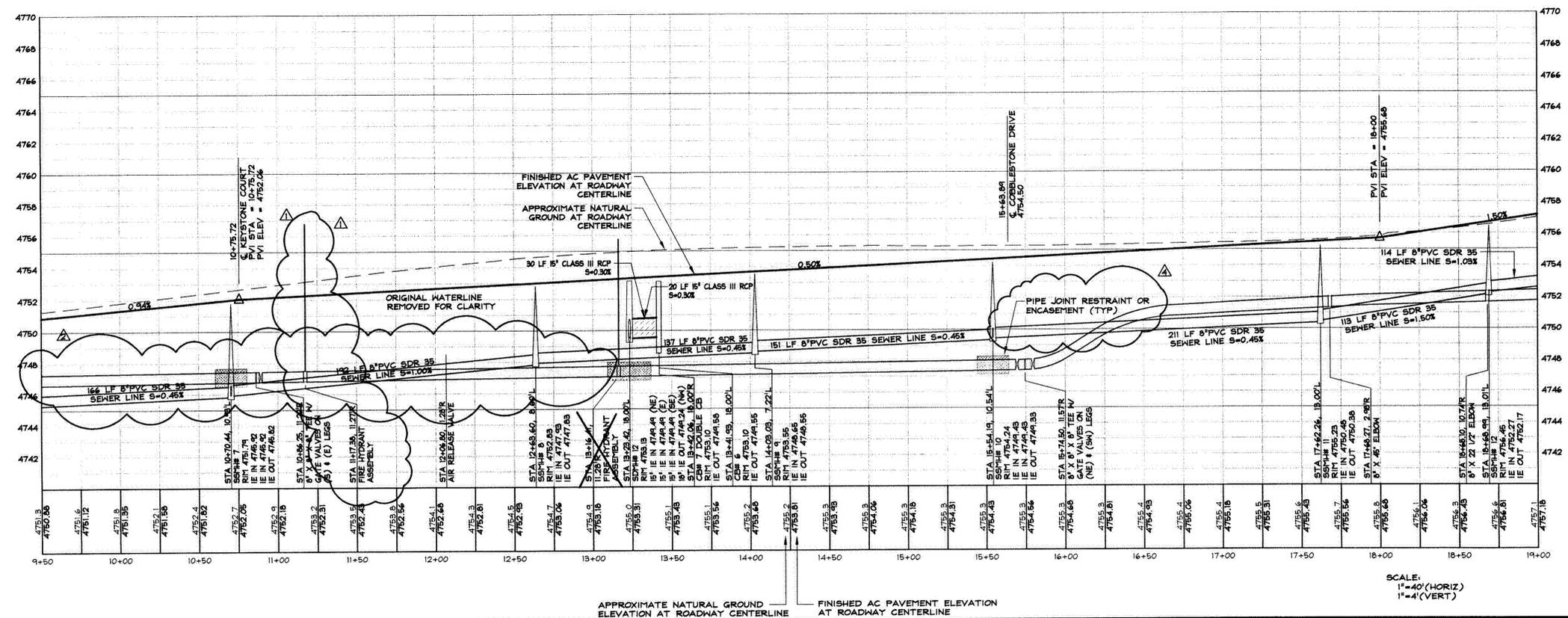
**CURVE TABLE**

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C7	93°56'22"	27.00'	44.27'	28.92'
C8	93°56'22"	27.00'	44.27'	28.92'
C9	29°09'57"	482.00'	245.36'	125.40'
C10	2°54'42"	682.00'	34.66'	17.33'
C11	29°09'57"	518.00'	263.68'	134.76'
C12	90°00'00"	27.00'	42.41'	27.00'
C13	90°00'00"	27.00'	42.41'	27.00'

NOTE:  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

- NOTES:**
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN, WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROCKAC INDUSTRIES 1600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.
  - PIPE JOINT RESTRAINTS OR ENCASEMENT ON WATER AND LOCATE SEWER AND WATER JOINTS AS FAR FROM INTERSECTION OF PIPE AS POSSIBLE.

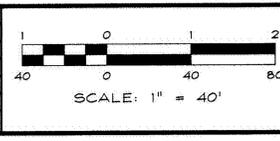
**ROCKY TERRACE DRIVE**



**SHEET INDEX**

RECORD INFORMATION AS NOTED

NO.	DATE	REVISION BLOCK	BY
1	05/12/05	RELOCATED FIRE HYDRANTS	R5F
2	05/12/05	REVISED WATERLINE	R5F
3	08/18/05	ADDED PIPE RESTRAINT AND NOTE	CMK
4	09/20/05	REVISED TEXT	R5F



**Anderson**  
ENGINEERING INC  
1603 ESPERANZA AVENUE / POST OFFICE BOX 2228  
TANDON, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

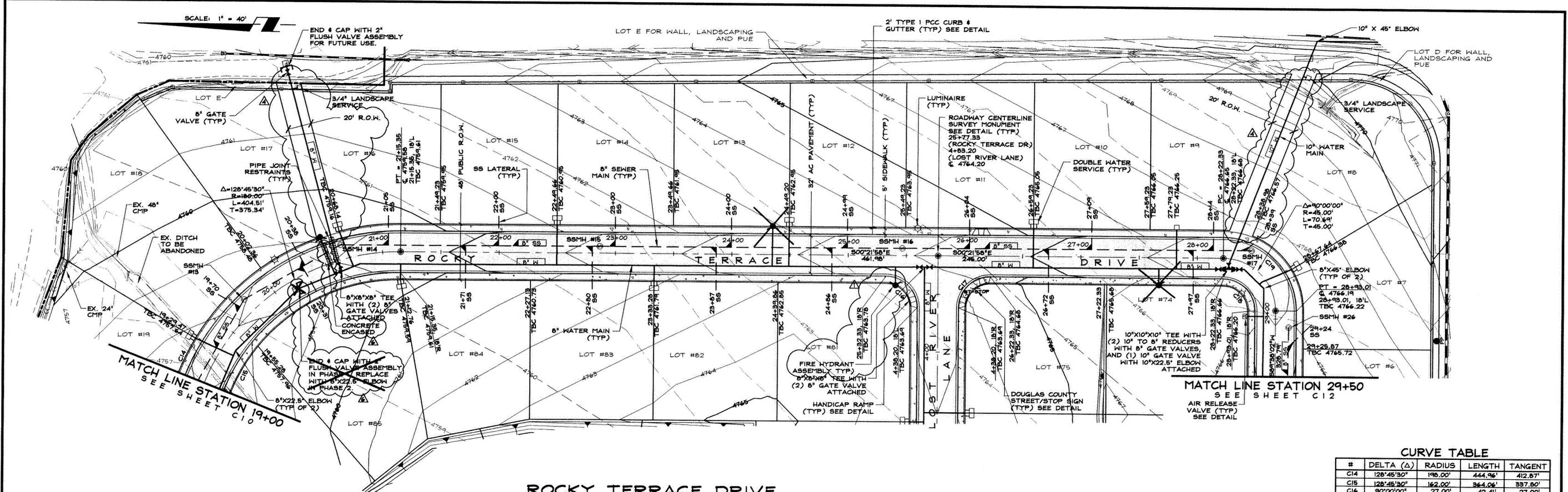
**PLAN & PROFILE**  
ROCKY TERRACE DRIVE  
STA 9+50 TO 19+00

**RECORD INFORMATION AS NOTED**

DRAWN: CMC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C10
SCALE: 1" = 40'	SHEET: C10
DATE: 05/12/05	OF: C36 SHEETS



9-20-05



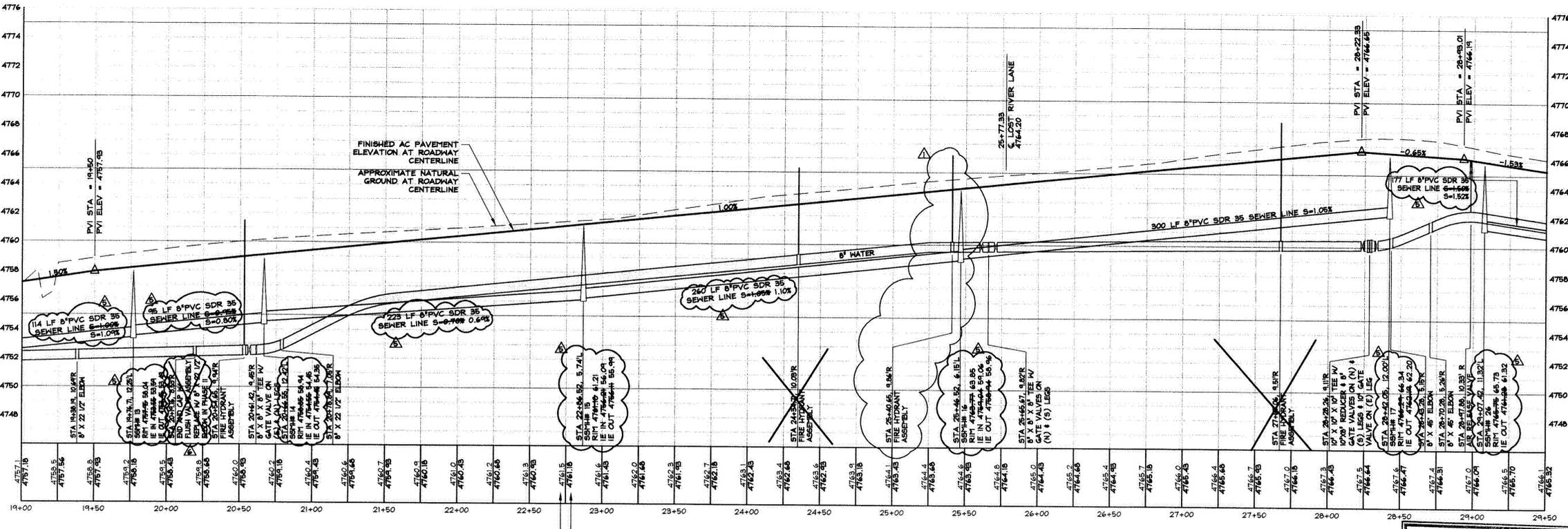
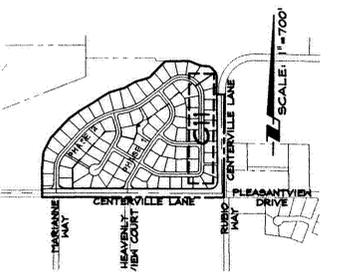
**ROCKY TERRACE DRIVE**

**CURVE TABLE**

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C14	128°45'30"	198.00'	444.96'	412.87'
C15	128°45'30"	162.00'	162.00'	364.06'
C16	90°00'00"	27.00'	42.41'	27.00'
C17	90°00'00"	27.00'	42.41'	27.00'
C18	90°00'00"	27.00'	42.41'	27.00'
C19	90°00'00"	63.00'	98.96'	63.00'

NOTE:  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

- NOTES:**
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN, WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROSTAC INDUSTRIES 400" SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPLINGS INSTEAD OF SLEEVING.

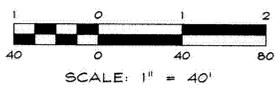


RECORD INFORMATION AS NOTED

SHEET INDEX

**REVISION BLOCK**

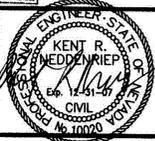
NO.	DATE	REVISION	BY
1	05/12/05	RELOCATED FIRE HYDRANTS	RSF
2	06/15/05	REVISED 20' UTILITY EASEMENT TO 20' R.O.W.	RSF
3	03/01/06	RECORD INFORMATION	JMR
4	05/23/06	RECORD INFORMATION	JMR



**R|O|Anderson**  
1609 58TH/HERALDO AVENUE / POST OFFICE BOX 2229  
HINDEN, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7004  
WEB SITE: WWW.ROANDERSON.COM

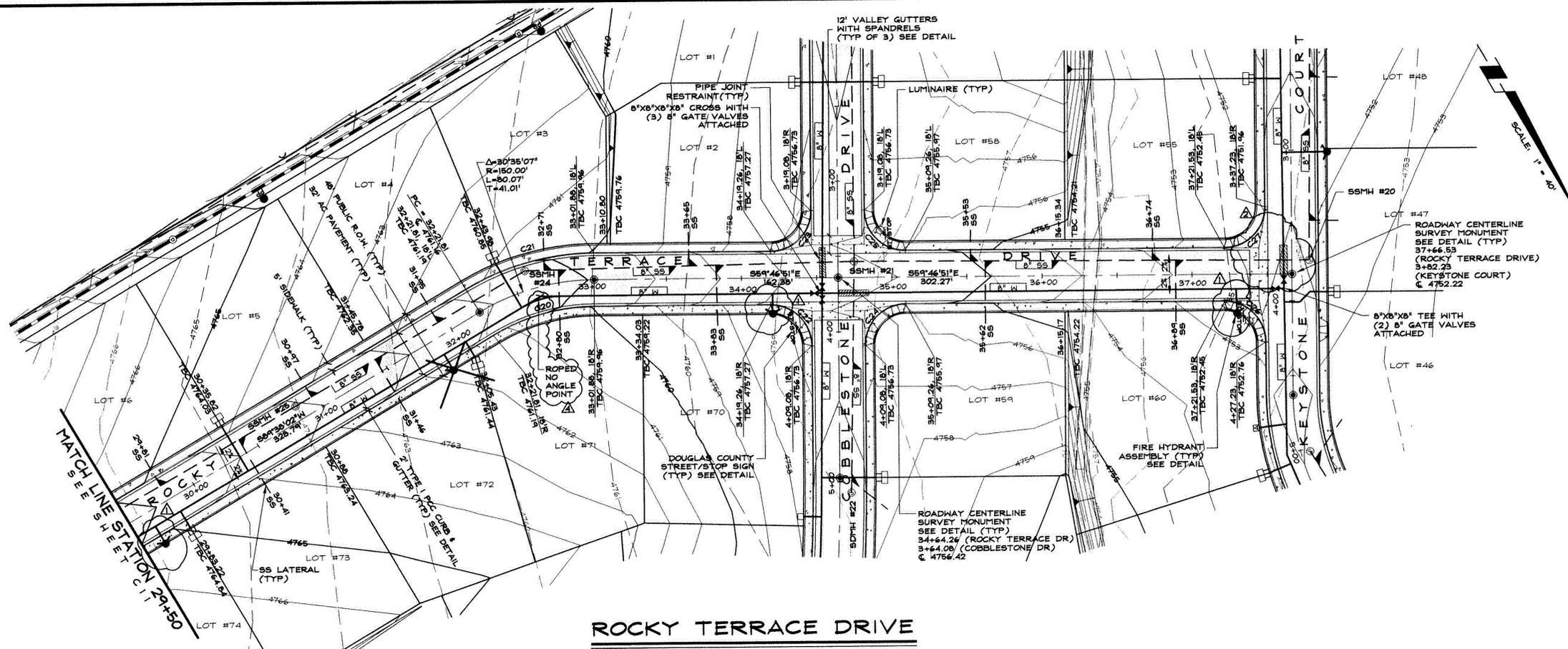
**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE  
ROCKY TERRACE DRIVE  
STA 19+00 TO 29+50**



DRAWN: GNC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C11
SCALE: 1" = 40'	SHEET: C11
DATE: 06/15/05	OF: C36 SHEETS

5-23-06

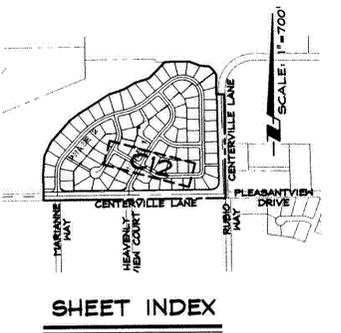
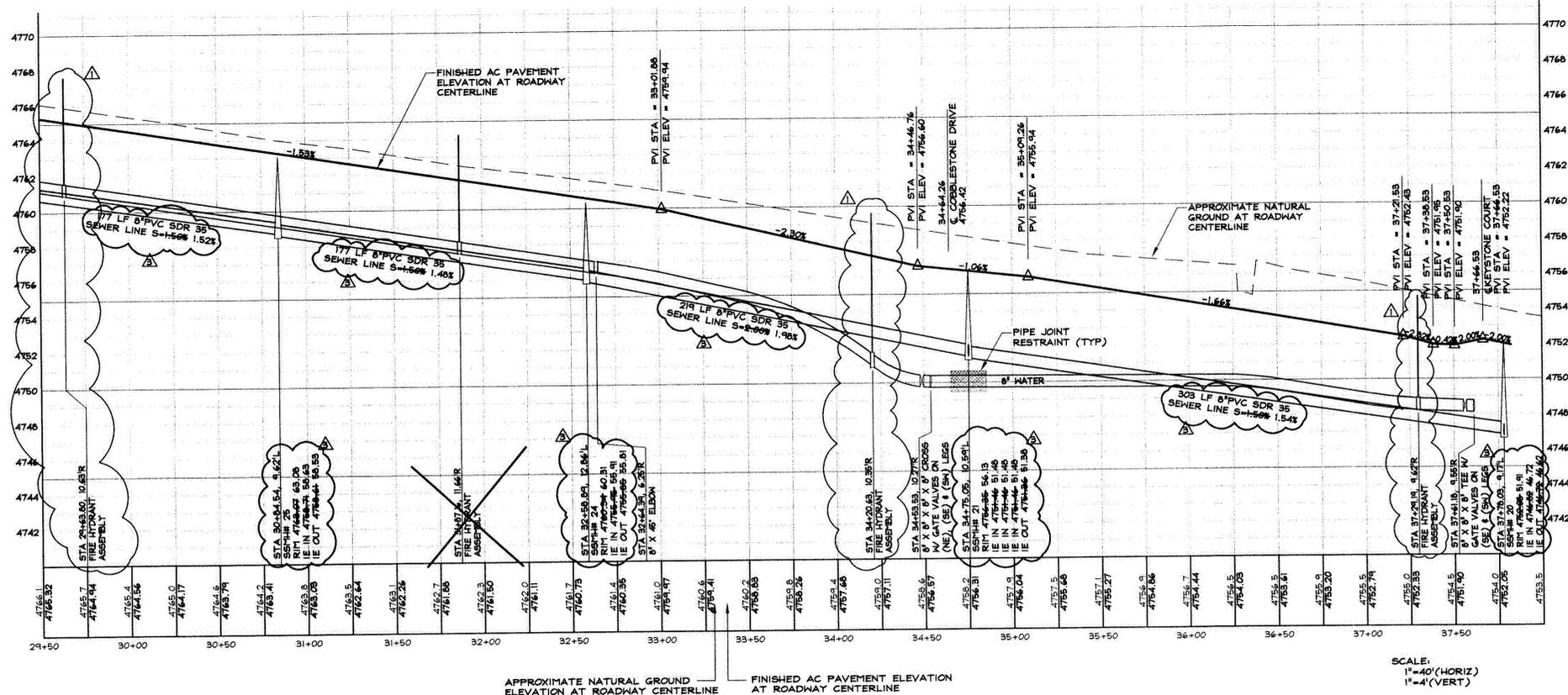


#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C20	30°35'07"	132.00'	70.46'	36.09'
C21	30°35'07"	168.00'	89.68'	45.94'
C22	90°00'00"	27.00'	42.41'	27.00'
C23	90°00'00"	27.00'	42.41'	27.00'
C24	90°00'00"	27.00'	42.41'	27.00'
C25	90°00'00"	27.00'	42.41'	27.00'
C26	90°00'00"	27.00'	42.41'	27.00'
C27	90°00'00"	27.00'	42.41'	27.00'

NOTE:  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

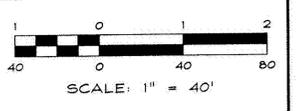
- NOTES:
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR SLF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COULPINGS INSTEAD OF SLEEVING.

**ROCKY TERRACE DRIVE**



RECORD INFORMATION  
AS NOTED

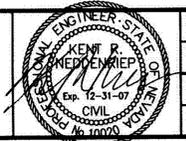
NO.	DATE	REVISION BLOCK	BY
1	05/12/05	RELOCATED FIRE HYDRANTS	RSF
2	09/20/05	ADDED PIPE RESTRAINT	RSF
3	03/01/06	RECORD INFORMATION	JMR
4	05/23/06	RECORD INFORMATION	JMR



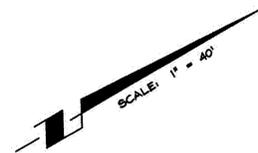
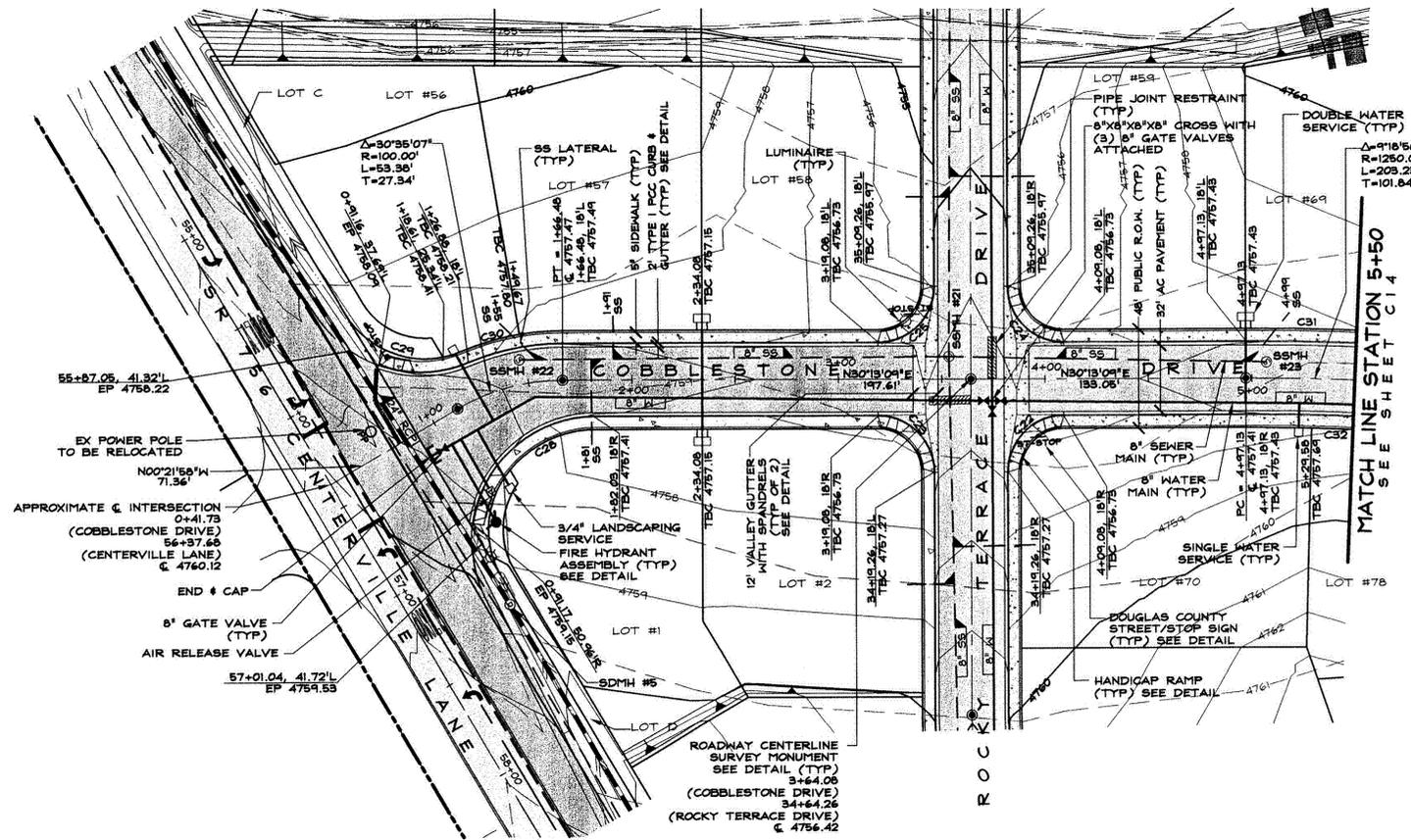
**R.O. Anderson**  
1609 E. HERALDA AVENUE / POST OFFICE BOX 2229  
PRINCE, NEVADA 89433  
PHONE: (775) 792-2322 / FAX: (775) 792-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE  
ROCKY TERRACE DRIVE  
STA 29+50 TO 38+00**



DRAWN: CMC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C12
SCALE: 1" = 40'	SHEET: C12
DATE: 06/15/05	OF: C36 SHEETS

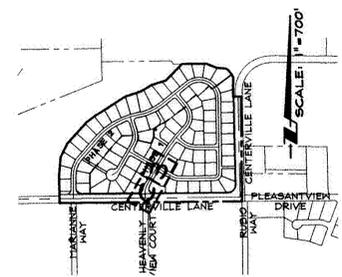
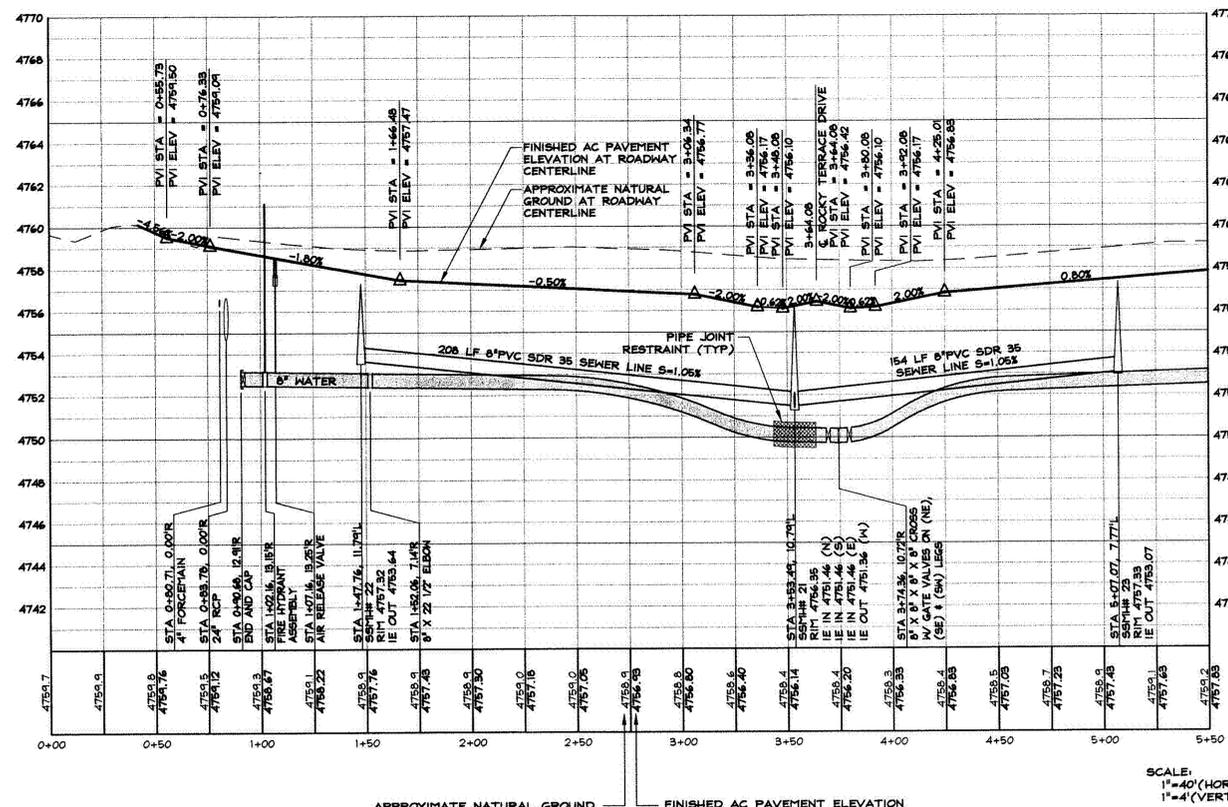


#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C22	90°00'00"	27.00'	42.41'	27.00'
C23	90°00'00"	27.00'	42.41'	27.00'
C24	90°00'00"	27.00'	42.41'	27.00'
C25	90°00'00"	27.00'	42.41'	27.00'
C26	87°47'34"	59.50'	84.94'	51.54'
C29	42°34'07"	59.50'	44.24'	23.23'
C30	22°41'04"	118.00'	46.72'	23.47'
C31	15°02'58"	1268.00'	333.06'	167.49'
C32	71°03'11"	1292.00'	154.24'	77.24'

NOTE:  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

- NOTES:
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRAD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR SLF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAG INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.

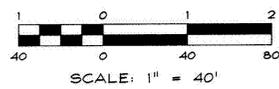
**COBBLESTONE DRIVE**



**SHEET INDEX**

RECORD INFORMATION  
AS NOTED

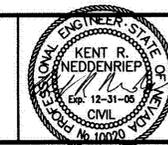
NO.	DATE	REVISION	BLOCK	BY



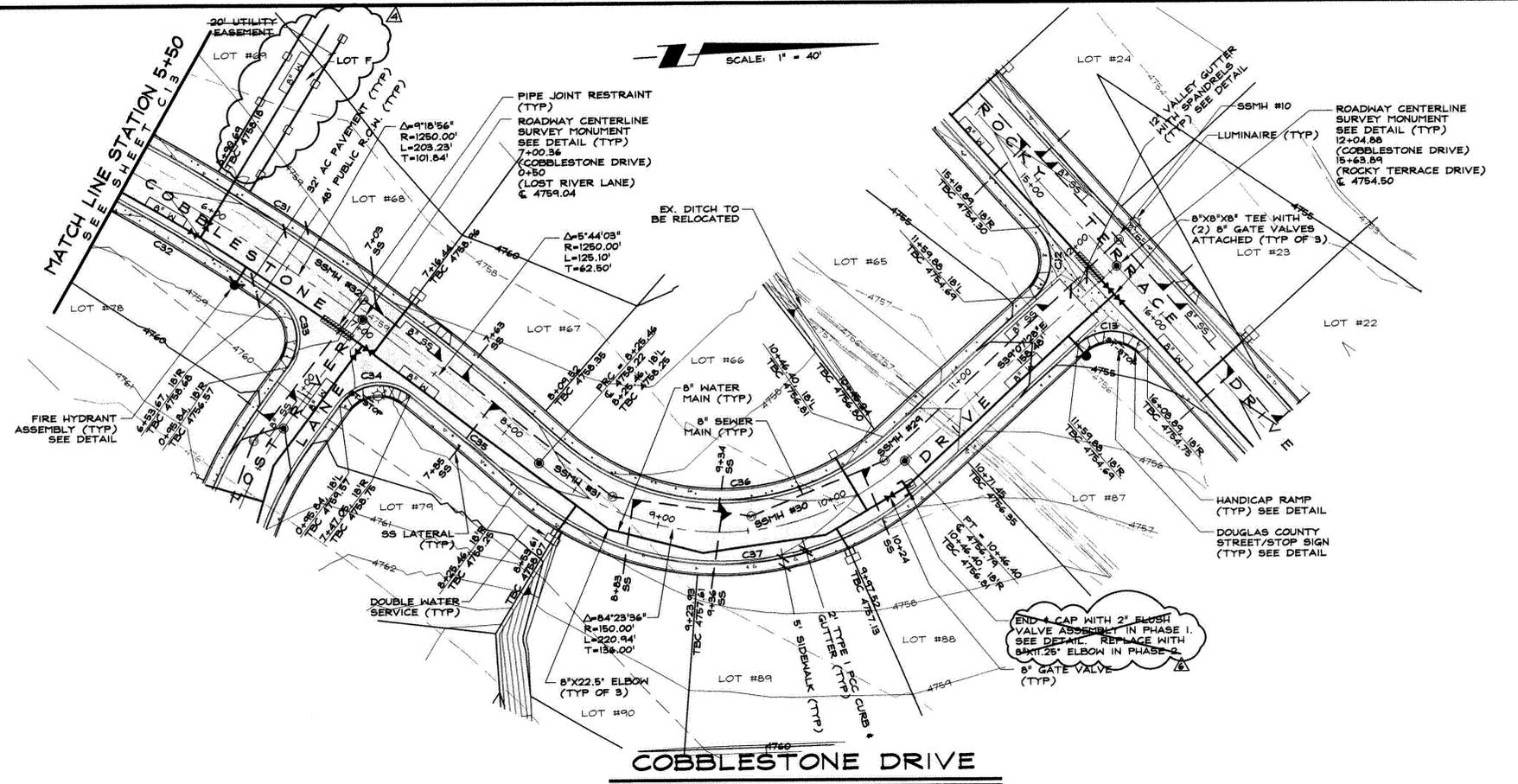
**Anderson**  
ENGINEERING INC  
1603 ESPERANZA AVENUE / POST OFFICE BOX 2229  
RENO, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

**PLAN & PROFILE**  
COBBLESTONE DRIVE  
STA 0+00 TO 5+50



DRAWN: CNC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C13
SCALE: 1" = 40'	SHEET: C13
DATE: 04/18/05	OF: 36 SHEETS

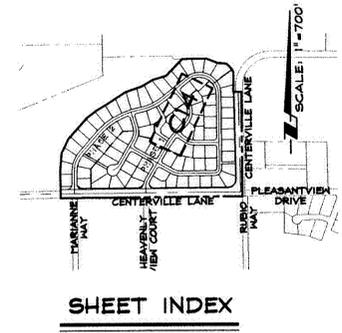
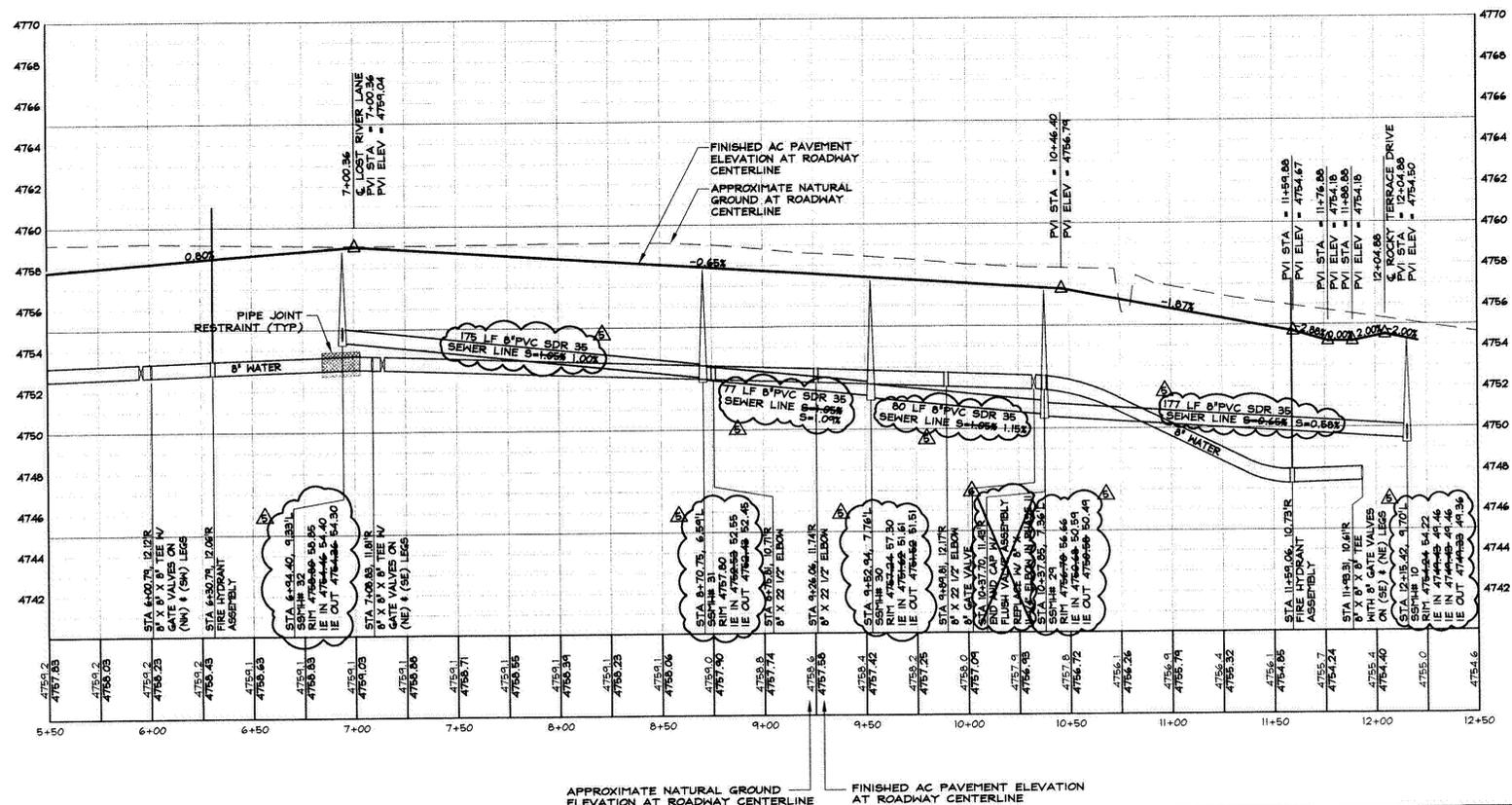


**CURVE TABLE**

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C12	90°00'00"	27.00'	42.41'	27.00'
C13	90°02'00"	27.00'	42.41'	27.00'
C31	15°02'58"	1288.00'	333.06'	167.49'
C32	7°10'31"	1232.00'	154.29'	77.24'
C33	92°08'25"	27.00'	43.42'	28.03'
C34	92°08'25"	27.00'	43.42'	28.03'
C35	3°35'38"	1232.00'	154.29'	77.24'
C36	84°23'36"	132.00'	194.43'	119.68'
C37	84°23'36"	168.00'	247.45'	152.32'

**NOTE:**  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

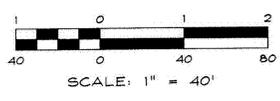
- NOTES:**
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES "600" SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.



RECORD INFORMATION  
AS NOTED

SCALE:  
1"=40'(HORIZ)  
1"=4'(VERT)

NO.	DATE	REVISION BLOCK	BY
1	06/14/05	REVISED 20' UTILITY EASEMENT TO LOT F	RSF
2	03/01/06	RECORD INFORMATION	JMR
3	05/23/06	RECORD INFORMATION	JMR



**R|O Anderson**

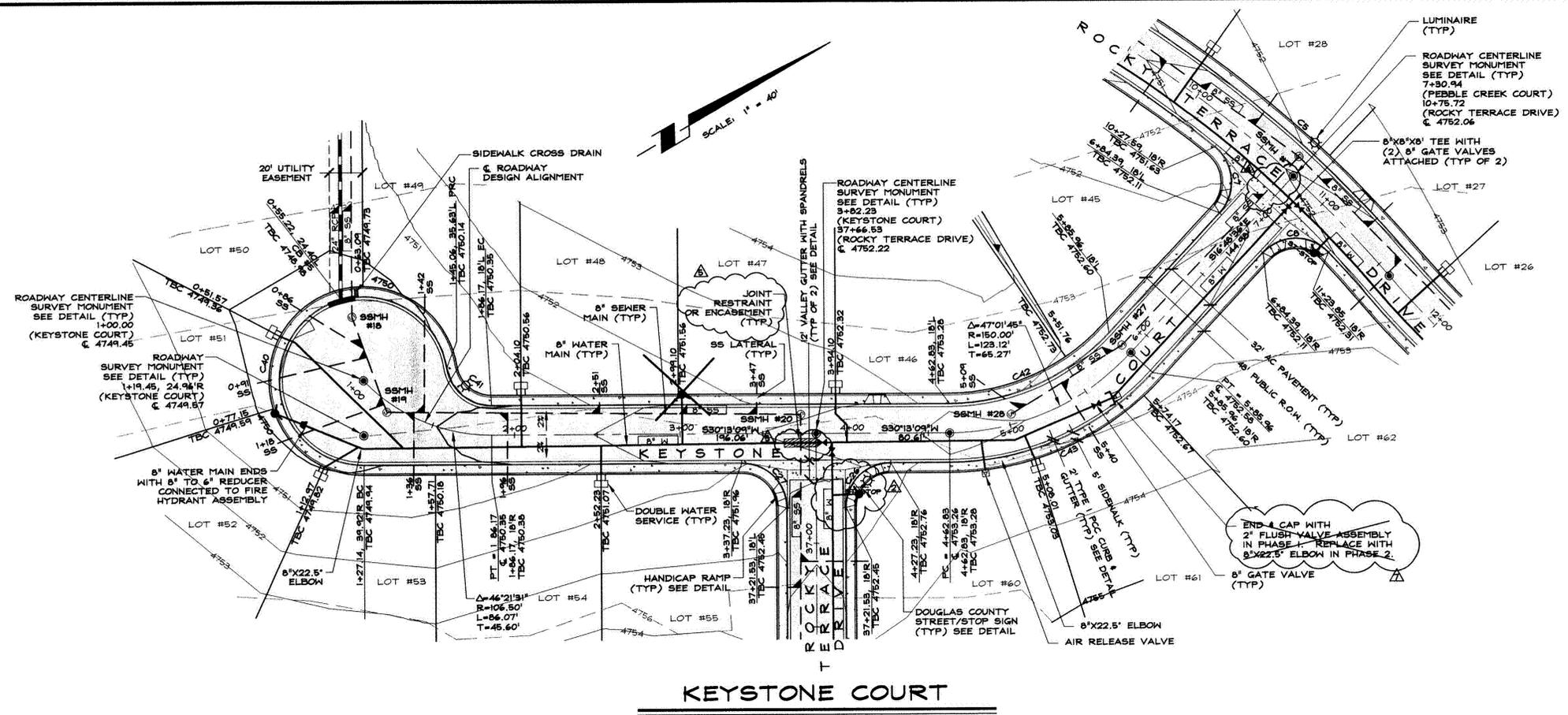
1605 ESHERALDA AVENUE / POST OFFICE BOX 2229  
PINDEN, NEVADA 89423  
PHONE: (775) 782-2822 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE  
COBBLESTONE DRIVE  
STA 5+50 TO 12+50**



DRAWN: CNC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C14
SCALE: 1" = 40'	SHEET: C14
DATE: 03/18/05	OF: C36 SHEETS



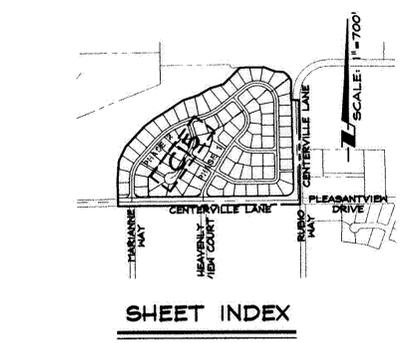
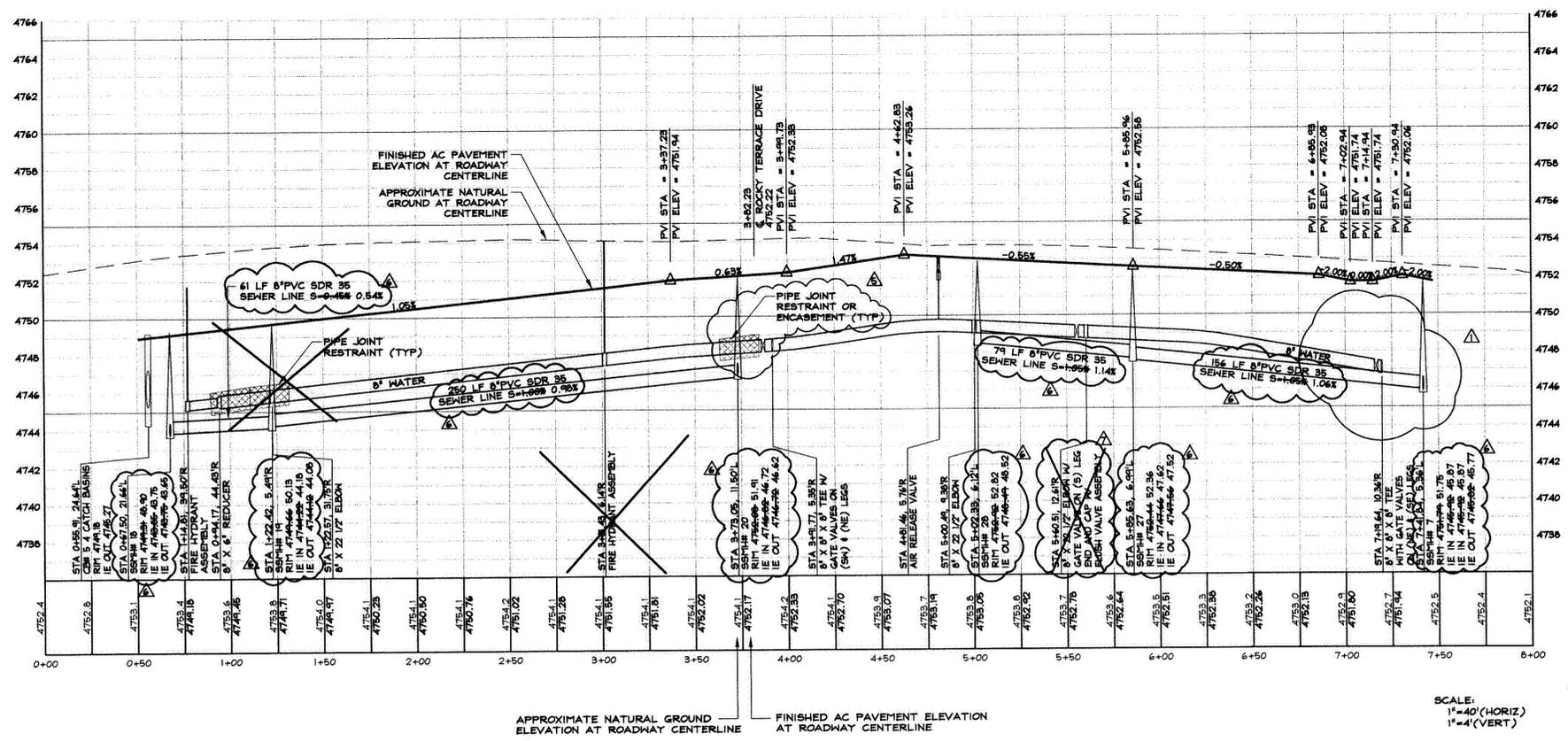
**CURVE TABLE**

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C5	33°39'16"	718.00'	484.40'	251.82'
C7	93°56'22"	27.00'	44.27'	28.92'
C8	93°56'22"	27.00'	44.27'	28.92'
C26	90°00'00"	27.00'	42.41'	27.00'
C27	90°00'00"	27.00'	42.41'	27.00'
C40	261°04'00"	51.00'	232.45'	54.54'
C41	81°00'00"	27.00'	38.24'	23.12'
C42	47°01'45"	152.00'	108.95'	57.44'
C49	47°01'45"	168.00'	137.90'	73.10'

NOTE:  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

- NOTES:**
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1' CONCRETE ENCASE SEWER LATERAL FOR SLF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES 1600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.
  - PIPE JOINT RESTRAINTS OR ENCASEMENT ON WATER AND LOCATE SEWER AND WATER JOINTS AS FAR FROM INTERSECTION OF PIPE AS POSSIBLE.

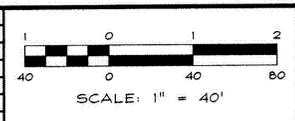
**KEYSTONE COURT**



RECORD INFORMATION  
AS NOTED

Z:\PROJECTS\14120\14120.dwg, 5/24/2006, 11:41:11 PM, JRC

NO	DATE	REVISION BLOCK	BY
05/12/05	05/12/05	REVISED WATERLINE	RSF
05/12/05	05/12/05	RELOCATED FIRE HYDRANT	RSF
06/15/05	06/15/05	ADDED PIPE RESTRAINT	RSF
08/18/05	08/18/05	ADDED PIPE RESTRAINT AND NOTE	CHK
09/20/05	09/20/05	RELOCATED PIPE RESTRAINT & REVISED TEXT	RSF
09/20/05	09/20/05	RECORD INFORMATION	JMR
05/23/06	05/23/06	RECORD INFORMATION	JMR



**RIO Anderson**  
403 ESHERALDA AVENUE / POST OFFICE BOX 2209  
HINDEN, NEVADA 89423  
PHONE: (775) 782-2822 / FAX: (775) 782-1084  
WEB SITE: WWW.RIOANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

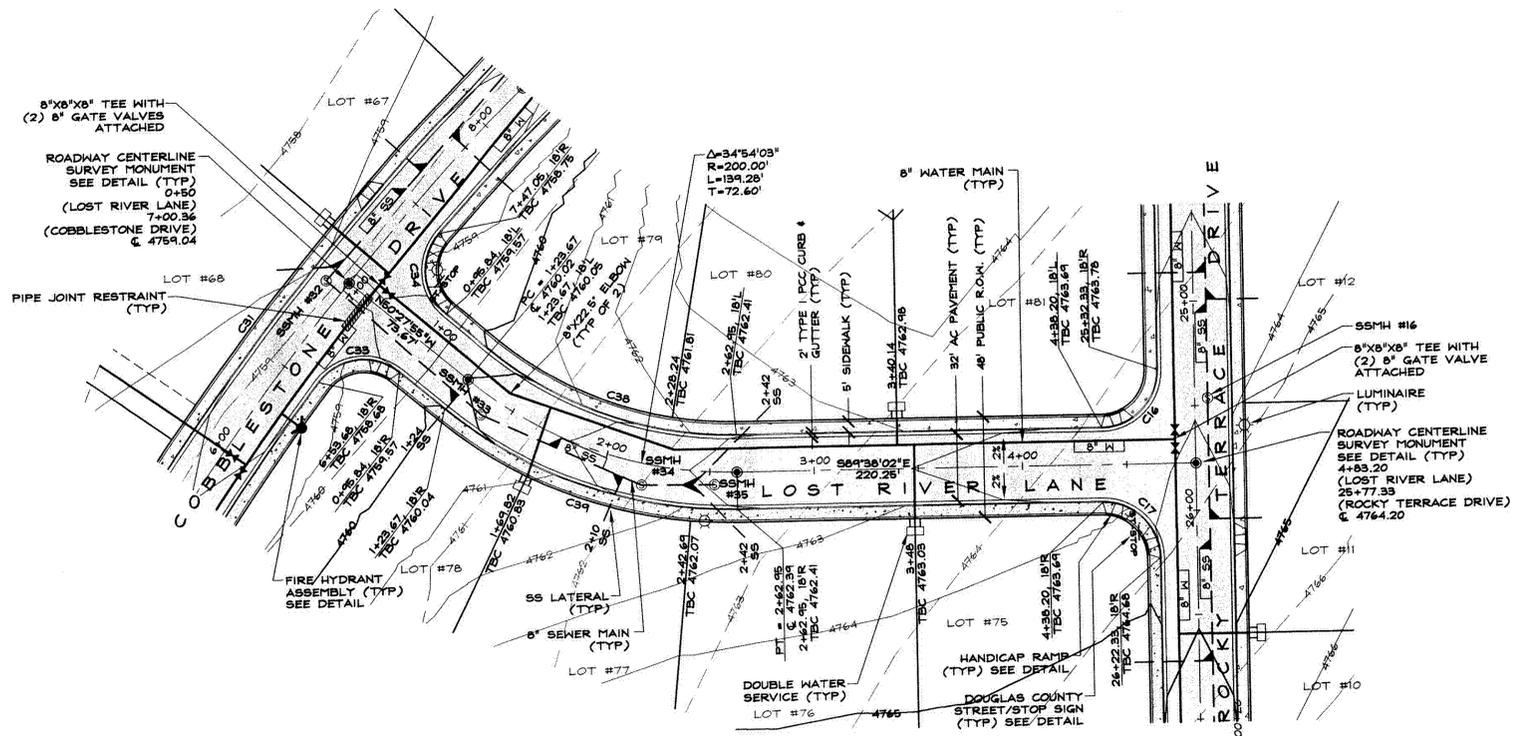
**PLAN & PROFILE**  
KEYSTONE COURT  
STA 0+00 TO 7+50

**RECORD INFORMATION**

DRAWN: CMC, JRC, JMR, NOS  
ENGINEER: KRN  
SCALE: 1" = 40'  
DATE: 06/15/05

JOB: 0412-010-04  
DRAWING: 41210C15  
SHEET: C15  
OF: C36 SHEETS

5-23-06



SCALE: 1" = 40'

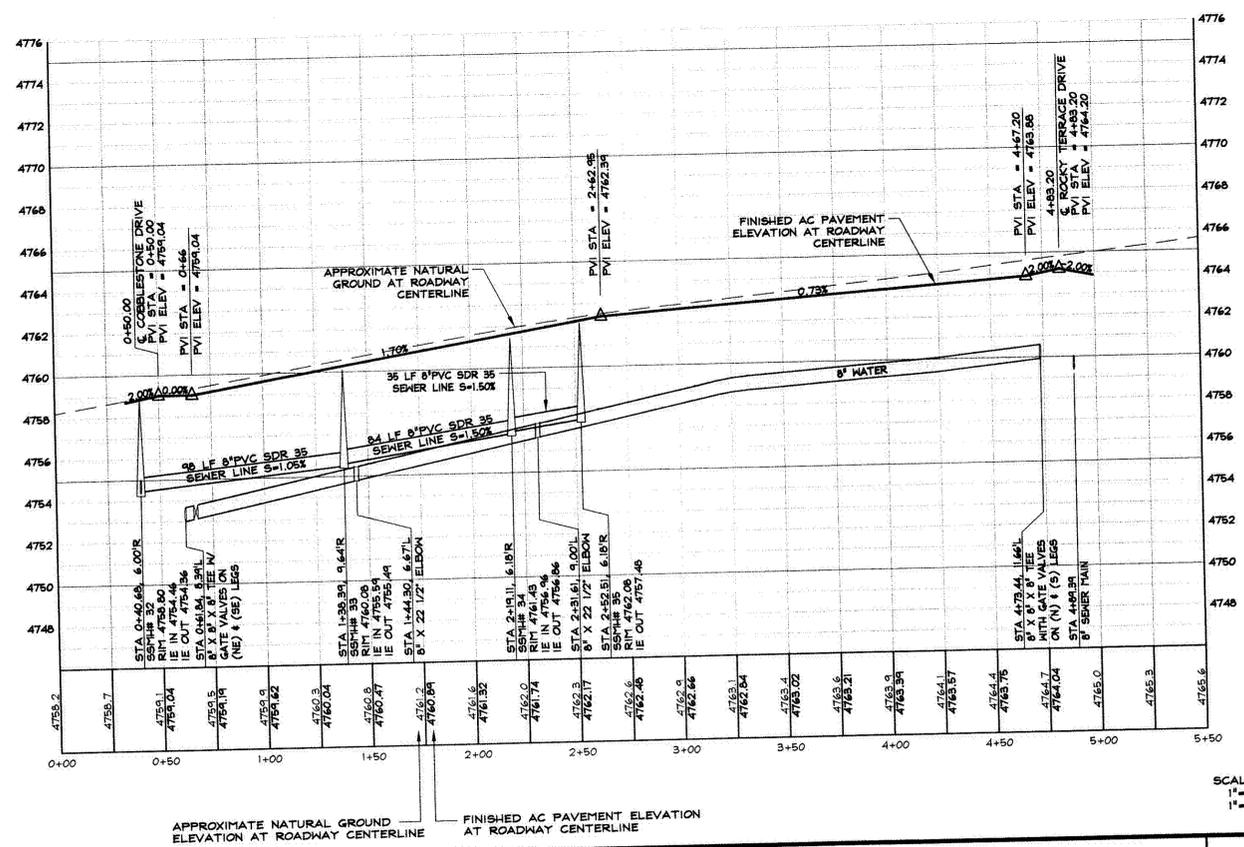
**CURVE TABLE**

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C16	90°00'00"	27.00'	42.41'	27.00'
C17	90°00'00"	27.00'	42.41'	27.00'
C31	15°02'56"	1268.00'	395.06'	167.49'
C33	42°08'26"	27.00'	49.42'	28.03'
C34	42°08'26"	27.00'	49.42'	28.03'
C38	39°16'40"	182.00'	126.75'	66.06'
C39	39°16'40"	216.00'	151.82'	79.13'

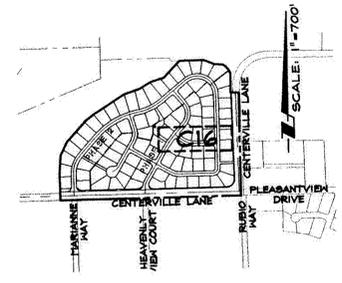
NOTE:  
ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

- NOTES:**
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN, WHEREVER THE SEPARATION IS LESS THAN 1' CONCRETE ENCASE SEWER LATERAL FOR SLF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES "600" SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COULPLINGS INSTEAD OF SLEEVING.

**LOST RIVER LANE**



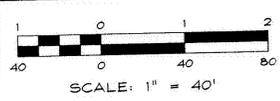
SCALE:  
1"=40'(HORIZ)  
1"=4'(VERT)



**SHEET INDEX**

RECORD INFORMATION  
AS NOTED

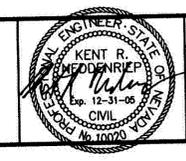
NO.	DATE	REVISION BLOCK	BY



**Anderson**  
ENGINEERING INC  
1609 ESHERALDA AVENUE / POST OFFICE BOX 2229  
HENDEN, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7004  
WEB SITE: WWW.ROANDERSON.COM

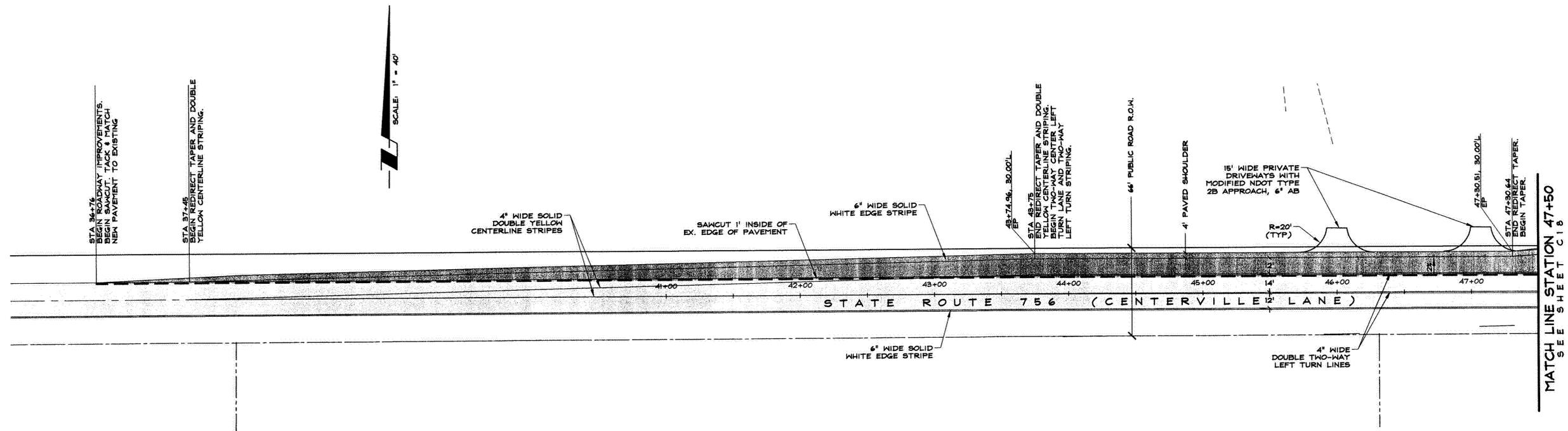
**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

**PLAN & PROFILE**  
LOST RIVER LANE  
STA 0+00 TO 5+00

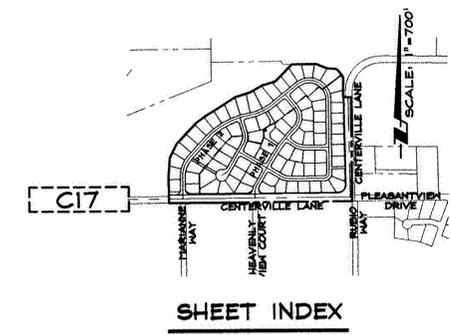


DRAWN: CMC, JRC, JMR, NOS	JOB: 0410-010-04
ENGINEER: KRN	DRAWING: 41210C16
SCALE: 1" = 40'	SHEET: C16
DATE: 03/18/05	OF: C36 SHEETS

NOTE: WORK WITHIN CENTERVILLE LANE IS SHOWN FOR REFERENCE ONLY - SEE NDOT PERMIT PLANS

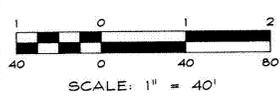


**CENTERVILLE LANE (EAST-WEST)**



RECORD INFORMATION  
AS NOTED

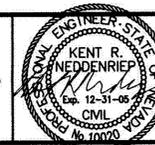
NO.	DATE	REVISION	BLOCK	BY



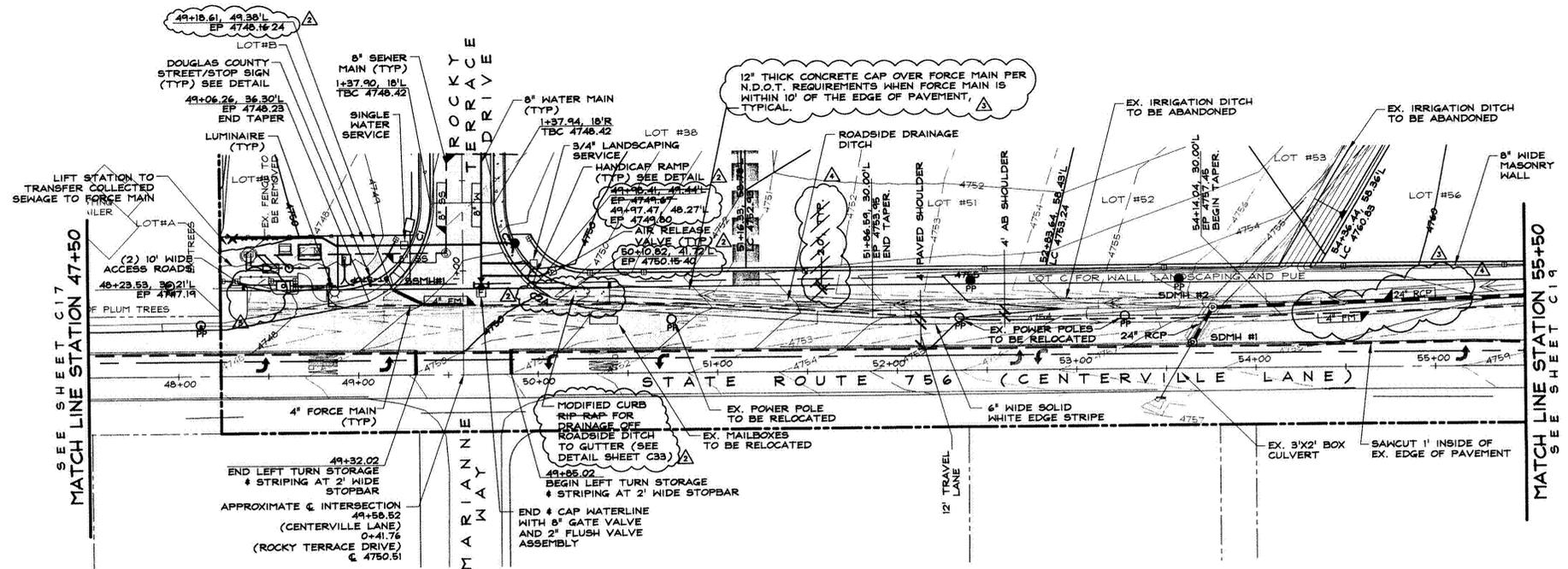
**Anderson**  
ENGINEERING INC  
1403 ESHERALDA AVENUE / POST OFFICE BOX 2224  
HENDEN, NEVADA 89423  
PHONE: (775) 782-2532 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

**PLAN**  
CENTERVILLE LANE (E-W)  
STA 36+76 TO 47+50



DRAWN: CMC, JRC, JMR, NOS	JOB: 0410-010-04
ENGINEER: KRN	DRAWING: 41210C17
SCALE: 1" = 40'	SHEET: C17
DATE: 04/18/05	OF: C36 SHEETS



SCALE: 1" = 40'

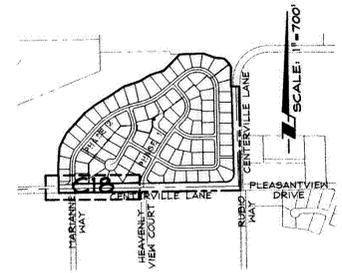
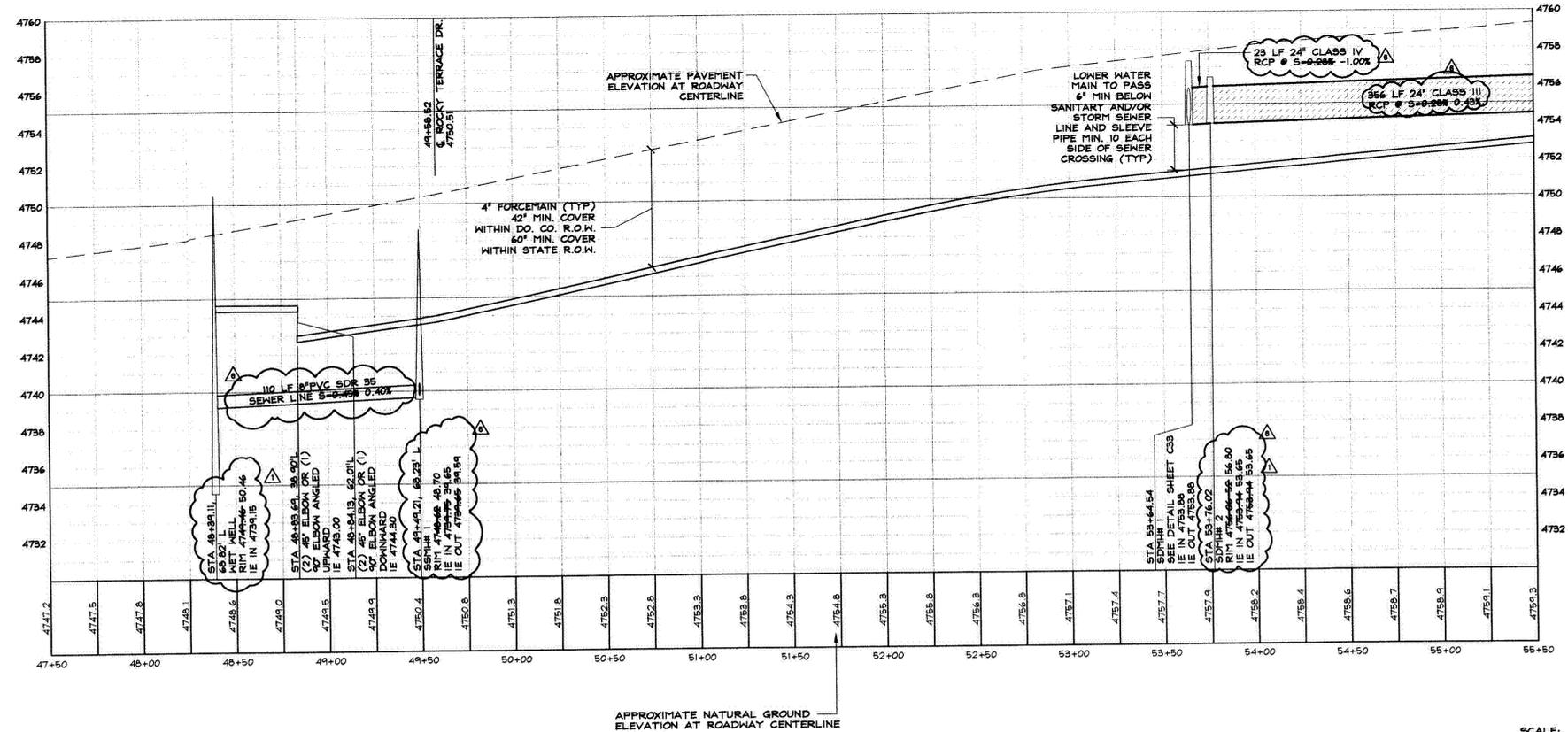
NOTE: WORK WITHIN CENTERVILLE LANE IS SHOWN FOR REFERENCE ONLY - SEE NDOT PERMIT PLANS

#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C1	51°13'08"	59.50'	53.19'	28.52'
C2	51°09'49"	59.50'	53.19'	28.48'
C2A	141°14'32"	60.00'	14.91'	7.50'

NOTE: ALL CURVE INFORMATION REFERS TO THE TOP BACK OF CURB

**CENTERVILLE LANE (EAST-WEST)**

- NOTES:
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR SLF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.
  - 4" FORCE MAIN IS BLUE C900 PVC WITH GREEN PLASTIC SLEEVE



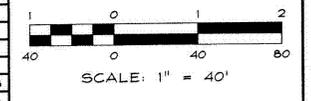
RECORD INFORMATION AS NOTED

SCALE: 1"=40'(HORIZ) 1"=4'(VERT)

2:\PROJECTS\142120\06\Drawings\Plan\14212018.dwg, 5/24/2006, 12:46:01 PM, JMS

NOTE: WORK WITHIN CENTERVILLE LANE IS SHOWN FOR REFERENCE ONLY - SEE NDOT PERMIT PLANS

NO.	DATE	REVISION BLOCK	BY
1	4/18/06	STORM DRAIN & NET WELL RIM CORRECTIONS	JRC
2	05/05/06	MADE MODIFICATIONS TO ROADSIDE DRAINAGE DESIGN	JRC
3	07/01/06	RELOCATE FORCE MAIN	SLL
4	08/17/06	RELOCATED FORCE MAIN	JRC
5	09/02/06	REVISED DRAWING TO SHOW NEW LIFT STATION ACCESS ROAD LOCATION	GMS
6	03/01/06	RECORD INFORMATION	JMR
7	05/23/06	RECORD INFORMATION	JMR



**R|O|Anderson**  
 1403 ESHERALDA AVENUE / POST OFFICE BOX 2229  
 RENO, NEVADA 89433  
 PHONE: (775) 782-2322 / FAX: (775) 782-1084  
 WEB SITE: WWW.ROANDERSON.COM

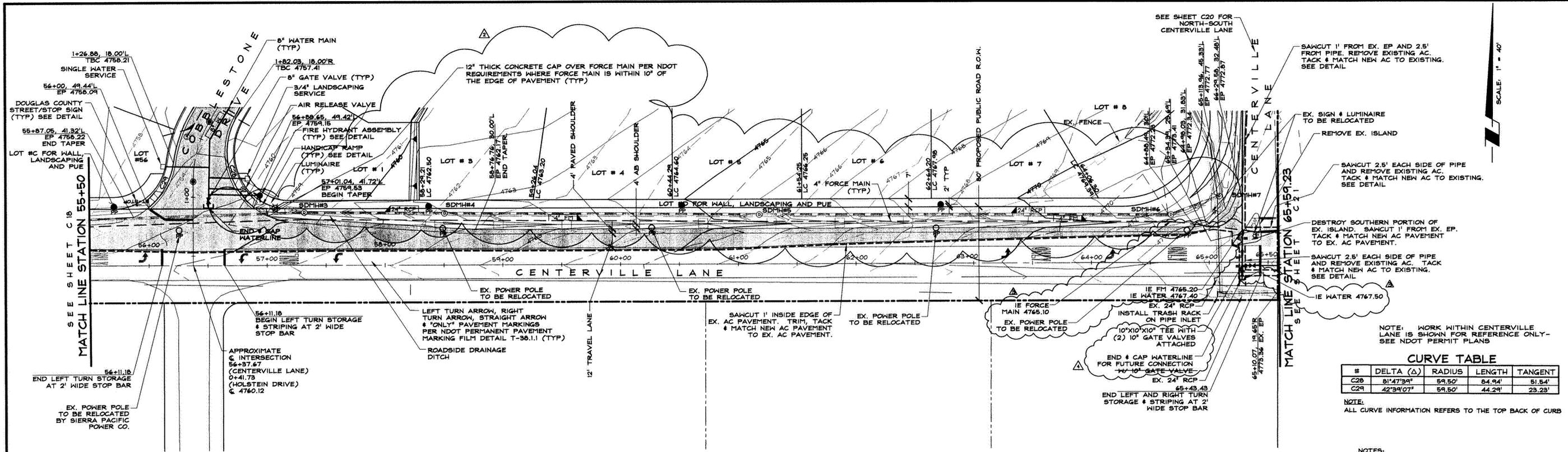
**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE**  
**CENTERVILLE LANE (E-W)**  
**STA 47+50 TO 55+50**



DRAWN: CMC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C18
SCALE: 1" = 40'	SHEET: C18
DATE: 09/02/06	OF: 036 SHEETS

5-23-06



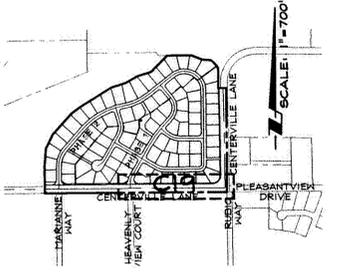
**CENTERVILLE LANE (EAST-WEST)**

**CURVE TABLE**

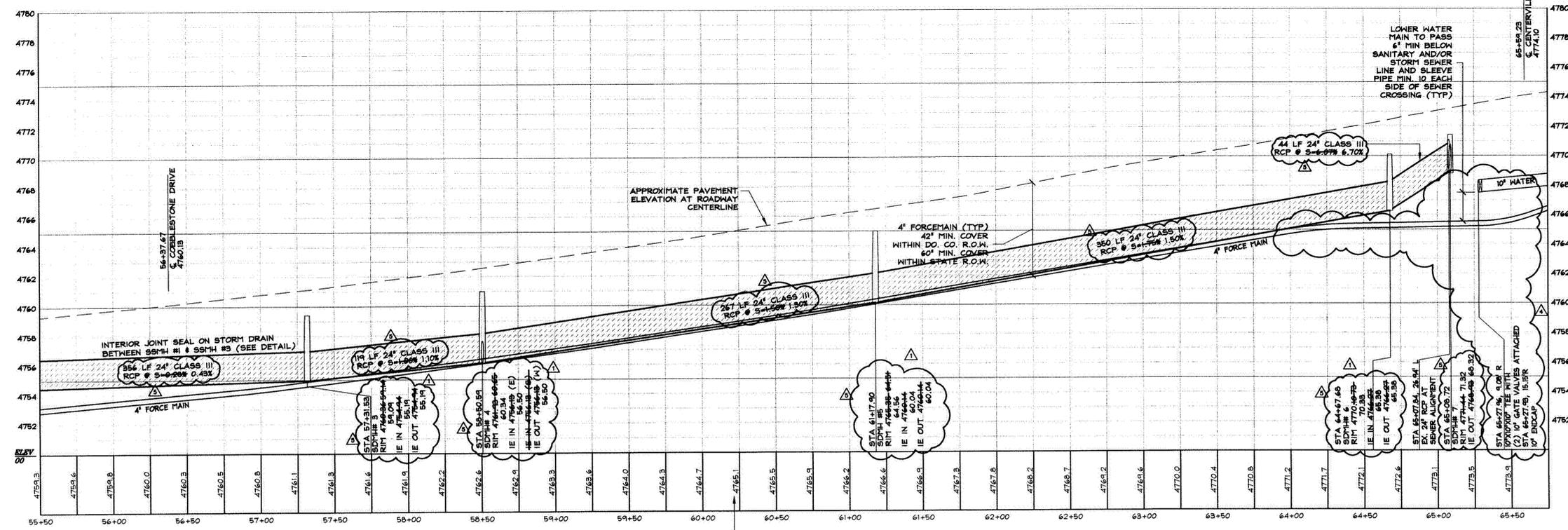
#	DELTA (Δ)	RADIUS	LENGTH	TANGENT
C28	81°47'39"	59.50'	84.94'	51.54'
C29	42°39'07"	59.50'	44.29'	23.23'

NOTE: WORK WITHIN CENTERVILLE LANE IS SHOWN FOR REFERENCE ONLY - SEE NDOT PERMIT PLANS

- NOTES:**
- ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  - BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  - CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1' CONCRETE ENCASE SEWER LATERAL FOR SLF ON BOTH SIDES OF STORM DRAIN CROSSING.
  - LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES 1/2" SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.
  - 4" FORCE MAIN IS BLUE C900 PVC WITH GREEN PLASTIC SLEEVES.

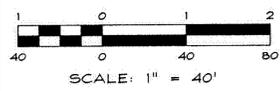


**RECORD INFORMATION AS NOTED**



**REVISION BLOCK**

NO.	DATE	REVISION	BY
1	4/18/05	STORM DRAIN RIM REVISIONS	JRC
2	07/01/05	RELOCATE FORCE MAIN	JRC
3	08/04/05	RELOCATED FORCE MAIN & WATER	RBF
4	08/17/05	RELOCATED FORCE MAIN & WATER	JRC
5	03/01/06	RECORD INFORMATION	JMR
6	05/23/06	RECORD INFORMATION	JMR



**R|O Anderson**  
 1609 ESHERALDA AVENUE / POST OFFICE BOX 2229  
 HINDEN, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
 ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE  
 CENTERVILLE LANE (E-W)  
 STA 55+50 TO 65+59.23**

**RECORD INFORMATION AS NOTED**

SCALE: 1" = 40' (HORIZ)  
 1" = 4' (VERT)

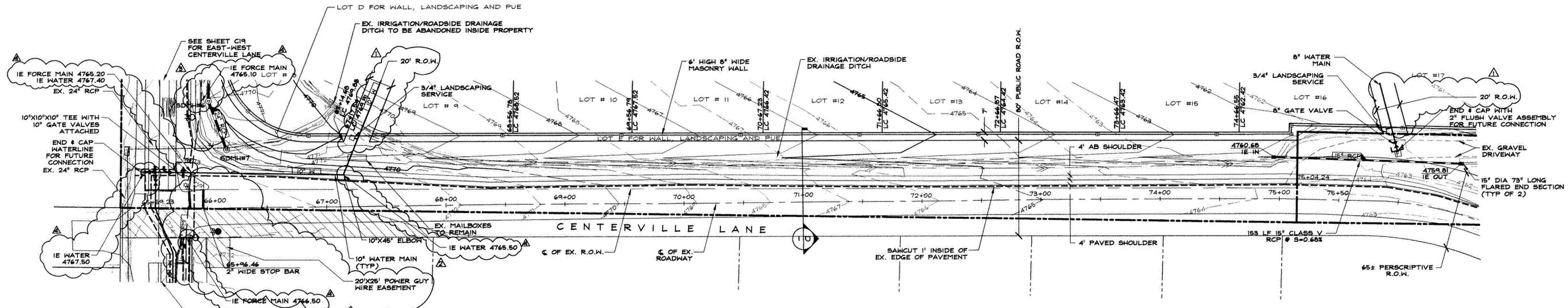
**DATE:** 08/17/05

**JOB:** 0412-010-04  
**DRAWING:** 41210C19  
**SHEET:** C19  
**OF:** C36 SHEETS

5-23-06

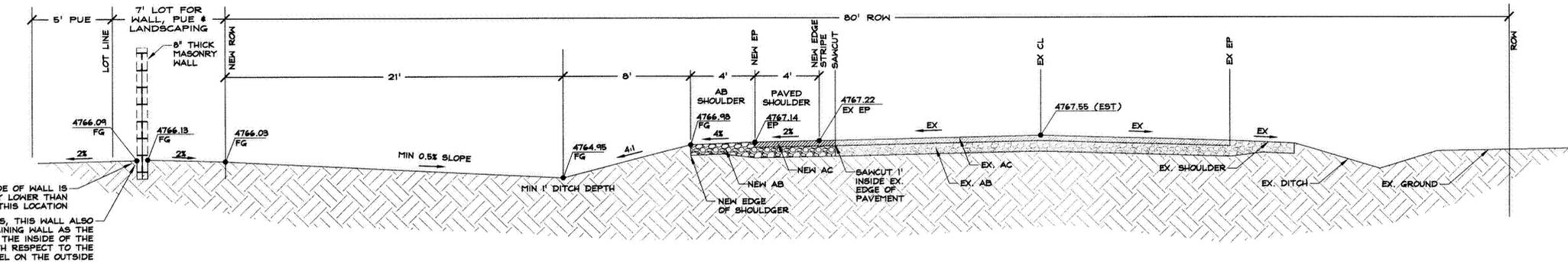
NOTE: WORK WITHIN CENTERVILLE LANE IS SHOWN FOR REFERENCE ONLY - SEE NDOT PERMIT PLANS

SCALE: 1" = 40'



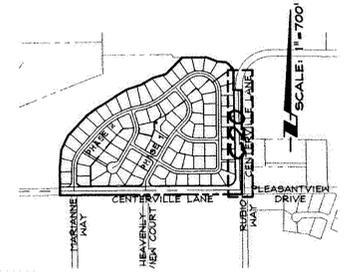
**CENTERVILLE LANE (NORTH-SOUTH)**

- NOTES:**
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COULINGS INSTEAD OF SLEEVING.
  5. 4" FORCE MAIN IS BLUE C900 PVC WITH GREEN PLASTIC SLEEVES.



**EXAMPLE ROADWAY SECTION AT CENTERVILLE LANE STA 71+00**

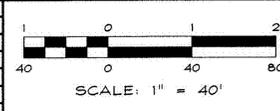
SCALE 1" = 4'



RECORD INFORMATION AS NOTED

SHEET INDEX

NO	DATE	REVISION BLOCK	BY
1	06/15/05	REVISED 20' UTILITY EASEMENT TO 20' R.O.W.	RSF
2	06/15/05	ADDED POWER GUY EASEMENT, RELOCATED WATER & SEWER	RSF
3	07/01/05	RELOCATED FORCE MAIN	RSF
4	08/04/05	RELOCATED FORCE MAIN & WATER	RSF
5	05/23/06	RECORD INFORMATION	JMR



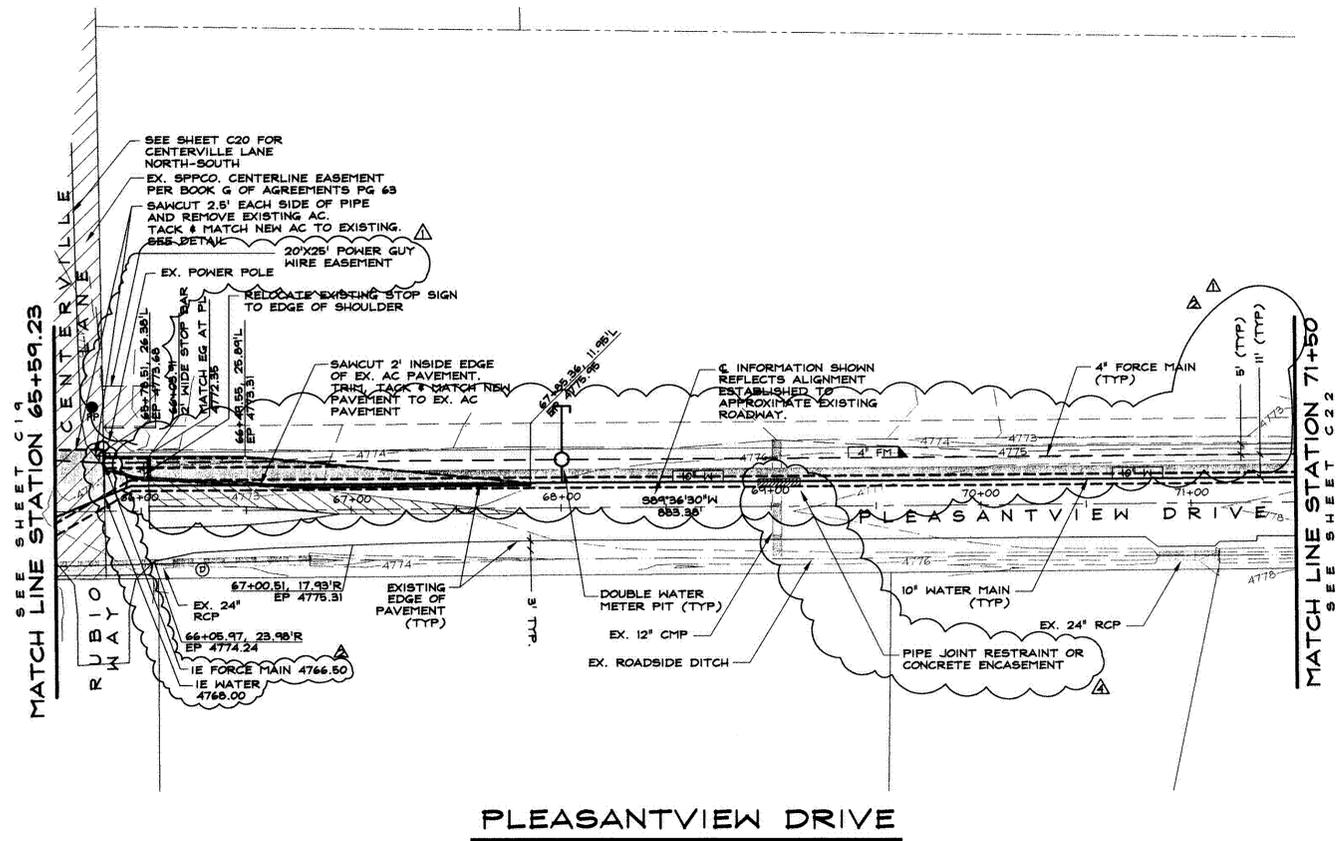
**R|O|Anderson**  
 1609 EPIPHANEA AVENUE / POST OFFICE BOX 2229  
 MINDEN, NEVADA 89423  
 PHONE: (775) 782-2822 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**PLAN**  
**CENTERVILLE LANE (N-S)**  
**STA 65+59.23 TO 75+50**



DRAWN: CMC, JRC, JMR, NGS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C20
SCALE: 1" = 40'	SHEET: C20
DATE: 06/16/05	OF: C36 SHEETS

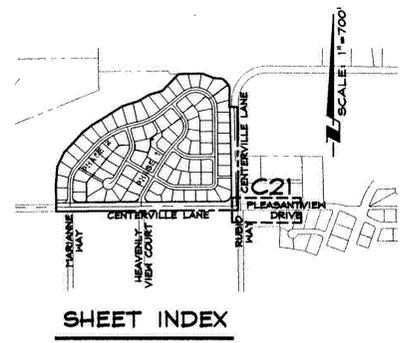
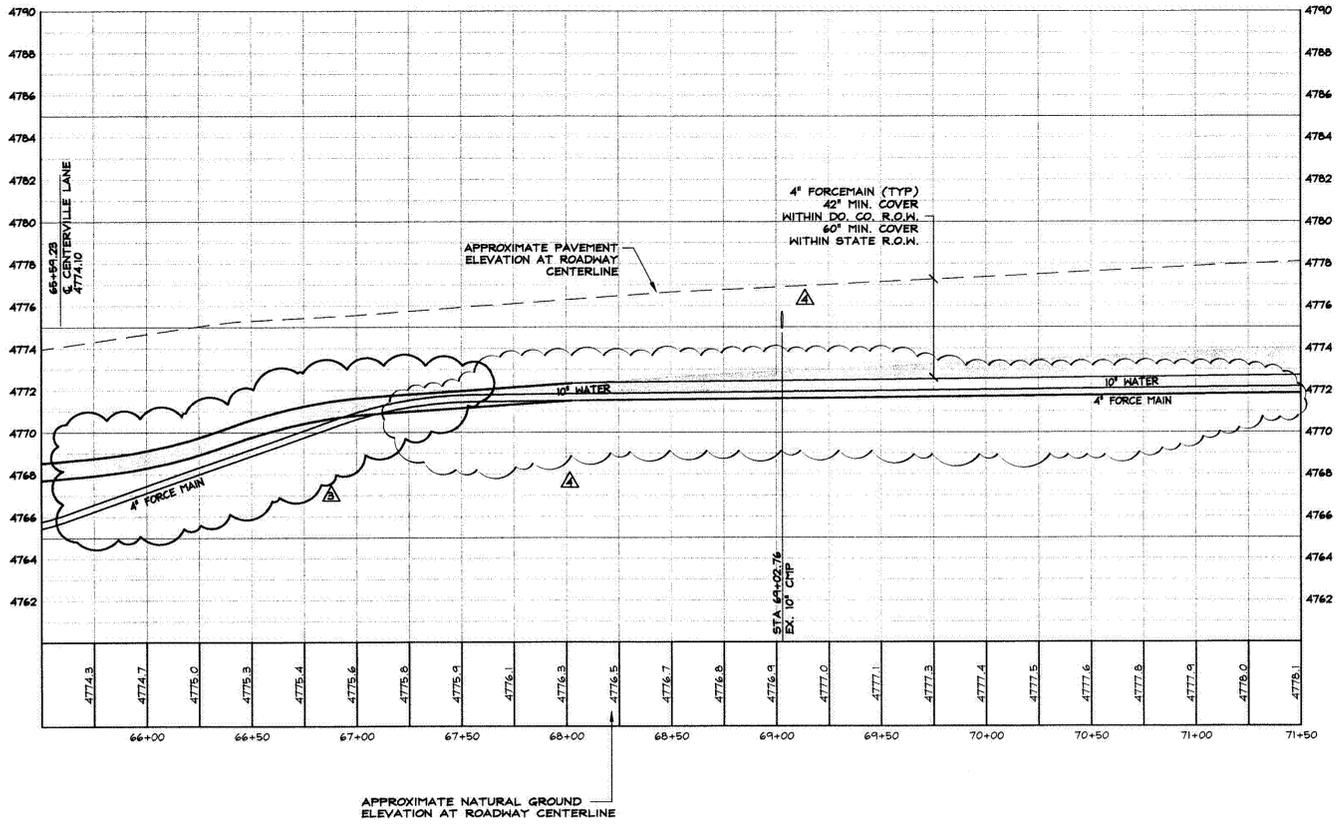


NOTE:  
 UTILITY WORK WILL BE PERMITTED AND PERFORMED BY APPURTENANT UTILITY COMPANY.  
 POWER: SIERRA PACIFIC POWER COMPANY  
 GAS: SOUTHWEST GAS COMPANY  
 PHONE: VERIZON  
 CABLE: CHARTER COMMUNICATIONS  
 WATER: GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
 SANITARY SEWER: GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT

SCALE: 1" = 40'

**PLEASANTVIEW DRIVE**

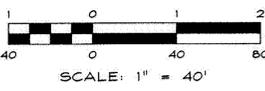
- NOTES:
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 11" CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPLINGS INSTEAD OF SLEEVING.
  5. PIPE JOINT RESTRAINTS OR ENCASUREMENT ON WATER AND LOCATE SEWER AND WATER JOINTS AS FAR FROM INTERSECTION OF PIPE AS POSSIBLE.
  6. 4" FORCE MAIN IS BLUE C900 PVC WITH GREEN PLASTIC SLEEVES.



RECORD INFORMATION AS NOTED

SCALE: 1"=40'(HORIZ) 1"=4'(VERT)

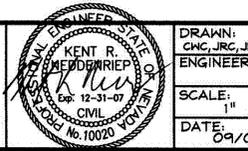
NO.	DATE	REVISION	BY
1	06/15/05	ADDED POWER GUY & PUBLIC UTILITY EASEMENTS & RELOCATED WATER & SEWER LINES	RSF
2	08/04/05	RELOCATE FORCE MAIN & WATER	RSF
3	08/17/05	RELOCATE FORCE MAIN & WATER	JRC
4	09/08/05	RELOCATE FORCE MAIN & WATER & ADDED PIPE JOINT RESTRAINTS	JM
5	06/23/06	RECORD INFORMATION	JTR



**R|O Anderson**  
 1609 ESPERANZA AVENUE / POST OFFICE BOX 2221  
 SPINDEN, NEVADA 89423  
 PHONE: (775) 782-2922 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

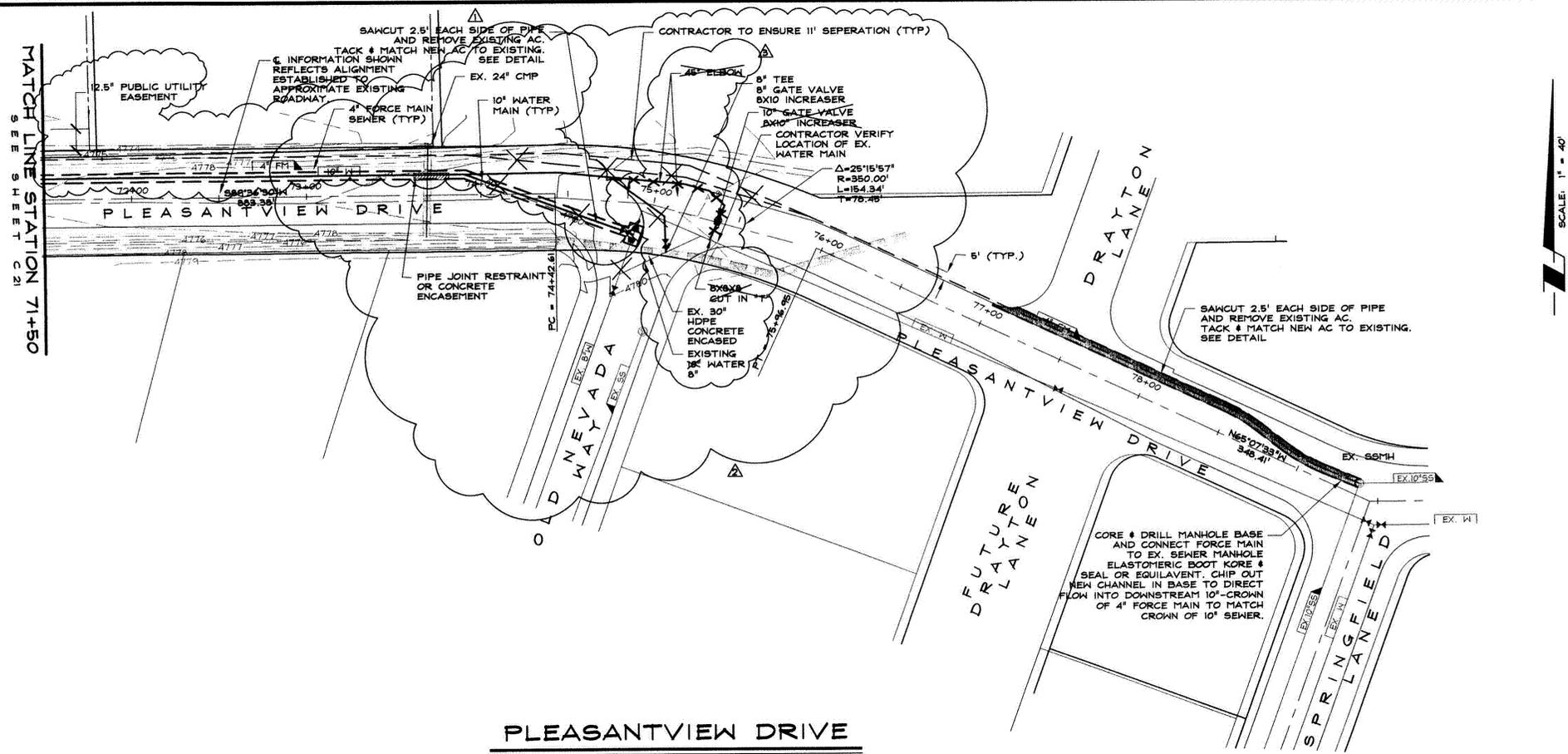
**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE**  
**PLEASANTVIEW DRIVE**  
**STA 65+59.23 TO 71+50**



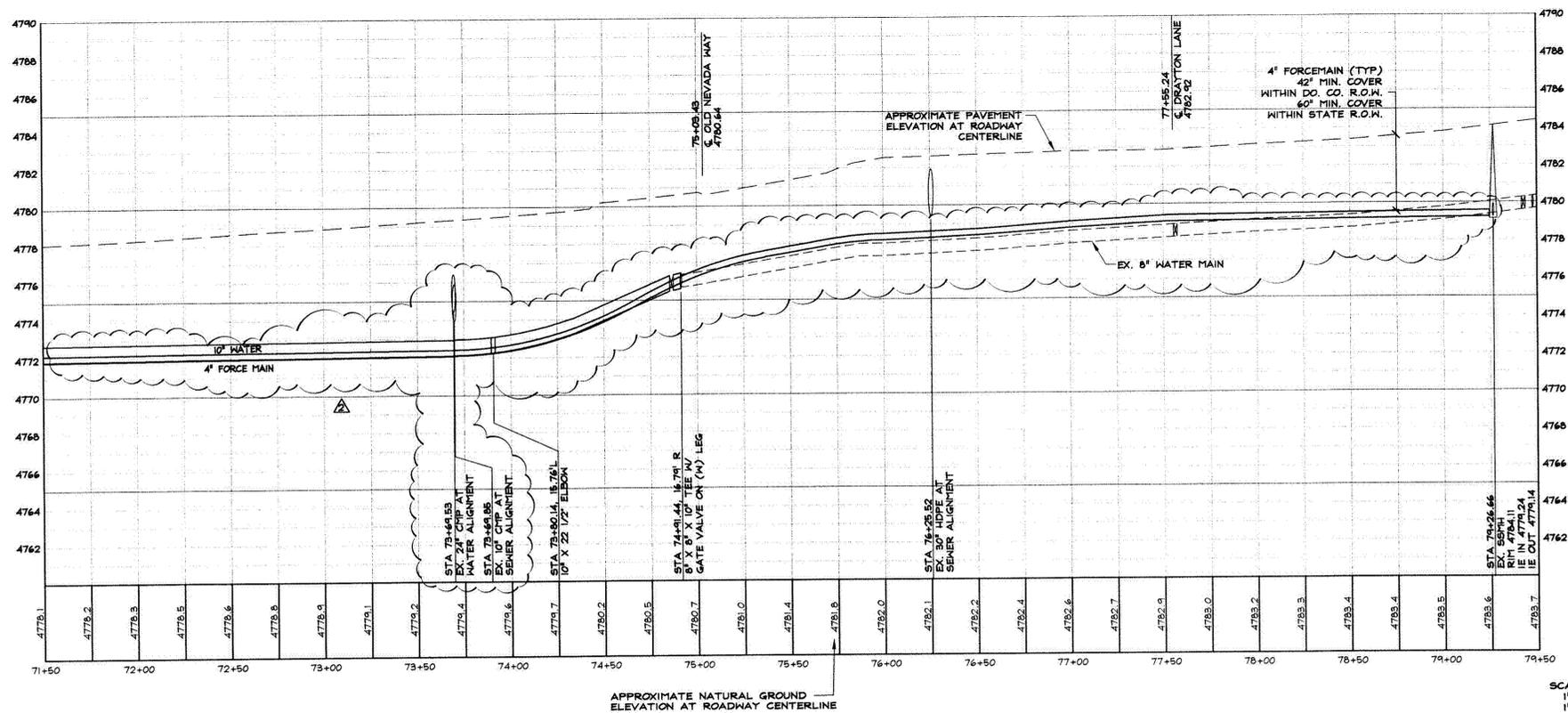
DRAWN: CMC, JRC, JMR, NOS  
 ENGINEER: KRN  
 SCALE: 1" = 40'  
 DATE: 09/08/05  
 JOB: 0412-010-04  
 DRAWING: 41210C21  
 SHEET: C21  
 OF: C36 SHEETS

Z:\PROJECTS\41210\Draw\Improvement\Draw\41210C21.dwg, 5/24/2006, 1:56:16 PM, JRC

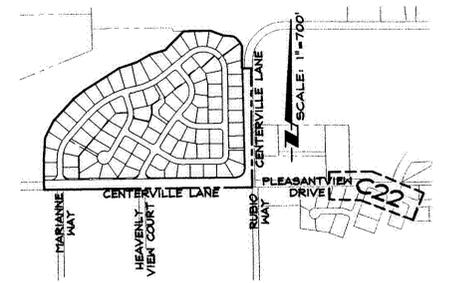


SCALE: 1" = 40'

**PLEASANTVIEW DRIVE**



- NOTES:**
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPLINGS INSTEAD OF SLEEVING.
  5. PIPE JOINT RESTRAINTS OR ENCASEMENT ON WATER AND LOCATE SEWER AND WATER JOINTS AS FAR FROM INTERSECTION OF PIPE AS POSSIBLE.
  6. 4" FORCE MAIN IS BLUE C900 PVC WITH GREEN PLASTIC SLEEVES.

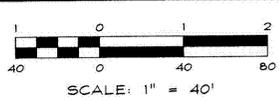


**SHEET INDEX**

RECORD INFORMATION AS NOTED

Z:\PROJECTS\412102\Improvement\Plan\412102C22.dwg, 5/24/2006, 1:17:26 PM, jrc

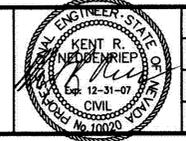
NO.	DATE	REVISION BLOCK	BY
1	06/15/05	ADDED PUBLIC UTILITY EASEMENT & RELOCATED WATER & SEWER LINE	RSF
2	09/08/05	RELOCATE FORCE MAIN & WATER & ADDED PIPE JOINT RESTRAINT	JM
3	05/23/06	RECORD INFORMATION	JMR



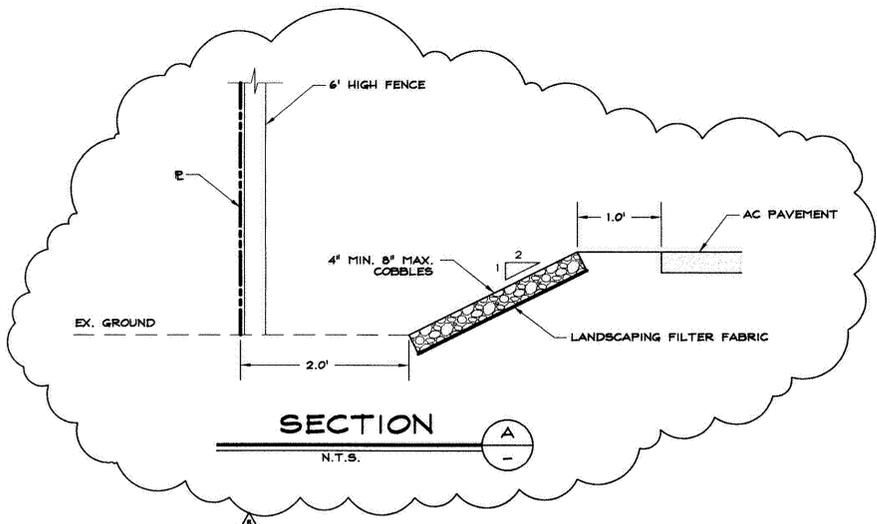
**R|O|Anderson**  
 1609 ESHERALDA AVENUE / POST OFFICE BOX 2229  
 PRINDEN, NEVADA 89423  
 PHONE: (775) 782-2822 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
 ROCKY TERRACE ESTATES, LLC

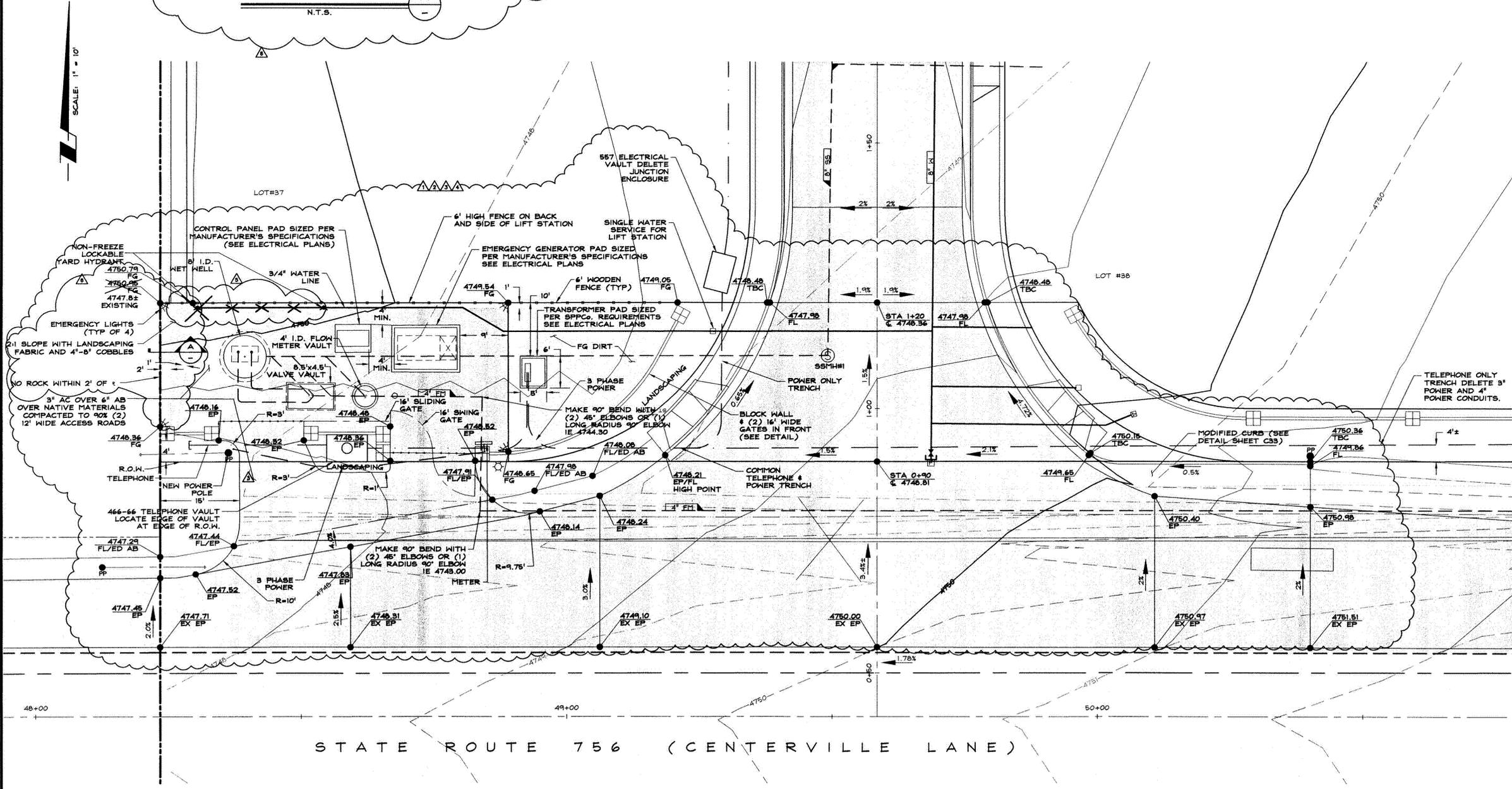
**PLAN & PROFILE**  
 PLEASANTVIEW DRIVE  
 STA 71+50 TO 79+50



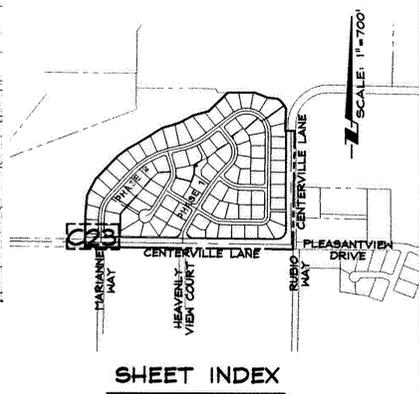
DRAWN: CMC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C22
SCALE: 1" = 40'	SHEET: C22
DATE: 09/08/05	OF: C36 SHEETS



**\*NOTE:**  
 UTILITY WORK WILL BE PERMITTED AND PERFORMED BY APPURTENANT UTILITY COMPANY.  
 POWER: SIERRA PACIFIC POWER COMPANY  
 GAS: SOUTHWEST GAS COMPANY  
 PHONE: VERIZON  
 CABLE: CHARTER COMMUNICATIONS  
 WATER: GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
 SANITARY SEWER: GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT



- NOTES:**
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES "600" SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPLINGS INSTEAD OF SLEEVING.



NO.	DATE	REVISION	BLOCK	BY
1	05/06/05	MADE MODIFICATIONS TO ROADSIDE DRAINAGE DESIGN		JRC
2	09/02/05	MOVED LIFT STATION ACCESS ROAD TO ACCOMMODATE POWER POLE		GWS
3	10/25/05	REVISED POWER LAYOUT		KRN
4	05/11/06	UPDATED LIFT STATION GRADING, ADDED NEW WALL & GATES &		GWS
5	06/23/06	UPDATED AC FG CALLOUTS AT INTERSECTION		JMR
6	07/11/06	REVISED GRADING		KRN

**R|O|Anderson**  
 1603 EMERALDA AVENUE / POST OFFICE BOX 2229  
 HENDEN, NEVADA 89423  
 PHONE: (775) 762-2322 / FAX: (775) 762-7084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
 ROCKY TERRACE ESTATES, LLC**

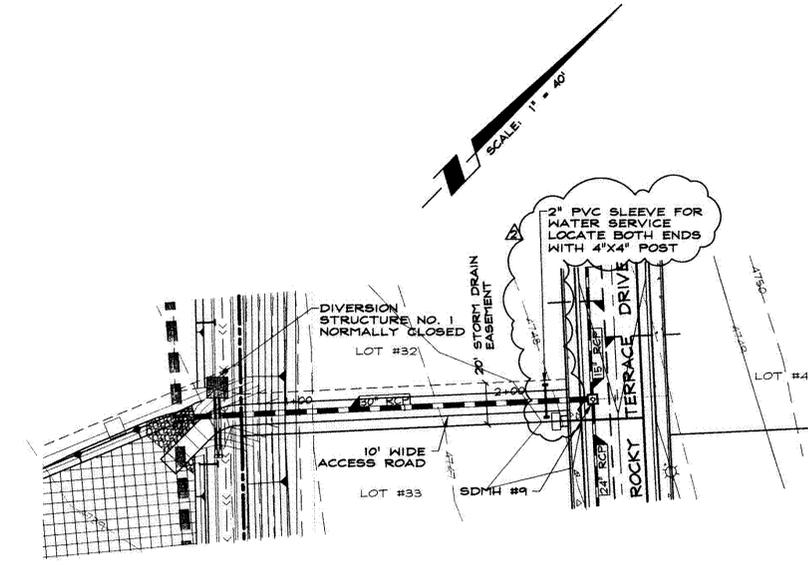
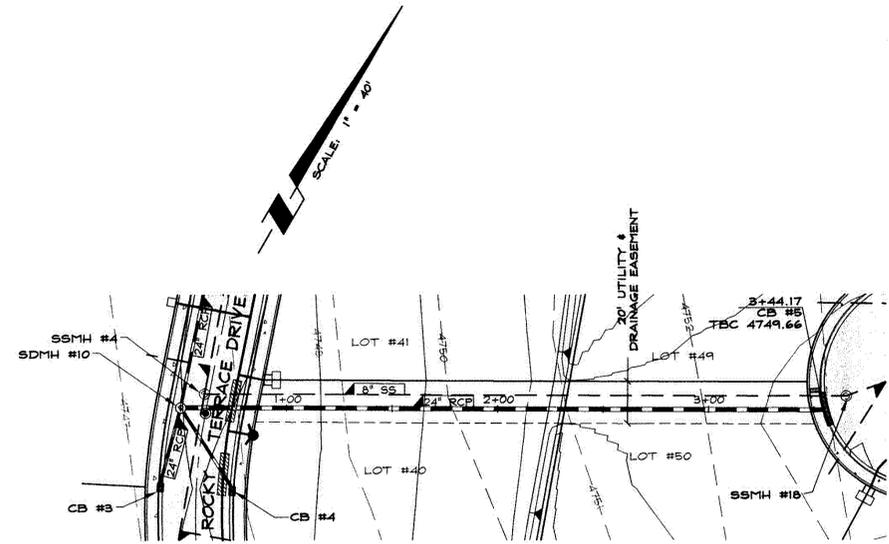
**SANITARY SEWER  
 LIFT STATION  
 GRADING & SITE PLAN**

**ENGINEER**  
 KENT R. ROANDERSON  
 LICENSE NO. 10178

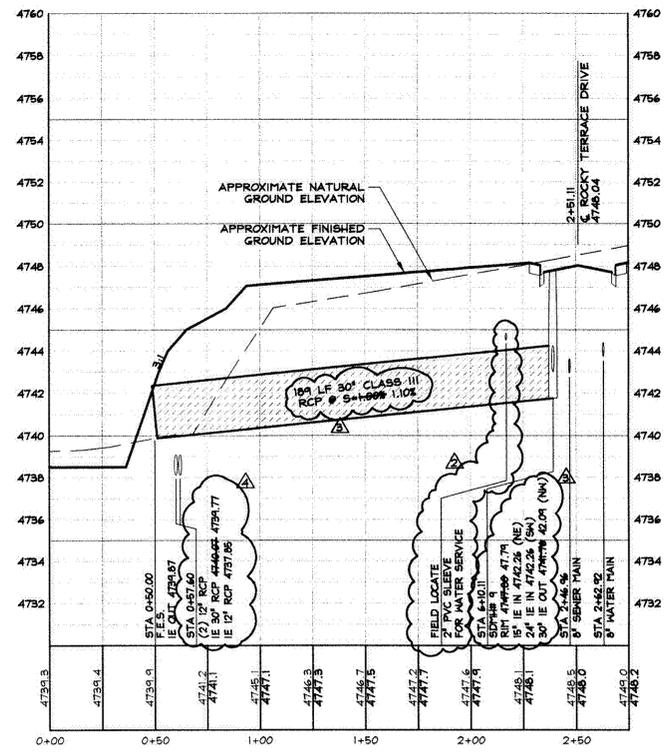
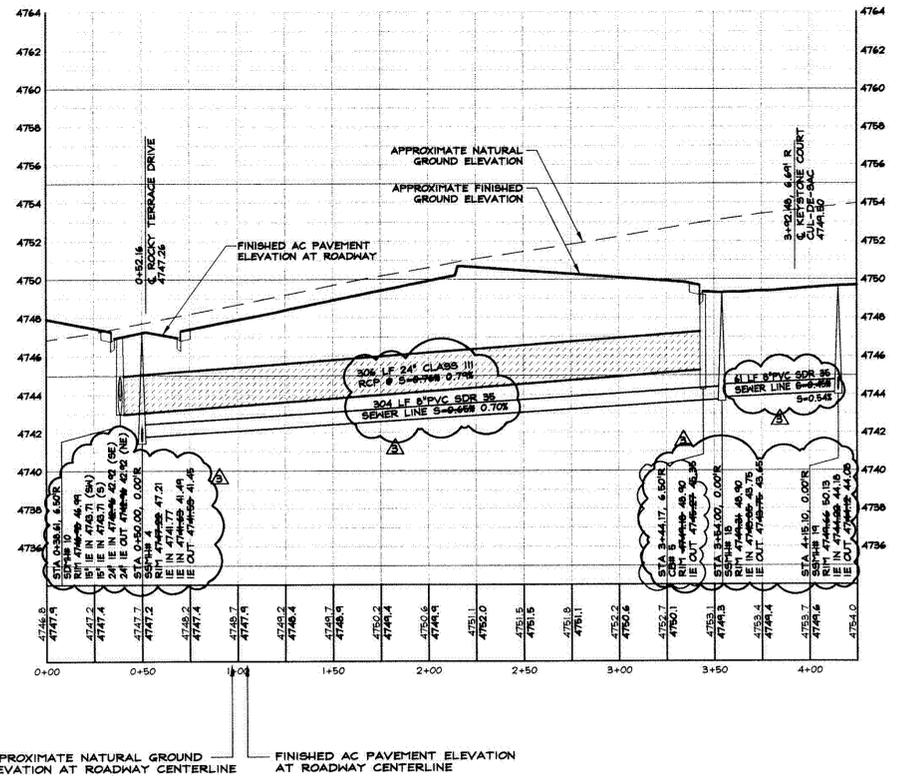
DRAWN: JMR  
 ENGINEER: KRN  
 SCALE: 1" = 10'  
 DATE: 05/11/06

JOB: 0412-010-04  
 DRAWING: 41210C23  
 SHEET: C23  
 OF: C36 SHEETS

7-12-06



**STORM DRAIN**



- NOTES:**
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRID STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COUPPLINGS INSTEAD OF SLEEVING.

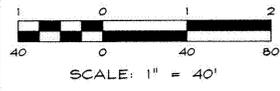


RECORD INFORMATION AS NOTED

SHEET INDEX

Z:\PROJECTS\412100\Drawings\Plan\412100C24.dwg, 5/24/2006, 1:18:29 PM, jrc

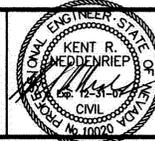
NO.	DATE	REVISION BLOCK	BY
1	08/02/06	REVISED CB GRADE	KRN
2	11/15/05	ADDED 2" PVC SLEEVE FOR WATER SERVICE	JMR
3	03/01/06	RECORD INFORMATION	JMR
4	04/13/06	RECORD INFORMATION	JMR



**R/O Anderson**  
 1605 ESTHERALDA AVENUE / POST OFFICE BOX 2224  
 PRINCE, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

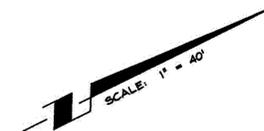
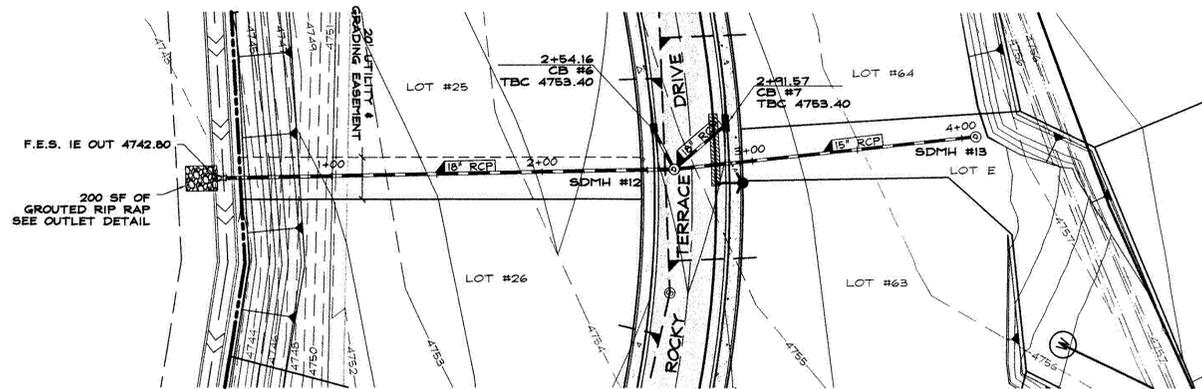
**ROCKY TERRACE  
 ROCKY TERRACE ESTATES, LLC**

**PLAN & PROFILE  
 STORM DRAIN**

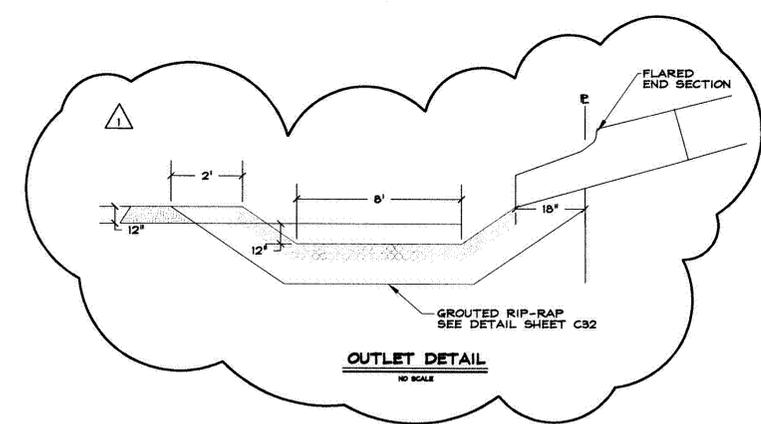
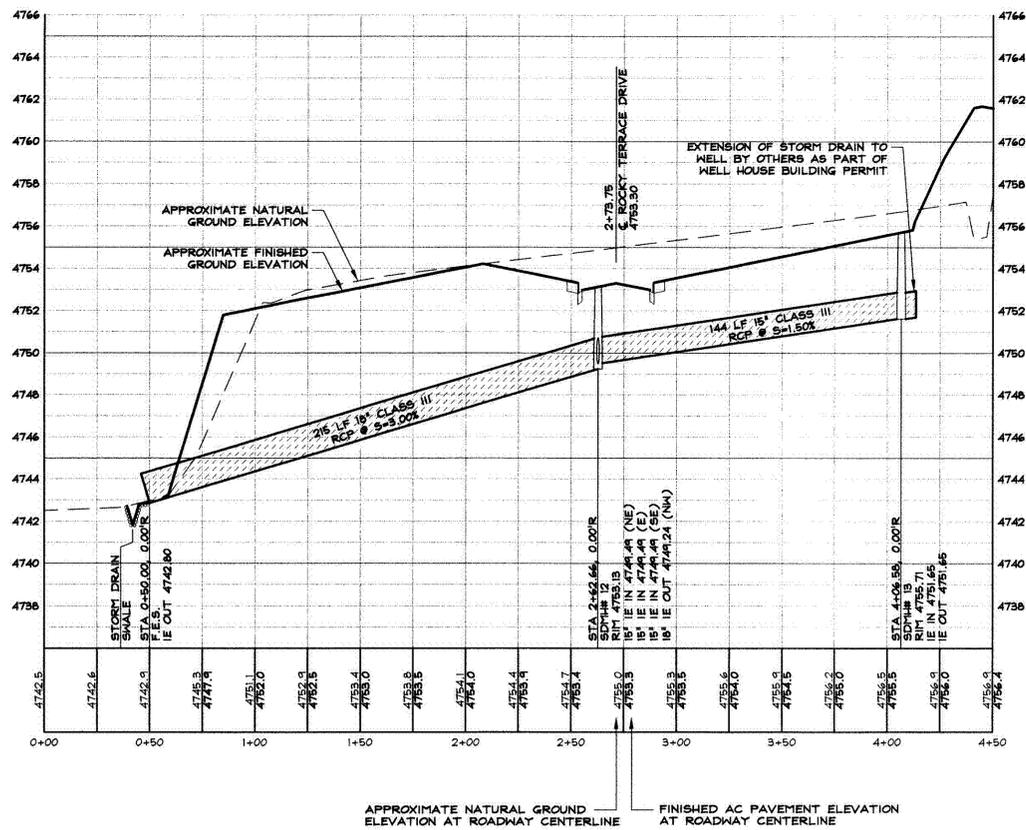


DRAWN: CMC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 412100C24
SCALE: 1" = 40'	SHEET: C24
DATE: 03/18/06	OF: C36 SHEETS

5-29-06



**STORM DRAIN**



- NOTES:**
1. ALL SANITARY SEWER LATERAL STATIONS ARE AT THE POINT OF CONNECTION TO THE SEWER MAIN.
  2. BEARINGS, DISTANCES AND CURVE DATA FOR THE ROADWAY CENTERLINE REFERS TO THAT PORTION OF THE CENTERLINE BETWEEN SURVEY MONUMENTS, OR ON EXISTING ROADWAYS, BETWEEN EACH POINT OF ALIGNMENT DEVIATION.
  3. CONSTRUCT SEWER LATERAL AT MINIMUM SLOPE PER GRGD STANDARDS TO ACHIEVE MAXIMUM CROSSING SEPARATION BETWEEN THE SEWER LATERAL AND STORM DRAIN. WHEREVER THE SEPARATION IS LESS THAN 1', CONCRETE ENCASE SEWER LATERAL FOR 5LF ON BOTH SIDES OF STORM DRAIN CROSSING.
  4. LOCATIONS WHERE WATERLINES AND SEWER/STORM DRAIN LINES CROSS AND MINIMUM SEPARATIONS CANNOT BE MET ARE SHOWN ON BOTH PLAN AND PROFILE VIEWS. IN THESE LOCATIONS, ROMAC INDUSTRIES '600' SERIES PIPE RESTRAINING SYSTEM OR EQUIVALENT IS REQUIRED ON PIPE JOINTS/COULPINGS INSTEAD OF SLEEVING.

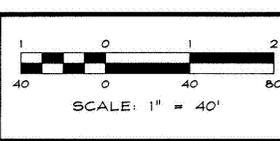


RECORD INFORMATION  
AS NOTED

SHEET INDEX

SCALE:  
1"=40'(HORIZ)  
1"=4'(VERT)

NO.	DATE	REVISION BLOCK	BY
1	05/02/05	ADDED OUTLET DETAIL	RSF



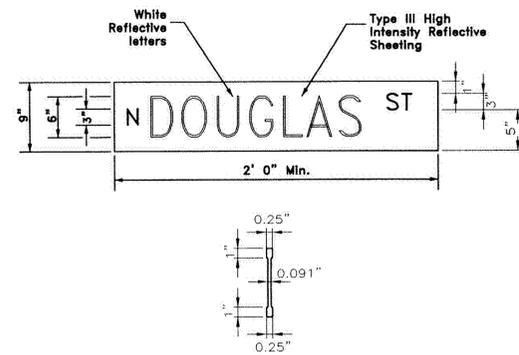
**Anderson**  
ENGINEERING INC  
1603 ESPHERALDA AVENUE / POST OFFICE BOX 2224  
PANDORA, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-1084  
WEB SITE: WWW.ANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

**PLAN & PROFILE**  
STORM DRAIN

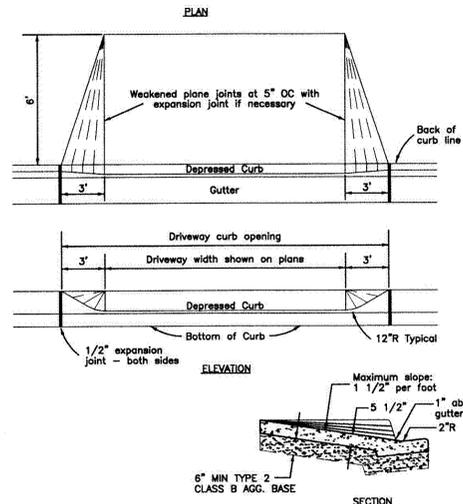


DRAWN: CNC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C25
SCALE: 1" = 40'	SHEET: C25
DATE: 03/18/05	OF: C36 SHEETS



- NOTES:
1. Street name sign shall be in conformance with the latest edition of the MUTCD.
  2. Sign Panel shall be Heavy Duty extruded aluminum 6061-T6.
  3. Reflective Sheeting and Letters shall be mounted in accordance with Section 215 of the Standard Specifications for Public Works Construction.

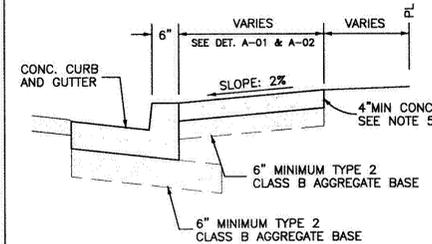
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			STREET NAME SIGN	DRAWING NO. DC-A22 DATE 7/2000 PAGE A-08



- NOTES:
1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION FOR CONCRETE EXPOSED TO FREEZE-THAW ENVIRONMENTS.
  2. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED EVERY 5 FEET. THE JOINTS SHALL PENETRATE TO A DEPTH OF 2 INCHES AND BE CONSTRUCTED IN CONFORMANCE WITH SECTION 312.09.02 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT LOCATIONS DESIGNATED IN SECTION 312.09.01A OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  4. TYPE 2, CLASS B AGGREGATE BASE SHALL CONFORM TO SECTION 200 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, AND SHALL BE MECHANICALLY COMPACTED IN CONFORMANCE WITH SECTION 308.05 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  5. CONCRETE SIDEWALK ADJACENT TO DRIVEWAY APRONS SHALL HAVE A MINIMUM THICKNESS OF 5 1/2".

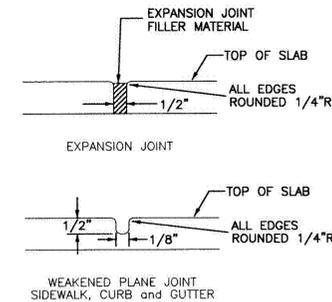
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			PCC DRIVEWAY APRON (RESIDENTIAL)	DRAWING NO. DC-A21 DATE 10/96 PAGE A-17

NOTE: DRIVEWAY WIDTH AND LOCATIONS TO BE DETERMINED PRIOR TO CONSTRUCTION.

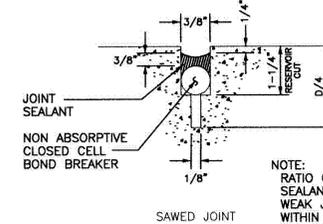


- NOTES:
1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION FOR CONCRETE EXPOSED TO FREEZE-THAW ENVIRONMENTS.
  2. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED EVERY 5 FEET ON SIDEWALKS WIDER THAN 5 FEET. THE JOINTING PATTERN SHALL BE 0.8 TO 1.2 TIMES THE WIDTH OF THE SIDEWALK, NOT TO EXCEED 8 FEET. THE JOINTS SHALL PENETRATE TO A DEPTH OF 2 INCHES AND BE CONSTRUCTED IN CONFORMANCE WITH SECTION 312.09.02 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT LOCATIONS DESIGNATED IN SECTION 312.09.01A OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  4. TYPE 2, CLASS B AGGREGATE BASE SHALL CONFORM TO SECTION 200 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, AND SHALL BE MECHANICALLY COMPACTED IN CONFORMANCE WITH SECTION 308.05 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  5. CONCRETE SIDEWALK ADJACENT TO DRIVEWAY APRONS SHALL HAVE A MINIMUM THICKNESS OF 6".
  6. NO OBSTRUCTION, SUCH AS UTILITY POLES, SIGNAL POLES AND CONTROLS, WATER METER BOXES, PULL BOXES, ETC. ARE ALLOWED WITHIN SIDEWALKS.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			TYPICAL SIDEWALK	DRAWING NO. DC-A20 DATE 10/96 PAGE A-16

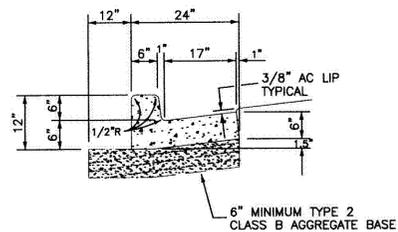


ALL MEASUREMENTS: ± 1/16" TOLERANCE



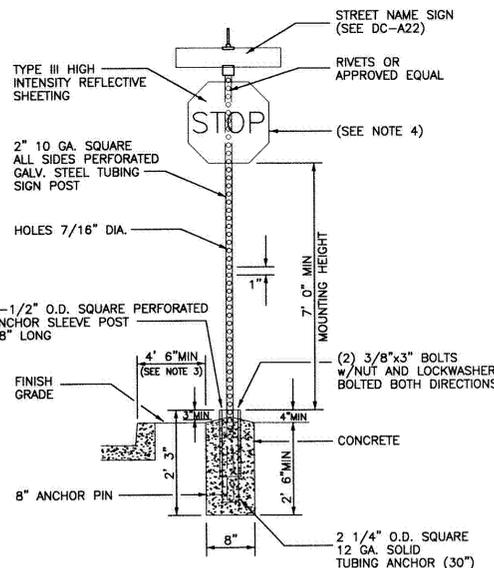
NOTE: RATIO OF DEPTH TO WIDTH OF JOINT SEALANT SHOULD BE 1:1. INITIAL 1/8" WEAK JOINT SAW CUT TO BE DONE WITHIN SPECIFIED TIME LIMIT. RESERVOIR CUT MAY BE DONE AT A LATER TIME.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			PCC JOINTING DETAILS	DRAWING NO. DC-A36 DATE 10/96 PAGE A-22



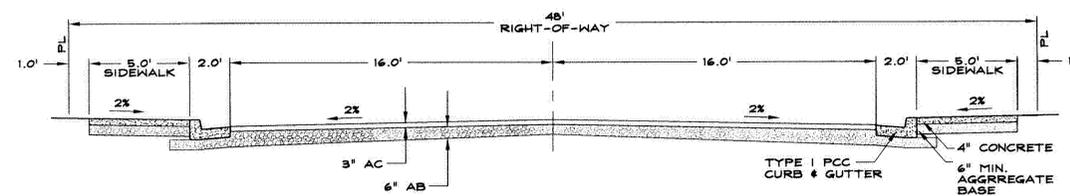
- NOTES:
1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION FOR CONCRETE EXPOSED TO FREEZE-THAW ENVIRONMENTS.
  2. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED EVERY 10 FEET. THE JOINTS SHALL PENETRATE TO A DEPTH OF 2 INCHES AND BE CONSTRUCTED IN CONFORMANCE WITH SECTION 312.09.02 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT LOCATIONS DESIGNATED IN SECTION 312.09.01A OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  4. TYPE 2, CLASS B AGGREGATE BASE SHALL CONFORM TO SECTION 200 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, AND SHALL BE MECHANICALLY COMPACTED IN CONFORMANCE WITH SECTION 308.05 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			TYPE 1 PCC CURB & GUTTER	DRAWING NO. DC-A26 DATE 10/96 PAGE A-12



- NOTES:
1. SIGN MATERIALS, CONSTRUCTION AND PLACEMENT SHALL BE IN CONFORMANCE WITH THE MOST RECENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND SECTION 215 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  2. STREET NAME SIGN SHALL BE MOUNTED WITH VANDAL-PROOF HARDWARE.
  3. ON STREETS WHERE CURBING DOES NOT EXIST, SET SIGN 6" MINIMUM FROM PAVEMENT EDGE.
  4. STOP SIGN 30" WITH 3/8" GALVANIZED STEEL SIGN BACK BRACE.
  5. SIGN POST SHALL NOT BE ANCHORED IN SIDEWALK.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			STANDARD STREET SIGN	DRAWING NO. DC-A23 DATE 7/2000 PAGE A-09



TYPICAL STREET SECTION  
SCALE: 1"=4'

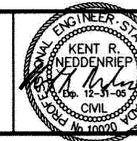
RECORD INFORMATION  
AS NOTED

NO.	DATE	REVISION BLOCK	BY



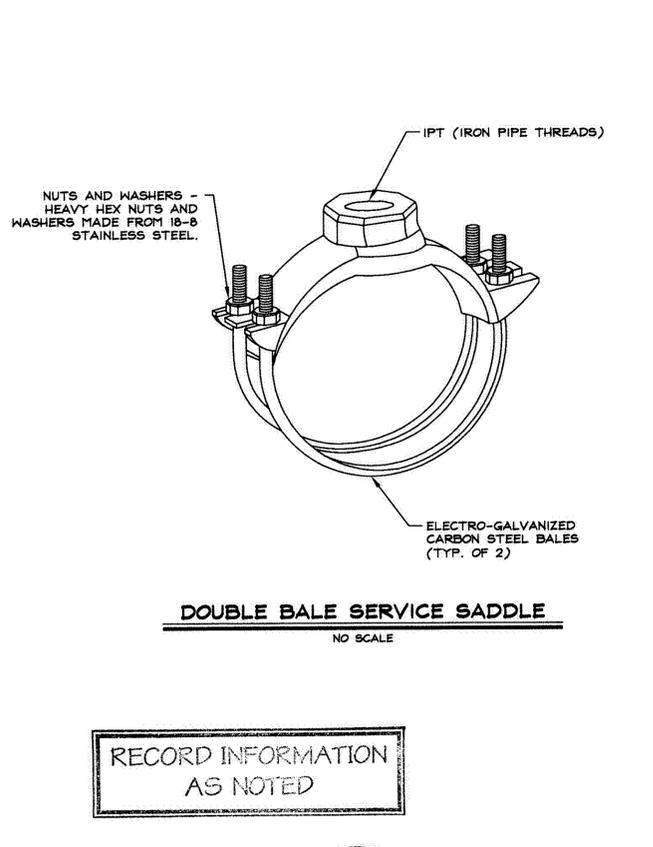
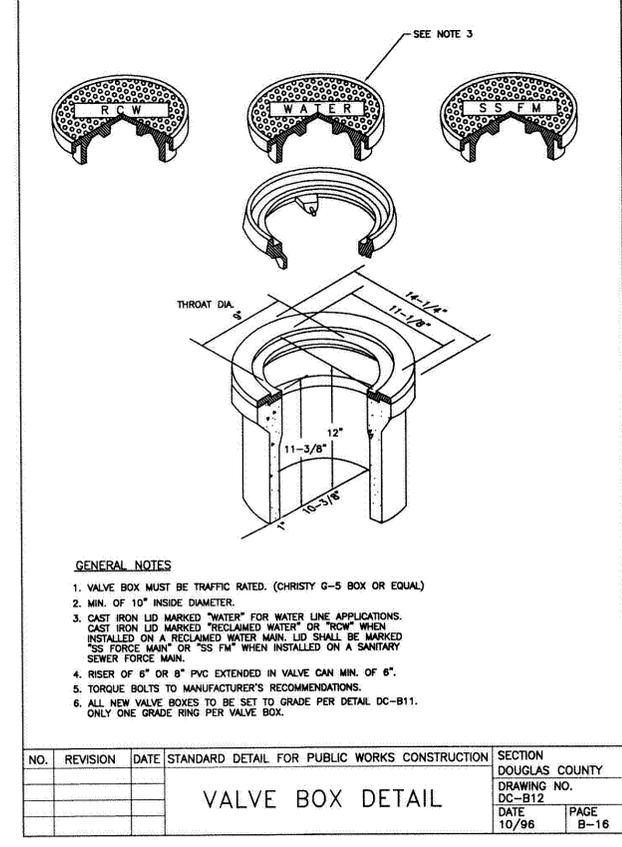
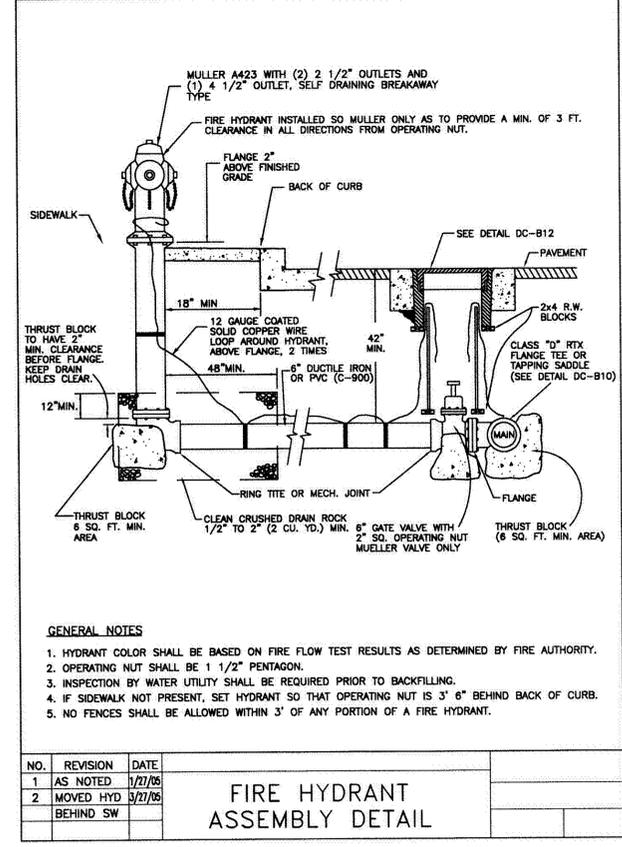
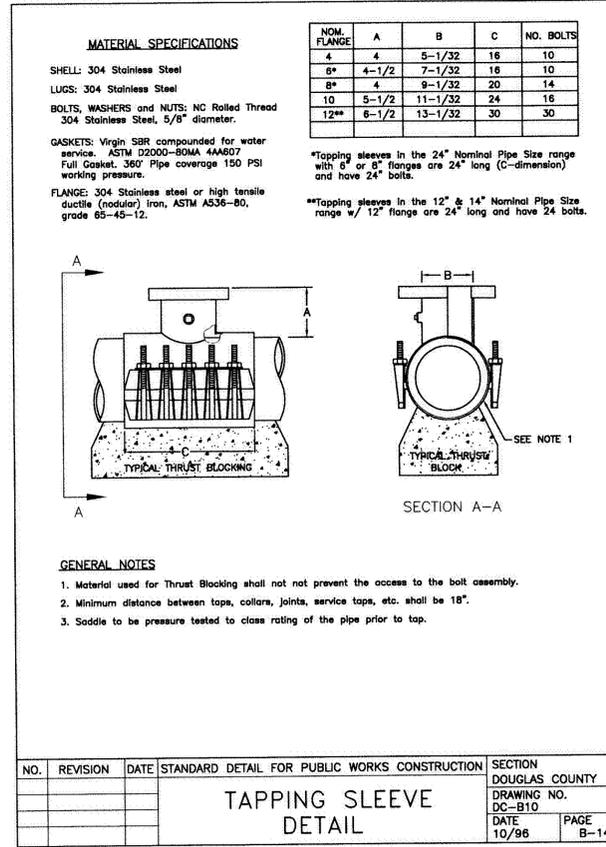
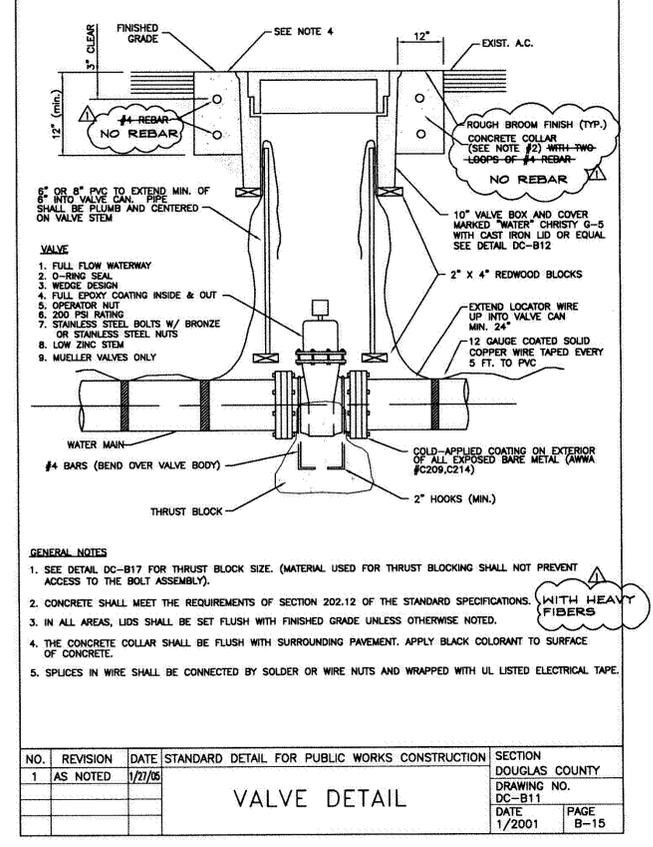
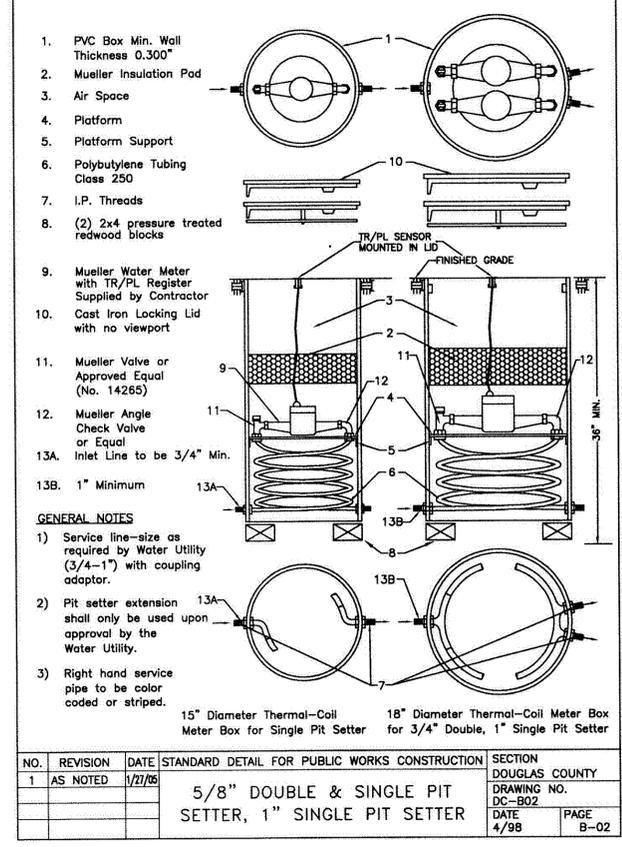
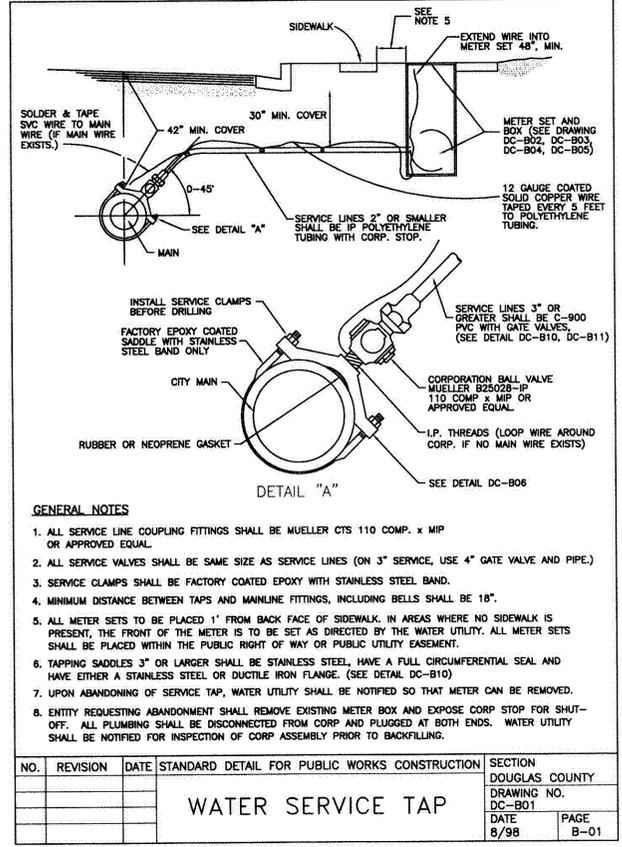
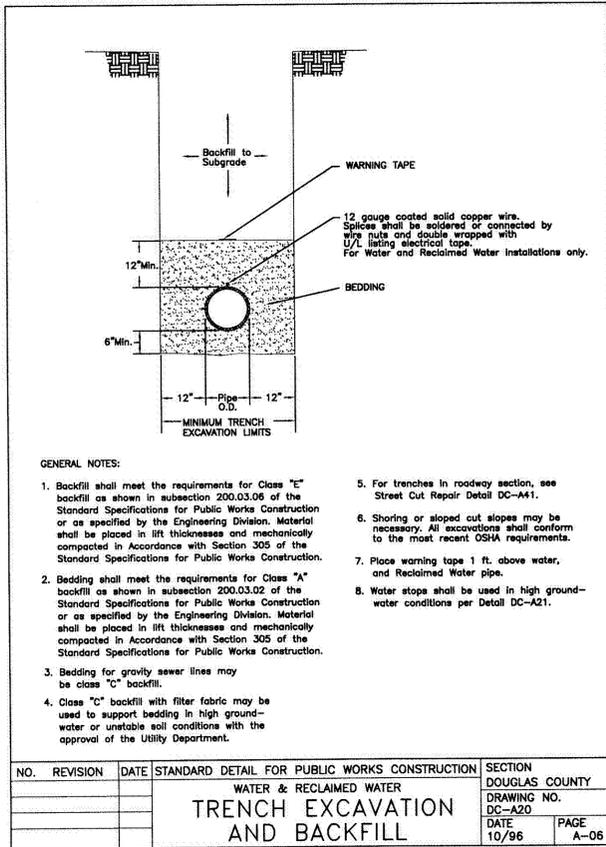
ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC

DETAILS  
SITE IMPROVEMENT



DRAWN: GNC, JRC, JMR, N08  
ENGINEER: KRN  
SCALE: AS SHOWN  
DATE: 03/18/05  
JOB: 0412-010-04  
DRAWING: 41210C26  
SHEET: C26  
OF: C36 SHEETS





RECORD INFORMATION  
AS NOTED

Z:\PROJECTS\41210\Drawings\Environmental Plans\41210DC28.dwg, 11/15/05 10:08:34 AM, JRC

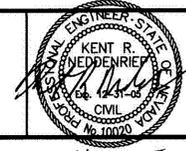
NO.	DATE	REVISION BLOCK	BY
1	11/15/05	REVISED DETAILS	JMR

**R|O Anderson**

1405 ESMERALDA AVENUE / POST OFFICE BOX 2229  
HENDEN, NEVADA 89423  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**DETAILS  
WATER**



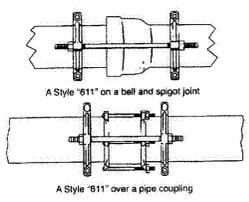
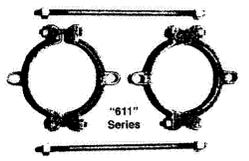
DRAWN: CMC, JRC, JMR, N08	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C28
SCALE: AS SHOWN	SHEET: C28
DATE: 03/18/05	OF: C36 SHEETS

11-15-05

ROMAC INDUSTRIES, INC. "600" Series Pipe Restraining System

**Material Specifications**  
 Castings: Ductile iron, meeting or exceeding ASTM A 536, Grade 65-45-12.  
 Clamping Bolts: High Strength Low Alloy Steel per AWWA C111  
 Clamping Nuts: ANSI B 18.2.2  
 Restraining Rods, T-Bolts and Nuts: High strength, low alloy steel per AWWA C111.  
 Coating: Color coded shop coat. Black on ductile iron sizes. Red on IPS (steel) size PVC.

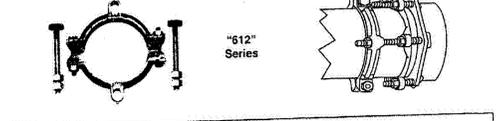
The Romac Series 600 is a multi-purpose pipe restraint system for PVC and ductile iron pipe joints. Configurations are available for use on bell and spigot joints, mechanical joints, Romac Style 501 and 511 flange couplings, and Romac Style FC4501 flange coupling adapters. They are engineered to eliminate the need for thrust blocks or other methods of restraint.  
 Series 600 restrainers feature a wide profile pad that contacts the pipe surface, reducing distortion and spreading restraining forces more evenly along the pipe. Precision machined gripping teeth engage vertically the full pipe circumference. Castings are designed to "bottom-out" before clamping bolt forces can over stress PVC pipe.



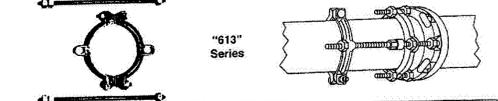
NOM. PIPE SIZE	PIPE	PIPE DIA.	CATALOG NUM-BER	CLAMPING BOLTS QTY. SIZE	RESTRAINING RODS QTY. SIZE	APPROX. WEIGHT (lbs)
4"	IPS size PVC	4.50	611 - 4.50	4: 3/4" x 4"	2: 3/4" x 18"	18 1/2 #
	DI, C-900	4.80	611 - 4.80	4: 3/4" x 4"	2: 3/4" x 20"	22 #
6"	IPS size PVC	6.63	611 - 6.63	4: 3/4" x 4"	2: 3/4" x 20"	40 #
	DI, C-900	6.90	611 - 6.90	4: 3/4" x 4"	2: 3/4" x 22"	50 #
8"	IPS size PVC	8.63	611 - 8.63	4: 3/4" x 4"	4: 3/4" x 22"	60 #
	DI, C-900	9.05	611 - 9.05	4: 3/4" x 4"	4: 3/4" x 22"	60 #
10"	IPS size PVC	10.75	611 - 10.75	4: 3/4" x 4"	4: 3/4" x 22"	60 #
	DI, C-900	11.10	611 - 11.10	4: 3/4" x 4"	4: 3/4" x 22"	60 #
12"	IPS size PVC	12.75	611 - 12.75	4: 3/4" x 4"	4: 3/4" x 22"	60 #
	DI, C-900	13.20	611 - 13.20	4: 3/4" x 4"	4: 3/4" x 22"	60 #

Example: For a 6" DI or C-900 Bell & Spigot Joint, order: **Style 611 - 6.90**  
 1 Per pair of castings To Order: Specify catalog number.  
 Submitted by Western Nevada Supply Co.

ROMAC INDUSTRIES, INC. "600" Series Pipe Restraining System



NOM. PIPE SIZE	PIPE	PIPE DIA.	CATALOG NUM-BER	CLAMPING BOLTS QTY. SIZE	RESTRAINING RODS QTY. SIZE	APPROX. WEIGHT (lbs)
4"	IPS size PVC	4.50	612 - 4.50	2: 3/4" x 4"	2: 3/4" x 7"	10 #
	DI, C-900	4.80	612 - 4.80	2: 3/4" x 4"	2: 3/4" x 7"	11 1/2 #
6"	IPS size PVC	6.63	612 - 6.63	2: 3/4" x 4"	2: 3/4" x 7"	20 1/2 #
	DI, C-900	6.90	612 - 6.90	2: 3/4" x 4"	2: 3/4" x 7"	29 #
8"	IPS size PVC	8.63	612 - 8.63	2: 3/4" x 4"	4: 3/4" x 7"	32 #
	DI, C-900	9.05	612 - 9.05	2: 3/4" x 4"	4: 3/4" x 7"	32 #
10"	IPS size PVC	10.75	612 - 10.75	2: 3/4" x 4"	4: 3/4" x 7"	32 #
	DI, C-900	11.10	612 - 11.10	2: 3/4" x 4"	4: 3/4" x 7"	32 #
12"	IPS size PVC	12.75	612 - 12.75	2: 3/4" x 4"	4: 3/4" x 7"	32 #
	DI, C-900	13.20	612 - 13.20	2: 3/4" x 4"	4: 3/4" x 7"	32 #



NOM. PIPE SIZE	PIPE	PIPE DIA.	CATALOG NUM-BER	CLAMPING BOLTS QTY. SIZE	RESTRAINING RODS QTY. SIZE	APPROX. WEIGHT (lbs)
4"	IPS size PVC	4.50	613 - 4.50	2: 3/4" x 4"	2: 3/4" x 8"	10 #
	DI, C-900	4.80	613 - 4.80	2: 3/4" x 4"	2: 3/4" x 8"	11 1/2 #
6"	IPS size PVC	6.63	613 - 6.63	2: 3/4" x 4"	2: 3/4" x 8"	20 1/2 #
	DI, C-900	6.90	613 - 6.90	2: 3/4" x 4"	2: 3/4" x 8"	29 #
8"	IPS size PVC	8.63	613 - 8.63	2: 3/4" x 4"	4: 3/4" x 8"	32 #
	DI, C-900	9.05	613 - 9.05	2: 3/4" x 4"	4: 3/4" x 8"	32 #

Example: For a 6" DI or C-900 Romac FC4501 Flange Coupling Adapter, order: **Style 613 - 6.90**  
 1 Per pair of castings To Order: Specify catalog number.  
 Submitted by Western Nevada Supply Co.

ROMAC INDUSTRIES, INC. "600" SERIES PIPE RESTRAINING SYSTEM SUBMITTAL INFORMATION

**USE**  
 The Series 600 is a multi-purpose pipe restraint system for PVC and ductile iron pipe joints. Configurations are available for use on bell and spigot joints, mechanical joints, Romac Style 501 and 511 flange couplings, and FC4501 flange coupling adapters. They are engineered to eliminate the need for thrust blocks or other methods of restraint. Not for use on plain end mechanical joint fittings.

**MATERIALS**  
 Castings: The restrainer rings are cast from ductile (nodular) iron, meeting or exceeding ASTM A 536, Grade 65-45-12.  
 Restraining Fasteners: 3/4" Restraining rods, T-bolts, heavy hex nuts, and coupling nuts are high strength low alloy steel, meeting AWWA C111 composition specifications. National coarse thread. Allowable force per bolt is 7,500 pounds when properly installed.  
 Clamping Fasteners: Clamping bolts ANSI B 18.2.1, Grade 5. Clamping nuts ANSI B 18.2.2, National coarse thread. Four and six inch use 5/8", eight inch use 3/4", 10 inch and 12 inch use 7/8" track head bolts.  
 Coatings: Shop coat applied to cast parts for corrosion protection in transit.

**PRESSURE**  
 When properly installed on the correct size pipe, the Romac Series "600" Restraining System can be used at these working pressures:

Pipe Material	Pressure Rating
PVC	Rating of Pipe
Ductile Iron	150 psi

**SIZES**  
 See Catalog.  
 Romac Document Number 05-8-0007 6/03  
 This information is based on the best data available at the date printed above. please check with Romac Engineering Department for any updates or changes.  
 Submitted by Western Nevada Supply Co.

RECORD INFORMATION AS NOTED

NO.	DATE	REVISION BLOCK	BY
1	06/14/05	SHEET ADDED	RSF

**Anderson ENGINEERING INC**  
 1603 ESMERALDA AVENUE / POST OFFICE BOX 2229  
 RENO, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

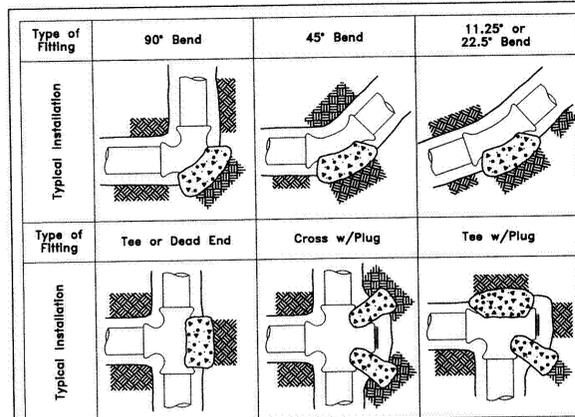
**ROCKY TERRACE**  
 ROCKY TERRACE ESTATES, LLC

**SUPPLEMENTAL**  
 DETAILS  
 WATER

**Professional Engineer Seal**  
 KENT R. HEDDENRIED  
 License No. 10070

DRAWN: CMC, JRC, JMR, NOS	JOB: 0412-010-04
ENGINEER: KRN	DRAWING: 41210C28A
SCALE: AS SHOWN	SHEET: C28A
DATE: 06/14/05	OF: C36 SHEETS

2-1-05

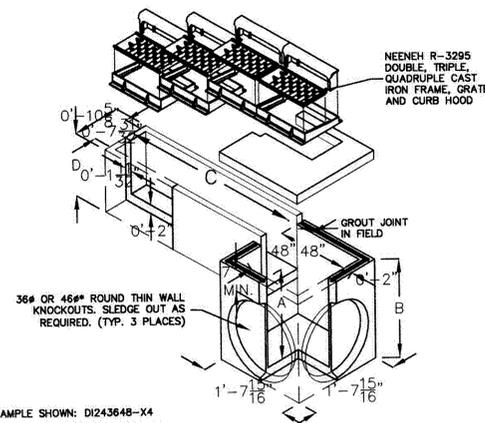


Thrust Block Bearing Area - Square Feet

Type of Fitting	90° Bend	45° Bend	11.25° or 22.5° Bend	Tee or Dead End	Cross w/Plug	Tee w/Plug
4"	2	1	1	2	2	2
6"	5	3	2	4	5	5
8"	8	5	3	6	8	8
10"	13	7	4	9	13	13
12"	18	10	5	13	18	18
14"	25	13	7	17	25	25
16"	32	17	9	23	32	32

- NOTE:
- CONCRETE FOR THRUST BLOCKS SHALL CONFORM TO SECTION 202 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED SOIL.
  - JOINTS AND FACE OF PLUGS SHALL BE KEPT CLEAR OF CONCRETE.
  - THRUST BLOCK BEARING AREAS ARE FOR A 150 PSI TEST PRESSURE WITH 2000 PSF BEARING CAPACITY. NOMINAL PIPE DIAMETER, AND A FACTOR OF SAFETY OF 1.5 INSTALLATIONS USING DIFFERENT TEST PRESSURES, AND/OR SOIL TYPES SHALL BE ADJUSTED BY THE DESIGN ENGINEER.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			THRUST BLOCKS	DRAWING NO. DC-B17
				DATE 10/96
				PAGE B-21



EXAMPLE SHOWN: D1243648-X4  
 DESIGN LOAD: H20 FULL TRAFFIC  
 CUSTOM SIZES ALSO AVAILABLE.  
 DIMENSION 'C' = VARIABLE AS REQUIRED.  
 DIMENSION 'D' = VARIABLE UP TO 78" MAX (72" I.D.).

Model No.	Dimensions
X2	2 41 1/2" 36"
X3	3 79" 48"
X4	4 116 1/2" 60"

Model No.	Dimensions
D1 Model	Left of Right
D1484836	36" 42"
D1484848	L OR R 48" 54"
D1484860	X2, X3, X4 (LEFT) 60" 66"
D1484872	(RIGHT) 72" 78"

FOR COMPLETE DESIGN AND PRODUCT INFORMATION, CONTACT JENSEN PRECAST.

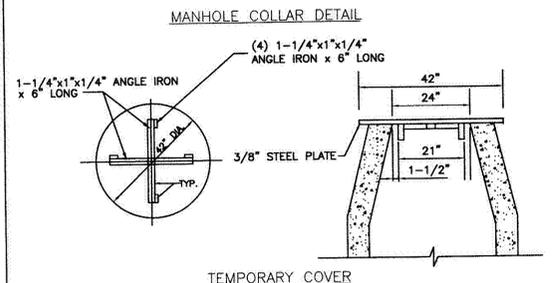
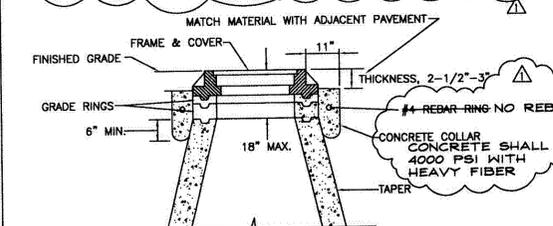
### HIGH CAPACITY CURB INLET 4848-X4 (L OR R)

5/13/02  
 01046\_340\_001.dwg  
 © 2002 Jensen Precast

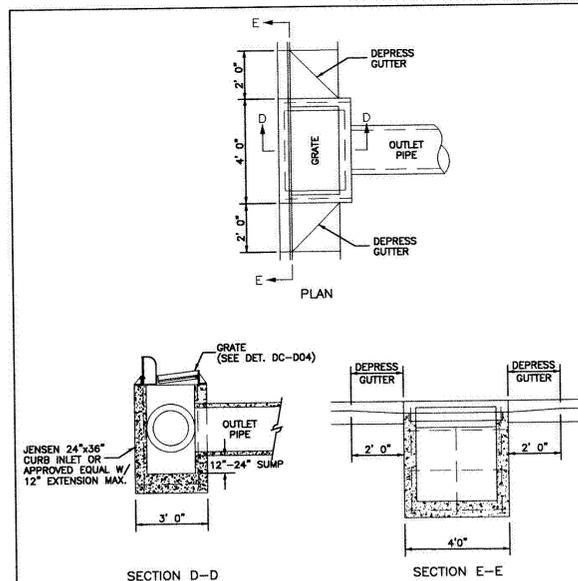
NO SCALE

#### GENERAL NOTES

- EXISTING PAVEMENT TO BE MATCHED SHALL BE NEATLY CUT.
- CONCRETE SHALL MEET THE REQUIREMENTS OF SECTION 202.12 OF THE STANDARD SPECIFICATIONS.
- IN ALL AREAS, CONCRETE SHALL BE SET FLUSH WITH FINISHED GRADE UNLESS OTHERWISE NOTED.
- THE CONCRETE COLLAR SHALL BE LEFT 2-1/2" - 3" BELOW FINISHED ASPHALT SURFACE. APPLY AN APPROVED TACK COAT AND FILL VOID BETWEEN ADJACENT PAVEMENT AND FRAME WITH TYPE 3 A.C. PAVING, CHIP OR FOG SEAL PAVED SURFACE. EXCEPTION: WHEN STRUCTURE NOT LOCATED IN ASPHALT PAVEMENT OR IN AN UNPAVED AREA, EXTEND CONCRETE TO FINISHED GRADE AND PLACE ONE #4 REBAR RING. NO REBAR.

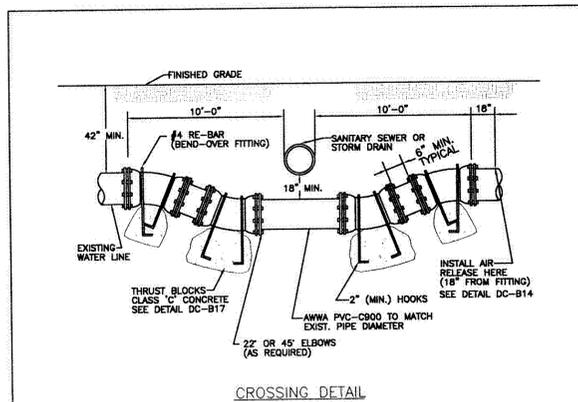


NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION CARSON CITY
			MANHOLE COLLAR DETAIL AND TEMPORARY COVER	DRAWING NO. DC-C08
				DATE 10/94
				PAGE C-08



- NOTE:
- SUBGRADE SHALL BE COMPACTED IN CONFORMANCE WITH SECTION 302 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - A MINIMUM OF 6 INCHES OF GRADED BEDDING MATERIAL AS DESCRIBED ON DETAIL DC-C02 SHALL BE CONSTRUCTED.
  - CONCRETE BOX SHALL BE DESIGNED FOR H-20 TRAFFIC LOAD.

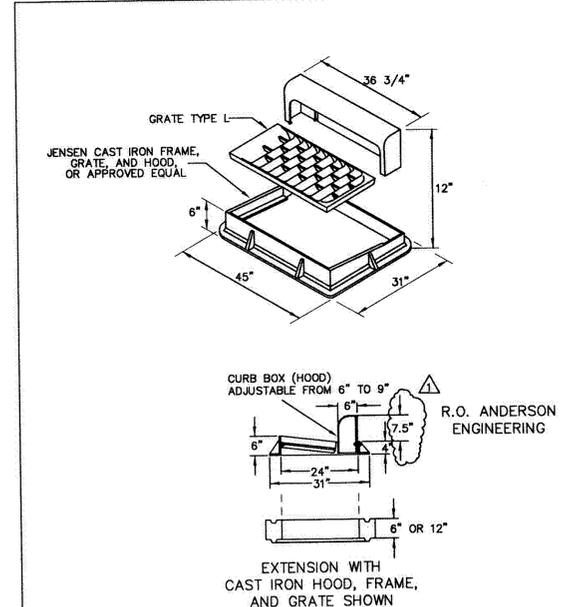
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			TYPE 4R CURB INLET	DRAWING NO. DC-D03
				DATE 1/2001
				PAGE D-03



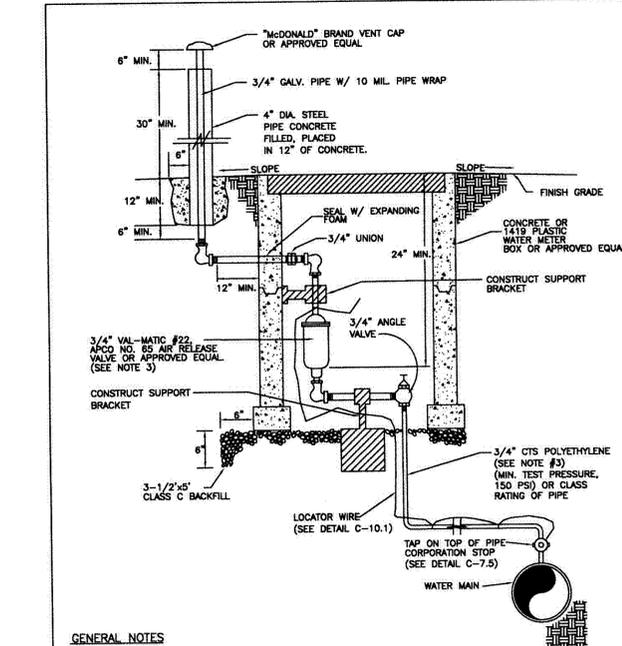
#### GENERAL NOTES

- WATER LINES 12" AND LARGER SHALL REQUIRE SPECIAL DESIGN.
- UPON APPROVAL OF THE WATER UTILITY, THE ABOVE ASSEMBLY MAY BE REPLACED WITH A WELDED STEEL "SPOOL" OF EQUIVALENT DIAMETER, PRIME AND WRAPPED (10 MILS MIN.) CONNECT TO EXISTING LINES USING MECHANICAL JOINTS. STEEL SPOOL SHALL BE CONSTRUCTED BY A CERTIFIED WELDER AND PRESSURE CHECKED IN ACCORDANCE WITH SPECIFICATIONS. ALL BOLTS TO BE TAR COATED.
- CONCRETE FOR THRUST BLOCKS SHALL NOT INTERFERE WITH THE REMOVAL OF BOLTED ASSEMBLIES.
- AIR-RELEASE TO BE INSTALLED ON BOTH SIDES OF CROSSING. (18" MIN. FROM ANY FITTING). ONE AIR RELEASE MAY BE USED WITH ONE LINE TO EACH SIDE OF CROSSING. SEE DETAIL DC-B14.
- ROUTING WATER LINE OVER SEWER LINE OR "ROPING" UNDER SEWER LINE REQUIRES APPROVAL BY THE WATER UTILITY.
- FOR PURPOSES OF SEPARATION AND PROTECTION OF THE WATER SUPPLY, RECLAIMED WATER SHALL BE CONSIDERED A SEWER LINE.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			LOWERING WATER MAINS	DRAWING NO. DC-B19
				DATE 4/98
				PAGE B-23



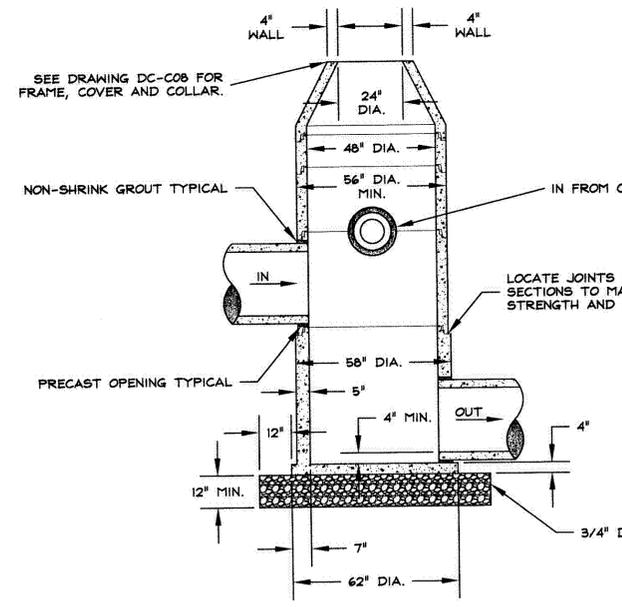
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			GRATE DETAIL TYPE 4R	DRAWING NO. DC-D05
				DATE 1/2001
				PAGE D-04



#### GENERAL NOTES

- Air Release valves shall be installed outside pavement section. Slope ground away from valve box or construct curbing to protect from flooding by surface waters.
- All pipes shall have positive slope from main line to air release valve.
- R/W Transmission mains require special design. (see detail c-00.0)

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION CARSON CITY
			POTABLE WATER AIR-RELEASE DETAIL	DRAWING NO. C-10.4
				DATE 10/94
				PAGE 35



- NOTES:
- 48" PRECAST MANHOLE COMPONENTS SHALL CONFORM TO ASTM C-478 WITH PRECAST OPENINGS FOR PIPES.
  - SUBMIT SHOP DRAWINGS TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
  - SEE PLANS FOR INVERTS AND CONFIGURATION.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
			STORM DRAIN MANHOLE #12	DRAWING NO. DC-D06
				DATE 1/2001
				PAGE D-04

RECORD INFORMATION AS NOTED

Z:\PROJECTS\145120.dwg (Improvement) - Plots 11/18/2005 1:24:42 PM, p1/4

NO.	DATE	REVISION BLOCK	BY
1	11/16/05	REVISED DETAILS	JMR

**R.O. Anderson**

**ROCKY TERRACE ROCKY TERRACE ESTATES, LLC**

1609 ESPERANZA AVENUE / POST OFFICE BOX 2229  
 HINDEN, NEVADA 89423  
 PHONE: (775) 782-2822 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

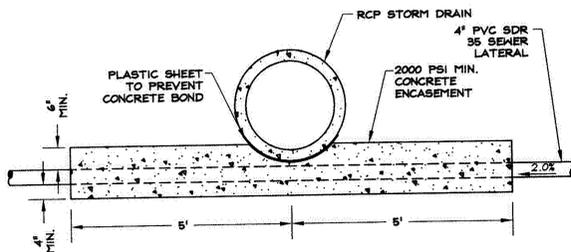
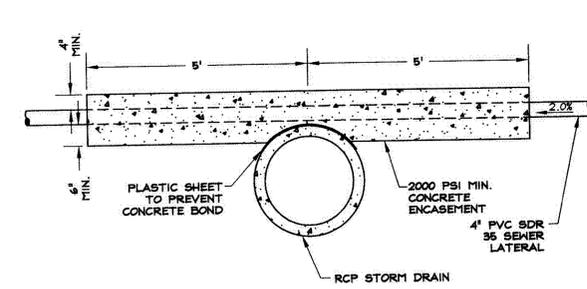
**DETAILS WATER & STORM DRAIN**

**RECORD INFORMATION AS NOTED**

DRAWN: GNC, JRC, JMR, NOS  
 ENGINEER: KRN  
 SCALE: AS SHOWN  
 DATE: 03/18/05

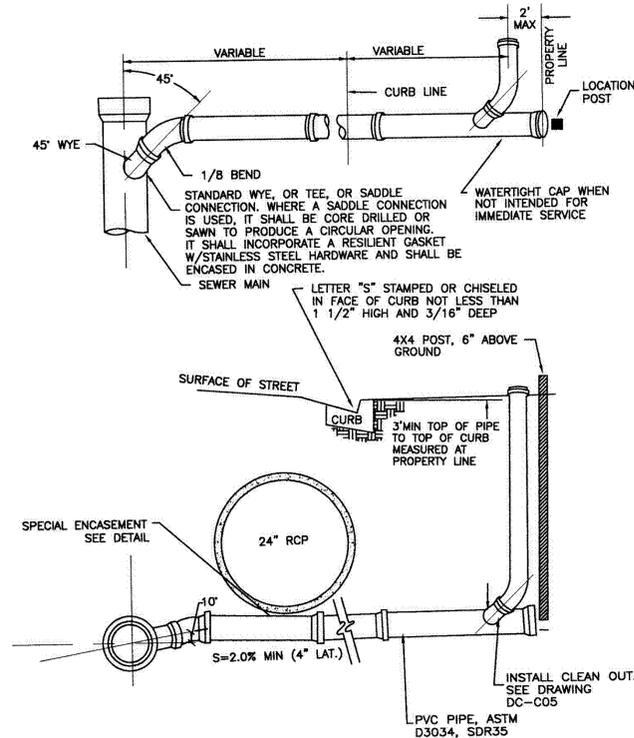
JOB: 0412-010-04  
 DRAWING: 41210C29  
 SHEET: C29  
 OF: C36 SHEETS

11-15-05



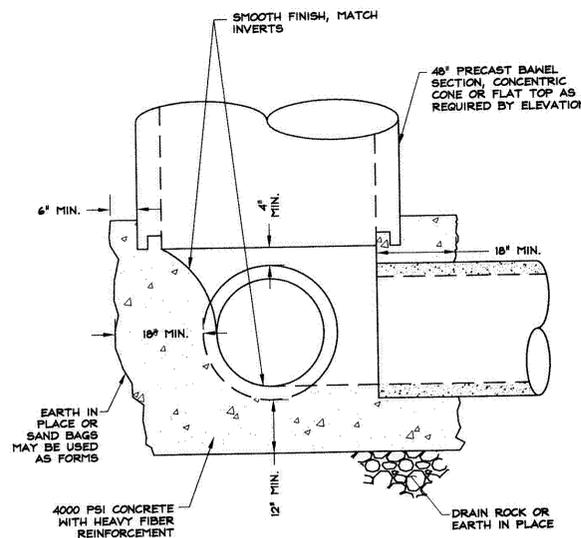
NOTE: USE WHERE 6" SEPERATION BETWEEN SEWER LATERAL AND STORM DRAIN CANNOT BE MET.

**SEWER LATERAL/  
STORM DRAIN CROSSING**

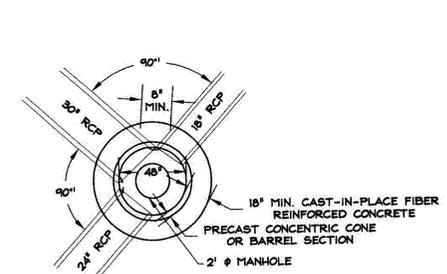


NOTES:  
1. ALL JOINTS AND CONNECTIONS SHALL BE WATERTIGHT.

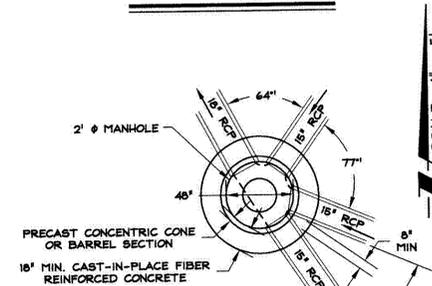
**SEWER LATERAL  
STA 4+68 ROCKY TERRACE DR.**



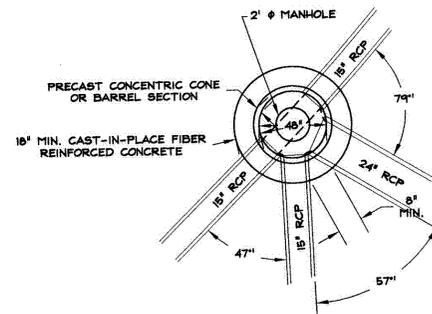
**CAST-IN-PLACE  
SDMH SECTION**



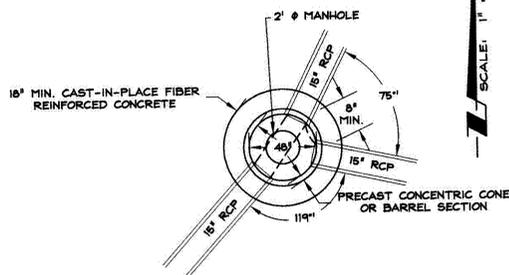
**PLAN VIEW  
SDMH #9**



**PLAN VIEW  
SDMH #12**



**PLAN VIEW  
SDMH #10**



**PLAN VIEW  
SDMH #11**

RECORD INFORMATION  
AS NOTED

Z:\PROJECTS\11-15-05\11-15-05-01\11-15-05-01.dwg, 11/16/05, 1:46:35 PM, jmr

NO.	DATE	REVISION	BLOCK	BY
1	11/16/05	REVISED DETAILS		JMR

**R|O Anderson**  
 1403 ESPERALDA AVENUE / POST OFFICE BOX 2229  
 PRINDEN, NEVADA 89403  
 PHONE: (775) 782-2922 / FAX: (775) 782-7084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

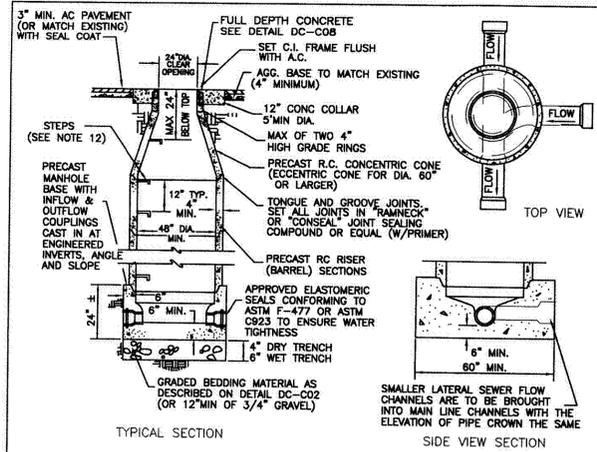
**DETAILS  
SEWER &  
STORM DRAIN**

**RECORD INFORMATION**  
 AS NOTED

DRAWN: JMR  
 ENGINEER: KRN  
 SCALE: AS SHOWN  
 DATE: 11/16/05

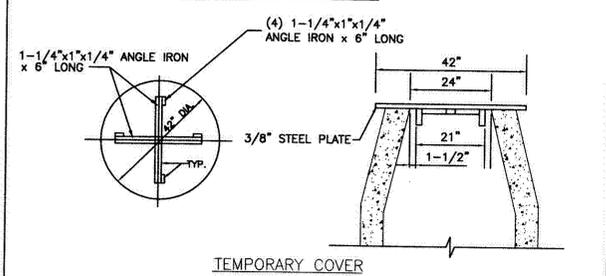
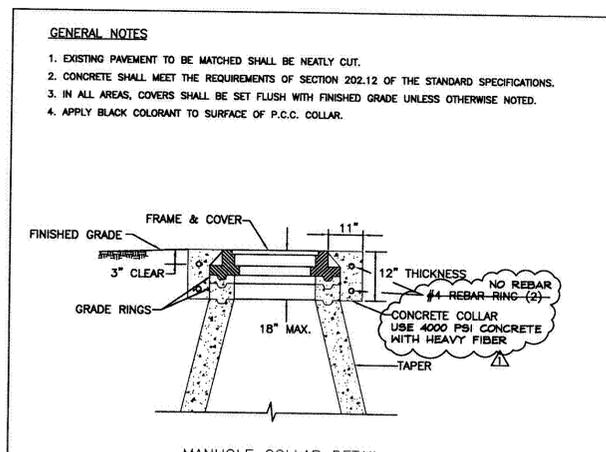
JOB: 0412-010-04  
 DRAWING: 41210C29A  
 SHEET: C29A  
 OF: C36 SHEETS

11-15-05

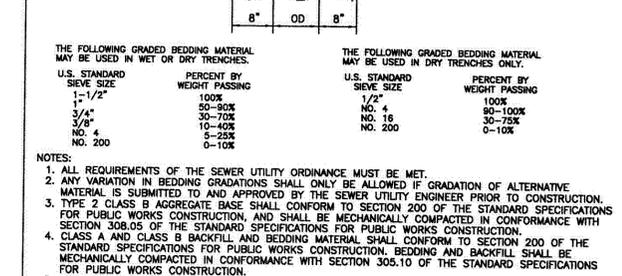
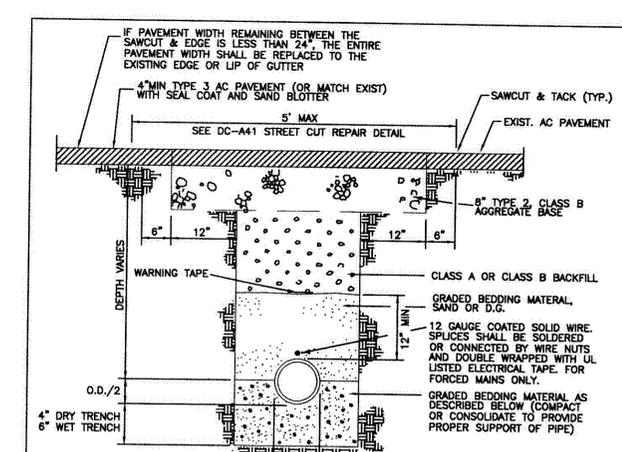


- NOTES:**
- CONTRACTOR SHALL CONTACT AND COORDINATE WITH THE SEWER UTILITY AND ALL OTHER UTILITIES 48 HOURS PRIOR TO CONSTRUCTION.
  - ALL CONSTRUCTION SHALL CONFORM TO DOUGLAS COUNTY STANDARDS AND NO BACKFILLS WILL BE ALLOWED UNTIL INSPECTED AND APPROVED BY THE SEWER UTILITY.
  - MANHOLE SHALL BE CONSTRUCTED OF PRECAST REINFORCED CONCRETE SECTIONS CONFORMING TO ASTM DESIGNATION C478.
  - EXCAVATION FOR MANHOLE MUST BE MADE TO A MINIMUM OF ONE FOOT OUTSIDE OF THE MANHOLE WALL TO PROVIDE FOR ADEQUATE WORKSPACE. SPACE OUTSIDE OF THE MANHOLE SHALL BE BACKFILLED WITH ACCEPTABLE MATERIAL IN UNIFORM LAYERS NOT EXCEEDING 8" IN DEPTH. EACH LAYER SHALL BE THOROUGHLY COMPACTED TO THE CENTER OF THE ADJACENT TRENCH SECTIONS. (MIN. 80% IN EXISTING OR PROPOSED STREET OR ALLEY RIGHTS-OF-WAY).
  - CAST IRON FRAME AND COVER SHALL BE 24" DIAMETER (LIGHT COPING) AND SHALL BE MANUFACTURED FROM GRAY CAST IRON CONFORMING TO ASTM DESIGNATION A 48, CLASS 30 AND DESIGNED FOR A MINIMUM HS-20 TRAFFIC LOADING. COVERS AND FRAMES SHALL BE MATCH-MARKED IN PINK AND SEATING SURFACES MACHINED SO THAT COVER IS NON-ROCKING. COVERS SHALL HAVE ONE (1) CENTRAL HOLE AND ONE (1) LOCATED 1" DIA HOLES. COVERS SHALL HAVE NO "THRU" HOLES.
  - ALL SADDLES MUST BE PRECAST UNLESS OTHERWISE APPROVED BY THE SEWER UTILITY.
  - ALL JOINTS AND CONNECTIONS TO NEW OR EXISTING MANHOLES SHALL BE WATER TIGHT.
  - CONCRETE FOR CAST-IN-PLACE MANHOLE BASE, IF APPROVED BY THE SEWER UTILITY FOR USE, SHALL CONFORM TO SECTION 202.02 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - SEWER STUBS FOR FUTURE EXTENSION SHALL BE NO MORE THAN 5 FEET IN LENGTH.
  - THE TOP OF HORIZONTAL LATERAL SEWERS SHALL ENTER THE MANHOLE AT AN ELEVATION EQUAL TO THE TOP OF THE MAIN LINE. EXCEPTIONS ONLY BY PRIOR SEWER UTILITY APPROVAL.
  - BASES SHALL BE FORMED DIRECTLY IN CONCRETE OF MANHOLE AND SHALL BE SMOOTH AND ACCURATELY SHAPED TO A SEMI-CIRCULAR BOTTOM CONFORMING TO THE INSIDE OF THE ADJACENT TRENCH SECTIONS.
  - STEPS ARE REQUIRED WHERE MANHOLE DEPTH IS 54" (4'-6") OR GREATER. STEPS SHALL BE RAISED VERTICALLY (4" MAX TOLERANCE) AND HORIZONTALLY (0.5" TOLERANCE) SO AS TO FORM A CONTINUOUS LADDER, AND SHALL CONFORM WITH THE DESIGN REQUIREMENTS OF THE STATE OF NEVADA, CSMA STANDARDS, SECTION 1510.17 (DEPTH IS RISE ELEV. TO TOP OF PIPE).
  - WHERE MANHOLES ARE NOT LOCATED IN STREETS, PLACE TOP OF MANHOLE IF ABOVE EXISTING GROUND UNLESS OTHERWISE REQUIRED BY M.G.S.D. INSTALL THE CONCRETE COLLAR FROM A POINT AT THE TOP OF THE COVER FRAME AND EXTEND A MINIMUM OF 8 INCHES BELOW THE SURROUNDING GROUND. SURFACE TAPER THE CONCRETE COLLAR FROM TOP TO BOTTOM AT A 1:1 SLOPE OR FLATTER.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C01
				DATE 1/2001
				PAGE C-01

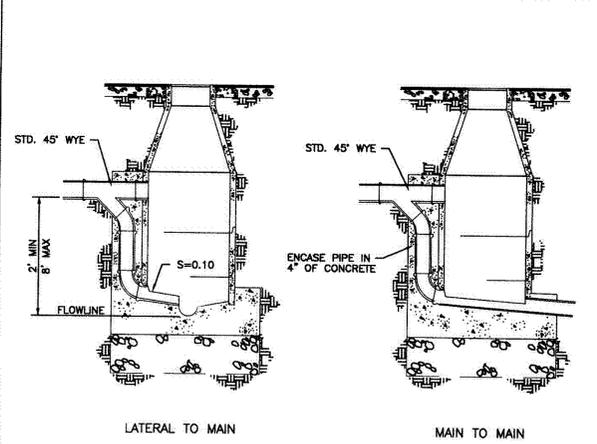


NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C08
				DATE 1/2001
				PAGE C-08



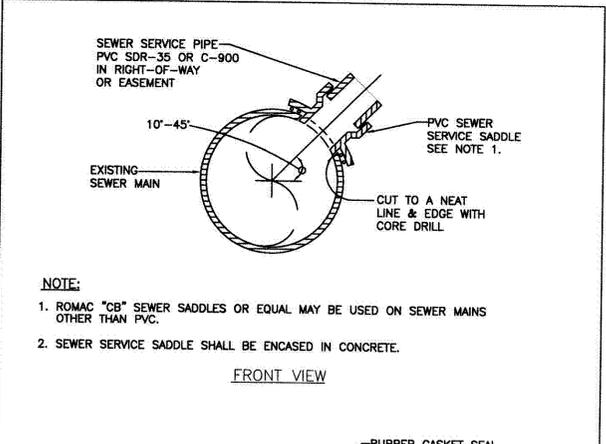
NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C02
				DATE 4/98
				PAGE C-02

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C10
				DATE 10/96
				PAGE C-10



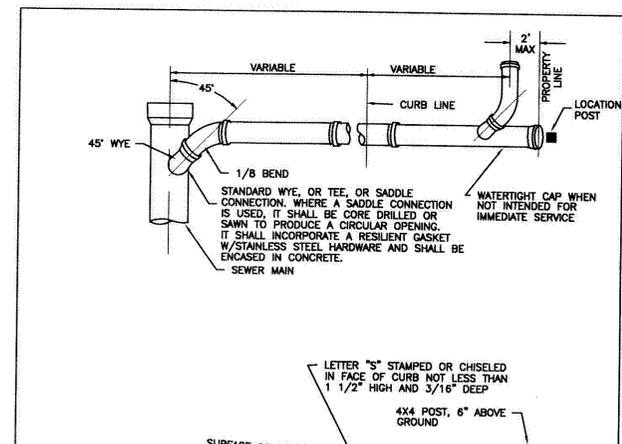
- NOTES:**
- DROP MANHOLES ARE TO BE USED ON ALL SANITARY SEWERS WITH MORE THAN 2 FEET VERTICAL DROP AT MANHOLE (DROP SHALL NOT EXCEED 8 FEET AT ANY MANHOLE).
  - MAINS SHALL BE SLOPED TO FALL AT LEAST 0.1 FEET ACROSS MANHOLE SECTION.
  - ALL OTHER DIMENSIONS, NOTES AND REQUIREMENTS AS SHOWN ON THE STANDARD SEWER MANHOLE DETAIL SHALL APPLY TO DROP MANHOLES.
  - DIMENSIONS NOT SHOWN ARE GIVEN ON STANDARD MANHOLE DETAIL.
  - ALL JOINTS AND CONNECTIONS TO NEW OR EXISTING MANHOLES SHALL BE WATER TIGHT.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C03
				DATE 10/96
				PAGE C-03



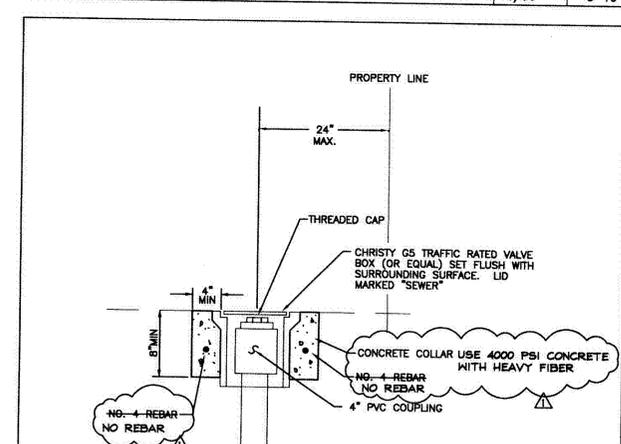
- NOTE:**
- ROMAC "CB" SEWER SADDLES OR EQUAL MAY BE USED ON SEWER MAINS OTHER THAN PVC.
  - SEWER SERVICE SADDLE SHALL BE ENCASED IN CONCRETE.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C07
				DATE 10/96
				PAGE C-07



- NOTES:**
- ALL JOINTS AND CONNECTIONS SHALL BE WATER TIGHT.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C04
				DATE 8/20/98
				PAGE C-04



- NOTE:** ALL JOINTS AND CONNECTIONS SHALL BE WATER TIGHT.

NO.	REVISION	DATE	STANDARD DETAIL FOR PUBLIC WORKS CONSTRUCTION	SECTION DOUGLAS COUNTY
				DRAWING NO. DC-C05
				DATE 8/20/98
				PAGE C-05

NO.	DATE	REVISION BLOCK	BY
1	11/15/05	REVISED DETAILS	JMR

**R|O Anderson**  
 1609 ESPERALDA AVENUE / POST OFFICE BOX 2229  
 TINDEN, NEVADA 89423  
 PHONE: (775) 782-3322 / FAX: (775) 782-1084  
 WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**DETAILS SEWER**

**RECORD INFORMATION AS NOTED**

**SCALE: AS SHOWN**

**DATE: 03/18/05**

**OF: C36 SHEETS**

**C30**

**03/18/05**

**0412-010-04**

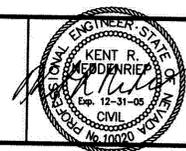
**DRAWING: 41210C30**

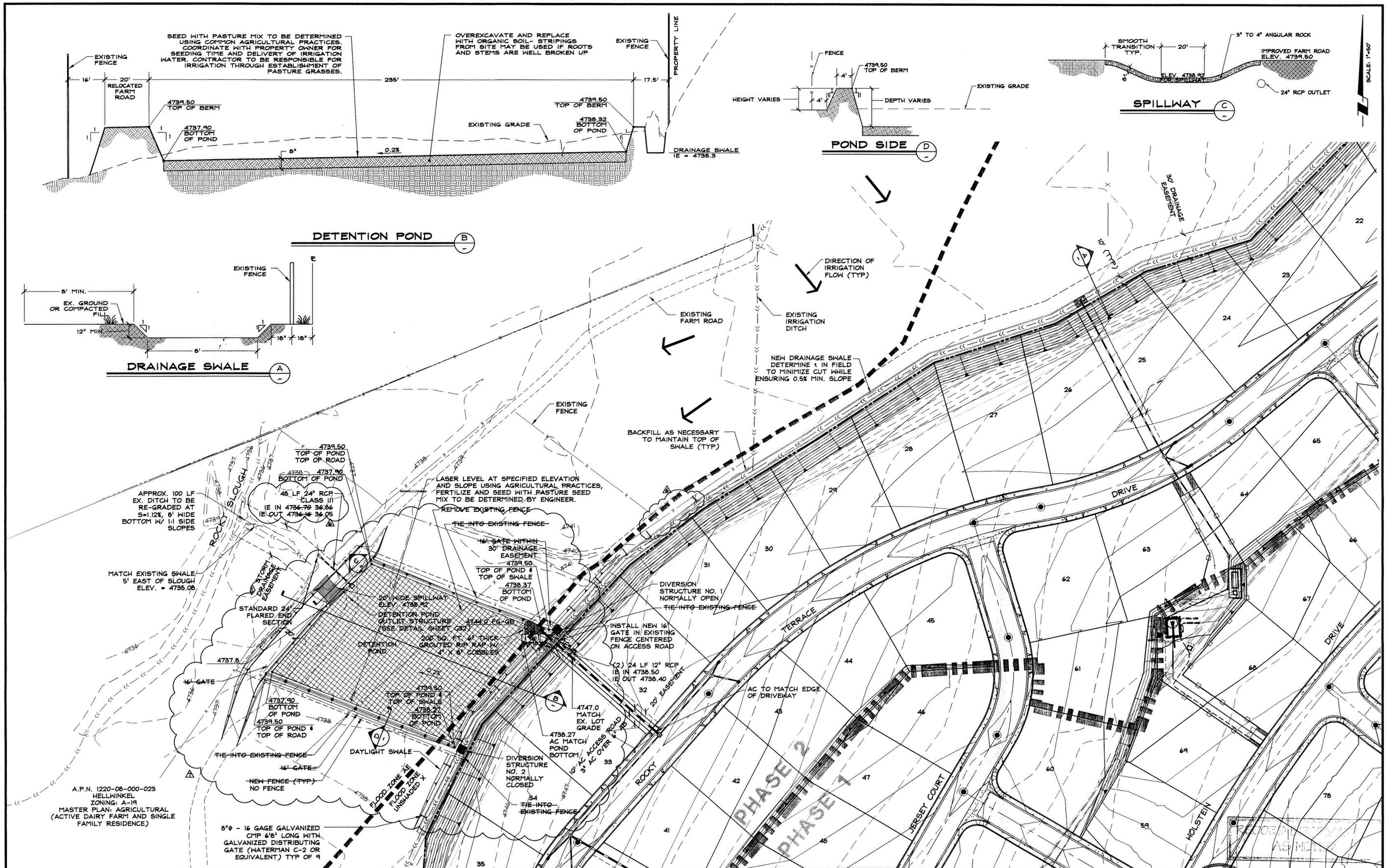
**ENGINEER: KRN**

**SCALE: AS SHOWN**

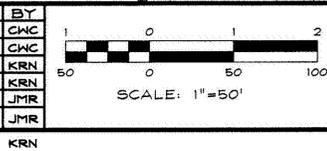
**DATE: 03/18/05**

**OF: C36 SHEETS**





NO.	DATE	REVISION	BLOCK	BY
1	09/18/05	REVISED POND AND DETAILS.		CNC
2	09/23/05	REVISED POND AND DETAILS.		CNC
3	10/05/05	REVISED POND AND DETAILS.		KRN
4	10/17/05	REVISED POND AND DETAILS.		KRN
5	11/17/05	REVISED ACCESS ROAD		JMR
6	05/23/06	RECORD INFORMATION		JMR

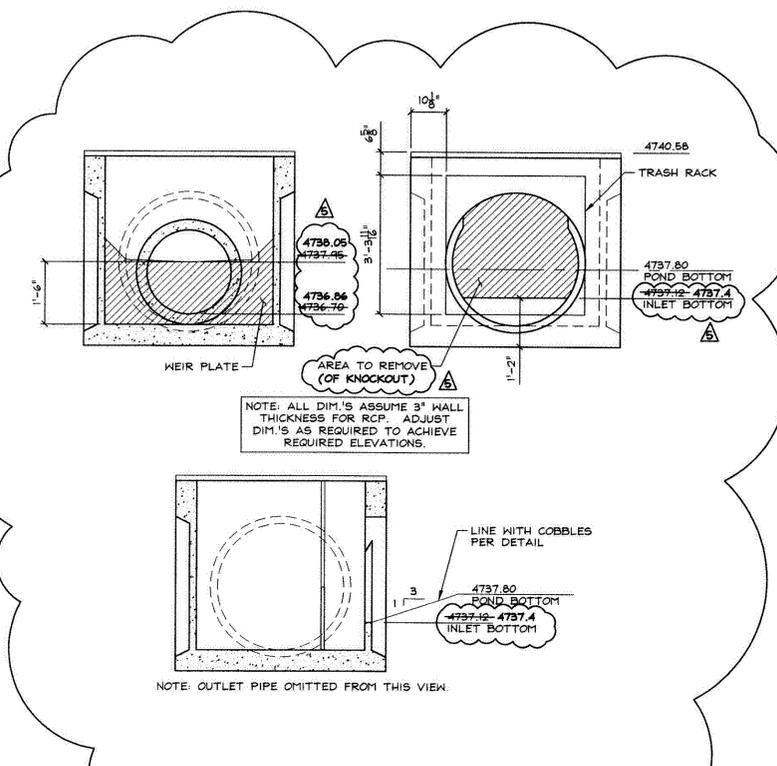


**R/O Anderson**  
 1603 ESMERALDA AVENUE / POST OFFICE BOX 2229  
 PRINDEN, NEVADA 89423  
 PHONE: (775) 782-2322 / FAX: (775) 782-1084  
 WEB SITE: WWW.ROANDERSON.COM

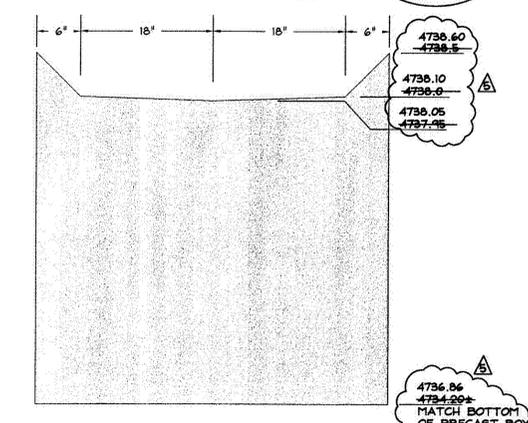
**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**DETAIL- STORM**  
**WATER PONDS**

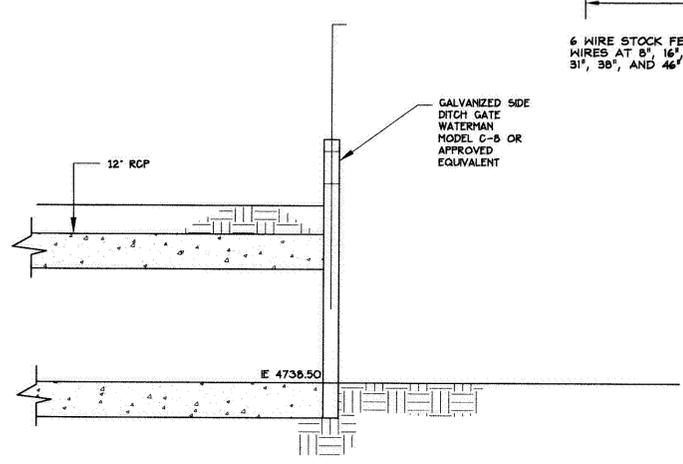
	DRAWN: GNC, JRC, JMR, NOS ENGINEER: KRN	JOB: 0412-010-04 DRAWING: 41210C31
	SCALE: 1"=50' DATE: 11/17/05	SHEET: <b>C31</b> OF: C36 SHEETS
	9-26-06	
	9-26-06	



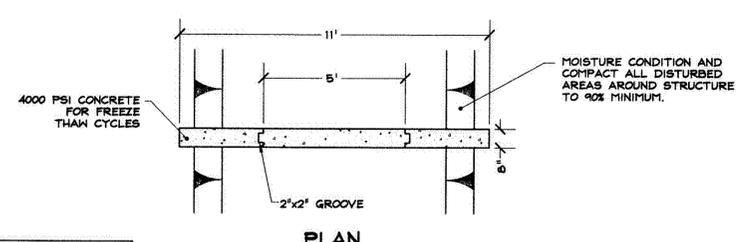
**POND OUTLET STRUCTURE**  
NO SCALE



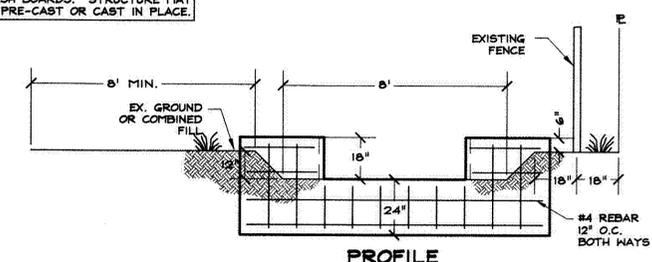
**WEIR PLATE DETAIL**  
NO SCALE



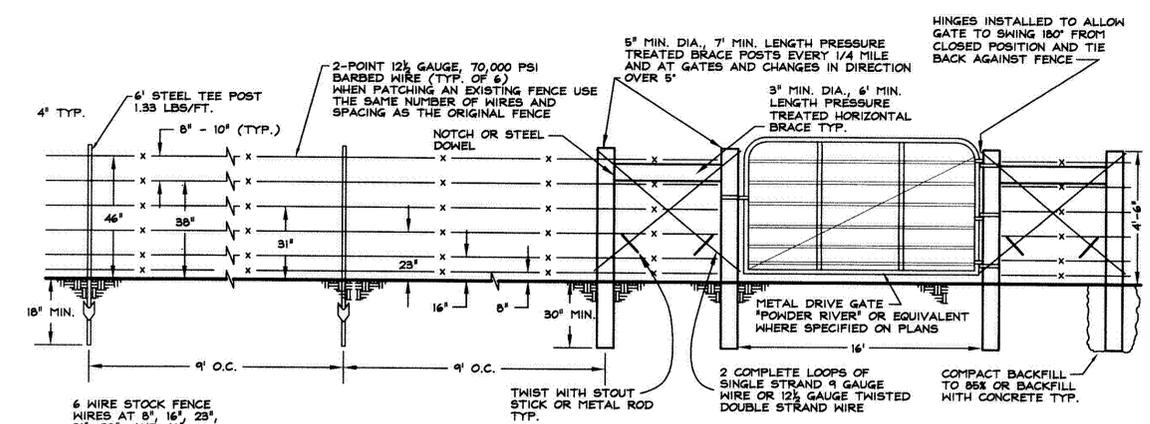
**DIVERSION STRUCTURE NO.1**  
NO SCALE



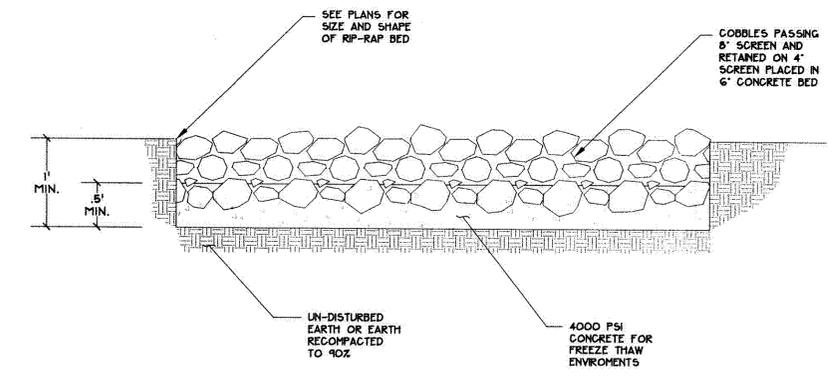
NOTE: PROVIDE DOUGLAS FIR #1 FLASH BOARDS. STRUCTURE MAY BE PRE-CAST OR CAST IN PLACE.



**DIVERSION STRUCTURE NO.2**  
NO SCALE



**FENCE DETAIL**  
NO SCALE



**GROUTED RIP-RAP**  
NO SCALE

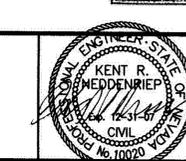
RECORD INFORMATION AS NOTED

NO.	DATE	REVISION	BY
1	05/02/05	ADDED GROUTED RIP-RAP DETAIL	RSF
2	09/23/05	REVISED WEIR PLATE DETAIL	RSF
3	10/05/05	REVISED WEIR PLATE AND OUTLET STRUCTURE	KRN
4	05/23/06	RECORD INFORMATION	JMR
5	09/27/06	RECORD INFORMATION	KRN

**R|O|Anderson**  
1603 ESPERLADA AVENUE / POST OFFICE BOX 2229  
MINDEN, NEVADA 89429  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

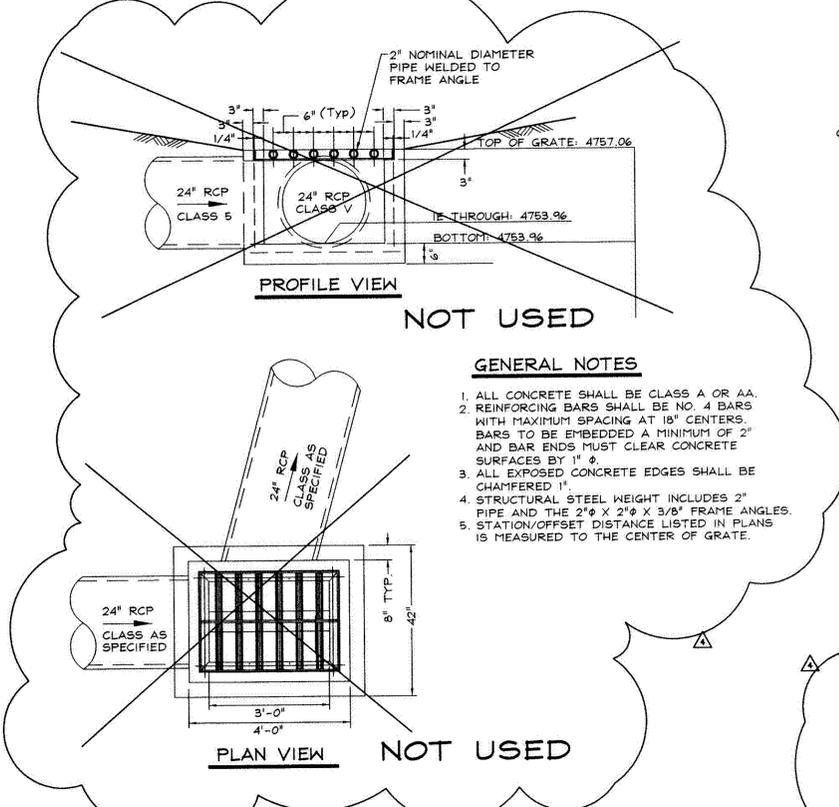
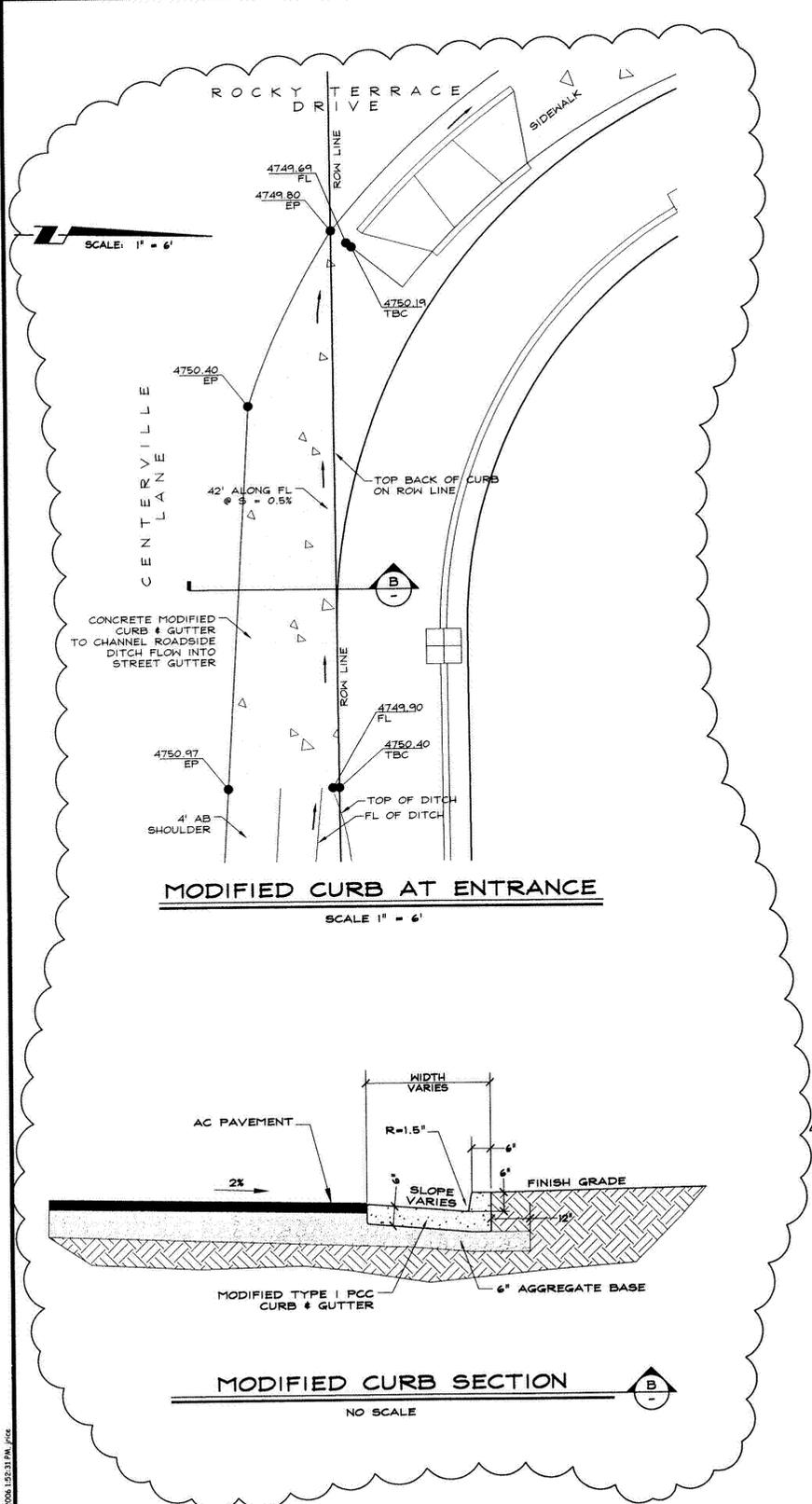
**ROCKY TERRACE**  
**ROCKY TERRACE ESTATES, LLC**

**DETAILS**  
**DETENTION**  
**POND**



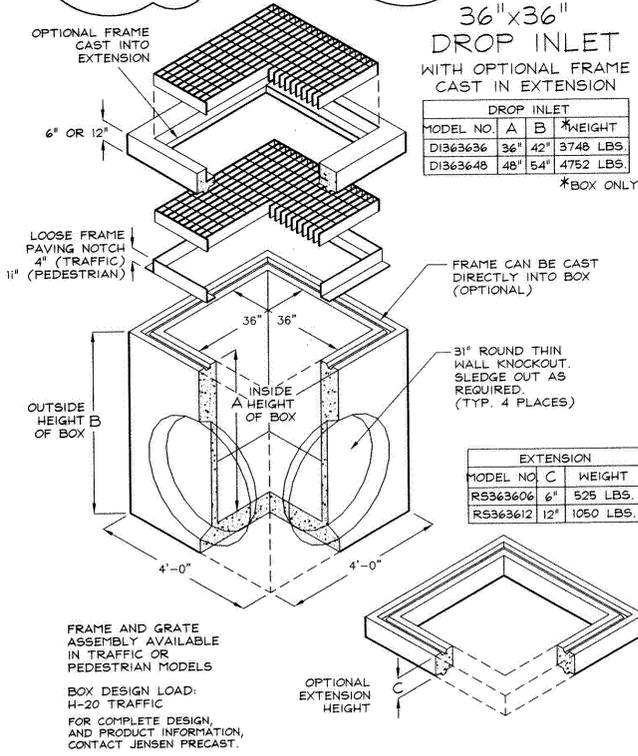
DRAWN: JMR	JOB: 412-10
ENGINEER: KRN	DRAWING: 41210C32
SCALE: N.T.S.	SHEET: C32
DATE: 10/05/05	OF: C36 SHEETS

9-27-06



**GENERAL NOTES**

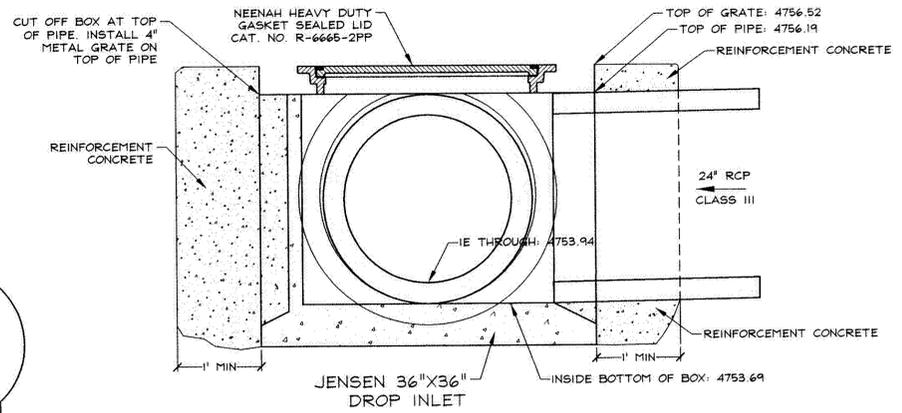
1. ALL CONCRETE SHALL BE CLASS A OR AA. REINFORCING BARS SHALL BE NO. 4 BARS WITH MAXIMUM SPACING AT 18" CENTERS. BARS TO BE EMBEDDED A MINIMUM OF 2" AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 1"  $\phi$ .
2. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 1".
3. STRUCTURAL STEEL WEIGHT INCLUDES 2" PIPE AND THE 2"  $\phi$  X 2"  $\phi$  X 3/8" FRAME ANGLES.
4. STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE CENTER OF GRATE.



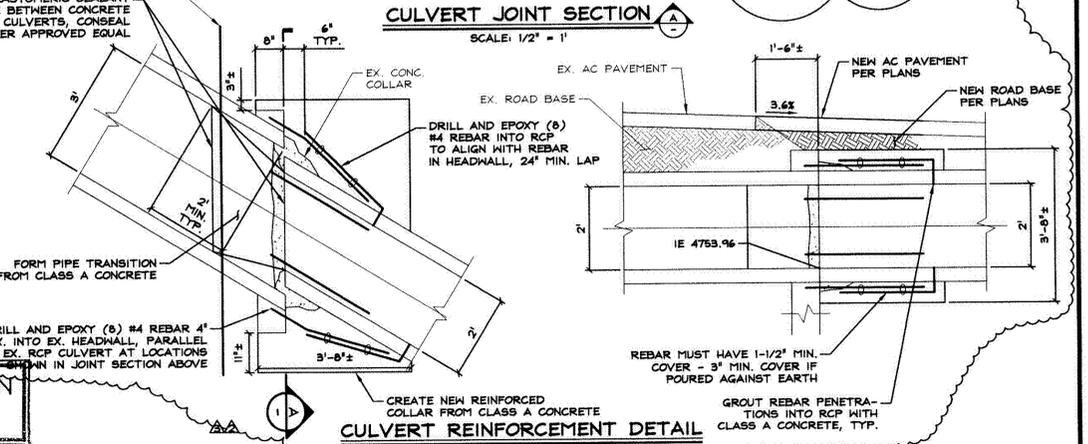
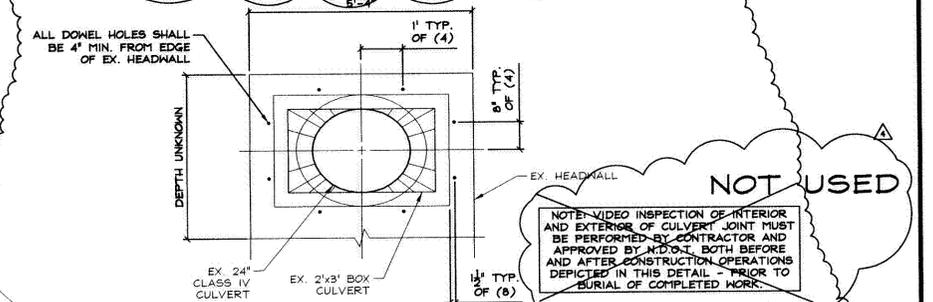
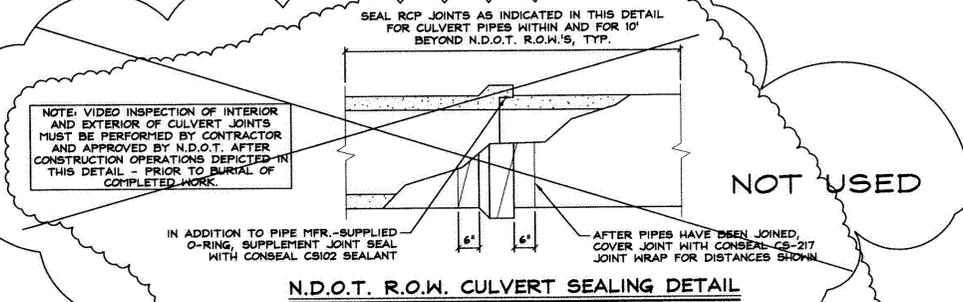
**SDMH #3-#7 & #9-#12 DETAIL**

**RECORD INFORMATION AS NOTED**

NOTE: WORK WITHIN CENTERVILLE LANE IS SHOWN FOR REFERENCE ONLY - SEE NDOT PERMIT PLANS



**SDMH #2 DETAIL PROFILE VIEW**



C:\PROJECTS\121210.dwg, 05/24/2006, 12:51:30 PM, jrc

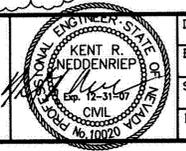
NO.	DATE	REVISION BLOCK	BY
1	05/05/05	MODIFICATIONS TO ROADSIDE DRAINAGE DESIGN	JRC
2	06/17/05	REMOVE UNDESIRABLE RCP JOINTS AND REINFORCEMENT DETAILS PER NDOT REQUIREMENTS	GMS
3	06/22/05	REVISED CULVERT REINFORCEMENT DETAIL PER NDOT COMMENTS	GMS
4	05/23/06	RECORD INFORMATION	JMR

**R/O Anderson**

1609 ESHERALDA AVENUE / POST OFFICE BOX 2224  
TRINIDAD, NEVADA 89403  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE  
ROCKY TERRACE ESTATES, LLC**

**DETAILS  
STORM DRAIN  
NDOT**

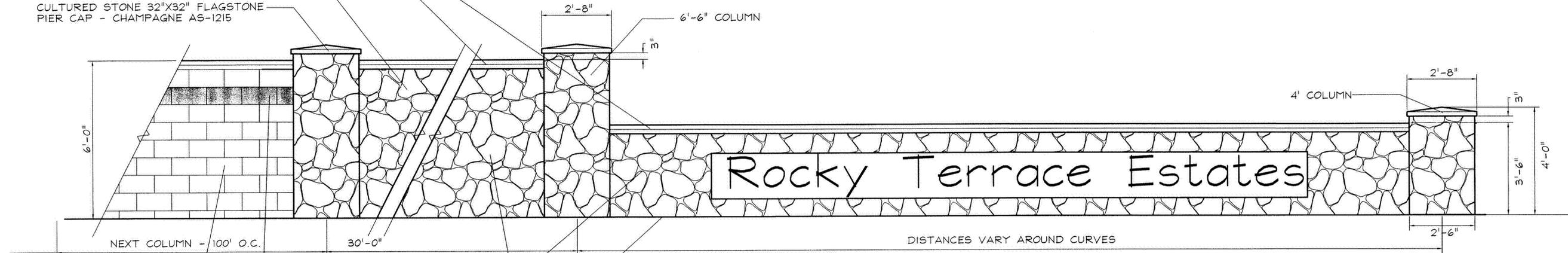


DRAWN: CWC	JOB: 412-10
ENGINEER: KRN	DRAWING: 41210C33
SCALE: N.T.S.	SHEET: C33
DATE: 06/22/05	OF: C36 SHEETS

CULTURED STONE 12"X20" FLAGSTONE  
WALL CAP - CHAMPAGNE AS-1204

PROTO II WALL SYSTEM  
BY BASALITE  
6" - PRECISION FRONT, COMBED BACK  
GROUT STONE TO FRONT FACE OF WALL  
(INSTALL PER MANUFACTURERS  
SPECIFICATIONS)

CULTURED STONE 32"X32" FLAGSTONE  
PIER CAP - CHAMPAGNE AS-1215

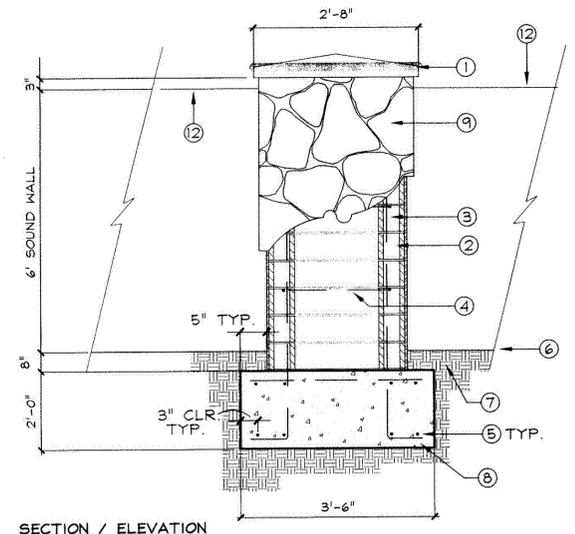


PROTO II WALL SYSTEM  
BASALITE COLOR D-225  
6" - SPLIT FACE FRONT, COMBED BACK  
(INSTALL PER MANUFACTURERS  
SPECIFICATIONS)

ONE ROW - PRECISION FACE BLOCK  
BASALITE COLOR - D-390

COLORADO BOQUET  
CANYON STONE  
FINISHED GRADE

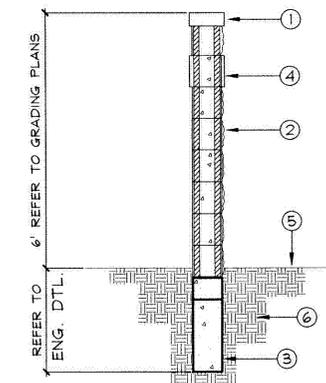
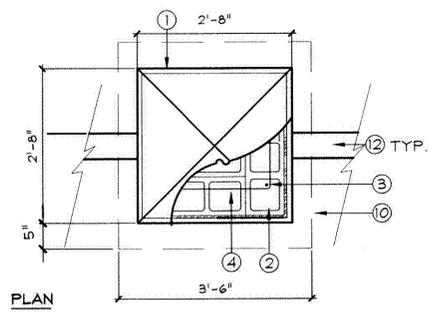
PROTO II SCREEN WALL  
SCALE 1/2"=1'-0"



- ① PRECAST COLUMN CAP. CULTURED STONE 32"X32" FLAGSTONE PIER CAP. GRAY AS-1213 MORTAR TO TOP OF PILASTER.
- ② PRECISION CMU BLOCK, BY BASALITE (916) 486-4094. GROUT ALL CELLS SOLID.
- ③ #4 VERT. REBAR IN EA. CORNER.
- ④ #4 HORIZ. REBAR, 24" O.C., TYP.
- ⑤ #4 HORIZ. REBAR, 12" O.C., BOTH WAYS, TYP.
- ⑥ FINISHED GRADE
- ⑦ COMPACTED SUBGRADE, 90% R.D.
- ⑧ CONCRETE FOOTING
- ⑨ COLORADO BOQUET CANYON STONE. MORTAR TO WALL AND GROUT ALL JOINTS WITH DARK GRAY GROUT.
- ⑩ OUTLINE OF PILASTER FOOTING.
- ⑪ OUTLINE OF ABUTTING WALL FOOTING.
- ⑫ ABUTTING WALL

NOTES:  
PILASTER TO RECEIVE APPLICATION OF STONE ON ALL EXPOSED SIDES.

**A** 32" Wide In Wall Pilaster Detail  
NOT TO SCALE

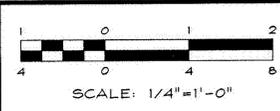


- ① PRECAST CROWN CAP. SEE AMENITY SCHEDULE FOR CAP TYPE AND COLOR.
- ② 6" PROTO II WALL BY BASALITE. COLOR D225. SPLIT FACE FRONT, COMBED BACK. WALL TO BE ENGINEERED BY BASALITE INC.
- ③ FOOTING PER STRUCTURAL ENGINEERS DRAWINGS FOR PROTO II WALL SYSTEMS, PLANS AVAILABLE BY BASALITE INC.
- ④ ONE ROW OF PRECISION CUT, BOTH SIDE, PROTO II BLOCK COLOR D-390.
- ⑤ FINISH GRADE
- ⑥ COMPACTED SUBGRADE, 90% R.D.

**B** Masonry Wall Detail  
NOT TO SCALE

RECORD INFORMATION  
AS NOTED

NO.	DATE	REVISION	BY



**Anderson**  
ENGINEERING INC

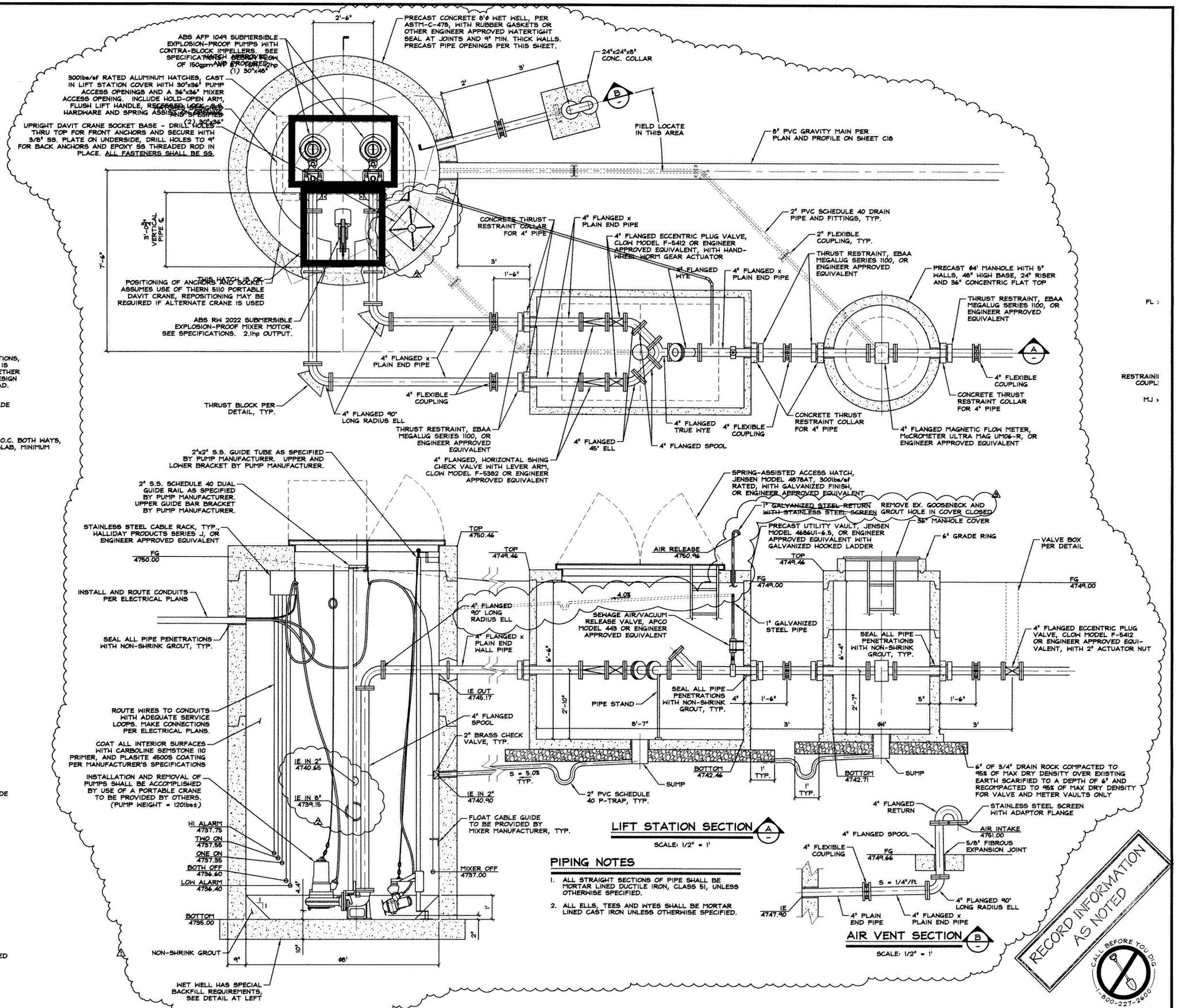
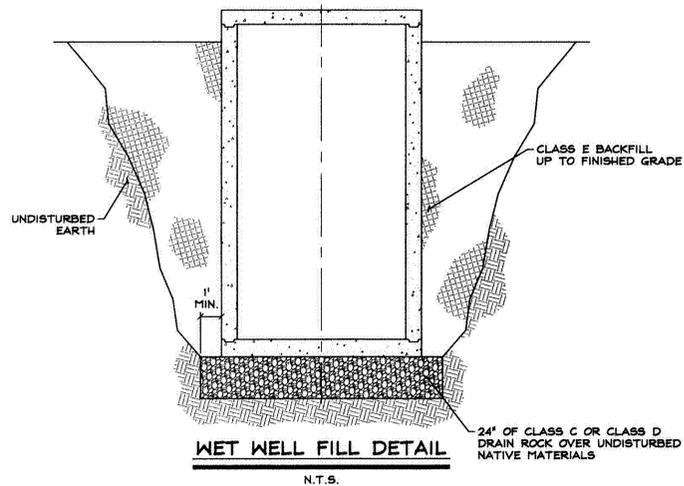
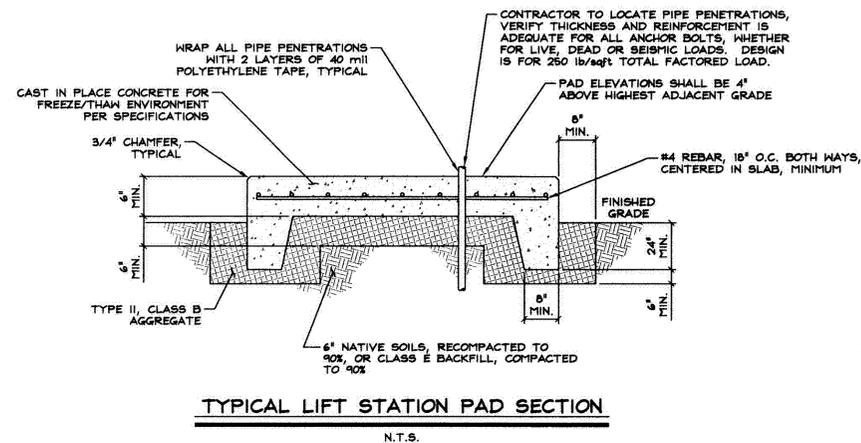
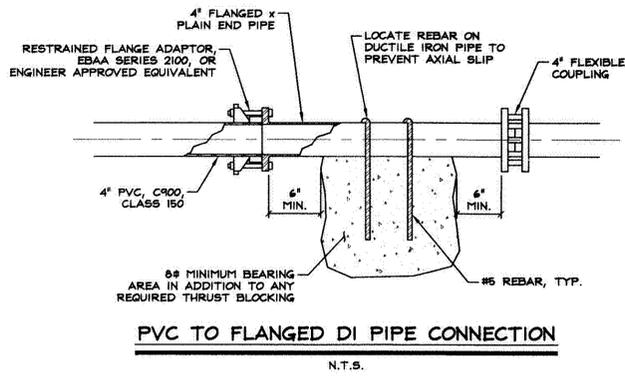
1603 EMERALDA AVENUE / POST OFFICE BOX 2229  
FINDEN, NEVADA 89429  
PHONE: (775) 782-2822 / FAX: (775) 782-7084  
WEB SITE: WWW.ANDERSON.COM

**ROCKY TERRACE**  
ROCKY TERRACE ESTATES, LLC

**DETAILS**  
WALL DETAILS

FOR REFERENCE WALL UNDER SEPERATE PERMIT	DRAWN: DJJ ENGINEER: KRN SCALE: AS NOTED DATE: 03/18/05	JOB: 0412-10 DRAWING: 41210C34 SHEET: <b>C34</b> OF: C36 SHEETS
---	--	--





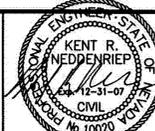
NO.	DATE	REVISION BLOCK	BY
1	04/18/05	REVISED WET WELL AND ADDED DAVIT CRANE ANCHORS PER GRID COMMENTS	GWS
2	09/02/05	SHIFTED DAVIT CRANE TO OPPOSITE SIDE, ADDED IE IN ELEVATIONS	GWS
3	05/23/06	RECORD INFORMATION	JMR

RECORD INFORMATION	
NO.	DATE

**R/O Anderson**  
1603 EBHERALDA AVENUE / POST OFFICE BOX 2229  
HENDER, NEVADA 89429  
PHONE: (775) 782-2322 / FAX: (775) 782-7084  
WEB SITE: WWW.ROANDERSON.COM

**ROCKY TERRACE ESTATES**  
ROCKY TERRACE ESTATES, LLC

**DETAILS**  
SANITARY SEWER  
LIFT STATION



DRAWN: GWS  
ENGINEER: KRN  
SCALE: AS NOTED  
DATE: 09/02/05

JOB: 0412-010-04  
DRAWING: 4120C36  
SHEET: C36  
OF: C36 SHEETS



GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT

# SPRINGFIELD LIFT STATION REHABILITATION

APN: 1220-17-610-004



308 N. CURRY ST., STE. 200  
CARSON CITY, NV 89703  
TEL: 775.883.7077  
WWW.LUMOSINC.COM  
INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.



9/22/2023

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
 SPRINGFIELD LIFT STATION REHABILITATION  
 TITLE SHEET  
 DOUGLAS COUNTY  
 NEVADA  
 GARDNERVILLE RANCHOS

REV.	DATE	DESCRIPTION

**CONFORMED SET**  
SEPTEMBER 2023

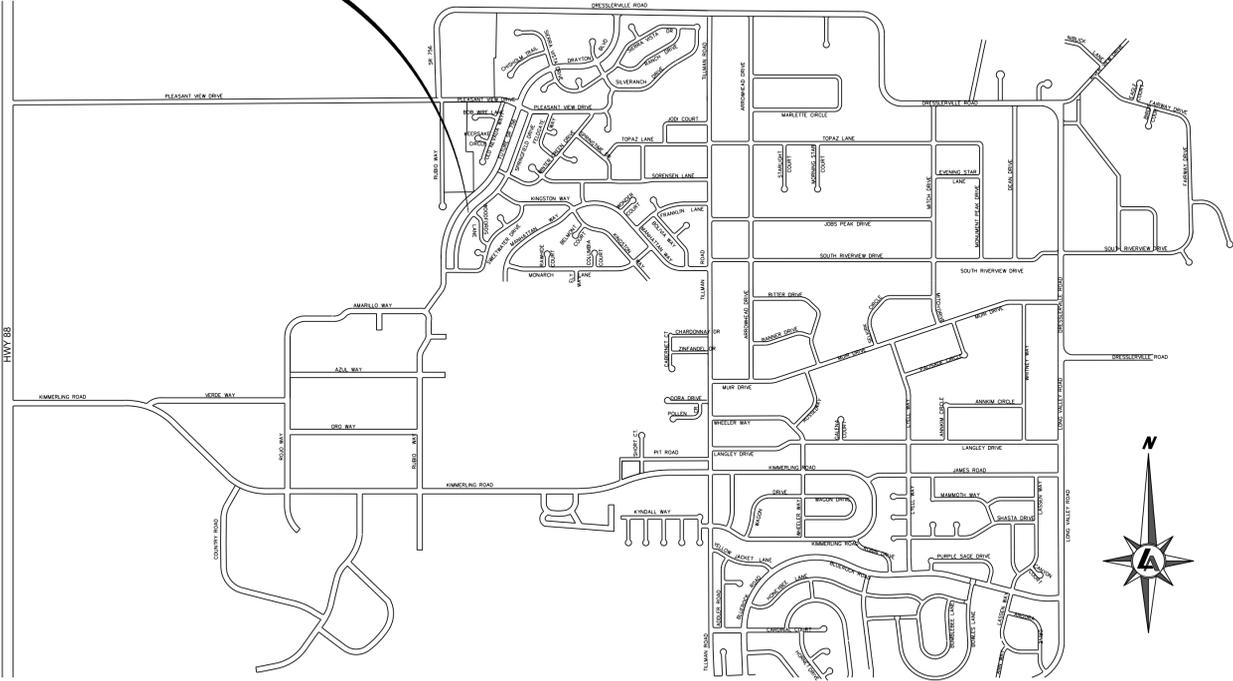
BAR IS 1 INCH ON ORIGINAL DRAWING  
0 N/A

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**C1.0**

DRAWN BY: LCH/FHP  
DESIGNED BY: MCQ  
CHECKED BY: JEL  
JOB NO.: 10303.006

PROJECT SITE



**LOCATION MAP**



**OWNER**  
**GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT**  
**ATTN: GREG REED, DISTRICT MANAGER**  
**931 MITCH DRIVE**  
**GARDNERVILLE, NEVADA 89460**

**SITE ADDRESS**  
**928 SPRINGFIELD DRIVE**  
**GARDNERVILLE, NEVADA 89460**

**BASIS OF BEARING**

THE BASIS OF BEARINGS FOR THIS SURVEY IS NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE NAD83(94) BASED UPON REAL TIME KINEMATIC GPS OBSERVATIONS, OBSERVED NOVEMBER 5, 2021 USING A SURVEY GRADE DUAL FREQUENCY GPS RECEIVER FROM CONTROL POINT 602 MODIFIED BY A COMBINED FACTOR OF 1.0002, SCALED FROM 0.00N .000E AND CONVERTED TO U.S. SURVEY FEET. ALL DIMENSIONS ON THIS MAP ARE GROUND DISTANCES.

**BASIS OF ELEVATION**

DATUM: NAVD 88  
 PROJECT BENCHMARK = 577  
 HAVING AN ELEVATION OF 4792.66'

**APPROVED BY:**

\_\_\_\_\_  
 GARDNERVILLE RANCHOS GID DATE

\_\_\_\_\_  
 LUMOS & ASSOCIATES, INC. DATE

**SHEET INDEX:**

TITLE SHEET	C1.0
PROJECT NOTES AND INDEX SHEET	C1.1
HORIZONTAL CONTROL PLAN	C1.2
SITE PLAN	C2.0
EXISTING LIFT STATION	C3.0
PROPOSED LIFT STATION	C3.1
ELECTRICAL ABBREVIATIONS & NOTES	E1.0
ELECTRICAL SYMBOLS	E1.1
GENERAL ELECTRICAL REQUIREMENTS	E1.2
SINGLE LINE DIAGRAM	E2.0
ELECTRICAL SITE PLAN	E3.0
ELECTRICAL DETAILS	E4.0



**ENGINEER**  
**308 N. CURRY ST., STE. 200**  
**CARSON CITY, NEVADA 89703**  
**TEL: 775.883.7077**  
**INFO@LUMOSINC.COM**

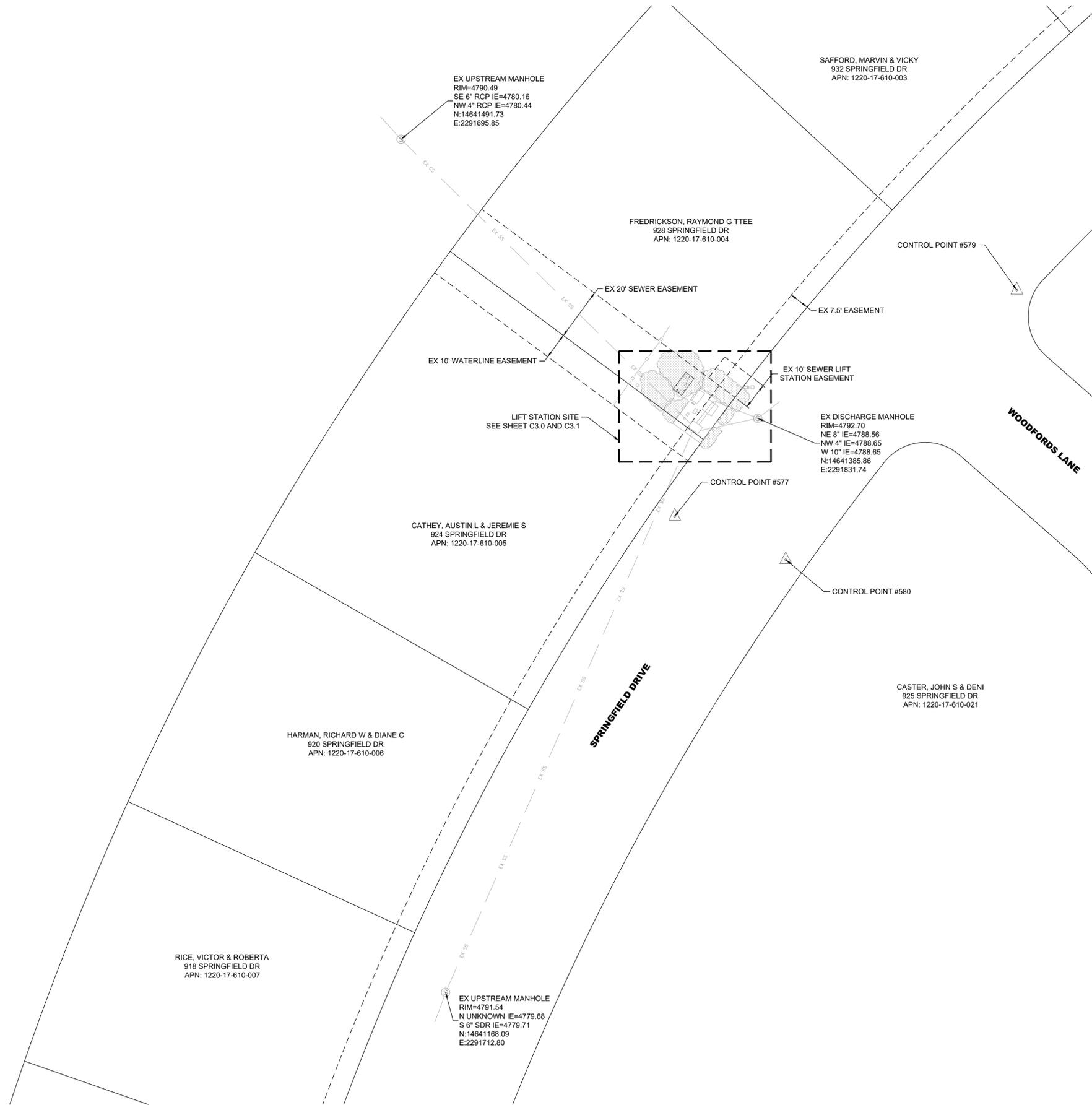


Know what's below.  
 Call before you dig.

L:\MapProj\10303.006 - Grids\Kimmerling Lift Station\Upgrades\DWG\Civil\3D\10303.006 BASE.dwg,C1.0 TITLE SHEET, 07/27/2023 04:47 pm swaite



L:\APro\10303.006 - GRID\Kmmmering Lift Station Upgrades\DWG\Civil\10303.006 BASE.dwg\HORIZONTAL CONTROL PLAN, 07/21/2023 04:47 pm swbte



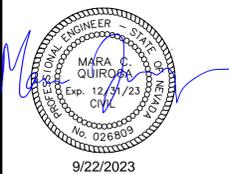
POINT	NORTH	EAST	ELEVATION	DESCRIPTION
577	14641348.71	2291800.12	4792.66	SCRIBED X
578	14641094.32	2291717.85	4791.30	SCRIBED X
579	14641434.53	2291930.46	4793.38	SCRIBED X
580	14641332.24	2291842.46	4792.76	SCRIBED X
602	14632202.43	2295387.41	4858.45	LUMOS CONTROL CAP

**PROJECT CONTROL**



308 N. CURRY ST., STE. 200  
CARSON CITY, NV 89703  
TEL: 775.883.7077  
WWW.LUMOSINC.COM  
INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.



9/22/2023

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
**SPRINGFIELD LIFT STATION REHABILITATION HORIZONTAL CONTROL PLAN**  
GARDNERVILLE RANCHOS DOUGLAS COUNTY NEVADA

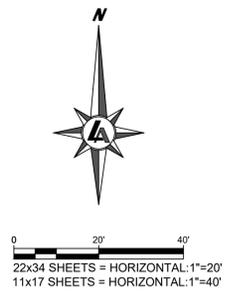
REV	DATE	DESCRIPTION

BY: \_\_\_\_\_

**CONFORMED SET**  
SEPTEMBER 2023

BAR IS 1 INCH ON ORIGINAL DRAWING  
0 N/A  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**C1.2**  
DRAWN BY: LCH/FHP  
DESIGNED BY: MCQ  
CHECKED BY: JEL  
JOB NO.: 10303.006





9/22/2023

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT

**SPRINGFIELD LIFT STATION  
REHABILITATION  
SITE PLAN**

NEVADA  
DOUGLAS COUNTY  
GARDNERVILLE RANCHOS

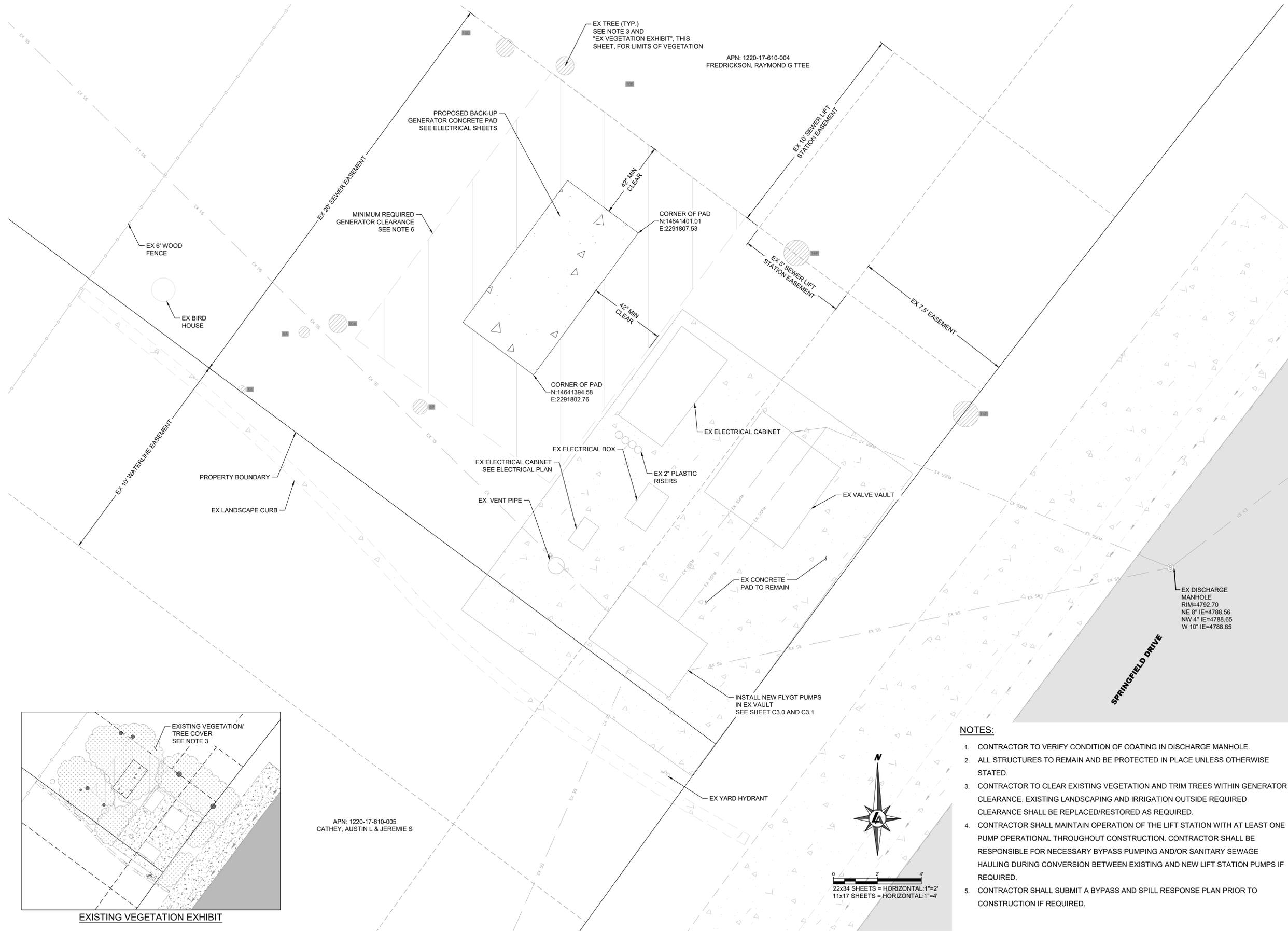
REV.	DATE	DESCRIPTION

**CONFIRMED SET**  
SEPTEMBER 2023

BAR IS 1 INCH ON ORIGINAL DRAWING  
0 2'  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**C2.0**

DRAWN BY: LCH/FHP  
DESIGNED BY: MCQ  
CHECKED BY: JEL  
JOB NO.: 10303.006



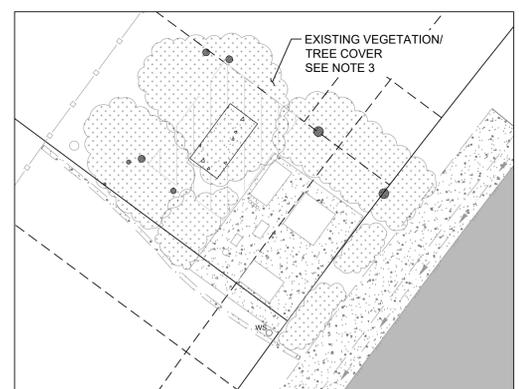
**NOTES:**

- CONTRACTOR TO VERIFY CONDITION OF COATING IN DISCHARGE MANHOLE.
- ALL STRUCTURES TO REMAIN AND BE PROTECTED IN PLACE UNLESS OTHERWISE STATED.
- CONTRACTOR TO CLEAR EXISTING VEGETATION AND TRIM TREES WITHIN GENERATOR CLEARANCE. EXISTING LANDSCAPING AND IRRIGATION OUTSIDE REQUIRED CLEARANCE SHALL BE REPLACED/RESTORED AS REQUIRED.
- CONTRACTOR SHALL MAINTAIN OPERATION OF THE LIFT STATION WITH AT LEAST ONE PUMP OPERATIONAL THROUGHOUT CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR NECESSARY BYPASS PUMPING AND/OR SANITARY SEWAGE HAULING DURING CONVERSION BETWEEN EXISTING AND NEW LIFT STATION PUMPS IF REQUIRED.
- CONTRACTOR SHALL SUBMIT A BYPASS AND SPILL RESPONSE PLAN PRIOR TO CONSTRUCTION IF REQUIRED.



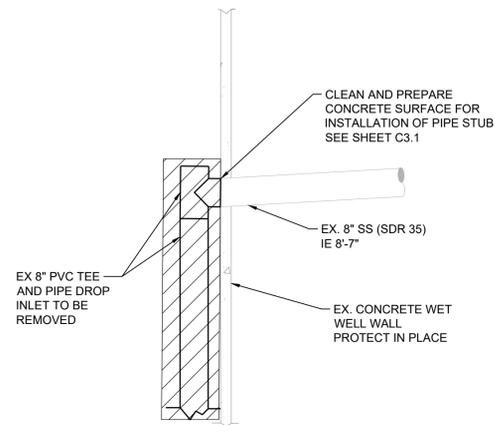
22x34 SHEETS = HORIZONTAL: 1"=2'  
11x17 SHEETS = HORIZONTAL: 1"=4'

L:\MapInfo\10303\_006 - GRID\Kimmerling Lift Station Upgrades\DWG\Civil\10303006 BASE.dwg\SITE PLAN, 07/21/2023 04:47 pm swaite

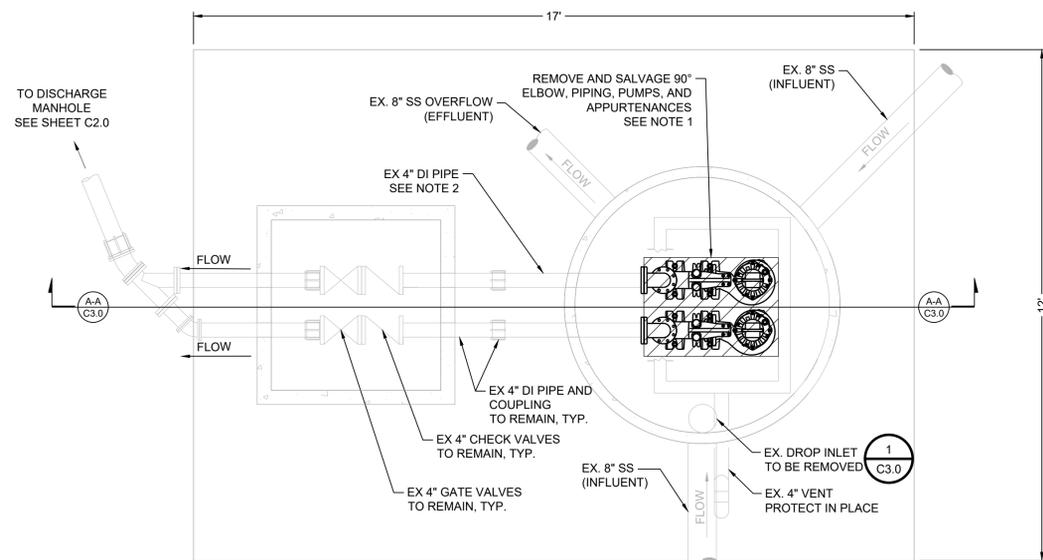


**NOTES:**

- CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE OWNER TO DETERMINE WHICH ITEMS ARE TO BE SALVAGED. CONTRACTOR IS RESPONSIBLE FOR HAULING AND DISPOSAL OF ALL DEMO MATERIALS AS SPECIFIED BY THE OWNER.
- CONTRACTOR TO WORK WITH ENGINEER TO EVALUATE CONDITION OF EXISTING FLANGE WITHIN WET WELL AND DUCTILE IRON PIPE. IF PIPE IS FOUND TO BE IN POOR CONDITION, DI PIPE SHALL BE REPLACED FROM FLANGE TO BURIED COUPLING.

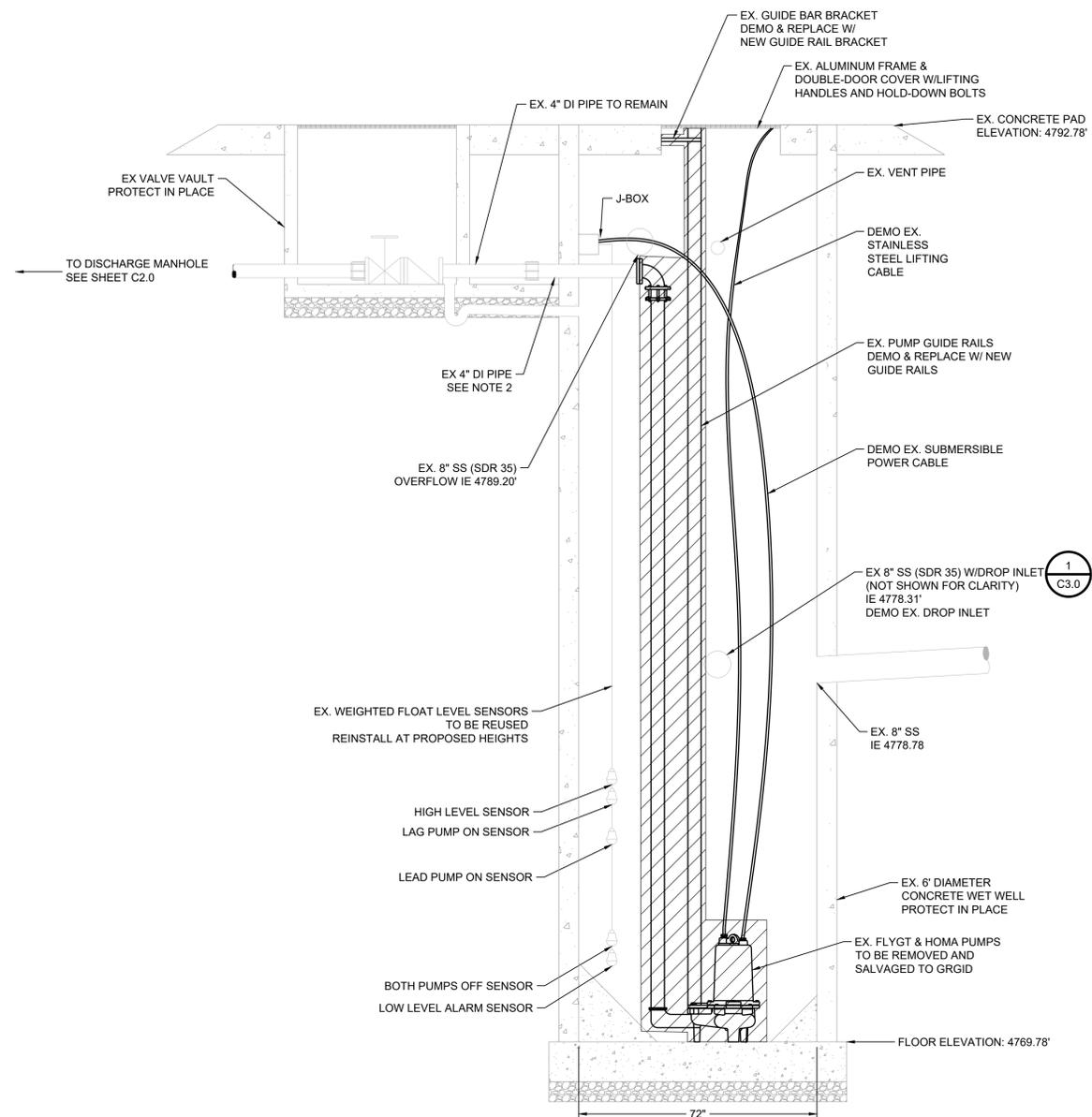
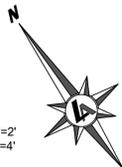


**1 DROP INLET**  
SCALE: NTS



**PLAN VIEW**

22x34 SHEETS = HORIZONTAL: 1"=2'  
11x17 SHEETS = HORIZONTAL: 1"=4'



**A-A SECTION VIEW**

22x34 SHEETS = HORIZONTAL: 1"=2'  
11x17 SHEETS = HORIZONTAL: 1"=4'



308 N. CURRY ST., STE. 200  
CARSON CITY, NV 89703  
TEL: 775.883.7077  
WWW.LUMOSINC.COM  
INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.



9/22/2023

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT

**SPRINGFIELD LIFT STATION  
REHABILITATION  
EXISTING LIFT STATION**

NEVADA  
DOUGLAS COUNTY  
GARDNERVILLE RANCHOS

REV	DATE	DESCRIPTION

**CONFORMED SET**  
SEPTEMBER 2023

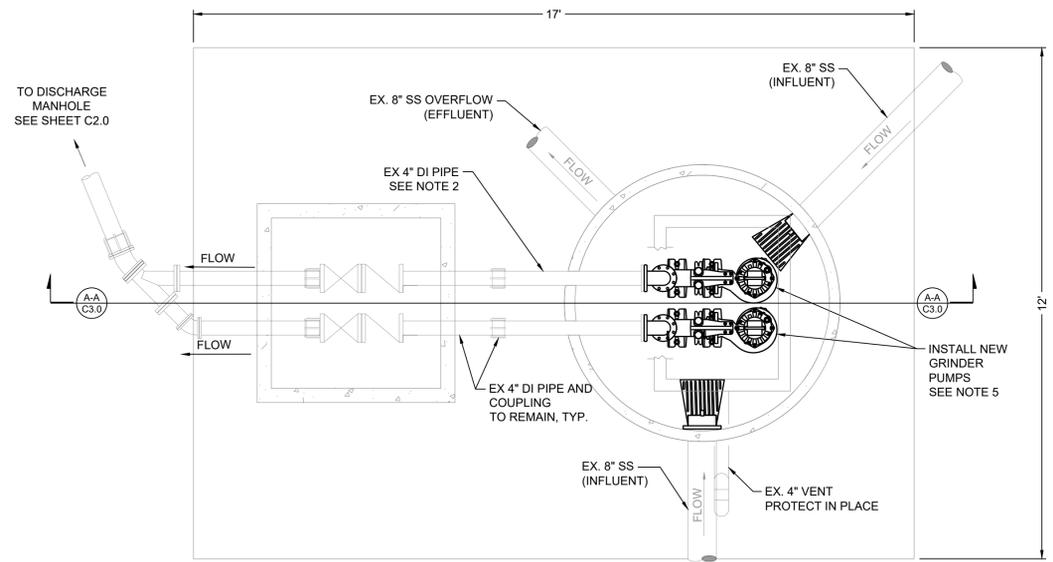
BAR IS 1 INCH ON ORIGINAL DRAWING  
0 N/A  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**C3.0**

DRAWN BY: LCH/FHP  
DESIGNED BY: MCQ  
CHECKED BY: JEL  
JOB NO.: 10303.006

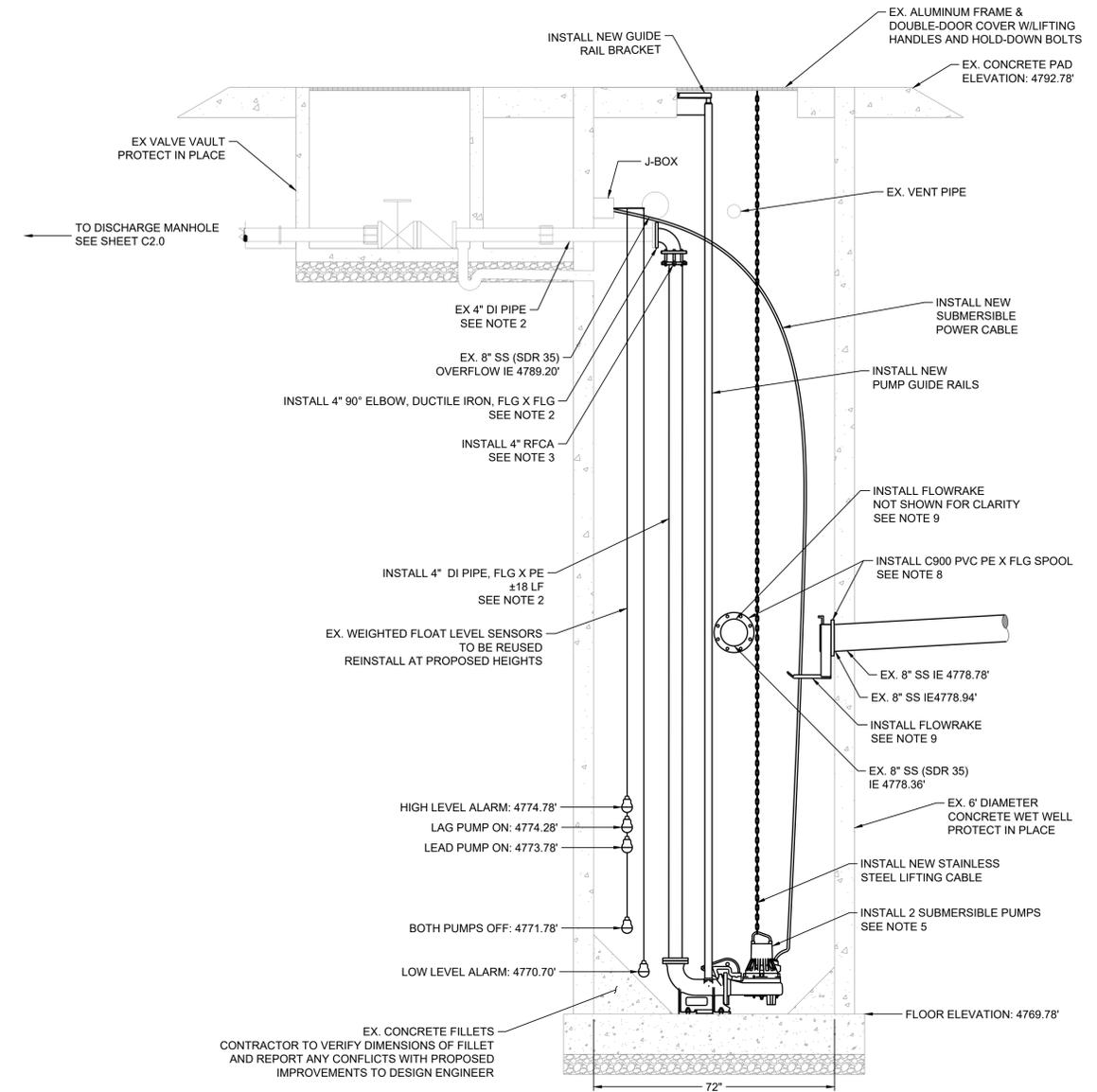
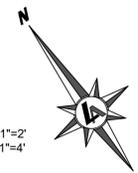
**NOTES**

1. EXISTING SANITARY SEWER LIFT STATION INFORMATION PER LIFT STATION FOR KIMMERLING SANITARY SEWER AS-BUILTS. DATED NOVEMBER 1996.
2. SANITARY SEWER DISCHARGE PIPING SHALL BE DUCTILE IRON PIPE CONFORMING TO AWWA C150/C151. PIPE FITTINGS SHALL BE DUCTILE IRON CONFORMING TO AWWA C110 OR AWWA C153 WITH SBR GASKETS IN ACCORDANCE WITH AWWA C111. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED WITH CERAMIC-EPOXY INTERNAL LINING. PIPE AND FITTINGS ABOVE GRADE OR WITHIN STRUCTURES SHALL BE EPOXY COATED. REFERENCE TECHNICAL SPECIFICATIONS FOR COATING, LINING, AND ENCASEMENT REQUIREMENTS.
3. RESTRAINED FLANGED COUPLING ADAPTERS SHALL BE FUSION EPOXY COATED, EBAA 2100 MEGAFLANGE, OR APPROVED EQUAL.
4. ALL JOINTS AND FITTINGS ON THE SANITARY SEWER DISCHARGE PIPING SHALL BE RESTRAINED.
5. SUBMERSIBLE GRINDER PUMPS (1 DUTY + 1 STANDBY) SHALL BE FLYGT FP-3085 WITH 4" FLANGED DISCHARGE, OR APPROVED EQUAL. MOTOR SHALL BE CONSTANT SPEED, 2.4 HP, 220 VOLTS/1 PHASE/60 HZ. PUMPS SHALL BE CAPABLE OF DELIVERING 220 GPM AT 19 FT TDH.
6. ELECTRICAL AND CONTROLS CONDUIT AND WIRING TO PUMPS AND INSTRUMENTATION SHALL BE PER ELECTRICAL AND CONTROLS PLAN SHEETS.
7. EPOXY COAT ALL PIPE AND FITTINGS WITHIN THE WET WELL.
8. INSTALL C900 PVC PE X FLG SPOOL FOR MOUNTING OF FLOWRAKE. DRILL AND EPOXY BOLT ANCHORS WITH 2" EMBEDMENT INTO EX. CONCRETE WET WELL. CLEAN AND PREP SURFACE PRIOR TO INSTALLATION. PVC SPOOL MUST MEET THESE REQUIREMENTS:
  - 8.1. STORMWATER AND WASTEWATER COMPATIBLE
  - 8.2. CUT IN FIELD TO ALLOW FOR MIN 3" OF EXPOSED PIPE OR ADDITIONAL COUPLING FOR FLOWRAKE MOUNTING
9. FLOWRAKE SHALL BE GOULDS 8" FLOWRAKE #77834 OR APPROVED EQUAL. INSTALL BY DRILLING A  $\frac{3}{8}$ " HOLE INTO THE TOPSIDE OF EXTRUDING PVC COMPANION FLANGE (APPROXIMATELY 1-1/2" FROM THE END OF PIPE STUB). WHEN THE LOCKING PEG SEATS INTO THE  $\frac{3}{8}$ " HOLE, THE FLOWRAKE IS SECURED TO THE PIPE.



**PLAN VIEW**

22x34 SHEETS = HORIZONTAL: 1"=2'  
11x17 SHEETS = HORIZONTAL: 1"=4'



**SECTION VIEW**

22x34 SHEETS = HORIZONTAL: 1"=2'  
11x17 SHEETS = HORIZONTAL: 1"=4'



308 N. CURRY ST., STE. 200  
CARSON CITY, NV 89703  
TEL: 775.883.7077  
WWW.LUMOSINC.COM  
INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.



9/22/2023

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
**SPRINGFIELD LIFT STATION  
 REHABILITATION  
 PROPOSED LIFT STATION**  
 GARDNERVILLE RANCHOS DOUGLAS COUNTY NEVADA

REV	DATE	DESCRIPTION

**CONFIRMED SET**  
SEPTEMBER 2023

BAR IS 1 INCH ON ORIGINAL DRAWING  
0 N/A  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**C3.1**

DRAWN BY: LCH/FHP  
DESIGNED BY: MCQ  
CHECKED BY: JEL  
JOB NO.: 10303.006



ELECTRICAL ABBREVIATIONS		GENERAL ELECTRICAL NOTES		GENERAL ELECTRICAL NOTES (CONT.)	
A	AMPERE, AUTOMATIC	M	MOTOR CONTACTOR COIL	1.	ALL RACEWAYS AND EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE 2020 EDITION OF THE NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.
AC	ALTERNATING CURRENT	mA	MILLIAMPERE	2.	ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING THE PROJECT TO VERIFY THE SCOPE OF WORK WITH FIELD CONDITIONS. PARTICULAR ATTENTION SHOULD BE GIVEN TO NEW CONDUIT RUNS IN EXISTING BUILDINGS.
AF	CIRCUIT BREAKER FRAME SIZE	MCC	MOTOR CONTROL CENTER	23.	EQUIPMENT LOCKOUTS SHALL BE IN STRICT ACCORDANCE WITH OWNER'S REQUIREMENTS.
AHF	ACTIVE HARMONIC FILTER	MCP	MOTOR CIRCUIT PROTECTOR	24.	FOR LIGHTING AND RECEPTACLE SYSTEMS, ONLY CIRCUIT NUMBERS ARE SHOWN. CONTRACTOR SHALL PROVIDE ALL NECESSARY CONDUITS, WIRES, FITTINGS, JUNCTION BOXES AND ALL NECESSARY COMPONENTS SHOWN OR NOT SHOWN ON THE DRAWINGS. TO MAKE THE ELECTRICAL INSTALLATION COMPLETE AND OPERATIONAL. ALL CONDUIT RUNS SHALL BE CONCEALED UNLESS INDICATED OTHERWISE. CIRCUIT LOADING SHALL BE AS INDICATED IN THE PANEL SCHEDULES. ALL LIGHTING AND RECEPTACLE CIRCUITS SHALL INCLUDE GROUND WIRE.
AM	AMMETER	MLO	MAIN LUGS ONLY	25.	CONTRACTOR SHALL BE ADVISED THAT EVERY ATTEMPT HAS BEEN MADE TO INCLUDE ALL CONDUITS IN THE DUCTBANK SCHEDULES AND CONDUIT DEVELOPMENT DRAWINGS FOR SPECIFIC FACILITIES, HOWEVER THE CONTRACTOR IS RESPONSIBLE FOR ANY CONDUIT/WIRE THAT IS NOT SHOWN.
ANN	ANNUNCIATOR	MOV	MOTOR OPERATED VALVE	26.	ALL UNDERGROUND FACILITIES SHALL BE PROTECTED FROM DAMAGE. IF ANY UNDERGROUND FACILITIES ARE DAMAGED, IT SHALL BE REPORTED TO THE ENGINEER AND CONTRACTOR SHALL REPLACE OR REPAIR FACILITIES AT NO COST TO THE OWNER.
ASD	ADJUSTABLE SPEED DRIVE	MS	MANUAL MOTOR STARTER		
AT	AMPERE TRIP	MTS	MANUAL TRANSFER SWITCH		
ATS	AUTOMATIC TRANSFER SWITCH	NEUT	NEUTRAL		
AUTO	AUTOMATIC	NP	NAMEPLATE		
AWG	AMERICAN WIRE GAUGE	O	OPEN, OFF		
BATT	BATTERY	OL	OVERLOAD		
BC	BARE COPPER				
BKR	BREAKER				
C	CONDUIT, CLOSED	PA	PUBLIC ADDRESS		
CB	CIRCUIT BREAKER	PB	PUSHBUTTON, PULLBOX		
CKT	CIRCUIT	PC	PHOTOCELL		
CLF	CURRENT LIMITING FUSE	PCM	PROCESS CONTROL MODULE		
CLG	CEILING	PF	POWER FACTOR		
COM	COMMON	PFM	POWER FACTOR METER		
COMM	COMMUNICATIONS	PH	PHASE		
COMP	COMPARTMENT	PL	PILOT LIGHT		
CP	CONTROL PANEL	PLC	PANELBOARD		
CPT	CONTROL POWER TRANSFORMER	PNLBD	PROGRAMMABLE LOGIC CONTROLLER		
CR	CONTROL RELAY, CARD READER	PP	POWER PANELBOARD		
CT	CURRENT TRANSFORMER	POS	POSITION		
		POT	POTENTIOMETER		
DCS	DISTRIBUTED CONTROL SYSTEM	PRI	PRIMARY		
DISC	DISCONNECT	PT	POTENTIAL TRANSFORMER		
DISTR	DISTRIBUTION	PTZ	PAN-TILT-ZOOM		
DP	DISTRIBUTION PANEL	PWR	POWER		
DPDT	DOUBLE POLE DOUBLE THROW	R	REMOTE		
DPST	DOUBLE POLE SINGLE THROW	RECPT	RECEPTACLE		
		RGS	RIGID GALVANIZED STEEL		
E	EMERGENCY	RMS	ROOT MEAN SQUARE		
EMT	ELECTRICAL METALLIC TUBING	RTU	REMOTE TERMINAL UNIT		
ENCL	ENCLOSURE	RVSS	REDUCED VOLTAGE SOLID STATE		
ETM	ELAPSED TIME METER				
EUPS	ENGINE UTILITY PARALLELING SYSTEM	SEL SW	SELECTOR SWITCH		
		SEQ	SEQUENCE		
F	FREQUENCY, FUSE, FIXED	SHLD	SHIELDED		
FDR	FEEDER	SIG	SIGNAL		
FLA	FULL LOAD AMPS	SP	SPARE		
FLUOR	FLUORESCENT	SP HTR	SPACE HEATER		
FM	FREQUENCY METER	SPD	SURGE PROTECTIVE DEVICE		
FO	FIBER OPTIC	SPDT	SINGLE POLE DOUBLE THROW		
FPR	FEEDER PROTECTION RELAY	SPST	SINGLE POLE SINGLE THROW		
FVR	FULL VOLTAGE REVERSING	SSM	SOLID STATE METER		
FVNR	FULL VOLTAGE NON-REVERSING	SSMP	SOLID STATE MOTOR PROTECTOR		
		ST, SH	SHUNT TRIP		
GEN	GENERATOR	STB	STANDBY		
GFCI	GROUND FAULT CIRCUIT	STR	STARTER		
GFP	INTERRUPTER	SSTU	SOLID STATE TRIP UNIT		
GND	GROUND FAULT PROTECTION GROUND	SW	SWITCH		
		SWBD	SWITCHBOARD		
		SWGR	SWITCHGEAR		
H	HAND	TB	TERMINAL BOX		
HH	HAND HOLE	TERM	TERMINAL		
HID	HIGH INTENSITY DISCHARGE	TM	REPEAT CYCLE TIMER		
HOA	HAND-OFF-AUTOMATIC	TD	TIME DELAY RELAY		
HPS	HIGH PRESSURE SODIUM	TS	TEMPERATURE SWITCH		
HRN	HORN				
HS	HAND SWITCH	UPR	UTILITY PROTECTION RELAY		
HZ	HERTZ	UPS	UNINTERRUPTIBLE POWER SUPPLY		
		V	VOLTAGE, VOLTS		
IMC	INTERMEDIATE METALLIC CONDUIT	VA	VOLT AMPERE		
INCAND	INCANDESCENT	VAR	VOLT AMPERE REACTIVE		
IND	INDICATION	VM	VOLTMETER		
INST	INSTANTANEOUS	VP	VAPOR PROOF		
I/O	INPUT/OUTPUT	W	WATTS, WIRE		
Isc	SHORT CIRCUIT CURRENT, AMPS	WM	WATT METER		
ISO	ISOLATION	WP	WEATHERPROOF		
J,JB	JUNCTION BOX	XFMR	TRANSFORMER		
KA	KILO AMPERES	XMTR	TRANSMITTER		
KAIC	KILO AMP INTERRUPTING CURRENT	XP	EXPLOSION PROOF		
KCML	KILO CIRCULAR MILS				
KV	KILOVOLT				
KVA	KILOVOLT AMPERE				
KW	KILOWATT				
LB	L-BOX CONDULETE				
LCP	LOCAL CONTROL PANEL				
LCS	LOCAL CONTROL STATION				
LOC	LOCAL				
LOR	LOCAL-OFF-REMOTE				
LOS	LOCKOUT STOP PUSHBUTTON				
LP	LIGHTING PANEL				
LRA	LOCKED ROTOR AMPS				
LS	LEVEL SWITCH				
LTCP	LIGHTING CONTROL PANEL				
LTG	LIGHTING				
LTS	LIGHTS				

### GENERAL ELECTRICAL NOTES

- ALL RACEWAYS AND EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE 2020 EDITION OF THE NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.
- THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF TERMINAL BOXES AND CONDUIT ENTRANCES OF ALL EQUIPMENT AGAINST APPROVED SHOP DRAWINGS BEFORE STUBBING UP CONDUITS.
- REFERENCE E1.2 FOR GENERAL ELECTRICAL REQUIREMENTS.
- CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT OR STRUCTURAL CONDITIONS. EXPOSED CONDUIT SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO BEAMS AND WALLS. REFER TO SPECIFICATION DIVISION 26.
- CONDUIT STUB-UPS SHALL NOT BE MORE THAN 6 INCHES FROM THE CENTERLINE OF TERMINAL BOXES.
- IN THE EVENT OF INTERFERENCE BETWEEN ELECTRICAL EQUIPMENT SHOWN ON THE DRAWINGS AND OTHER EQUIPMENT, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING.
- ALL SURFACE MOUNTED PANELS AND PANELBOARDS ON THE INTERIOR OR EXTERIOR WALLS ABOVE GRADE OR IN OTHER LOCATIONS CONSIDERED DAMP OR WET SHALL BE MOUNTED SO AS TO MAINTAIN A 1/4 INCH (MINIMUM) AIR SPACE BETWEEN THE ENCLOSURE AND THE WALL.
- LOCATION OF PULLBOXES ARE APPROXIMATE. THE CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH MECHANICAL PIPING AND SHALL BE 6 INCHES (MINIMUM) AWAY FROM MECHANICAL PIPING FLOW LINES.
- ONLY MAJOR PULLBOXES ARE SHOWN. THE CONTRACTOR SHALL PROVIDE ADDITIONAL PULLBOXES WHERE REQUIRED TO MAKE A WORKABLE INSTALLATION.
- THE WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE DETAILS WHETHER OR NOT THEY ARE REFERENCED ON THE DRAWINGS.
- ALL CONDUIT RUNS CROSSING EXPANSION JOINTS SHALL HAVE EXPANSION OR EXPANSION AND DEFLECTION TYPE FITTINGS. FOR LOCATIONS OF EXPANSION JOINTS, REFER TO THE STRUCTURAL DWGS.
- LUMINAIRES SHALL BE MOUNTED ACCORDING TO THE MOUNTING HEIGHT GIVEN ON THE DRAWINGS, WITH THE DISTANCE BEING MEASURED FROM THE BOTTOM OF THE LUMINAIRE TO THE FINISHED FLOOR. THE APPROPRIATE MOUNTING BRACKETS AND HARDWARE SHALL BE SUPPLIED.
- ALL PANELBOARDS SHALL BE MOUNTED SO THAT THE DISTANCE FROM THE CENTERLINE OF THE TOP CIRCUIT BREAKER OPERATING HANDLE IN THE UPPERMOST POSITION TO THE FINISHED FLOOR SHALL NOT EXCEED 6'-7".
- THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.
- CONNECTIONS BETWEEN RIGID CONDUIT AND MOTOR TERMINAL BOXES OR SIMILAR EQUIPMENT SUBJECT TO VIBRATION SHALL BE FLEXIBLE LIQUID-TIGHT CONDUIT.
- CONDUITS SHALL BE TERMINATED SO AS TO PERMIT NEAT CONNECTION TO MOTORS AND OTHER EQUIPMENT.
- CONDUITS FOR FUTURE EQUIPMENT OR EXTENSIONS SHALL BE TERMINATED AS SHOWN IN DETAIL OR AS SPECIFIED.
- MCC AND SWITCHGEAR COMPARTMENT DESIGNATIONS SHALL BE AS FOLLOWS:  
BLANK/SPACE: CONTAINS NECESSARY BUS AND HARDWARE FOR FUTURE ADDITION OF BREAKERS OR STARTERS.  
SPARE: CONTAINS A COMPLETE INSTALLED BREAKER OR STARTER AVAILABLE FOR FUTURE USE.
- ALL MOTOR STARTER CONTROL POWER TRANSFORMERS SHALL BE SIZED TO PROVIDE SUFFICIENT VOLT-AMPERE CAPACITY FOR OPERATING ALL LOCAL AND REMOTE ELECTRICAL DEVICES ASSOCIATED WITH CONTROL OF THE MOTOR IN ADDITION TO THE STARTER COIL.
- MOTOR CONTROL CENTERS AND ALL FREE STANDING PANELS SHALL BE SET ON CONCRETE HOUSEKEEPING PADS WITH LEVELING CHANNELS EMBEDDED IN THE PAD.
- ALL RECEPTACLES IN OUTDOOR AND ANTICIPATED WET AREAS SHALL BE GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES WITH WEATHERPROOF COVERS.

### GENERAL ELECTRICAL NOTES (CONT.)

- ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING THE PROJECT TO VERIFY THE SCOPE OF WORK WITH FIELD CONDITIONS. PARTICULAR ATTENTION SHOULD BE GIVEN TO NEW CONDUIT RUNS IN EXISTING BUILDINGS.
- EQUIPMENT LOCKOUTS SHALL BE IN STRICT ACCORDANCE WITH OWNER'S REQUIREMENTS.
- FOR LIGHTING AND RECEPTACLE SYSTEMS, ONLY CIRCUIT NUMBERS ARE SHOWN. CONTRACTOR SHALL PROVIDE ALL NECESSARY CONDUITS, WIRES, FITTINGS, JUNCTION BOXES AND ALL NECESSARY COMPONENTS SHOWN OR NOT SHOWN ON THE DRAWINGS. TO MAKE THE ELECTRICAL INSTALLATION COMPLETE AND OPERATIONAL. ALL CONDUIT RUNS SHALL BE CONCEALED UNLESS INDICATED OTHERWISE. CIRCUIT LOADING SHALL BE AS INDICATED IN THE PANEL SCHEDULES. ALL LIGHTING AND RECEPTACLE CIRCUITS SHALL INCLUDE GROUND WIRE.
- CONTRACTOR SHALL BE ADVISED THAT EVERY ATTEMPT HAS BEEN MADE TO INCLUDE ALL CONDUITS IN THE DUCTBANK SCHEDULES AND CONDUIT DEVELOPMENT DRAWINGS FOR SPECIFIC FACILITIES, HOWEVER THE CONTRACTOR IS RESPONSIBLE FOR ANY CONDUIT/WIRE THAT IS NOT SHOWN.
- ALL UNDERGROUND FACILITIES SHALL BE PROTECTED FROM DAMAGE. IF ANY UNDERGROUND FACILITIES ARE DAMAGED, IT SHALL BE REPORTED TO THE ENGINEER AND CONTRACTOR SHALL REPLACE OR REPAIR FACILITIES AT NO COST TO THE OWNER.

### ELECTRICAL DEMOLITION NOTES

- BIDDING CONTRACTORS SHALL VISIT THE SITE TO ASSESS THE SCOPE OF DEMOLITION, REMOVAL AND MODIFICATION WORK.
- THE ELECTRICAL CONTRACTOR AND THE OWNER SHALL DE-ENERGIZE ALL WIRING PRIOR TO REMOVAL OF EQUIPMENT, DEVICES, MOTORS INSTRUMENTATION, CONTROL PANELS, ETC. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL FROM THE OWNER.
- EXPOSED RACEWAYS: REMOVE CONDUIT, WIRES, AND BOXES. PATCH TO MATCH EXISTING. FINISH-ALL OPENINGS IN WALLS AND FLOORS.
- CONCEALED CONDUITS IN THE SLAB: REMOVE EXISTING WIRES TO THE EXTENT POSSIBLE AND ABANDON CONDUITS IN THE SLAB. CUT CONDUIT FLUSH AND PATCH THE FLOOR TO MATCH EXISTING.
- CONTROL PANEL: ELECTRICAL CONTRACTOR SHALL DE-ENERGIZE AND REMOVE ALL CONDUIT AND WIRE AS DESCRIBED IN NOTE 2. CONTRACTOR SHALL REMOVE PANELS AS NOTED ON THE CONTRACT DRAWINGS. REFER TO NOTE 4 ABOVE FOR DISPOSITION OF ENCASED CONDUITS.

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
 SPRINGFIELD LIFT STATION  
 REHABILITATION  
 ELECTRICAL ABBREVIATIONS & NOTES  
 GARDNERVILLE RANCHOS  
 DOUGLAS COUNTY  
 NEVADA

REV	DATE	DESCRIPTION

BAR IS 1 INCH ON ORIGINAL DRAWING AS SHOWN  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**E1.0**

DRAWN BY: CONTROL POINT  
DESIGNED BY: CONTROL POINT  
CHECKED BY: CONTROL POINT  
JOB NO.: 10303.006  
1 OF 6



ControlPoint Engineering, Inc.  
3941 Park Drive, Unit 20  
El Dorado Hills, CA 95762  
T 916.817.1376  
F 916.760.1378 GIDx21-001

D:\Projects\Nevada\2023\01-001 - Gardnerville Ranchos (Springfield) Lift Station\AutoCAD\ACT\01021-001\_E1.dwg, E1.0, 07/24/2023, 12:41 pm, Joseph@cpet.com





NOTE: CONTRACTOR TO SELECT LOCATIONS OF CB.S FOR PANEL.

PANEL		1 PHASE, 3 WIRE		40A MAIN 2 POLE		AMPS		125A									
LOCATION		EQUIPMENT ENCLOSURE		MOUNT:		FLUSH		SURF.		TYPE		M.O.		AIC		10K	
CIRCUIT NUMBER	V.A. LOAD		LOAD DESCRIPTION	TERMINATION		CIRCUIT BREAKER		BUS		CIRCUIT BREAKER		TERMINATION		LOAD DESCRIPTION	V.A. LOAD		CIRCUIT NUMBER
	LINE A	LINE B		E	J	A	B	E	J	A	B	E	J		LINE A	LINE B	
1	180		ENCLOSURE OUTLET		X		1	20						GENERATOR HEATER			2
3			SPARE				1	20						GEN. BATTERY CHARGER			4
5	500		ENCLOSURE HTR.	X			1	20						SPARE			6
7			SPARE				1	20				X		TELEMETRY UNIT	500		8
9			SPARE				1	20				X		ENCLOSURE LIGHT	300		10
11							1	20				X		ENCLOSURE CF FAN	300		12
13																	14
15																	16

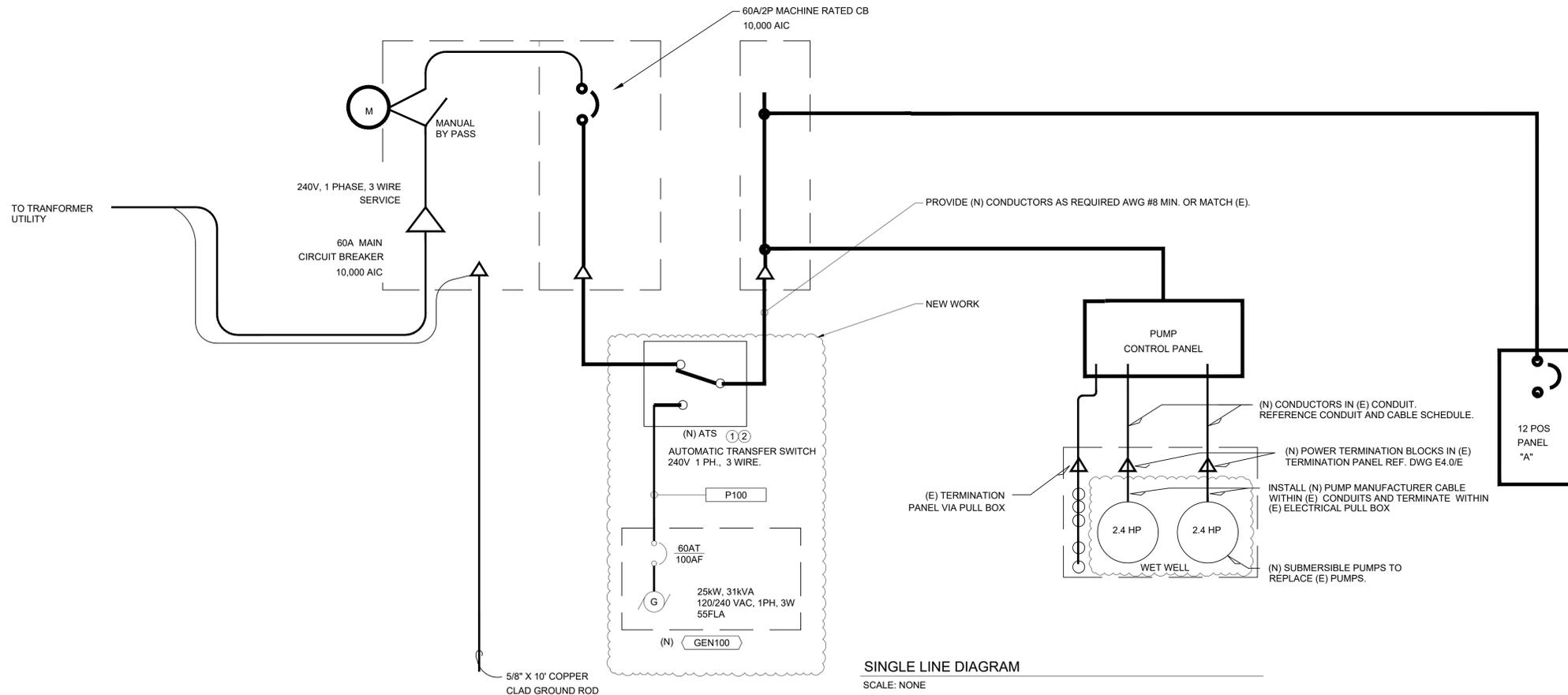
NOTES:  
 680 000VA  
 A 980 VA  
 B 800  
 TOTAL 1780 VA  
 (2) 2.7HP MOTORS @ 746W/HP (1.15) (1/.76) VAW = 6100 VA  
 6100VA/240V = 25A  
 LV 1780VA/240V = 7A  
 TOTAL 32A USE 100A SERVICE

100A SERVICE AT 240V 1 PHASE, 3 WIRE

(E) POWER PANEL "A" (PNL A) SCHEDULE  
 SCALE: NONE

LOAD CALCULATIONS	UTILITY SERVICE			GENERATOR SERVICE	
	LOAD AMPS	QTY	LOAD VA	QTY	LOAD VA
DESCRIPTION					
2.4 HP LIFT PUMPS 120V Loads	15	2	7,344	2	7,344
	24	1	5,830	1	5,830
SUBTOTAL			13,174		13,174
LARGEST MOTOR @ 25% ADDITIONAL: 2.4 HP => 0.25 x 3,672 VA =			918	GEN SIZE 25 KW 31 KVA	
TOTAL			14,092	AMPS= 55	
120/ 240 V, 1 PHASE, 3 WIRE SERVICE AMPS =	59 AMPS			KVA= 13	
SERVICE SIZE =	1.25 MULTIPLIER			%GEN LOAD= 42.2%	
	73 AMPS MINIMUM				

LOAD CALCULATIONS  
 SCALE: NONE



**GENERAL NOTES**

A. ALL EQUIPMENT IS EXISTING UNLESS SHOWN AS NEW (N).

**SHEET NOTES**

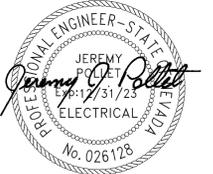
1. (N) ATS TO REPLACE (E) MTS.

2. CONTRACTOR TO PROVIDE AND CONNECT GENERATOR DURING ATS INSTALLATION.



308 N. CURRY ST., STE. 200  
 CARSON CITY, NV 89703  
 TEL: 775.883.7077  
 WWW.LUMOSINC.COM  
 INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.



GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT  
 SPRINGFIELD LIFT STATION  
 REHABILITATION  
 SINGLE LINE DIAGRAM  
 DOUGLAS COUNTY  
 NEVADA  
 GARDNERVILLE RANCHOS

REV	DATE	DESCRIPTION

**ISSUED FOR BID**  
 JULY 2023

BAR IS 1 INCH ON ORIGINAL DRAWING AS SHOWN  
 IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

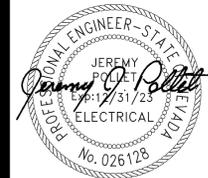
**E2.0**

DRAWN BY: CONTROL POINT  
 DESIGNED BY: CONTROL POINT  
 CHECKED BY: CONTROL POINT  
 JOB NO.: 10303.006  
 4 OF 6



ControlPoint Engineering, Inc.  
 3941 Park Drive, Unit 20  
 El Dorado Hills, CA 95762  
 T 916.817.1376  
 F 916.760.1378 GIDx2-1001

D:\Projects\Nevada\2023\01-001 - Gardnerville Ranchos (Springfield) Lift Station\AutoCAD\ACT\GIDx2-1001\_E2.0.dwg, E2.0, 07/24/2023, 12:55 pm, Joseph@cpet.com



GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT

**SPRINGFIELD LIFT STATION  
REHABILITATION  
ELECTRICAL SITE PLAN**

NEVADA  
DOUGLAS COUNTY  
GARDNERVILLE RANCHOS

REV	DATE	DESCRIPTION

**ISSUED FOR BID**  
JULY 2023

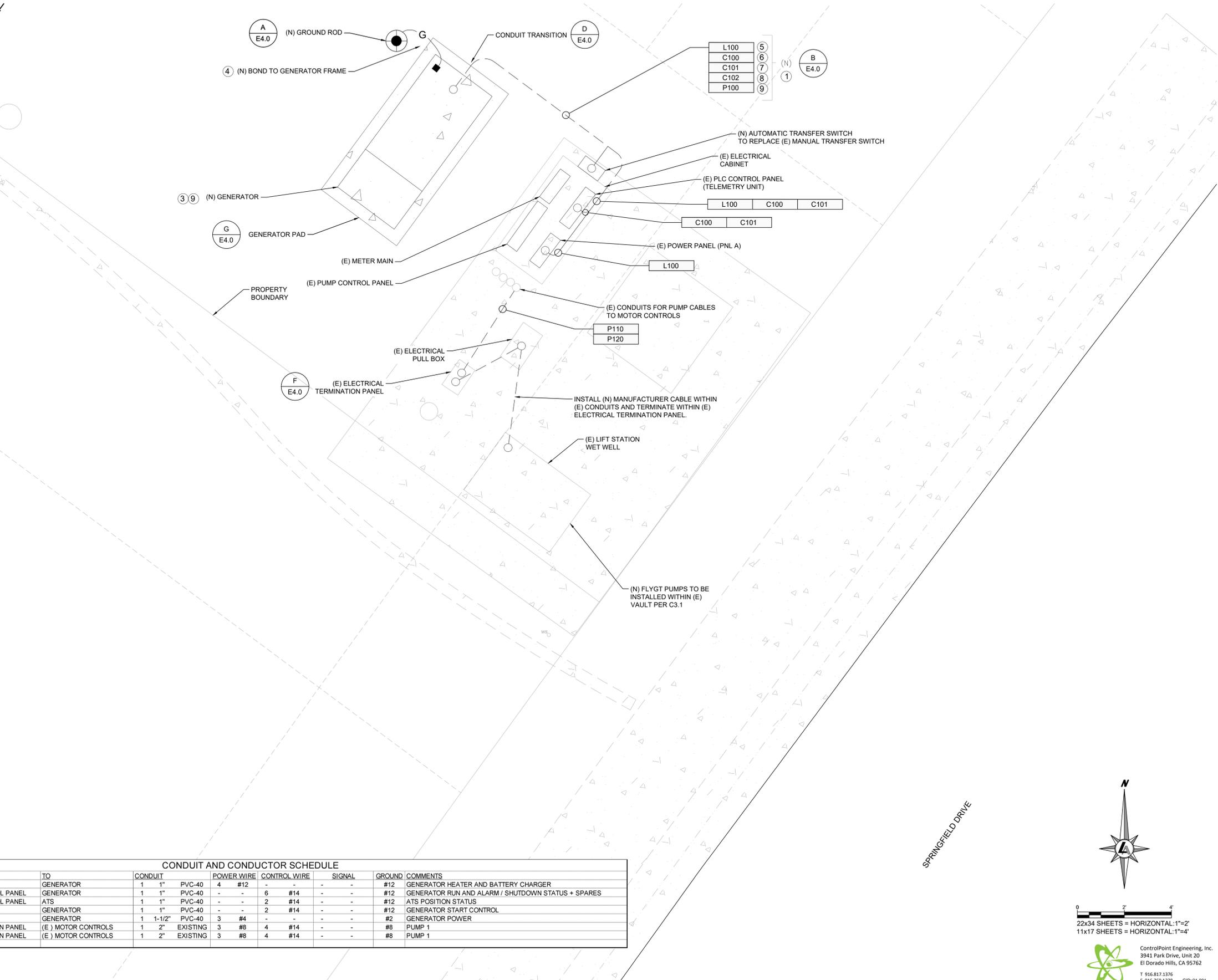
BAR IS 1 INCH ON ORIGINAL DRAWING AS SHOWN

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

**E3.0**

DRAWN BY: CONTROL POINT  
DESIGNED BY: CONTROL POINT  
CHECKED BY: CONTROL POINT  
JOB NO.: 10303.006

- NOTES:**
- ONLY NEW CONDUITS ARE SHOWN. ALL EXISTING CONDUITS AND UNDERGROUND FACILITIES SHALL BE PROTECTED FROM DAMAGE. IF UNDERGROUND FACILITIES ARE DAMAGED, ENGINEER SHALL BE NOTIFIED IMMEDIATELY. UNDERGROUND FACILITIES DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.
  - ALL EQUIPMENT IS EXISTING UNLESS SHOWN AS NEW (N).
  - REFERENCE C SERIES DRAWINGS FOR EXACT GENERATOR PLACEMENT AND (N) GENERATOR PAD REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING CONDUIT STUB UP LOCATIONS WITH GENERATOR SUBMITTAL DATA. SAW CUTTING AND REPAIR OF (E) CONCRETE PAD MAY BE REQUIRED AND PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
  - PROVIDE AND INSTALL UL LISTED LUG FOR GENERATOR FRAME BONDING TO #2 BARE COPPER GROUND WIRE TO NEW GROUND ROD.
  - INSTALL NEW CONDUIT AND CONDUCTORS FROM EXISTING POWER PANEL "A" TO NEW GENERATOR FOR BLOCK HEATER AND BATTERY CHARGER.
  - INSTALL (N) CONDUIT AND CONDUCTORS FOR GENERATOR RUN AND ALARM/SHUTDOWN STATUSES TO (E) PLC CONTROL PANEL.
  - INSTALL (N) CONDUIT AND CONDUCTORS FOR ATS POSITION STATUS TO (E) PLC CONTROL PANEL.
  - INSTALL (N) CONDUIT AND CONDUCTORS FOR GENERATOR START CONTROL.
  - INSTALL (N) CONDUCTORS FOR GENERATOR POWER FROM (E) ATS TO (N) GENERATOR.
  - REMOVE (E) MTS. PROVIDE AND INSTALL (N) ATS PER DWG. E5.0. PROVIDE (N) CONDUIT AND CONDUCTORS AS REQUIRED.



**CONDUIT AND CONDUCTOR SCHEDULE**

PLAN DWG	CONDUIT	FROM	TO	CONDUIT	POWER WIRE	CONTROL WIRE	SIGNAL	GROUND	COMMENTS
E4.0	L100	(E) PNL A	GENERATOR	1 1" PVC-40	4 #12	-	-	#12	GENERATOR HEATER AND BATTERY CHARGER
E4.0	C100	(E) PLC CONTROL PANEL	GENERATOR	1 1" PVC-40	-	6	#14	#12	GENERATOR RUN AND ALARM / SHUTDOWN STATUS + SPARES
E4.0	C101	(E) PLC CONTROL PANEL	ATS	1 1" PVC-40	-	2	#14	#12	ATS POSITION STATUS
E4.0	C102	ATS	GENERATOR	1 1" PVC-40	-	2	#14	#12	GENERATOR START CONTROL
E4.0	P100	ATS	GENERATOR	1 1-1/2" PVC-40	3 #4	-	-	#2	GENERATOR POWER
E4.0	P110	(E) TERMINATION PANEL	(E) MOTOR CONTROLS	1 2" EXISTING	3 #8	4	#14	#8	PUMP 1
E4.0	P120	(E) TERMINATION PANEL	(E) MOTOR CONTROLS	1 2" EXISTING	3 #8	4	#14	#8	PUMP 1

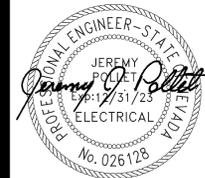


22x34 SHEETS = HORIZONTAL: 1"=2'  
11x17 SHEETS = HORIZONTAL: 1"=4'



ControlPoint Engineering, Inc.  
3941 Park Drive, Unit 20  
El Dorado Hills, CA 95762  
T 916.817.1376  
F 916.760.1378 GID21-001

D:\Projects\Nevada\2023\01-001 - Gardnerville Ranchos (Springfield) Lift Station\AutoCAD\ACT\GID21-001\_E3.0.dwg, E3.0, 07/24/2023, 12:55 pm, Joseph@cpet.com



GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT

**SPRINGFIELD LIFT STATION  
REHABILITATION  
ELECTRICAL DETAILS**

NEVADA

DOUGLAS COUNTY

GARDNERVILLE RANCHOS

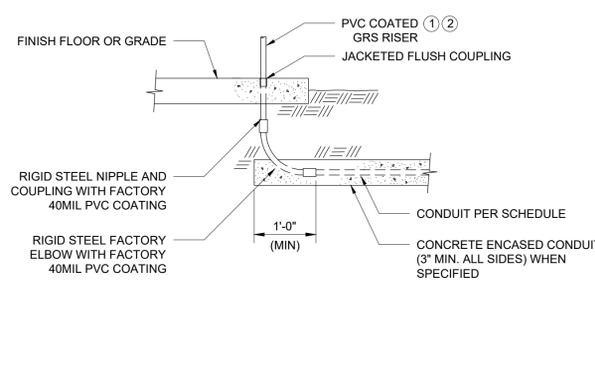
REV	DATE	DESCRIPTION

BAR IS 1 INCH ON ORIGINAL DRAWING AS SHOWN

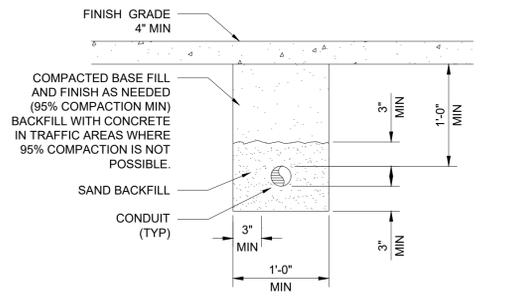
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

**E4.0**

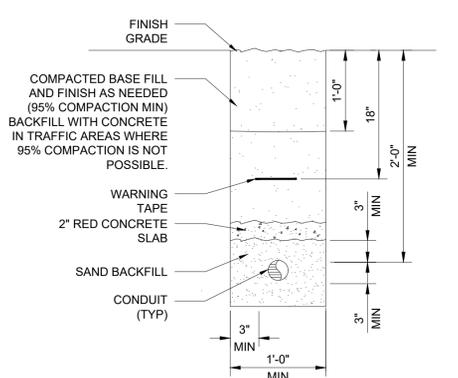
DRAWN BY: CONTROL POINT  
DESIGNED BY: CONTROL POINT  
CHECKED BY: CONTROL POINT  
JOB NO.: 10303.006



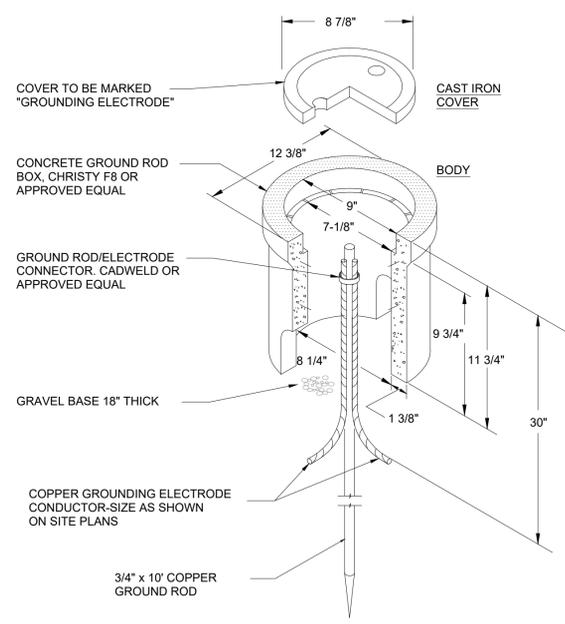
- DETAIL NOTES**
- COORDINATE COUPLING LOCATION TO MATCH LOCATION OF FUTURE EQUIPMENT WHERE REQUIRED.
  - PROVIDE CONDUIT CAP AND PLUG FOR FUTURE EQUIPMENT CONDUIT INSTALLATIONS



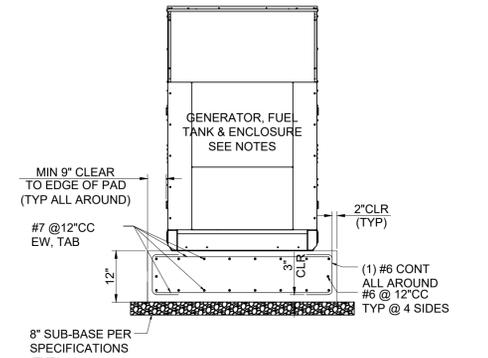
**UNDER SLAB TRENCH DETAIL**  
SCALE: NONE



**CONDUIT TRENCH DETAIL**  
SCALE: NONE

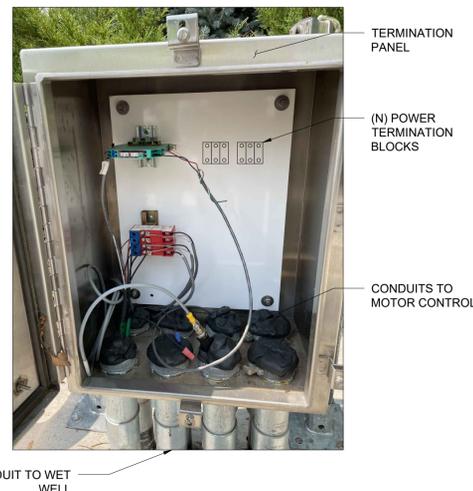


**CONCRETE GROUND ROD BOX DETAIL**  
SCALE: NONE



- DETAIL NOTES**
- PAD SHOWN IS FOR BIDDING PURPOSES ONLY. CONTRACTOR SHALL SUBMIT FOR APPROVAL. PAD DESIGN BASED ON THE REQUIREMENTS OF THE APPROVED GENERATOR.
  - REFERENCE E002 FOR GENERAL ELECTRICAL NOTES FOR EQUIPMENT PAD DESIGN REQUIREMENT.

**GENERATOR PAD DETAIL**  
SCALE: NONE



- DETAIL NOTES**
- INSTALL (N) PUMP CABLES FROM WET WELL VIA (E) ELECT. PULL BOX.
  - PROVIDE AND INSTALL (N) CONDUCTORS IN (E) CONDUIT TO (E) MOTOR CONTROLS. FILL (E) SEAL OFF FITTING TO ISOLATE MOTOR CONTROLS FROM TERMINATION PANEL.
  - PROVIDE AND INSTALL (N) PWER TERMINATION BLOCKS FOR MOTOR CABLES. LITTEL FUSE POWR-BLOCKS OR APPROVED EQUAL.

**(E) ELECT. TERMINATION PANEL DETAIL**  
SCALE: NONE



- DETAIL NOTES**
- INSTALL (N) ATS AS HIGH AS POSSIBLE ON (E) ENCLOSURE.
  - COORDINATE SHUTDOWN WITH OPERATION STAFF.

**AUTOMATIC TRANSFER SWITCH DETAIL**  
SCALE: NONE

D:\Projects\Nevada\2023\07-001 - Gardnerville Ranchos (Springfield) Lift Station\AutoCAD\ACT\02x1-001\_E4.dwg, E4.0, 07/24/2023, 12:57 pm, Joseph@lumos.com

**Appendix I Flow Monitoring Reports**

---

**Final Report for  
Lumos Engineering  
800 East College Parkway  
Carson City Nevada  
U15-116**

Attn: Mr. Derek Zimney

2015 Sanitary Sewer Flow Monitoring  
3 Flow Sites

---



Prepared and submitted by:

SFE Global Inc.  
1104 Development Way  
Sacramento, California 95831  
*Toll Free: 1-866-332-9876*



August 10 2015

Mr. Derek Zimney  
Lumos Engineering  
800 East College Parkway  
Carson City, Nevada

---

FINAL REPORT: GARDNERVILLE, NE U15-116  
Sanitary Sewer Flow Monitoring  
June 8 2015 to July 10 2015  
(3 Flow Sites)

---

Dear Mr. Zimney,

Please find enclosed SFE's Final Report for the above mentioned project. If you have any questions, comments or concerns, please do not hesitate to contact us at your earliest convenience.

Thank you for having SFE conduct this work on your behalf. We are appreciative of the opportunity to work with you and your team on this project. We look forward to working together again in the near future.

Sincerely,  
SFE Global  
SFE File #U15-116

A handwritten signature in black ink, appearing to read 'P. Loving', is positioned above the typed name.

Paul Loving  
Operations Manager  
(604) 992-6792  
Paul.lovings@sfeglobal.com  
[www.sfeonline.com](http://www.sfeonline.com)

**TABLE OF CONTENTS**

1. INTRODUCTION..... 4

2. FLOW MONITORING STATIONS..... 4

3. QA/QC AND SAFETY STATEMENT..... 5

4. DATA..... 5

**APPENDIX 1 – MAINTENANCE SHEETS, DATA SUMMARIES AND GRAPHS**

**APPENDIX 2 – SITE BOOKS**

## 1. Introduction

This report provides details of the sanitary sewer flow monitoring project conducted in the City of The Gardnerville, NE. SFE Global was retained by Lumos Engineering, under the direction of Mr. Derek Zimney. Mr. Paul Loving represented SFE Global as Project Manager during this project.

As requested, SFE installed three (3) sanitary sewer flow monitors to collect data for a one (1) month period. The stations were installed by June 7, 2015 and removed July 10, 2015. The monitoring stations are as follows:

Site #	Location	Meter Utilized
U15-116-01	Drayton Blvd at Dresslerville Road A	ISCO 2150 AV Flow Meter C/W SFE Custom Compound Weir
U15-116-02	Drayton Blvd at Dresslerville Road B	ISCO 2150 AV Flow Meter C/W SFE Custom Compound Weir
U15-116-03	1411 Glenwood Drive	ISCO 2150 AV Flow Meter C/W SFE Custom Compound Weir

## 2. Flow Monitoring Stations

Prior to installing flow monitoring stations, SFE performed detailed site assessments of each potential site to determine the appropriate monitoring method. Factors such as pipe size, channel condition, site location, site access, and flow hydraulics were all considered and documented while performing site assessments. The site were pre-determined by the client and all proved to conducive to quality flow monitoring.

The meters were calibrated and set to log data at 5 minute intervals as per spec and standard SFE procedure. To ensure proper operation of the stations, a regular maintenance schedule is normally adhered to for the duration of the project but since the duration of this project was only 2 weeks long, there were no intermediate visits. During install and removal manual readings were done using a preset benchmark and this was compared to the meter readings simultaneously. All sites have shown to be well within limitations.

### 3. QA/QC and Safety Statement

SFE confirms that all flow monitoring stations were installed according to SFE's QA/QC methodology and protocol, and standard industry practice. All flow monitoring equipment has been removed from the site locations.

SFE has a comprehensive Company Safety Manual and can be reviewed upon request.

Confined space entry procedures and general site/traffic safety was adhered to during site installation and site maintenance. SFE utilizes an approved rescue system, a 2800 CFM air induction device and four-gas air quality monitors. All of our staff members are thoroughly trained and certified in confined space entry procedures. Certificates are available upon request.

A thorough traffic control plan was established and used by SFE Global crews where required.

### 4. Data

Data collected during this project has been inspected for any anomalies and compared to field readings. All data submitted is in RAW format and has not been altered.

### Appendices

Appendix #1	Maintenance Sheets, Data Summaries and Graphs
Appendix #2	Site Books

Report End  
August 2015

SFE Global  
File #U15-116

**Appendix 1**  
Data Summaries and Graphs







Lumos Engineering - Gardnerville, Nevada  
 U15-116-01  
 Drayton Blvd at Dressler Road  
 June 8 to July 10, 2015

Date	Avg Flow (cfs)	Min Flow (cfs)	Max Flow (cfs)	Total Flow (mgd)
08-Jun-15	1.156	0.887	1.534	0.747
09-Jun-15	1.052	0.341	1.658	0.680
10-Jun-15	1.077	0.438	1.598	0.696
11-Jun-15	1.061	0.367	1.555	0.686
12-Jun-15	1.149	0.401	1.746	0.743
13-Jun-15	1.190	0.451	1.955	0.769
14-Jun-15	1.264	0.500	1.984	0.817
15-Jun-15	1.196	0.541	1.674	0.773
16-Jun-15	1.211	0.483	1.787	0.782
17-Jun-15	1.156	0.504	1.817	0.747
18-Jun-15	1.104	0.428	1.670	0.713
19-Jun-15	1.091	0.385	1.644	0.705
20-Jun-15	1.130	0.424	1.783	0.730
21-Jun-15	1.153	0.414	1.868	0.745
22-Jun-15	1.114	0.393	1.767	0.720
23-Jun-15	1.091	0.402	1.599	0.705
24-Jun-15	1.096	0.427	1.653	0.708
25-Jun-15	1.020	0.401	1.521	0.659
26-Jun-15	0.987	0.348	1.491	0.638
27-Jun-15	1.061	0.408	1.758	0.686
28-Jun-15	1.114	0.372	1.820	0.720
29-Jun-15	1.070	0.382	1.664	0.691
30-Jun-15	1.099	0.391	1.646	0.710
01-Jul-15	1.139	0.399	1.702	0.736
02-Jul-15	1.131	0.425	1.718	0.731
03-Jul-15	1.105	0.478	1.963	0.714
04-Jul-15	1.017	0.358	1.801	0.657
05-Jul-15	1.135	0.381	1.810	0.734
06-Jul-15	1.204	0.397	1.753	0.778
07-Jul-15	1.160	0.399	1.781	0.750
08-Jul-15	1.215	0.514	1.797	0.785
09-Jul-15	1.152	0.424	1.695	0.744
10-Jul-15	1.026	0.415	1.705	0.663
<b>Total Flow</b>	<b>Min Flow</b>	<b>Max Flow</b>		
<b>(mg)</b>	<b>(cfs)</b>	<b>(cfs)</b>		
23.865	0.341	1.984		







Lumos Engineering - Gardnerville, Nevada  
 U15-116-02  
 Drayton Blvd at Dressler Road  
 June 8 to July 10, 2015

Date	Avg Flow (cfs)	Min Flow (cfs)	Max Flow (cfs)	Total Flow (mgd)
08-Jun-15	0.911	0.659	1.158	0.589
09-Jun-15	0.807	0.288	1.268	0.522
10-Jun-15	0.838	0.339	1.183	0.541
11-Jun-15	0.769	0.272	1.178	0.497
12-Jun-15	0.813	0.272	1.278	0.525
13-Jun-15	0.866	0.312	1.328	0.559
14-Jun-15	0.911	0.327	1.508	0.589
15-Jun-15	0.861	0.340	1.245	0.557
16-Jun-15	0.834	0.314	1.284	0.539
17-Jun-15	0.822	0.306	1.280	0.531
18-Jun-15	0.818	0.308	1.247	0.529
19-Jun-15	0.744	0.264	1.093	0.481
20-Jun-15	0.776	0.285	1.260	0.501
21-Jun-15	0.814	0.257	1.297	0.526
22-Jun-15	0.758	0.247	1.096	0.490
23-Jun-15	0.768	0.285	1.255	0.497
24-Jun-15	0.814	0.305	1.183	0.526
25-Jun-15	0.759	0.301	1.118	0.490
26-Jun-15	0.743	0.250	1.072	0.480
27-Jun-15	0.799	0.328	1.301	0.516
28-Jun-15	0.848	0.288	1.313	0.548
29-Jun-15	0.817	0.303	1.229	0.528
30-Jun-15	0.827	0.308	1.186	0.534
01-Jul-15	0.821	0.298	1.182	0.530
02-Jul-15	0.813	0.306	1.218	0.525
03-Jul-15	0.839	0.329	1.363	0.542
04-Jul-15	0.830	0.283	1.377	0.537
05-Jul-15	0.934	0.288	1.513	0.603
06-Jul-15	0.910	0.324	1.283	0.588
07-Jul-15	0.865	0.280	1.262	0.559
08-Jul-15	0.852	0.323	1.255	0.550
09-Jul-15	0.874	0.315	1.264	0.565
10-Jul-15	0.810	0.308	1.284	0.524

Total Flow (mg)	Min Flow (cfs)	Max Flow (cfs)
17.619	0.247	1.513







Lumos Engineering - Gardnerville, Nevada  
 U15-116-03  
 1411 Glenwood Drive  
 June 8 to July 10, 2015

Date	Avg Flow (cfs)	Min Flow (cfs)	Max Flow (cfs)	Total Flow (mgd)
08-Jun-15	0.189	0.114	0.245	0.122
09-Jun-15	0.175	0.065	0.264	0.113
10-Jun-15	0.196	0.084	0.292	0.127
11-Jun-15	0.219	0.095	0.333	0.142
12-Jun-15	0.226	0.123	0.374	0.146
13-Jun-15	0.220	0.109	0.343	0.142
14-Jun-15	0.228	0.061	0.360	0.147
15-Jun-15	0.236	0.121	0.343	0.152
16-Jun-15	0.228	0.104	0.357	0.147
17-Jun-15	0.231	0.113	0.366	0.149
18-Jun-15	0.239	0.113	0.359	0.154
19-Jun-15	0.234	0.115	0.325	0.151
20-Jun-15	0.230	0.113	0.370	0.148
21-Jun-15	0.245	0.108	0.393	0.159
22-Jun-15	0.238	0.116	0.404	0.154
23-Jun-15	0.217	0.096	0.372	0.140
24-Jun-15	0.217	0.106	0.315	0.140
25-Jun-15	0.212	0.103	0.315	0.137
26-Jun-15	0.209	0.097	0.330	0.135
27-Jun-15	0.220	0.111	0.373	0.142
28-Jun-15	0.213	0.121	0.389	0.138
29-Jun-15	0.213	0.084	0.330	0.138
30-Jun-15	0.221	0.106	0.360	0.143
01-Jul-15	0.230	0.112	0.314	0.149
02-Jul-15	0.232	0.112	0.379	0.150
03-Jul-15	0.226	0.109	0.356	0.146
04-Jul-15	0.233	0.102	0.381	0.150
05-Jul-15	0.248	0.117	0.384	0.161
06-Jul-15	0.252	0.113	0.367	0.163
07-Jul-15	0.242	0.111	0.380	0.157
08-Jul-15	0.259	0.114	0.413	0.167
09-Jul-15	0.266	0.140	0.375	0.172
10-Jul-15	0.238	0.140	0.405	0.154
<b>Total Flow</b>	<b>Min Flow</b>	<b>Max Flow</b>		
<b>(mg)</b>	<b>(cfs)</b>	<b>(cfs)</b>		
4.835	0.061	0.413		

Appendix 2  
Site Books

CLIENT FLOW MONITORING #: U15-106  
 NAME: Gardenerville, Nevada  
 Date / Time: June 7 2015

SFE PROJECT #: U15-106  
 SFE SITE #: 1

**Project Specific Information**

Client Name: Lumos Engineering  
 End User Name: City of Gardenerville, Nevada  
 Project Name: U15-106  
 Client Contact: Derek Zimney  
 Field Contact: Tim Russell  
 SFE PM Contact: Brad Freeman 916-335-7791

**Site Equipment**

Install / Remove Date: June 7 2015  
 Meter Make & Model: Isco 2150 AV  
 Level Type: Pressure  
 Velocity Type: Average  
 Primary Device: Weir  
 Wireless: Yes  
 Redundancy: Yes  
 Logging Rate: 5min

**Site Location Information**

Client Manhole #: NA  
 Address (Location): Drayton Blvd at Dresslerville Rd  
 City, State: Gardenerville, Nevada  
 GPS (North - West): 38.91420 -119.74668  
 Landmarks: \_\_\_\_\_  
 Additional Information: \_\_\_\_\_

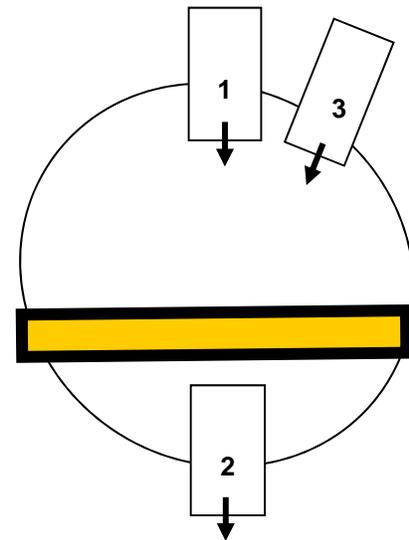
**Site Profile**

Pipe #1 Size: 15 Inches  
 Pipe #2 Size: 15 Inches  
 Pipe #3 Size: 10 Inches  
 Pipe #4 Size: NA Inches  
 Constant: 93.125 Inches  
 Laterals / Rungs: Yes  
 Additional Information: \_\_\_\_\_

**Map of Area**



**Manhole Layout**



**Traffic Control Requirements**

Provider: SFE  
 Condition: Local  
 Frequency: Install  
 Speed Limit: 35  
 # of Lanes Effected: 1  
 Lane Configuration: Quiet Road  
 Additional Information: \_\_\_\_\_

**Site Hydraulics**

Date & Time: June 7 2015 18:02  
 Depth: 4 Inches  
 Velocity: 2 FPS  
 Turbulent: No  
 Surcharge: No  
 Silting: No  
 Solids: Yes

**Notes**

- 1
- 2

**Notes**

- 3
- 4

CLIENT FLOW MONITORING #: U15-106  
NAME: Gardnerville, Nevada  
Date / Time: June 7 2015

SFE PROJECT #: U15-106  
SFE SITE #: 1

Picture 1



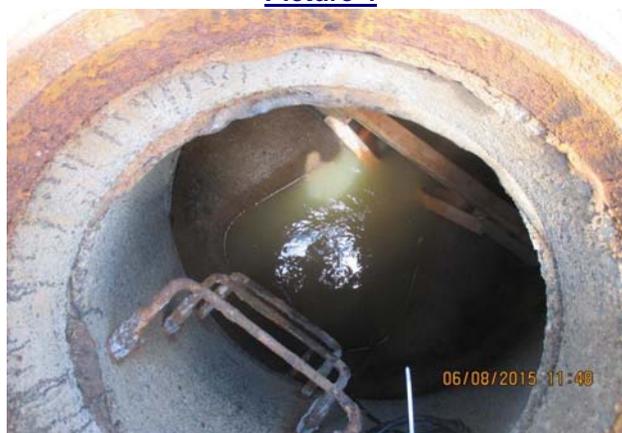
Picture 2



Picture 3



Picture 4



Picture 5

Picture 6

Notes

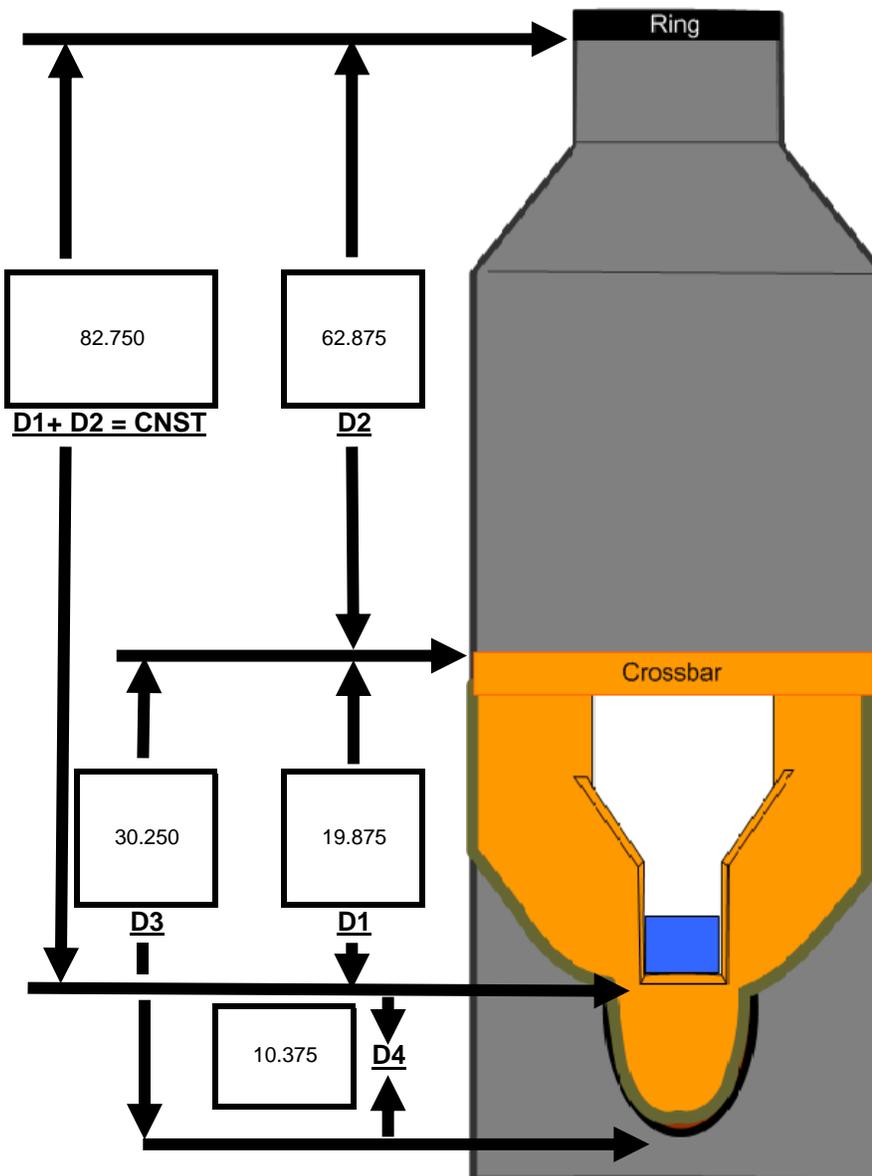
- 1
- 2
- 3

CLIENT FLOW MONITORING #: U15-106  
 NAME: Gardenerville, Nevada  
 Date / Time: June 7 2015

SFE PROJECT #: U15-106  
 SFE SITE #: 1  
 Technician 1: Brad Freeman 916-335-7791  
 Technician 2: James Scott

**Meter Depth vs.. Field Depth Calibration / Verification**

Reading Number	Date	Time	Field Meas (in.)	Meter Depth (in)	Comments (Zero Meter Level before Installation)
Initial	June 7 2015	12:58	5.750	5.23	Install Meter
1	June 7 2015	12:59	5.750	5.76	
2	June 7 2015	13:02	5.375	5.49	
3	June 7 2015	13:08	5.375	6.24	
Average			5.625	5.827	



**Constant Measurement (in)**  
**Rim to Weir Lip**  
93.125

**Pipe Diameters (in)**

Pipe 1	<u>15</u>
Pipe 2	<u>15</u>
Pipe 3	<u>10</u>
Pipe 4	<u>NA</u>

**D4=Invert to Weir Lip (D3-D1)**  
10.375

**Obvert to Weir Lip**  
4.625



CLIENT FLOW MONITORING #: U15-106  
NAME: Gardenerville, Nevada  
Date / Time: June 7 2015

SFE PROJECT #: U15-106  
SFE SITE #: 1

Flow Meter Information

Meter Make:	<u>Isco</u>	Logging Rate:	<u>5 Minute</u>
Meter Model:	<u>2150</u>	Flow Units:	<u>CFS</u>
Sensor Type	<u>AV</u>	Velocity Units:	<u>FPS</u>
Meter Serial Number:	<u>204J01035</u>	Depth Units	<u>Inches</u>
Battery Volts:	<u>12.2</u>	Surcharge Meter (Y/N):	<u>Yes</u>

Site Physical Information

Silt Level:	<u>0</u>	Weather:	<u>Sunny</u>
Slope:	<u>NA</u>	Weir Size:	<u>600 mm</u>
Uniform Flow (Y/N)	<u>Y</u>	Depth Only(DO)	<u>NA</u>
Debris in Flow (Y/N):	<u>Y</u>	or Look up Table(LT)	<u>LT</u>
Pipe Material:	<u>Concrete</u>	Comments	<u></u>

Check Off List

	Yes	No
Time Set:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Depth Calibrated:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Velocity Profile:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Download Data:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Meter Running:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pipe Size Verified:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Photograph Taken:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site Cleaned:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site Secured:	<input checked="" type="checkbox"/>	<input type="checkbox"/>

CLIENT FLOW MONITORING #: U15-106  
 NAME: Gardenerville, Nevada  
 Date / Time: June 8 2015

SFE PROJECT #: U15-106  
 SFE SITE #: 2

Project Specific Information

Client Name: Lumos Engineering  
 End User Name: City of Gardenerville, Nevada  
 Project Name: U15-106  
 Client Contact: Derek Zimney  
 Field Contact: Tim Russell  
 SFE PM Contact: Brad Freeman 916-335-7791

Site Equipment

Install / Remove Date: June 8 2015  
 Meter Make & Model: Isco 2150 AV  
 Level Type: Pressure  
 Velocity Type: Average  
 Primary Device: Weir  
 Wireless: Yes  
 Redundancy: Yes  
 Logging Rate: 5min

Site Location Information

Client Manhole #: NA  
 Address (Location): Drayton Blvd at Dresslerville Rd  
 City, State: Gardenerville, Nevada  
 GPS (North - West): 38.91426 -119.74694  
 Landmarks: \_\_\_\_\_  
 Additional Information: \_\_\_\_\_

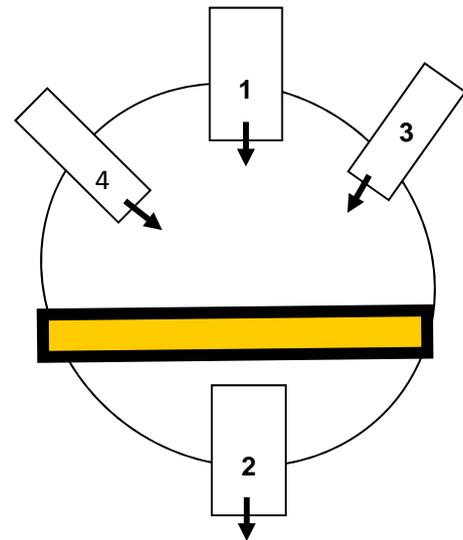
Site Profile

Pipe #1 Size: 15 Inches  
 Pipe #2 Size: 15 Inches  
 Pipe #3 Size: 8 Inches  
 Pipe #4 Size: 8 Inches  
 Constant: 119.5 Inches  
 Laterals / Rungs: Yes  
 Additional Information: \_\_\_\_\_

Map of Area



Manhole Layout



Traffic Control Requirements

Provider: SFE  
 Condition: Local  
 Frequency: Install  
 Speed Limit: 35  
 # of Lanes Effected: 1  
 Lane Configuration: Quiet Road  
 Additional Information: \_\_\_\_\_

Site Hydraulics

Date & Time: June 8 2015 7:52  
 Depth: 4 Inches  
 Velocity: 2 FPS  
 Turbulent: No  
 Surge: No  
 Silting: No  
 Solids: Yes

Notes

- 1
- 2

Notes

- 3
- 4

CLIENT FLOW MONITORING #: U15-106  
NAME: Gardnerville, Nevada  
Date / Time: June 8 2015

SFE PROJECT #: U15-106  
SFE SITE #: 2

Picture 1



Picture 3



Picture 5

Picture 2



Picture 4



Picture 6

Notes

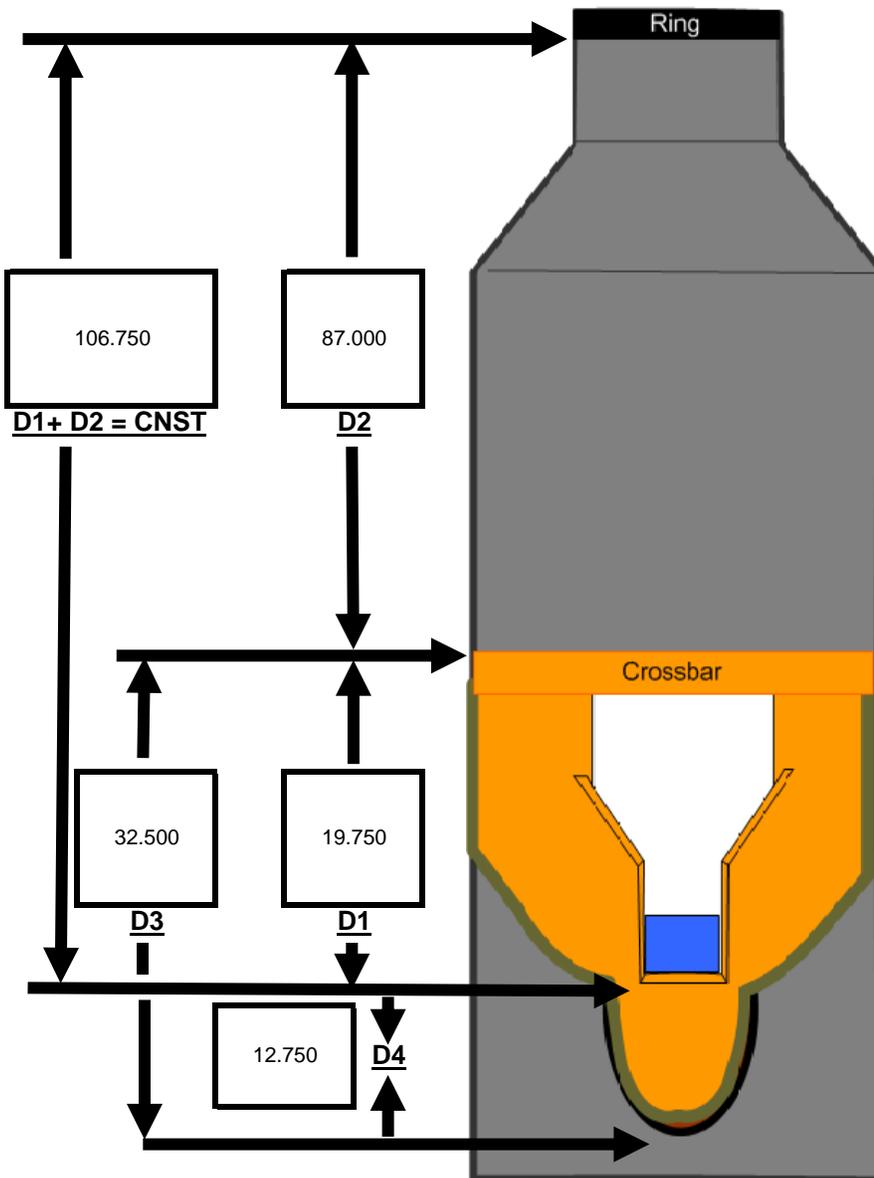
- 1
- 2
- 3

CLIENT FLOW MONITORING #: U15-106  
 NAME: Gardenerville, Nevada  
 Date / Time: June 8 2015

SFE PROJECT #: U15-106  
 SFE SITE #: 2  
 Technician 1: Brad Freeman 916-335-7791  
 Technician 2: James Scott

**Meter Depth vs.. Field Depth Calibration / Verification**

Reading Number	Date	Time	Field Meas (in.)	Meter Depth (in)	Comments (Zero Meter Level before Installation)
Initial	June 8 2015	11:06	8.000	8.06	Install Meter
1	June 8 2015	11:08	8.250	8.16	
2	June 8 2015	11:11	8.250	8.23	
3	June 8 2015	11:20	8.000	8.13	
Average			8.167	8.175	



**Constant Measurement (in)**  
**Rim to Weir Lip**  
119.500

**Pipe Diameters (in)**

Pipe 1	<u>15</u>
Pipe 2	<u>15</u>
Pipe 3	<u>8</u>
Pipe 4	<u>NA</u>

**D4=Invert to Weir Lip (D3-D1)**  
12.750

**Obvert to Weir Lip**  
4.625



CLIENT FLOW MONITORING #: U15-106  
NAME: Gardenerville, Nevada  
Date / Time: June 8 2015

SFE PROJECT #: U15-106  
SFE SITE #: 2

Flow Meter Information

Meter Make:	<u>Isco</u>	Logging Rate:	<u>5 Minute</u>
Meter Model:	<u>2150</u>	Flow Units:	<u>CFS</u>
Sensor Type:	<u>AV</u>	Velocity Units:	<u>FPS</u>
Meter Serial Number:	<u>206C00095</u>	Depth Units:	<u>Inches</u>
Battery Volts:	<u>12</u>	Surcharge Meter (Y/N):	<u>Yes</u>

Site Physical Information

Silt Level:	<u>0</u>	Weather:	<u>Sunny</u>
Slope:	<u>NA</u>	Weir Size:	<u>350 mm</u>
Uniform Flow (Y/N):	<u>Y</u>	Depth Only(DO)	<u>NA</u>
Debris in Flow (Y/N):	<u>Y</u>	or Look up Table(LT)	<u>LT</u>
Pipe Material:	<u>Concrete</u>	Comments	<u></u>

Check Off List

	Yes	No
Time Set:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Depth Calibrated:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Velocity Profile:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Download Data:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Meter Running:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pipe Size Verified:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Photograph Taken:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site Cleaned:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site Secured:	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**CLIENT FLOW MONITORING #:** U15-106  
**NAME:** Gardnerville, Nevada  
**Date / Time:** June 7 2015

**SFE PROJECT #:** U15-106  
**SFE SITE #:** 3

**Project Specific Information**

Client Name: Lumos Engineering  
 End User Name: City of Gardnerville, Nevada  
 Project Name: U15-106  
 Client Contact: Derek Zimney  
 Field Contact: Tim Russell  
 SFE PM Contact: Brad Freeman 916-335-7791

**Site Equipment**

Install / Remove Date: June 7 2015  
 Meter Make & Model: Isco 2150 AV  
 Level Type: Pressure  
 Velocity Type: Average  
 Primary Device: Weir  
 Wireless: Yes  
 Redundancy: Yes  
 Logging Rate: 5min

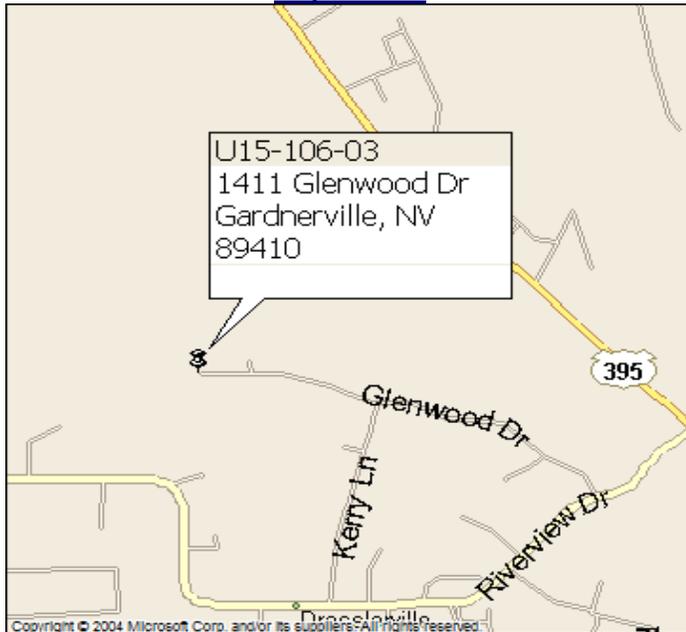
**Site Location Information**

Client Manhole #: NA  
 Address (Location): 1411 Glenwood Drive  
 City, State: Gardnerville, Nevada  
 GPS (North - West): 38.91730 -119.73261  
 Landmarks: \_\_\_\_\_  
 Additional Information: \_\_\_\_\_

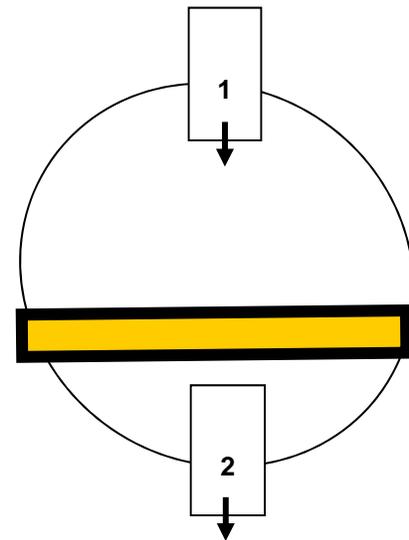
**Site Profile**

Pipe #1 Size: 12 Inches  
 Pipe #2 Size: 12 Inches  
 Pipe #3 Size: NA Inches  
 Pipe #4 Size: NA Inches  
 Constant: 78.875 Inches  
 Laterals / Rungs: Yes  
 Additional Information: \_\_\_\_\_

**Map of Area**



**Manhole Layout**



**Traffic Control Requirements**

Provider: SFE  
 Condition: Local  
 Frequency: Install  
 Speed Limit: 35  
 # of Lanes Effected: 1  
 Lane Configuration: Quiet Road  
 Additional Information: \_\_\_\_\_

**Site Hydraulics**

Date & Time: June 7 2015 15:20  
 Depth: 3 Inches  
 Velocity: 1 FPS  
 Turbulent: No  
 Surge: No  
 Silting: No  
 Solids: Yes

**Notes**

- 1
- 2

**Notes**

- 3
- 4

CLIENT FLOW MONITORING #: U15-106  
NAME: Gardnerville, Nevada  
Date / Time: June 7 2015

SFE PROJECT #: U15-106  
SFE SITE #: 3

Picture 1



Picture 2



Picture 3



Picture 4



Picture 5

Picture 6

Notes

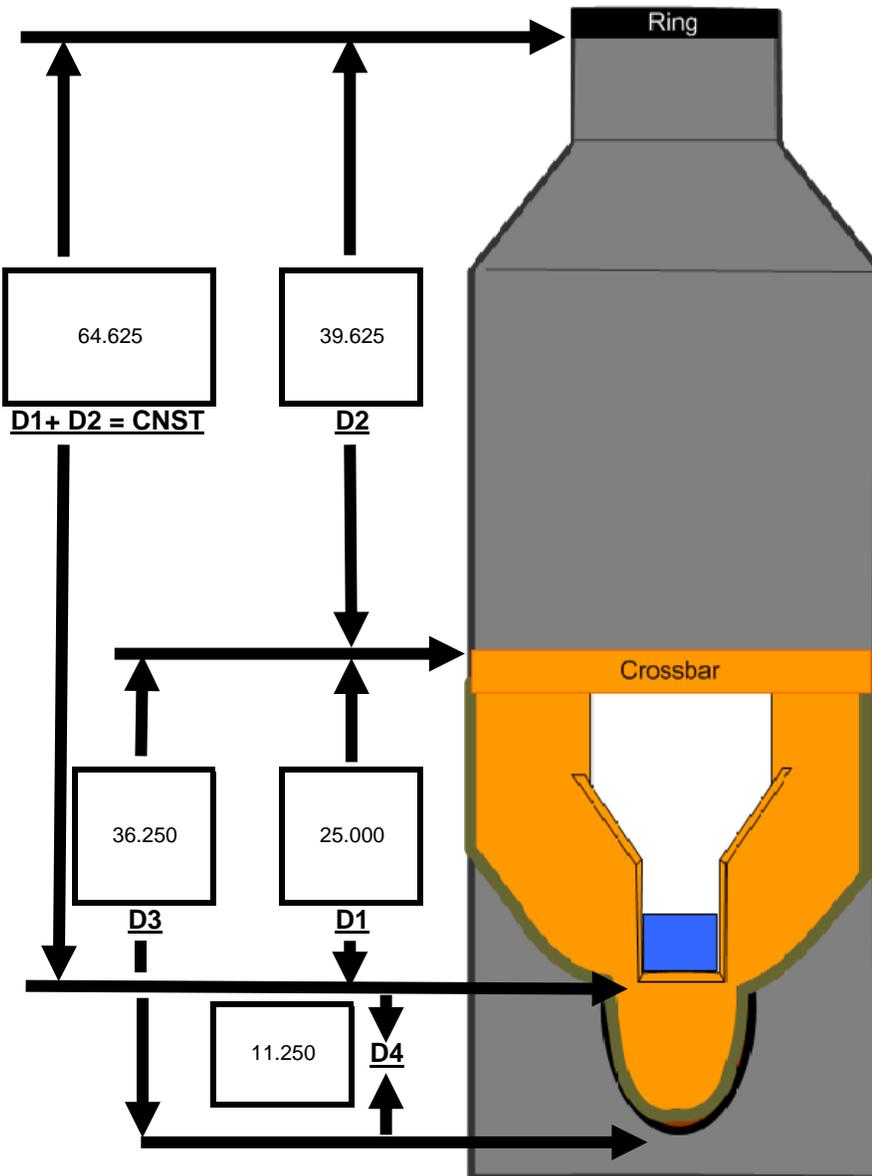
- 1
- 2
- 3

CLIENT FLOW MONITORING #: U15-106  
 NAME: Gardnerville, Nevada  
 Date / Time: June 7 2015

SFE PROJECT #: U15-106  
 SFE SITE #: 3  
 Technician 1: Brad Freeman 916-335-7791  
 Technician 2: James Scott

**Meter Depth vs.. Field Depth Calibration / Verification**

Reading Number	Date	Time	Field Meas (in.)	Meter Depth (in)	Comments (Zero Meter Level before Installation)
Initial	June 7 2015	14:10	2.000	2.050	Install Meter
1	June 7 2015	14:12	2.250	2.186	
2	June 7 2015	14:15	2.125	2.261	
3	June 7 2015	14:20	2,75	2.698	
Average			2.125	2.382	



**Constant Measurement (in)**  
**Rim to Weir Lip**  
78.875

**Pipe Diameters (in)**  
 Pipe 1 12  
 Pipe 2 12  
 Pipe 3 NA  
 Pipe 4 NA

**D4=Invert to Weir Lip (D3-D1)**  
11.250

**Obvert to Weir Lip**  
0.75



CLIENT FLOW MONITORING #: U15-106  
NAME: Gardenerville, Nevada  
Date / Time: June 7 2015

SFE PROJECT #: U15-106  
SFE SITE #: 3

Flow Meter Information

Meter Make:	<u>Isco</u>	Logging Rate:	<u>5 Minute</u>
Meter Model:	<u>2150</u>	Flow Units:	<u>CFS</u>
Sensor Type	<u>AV</u>	Velocity Units:	<u>FPS</u>
Meter Serial Number:	<u>204J01030</u>	Depth Units	<u>Inches</u>
Battery Volts:	<u>11.9</u>	Surcharge Meter (Y/N):	<u>Yes</u>

Site Physical Information

Silt Level:	<u>0</u>	Weather:	<u>Sunny</u>
Slope:	<u>NA</u>	Weir Size:	<u>350 mm</u>
Uniform Flow (Y/N)	<u>Y</u>	Depth Only(DO)	<u>NA</u>
Debris in Flow (Y/N):	<u>Y</u>	or Look up Table(LT)	<u>LT</u>
Pipe Material:	<u>Concrete</u>	Comments	<u></u>

Check Off List

	Yes	No
Time Set:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Depth Calibrated:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Velocity Profile:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Download Data:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Meter Running:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pipe Size Verified:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Photograph Taken:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site Cleaned:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site Secured:	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Appendix J Sewer Model Loads**

**APPENDIX J  
GRGID SEWER MASTER PLAN  
SEWER MODEL LOADS**

MH ID	Existing System						Infill (Vacant Lots)				Future Growth <sup>1</sup>						Total Infill + Future EDUs	
	SFR (DU)	MFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)	Total EDUs	SFR (DU)	MFR (DU)	C (ac)	Total EDUs	SFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)		Total EDUs
A1	0.0				0.0		0.0				0.0				0.0		0.0	
A1-A	0.0				0.0		0.0				0.0				0.0		0.0	
A2	2.0				2.0		2.0				0.0				0.0		0.0	
A3	4.0				4.0		4.0				0.0	3.0			3.0		3.0	3.0
A4	4.0				4.0		4.0				0.0				0.0		0.0	
A5	3.0				3.0		3.0				0.0				0.0		0.0	
A6	2.0				2.0		2.0				0.0				0.0		0.0	
A7	244.0	20.0	2.6		267.8		267.8	35.0			35.0	27.0			27.0		27.0	62.0
A8	0.0				0.0		0.0				0.0				0.0		0.0	
A9	0.0				0.0		0.0	1.0			1.0	2.0			2.0		2.0	3.0
A10	0.0				0.0		0.0	1.0			1.0	6.0			6.0		6.0	7.0
A11	2.0				2.0		2.0				0.0	3.0			3.0		3.0	3.0
A12	0.0				0.0		0.0				0.0	1.0			1.0		1.0	1.0
A13	0.0				0.0		0.0				0.0	2.0			2.0		2.0	2.0
A14	167.0			8.1	199.4	536.0	226.8	2.0			2.0				0.0		0.0	2.0
A15	9.0				9.0		9.0				0.0				0.0		0.0	
A16	33.0				33.0		33.0	1.0			1.0				0.0		0.0	1.0
A17	7.0				7.0		7.0				0.0				0.0		0.0	
A18	0.0				0.0		0.0				0.0				0.0		0.0	
A19	0.0				0.0		0.0				0.0				0.0		0.0	
A20	3.0				3.0		3.0				0.0				0.0		0.0	
A21	2.0				2.0		2.0				0.0	2.0			2.0		2.0	2.0
A22	3.0				3.0		3.0				0.0	2.0			2.0		2.0	2.0
A23	3.0				3.0		3.0				0.0	2.0			2.0		2.0	2.0
A24	3.0				3.0		3.0				0.0	1.0			1.0		1.0	1.0
A25	7.0				7.0		7.0	3.0			3.0	4.0			4.0		4.0	7.0
A26	2.0				2.0		2.0				0.0				0.0		0.0	
A27	6.0				6.0		6.0				0.0	100.0			100.0		100.0	100.0
A28	3.0				3.0		3.0				0.0				0.0		0.0	
A29	3.0				3.0		3.0				0.0	100.0			100.0		100.0	100.0
A30	4.0				4.0		4.0				0.0	117.0			117.0		117.0	117.0
A31	4.0				4.0		4.0				0.0	117.0			117.0		117.0	117.0
A32	3.0				3.0		3.0				0.0				0.0		0.0	
A33	1.0				1.0		1.0				0.0	1001.5			1001.5		1001.5	1001.5
A33-A	0.0				0.0		0.0				0.0	1001.5	2.1		1009.9	1810	1102.5	1102.5
A34	64.0				64.0	1174	124.1	2.0			2.0				0.0		0.0	2.0
A34.1	3.0				3.0		3.0				0.0				0.0		0.0	
A34.2	3.0				3.0		3.0				0.0				0.0		0.0	
A34.3	1.0				1.0		1.0				0.0				0.0		0.0	
A34.4	1.0				1.0		1.0				0.0				0.0		0.0	
B1	21.0				21.0		21.0				0.0				0.0		0.0	
B2	0.0				0.0		0.0				0.0	3.1			12.2		12.2	12.2
B3	31.0		1.5		37.0		37.0				0.0	1.6			6.2		6.2	6.2
B3-A	0.0				0.0		0.0				0.0				0.0		0.0	
B4	0.0				0.0		0.0				0.0				0.0		0.0	
B5	0.0		1.4		5.6		5.6				0.0				0.0		0.0	

**APPENDIX J  
GRGID SEWER MASTER PLAN  
SEWER MODEL LOADS**

MH ID	Existing System						Infill (Vacant Lots)				Future Growth <sup>1</sup>						Total Infill + Future EDUs	
	SFR (DU)	MFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)	Total EDUs	SFR (DU)	MFR (DU)	C (ac)	Total EDUs	SFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)		Total EDUs
B6	106.0				106.0		106.0				0.0	12.0			12.0		12.0	12.0
B7	3.0				3.0		3.0				0.0				0.0		0.0	
B8	3.0				3.0		3.0				0.0				0.0		0.0	
B9	3.0				3.0		3.0				0.0				0.0		0.0	
B10	2.0				2.0		2.0				0.0				0.0		0.0	
B11	83.0				83.0		83.0	2.0			2.0				0.0		0.0	2.0
B12	4.0				4.0		4.0				0.0				0.0		0.0	
B13	2.0				2.0		2.0				0.0				0.0		0.0	
B14	57.0				57.0		57.0	3.0			3.0				0.0		0.0	3.0
B15	3.0				3.0		3.0				0.0				0.0		0.0	
B16	120.0				120.0		120.0	1.0			1.0				0.0		0.0	1.0
B17	3.0	20.0			16.4		16.4				0.0				0.0		0.0	
B18	4.0				4.0		4.0				0.0				0.0		0.0	
B19	2.0	8.0			7.4		7.4				0.0				0.0		0.0	
B19-A	1.0				1.0		1.0				0.0				0.0		0.0	
B20	2.0	26.0			19.4		19.4				0.0				0.0		0.0	
B20-A	0.0				0.0		0.0				0.0				0.0		0.0	
B21	110.0	14.0			119.4		119.4				0.0				0.0		0.0	
B21-A	0.0				0.0		0.0				0.0				0.0		0.0	
B22	0.0				0.0		0.0				0.0				0.0		0.0	
B22-A	0.0				0.0		0.0				0.0				0.0		0.0	
B23	76.0				76.0		76.0	1.0			1.0				0.0		0.0	1.0
B24	0.0				0.0		0.0				0.0				0.0		0.0	
B25	0.0	40.0	2.0		34.8		34.8				0.0				0.0		0.0	
B26	100.0	154.0	1.1		207.6		207.6	3.0	4.0		5.7				0.0		0.0	5.7
B26-A	0.0				0.0		0.0				0.0				0.0		0.0	
B27	0.0		0.2		0.8		0.8			0.7	2.8				0.0		0.0	2.8
B28	283.0	322.0			498.7		498.7	2.0	12.0		10.0				0.0		0.0	10.0
B29	3.0				3.0		3.0				0.0				0.0		0.0	
B30	6.0				6.0		6.0	1.0			1.0				0.0		0.0	1.0
B30-1	6.0				6.0		6.0				0.0				0.0		0.0	
B30-2	6.0				6.0		6.0				0.0				0.0		0.0	
B30-3	12.0				12.0		12.0				0.0				0.0		0.0	
B30-4	7.0				7.0		7.0				0.0				0.0		0.0	
B30-5	10.0				10.0		10.0				0.0				0.0		0.0	
B30-6	11.0				11.0		11.0				0.0				0.0		0.0	
B30-7	4.0				4.0		4.0				0.0				0.0		0.0	
B31	15.0				15.0		15.0				0.0				0.0		0.0	
B32	7.0				7.0		7.0	1.0			1.0				0.0		0.0	1.0
B33	14.0				14.0		14.0	6.0			6.0				0.0		0.0	6.0
B33-1	15.0				15.0		15.0				0.0				0.0		0.0	
B33-1A	6.0				6.0		6.0				0.0				0.0		0.0	
B33-1B	11.0				11.0		11.0				0.0				0.0		0.0	
B33-1B1	8.0				8.0		8.0				0.0				0.0		0.0	
B33-1B2	8.0				8.0		8.0				0.0				0.0		0.0	
B33-1B3	9.0				9.0		9.0				0.0				0.0		0.0	

**APPENDIX J  
GRGID SEWER MASTER PLAN  
SEWER MODEL LOADS**

MH ID	Existing System						Infill (Vacant Lots)				Future Growth <sup>1</sup>						Total Infill + Future EDUs	
	SFR (DU)	MFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)	Total EDUs	SFR (DU)	MFR (DU)	C (ac)	Total EDUs	SFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)		Total EDUs
B33-1B4	8.0				8.0		8.0				0.0				0.0		0.0	
B33-1B5	8.0				8.0		8.0				0.0				0.0		0.0	
B33-1B6	7.0				7.0		7.0				0.0				0.0		0.0	
B33-1B7	0.0				0.0		0.0				0.0				0.0		0.0	
B33-1C	9.0				9.0		9.0				0.0				0.0		0.0	
B33-1C2	3.0				3.0		3.0				0.0				0.0		0.0	
B33-1C3	9.0				9.0		9.0				0.0				0.0		0.0	
B33-1C4	5.0				5.0		5.0				0.0				0.0		0.0	
B33-1C5	4.0				4.0		4.0				0.0				0.0		0.0	
B33-1C6	5.0				5.0		5.0				0.0				0.0		0.0	
B33-1C7	6.0				6.0		6.0				0.0				0.0		0.0	
B33-1C8	4.0				4.0		4.0				0.0				0.0		0.0	
B33-1D	5.0				5.0		5.0				0.0				0.0		0.0	
B33-1E	12.0				12.0		12.0				0.0				0.0		0.0	
B33-1E1	11.0				11.0		11.0				0.0				0.0		0.0	
B33-1E2	11.0				11.0		11.0				0.0				0.0		0.0	
B33-1E3	11.0				11.0		11.0				0.0				0.0		0.0	
B33-1E4	11.0				11.0		11.0				0.0				0.0		0.0	
B33-1E5	9.0				9.0		9.0				0.0				0.0		0.0	
B33-1E6	15.0				15.0		15.0				0.0				0.0		0.0	
B33-1E7	39.0				39.0		39.0				0.0				0.0		0.0	
B33-1E8	13.0				13.0		13.0				0.0				0.0		0.0	
B33-1E9	7.0				7.0		7.0				0.0				0.0		0.0	
B33-1E10	3.0				3.0		3.0				0.0				0.0		0.0	
B33-1E11	10.0				10.0		10.0				0.0				0.0		0.0	
B33-1E12	10.0				10.0		10.0				0.0				0.0		0.0	
B33-1F	9.0				9.0		9.0				0.0				0.0		0.0	
B33-1G	10.0				10.0		10.0				0.0				0.0		0.0	
B33-1G1	4.0				4.0		4.0				0.0				0.0		0.0	
B33-1H	8.0				8.0		8.0				0.0				0.0		0.0	
B33-1H1	10.0				10.0		10.0				0.0				0.0		0.0	
B33-1H2	0.0				0.0		0.0				0.0				0.0		0.0	
B33-1J	8.0				8.0		8.0				0.0				0.0		0.0	
B33-1J2	18.0				18.0		18.0				0.0				0.0		0.0	
B33-2	76.0				76.0		76.0				0.0				0.0		0.0	
B33-3	172.0				172.0		172.0				0.0				0.0		0.0	
B33-12A	0.0				0.0		0.0				0.0				0.0		0.0	
B34	8.0				8.0		8.0				0.0				0.0		0.0	
B35	9.0				9.0		9.0				0.0				0.0		0.0	
B36	6.0				6.0		6.0				0.0				0.0		0.0	
B37	10.0				10.0		10.0				0.0				0.0		0.0	
B38	11.0				11.0		11.0				0.0				0.0		0.0	
B39	10.0				10.0		10.0				0.0				0.0		0.0	
B40	0.0				0.0		0.0				0.0				0.0		0.0	
B41	8.0				8.0		8.0				0.0	480.0	2.1	488.4		488.4	488.4	488.4
B42	6.0				6.0		6.0				0.0				0.0		0.0	

**APPENDIX J  
GRGID SEWER MASTER PLAN  
SEWER MODEL LOADS**

MH ID	Existing System						Infill (Vacant Lots)				Future Growth <sup>1</sup>						Total Infill + Future EDUs	
	SFR (DU)	MFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)	Total EDUs	SFR (DU)	MFR (DU)	C (ac)	Total EDUs	SFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)		Total EDUs
B43	5.0				5.0		5.0				0.0				0.0		0.0	
B44	4.0				4.0		4.0				0.0				0.0		0.0	
B45	9.0				9.0		9.0				0.0				0.0		0.0	
B46	7.0				7.0		7.0				0.0				0.0		0.0	
B46-1	6.0				6.0		6.0				0.0				0.0		0.0	
B46-2	6.0				6.0		6.0				0.0	240.0			240.0		240.0	240.0
B47	6.0				6.0		6.0				0.0				0.0		0.0	
B47-1	9.0				9.0		9.0				0.0	240.0			240.0		240.0	240.0
B47-2	10.0				10.0		10.0				0.0				0.0		0.0	
B47-3	7.0				7.0		7.0				0.0				0.0		0.0	
B47-4	9.0				9.0		9.0				0.0	233.0			233.0		233.0	233.0
B48	28.0				28.0		28.0				0.0				0.0		0.0	
B48-1	2.0				2.0		2.0				0.0				0.0		0.0	
B49	11.0				11.0		11.0				0.0				0.0		0.0	
B50	9.0				9.0		9.0				0.0				0.0		0.0	
B51	8.0				8.0		8.0	1.0			1.0				0.0		0.0	1.0
B51-1	45.0				45.0		45.0				0.0				0.0		0.0	
B52	11.0				11.0		11.0				0.0				0.0		0.0	
B53	14.0				14.0		14.0				0.0				0.0		0.0	
B53-1	37.0				37.0		37.0				0.0				0.0		0.0	
B53-2	17.0				17.0		17.0				0.0				0.0		0.0	
B53-3	13.0				13.0		13.0				0.0				0.0		0.0	
B53-4	5.0				5.0		5.0				0.0				0.0		0.0	
B53-5	9.0				9.0		9.0				0.0				0.0		0.0	
B53-6	8.0				8.0		8.0				0.0				0.0		0.0	
B53-6A	3.0				3.0		3.0				0.0	25.0			25.0		25.0	25.0
B53-7	1.0				1.0		1.0				0.0				0.0		0.0	
B53-8	1.0				1.0		1.0				0.0				0.0		0.0	
B53-9	2.0				2.0		2.0				0.0	25.0			25.0		25.0	25.0
B54	9.0				9.0		9.0				0.0	48.0			48.0		48.0	48.0
B55	12.0				12.0		12.0				0.0				0.0		0.0	
B56	9.0				9.0		9.0				0.0				0.0		0.0	
B57	6.0				6.0		6.0				0.0	50.0	2.1		58.4		58.4	58.4
C1	6.0				6.0		6.0				0.0				0.0		0.0	
C2	9.0				9.0		9.0				0.0				0.0		0.0	
C3	5.0				5.0		5.0				0.0				0.0		0.0	
C3-A	86.0				86.0		86.0				0.0				0.0		0.0	
C4	0.0				0.0		0.0				0.0				0.0		0.0	
C4-A	0.0				0.0		0.0				0.0				0.0		0.0	
C5	13.0				13.0		13.0				0.0				0.0		0.0	
D1	2.0				2.0		2.0				0.0				0.0		0.0	
D1-A	2.0				2.0		2.0				0.0				0.0		0.0	
D2	10.0				10.0		10.0				0.0				0.0		0.0	
D2-A	0.0				0.0		0.0				0.0				0.0		0.0	
D3	12.0				12.0		12.0				0.0				0.0		0.0	
D3-A	0.0				0.0		0.0				0.0				0.0		0.0	

**APPENDIX J  
GRGID SEWER MASTER PLAN  
SEWER MODEL LOADS**

MH ID	Existing System						Infill (Vacant Lots)				Future Growth <sup>1</sup>						Total Infill + Future EDUs	
	SFR (DU)	MFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)	Total EDUs	SFR (DU)	MFR (DU)	C (ac)	Total EDUs	SFR (DU)	C (ac)	P (ac)	Subtotal EDUs	SCH (Students)		Total EDUs
D4	40.0				40.0		40.0				0.0				0.0		0.0	
D4-A	0.0				0.0		0.0				0.0				0.0		0.0	
D5	5.0				5.0		5.0				0.0				0.0		0.0	
D7	6.0				6.0		6.0				0.0				0.0		0.0	
D8	3.0				3.0		3.0				0.0				0.0		0.0	
D9	92.0	134.0			181.8		181.8	3.0			3.0				0.0		0.0	3.0
D9-A	30.0				30.0		30.0				0.0				0.0		0.0	
D10	6.0				6.0		6.0				0.0				0.0		0.0	
D11	7.0				7.0		7.0				0.0				0.0		0.0	
D12	7.0				7.0		7.0				0.0				0.0		0.0	
D13	7.0				7.0		7.0	1.0			1.0				0.0		0.0	1.0
D14	5.0				5.0		5.0				0.0				0.0		0.0	
D15	11.0				11.0		11.0	1.0			1.0				0.0		0.0	1.0
D15-A	0.0				0.0		0.0				0.0				0.0		0.0	
D16	6.0				6.0		6.0				0.0				0.0		0.0	
D16-1	13.0				13.0		13.0				0.0				0.0		0.0	
D16-2	4.0				4.0		4.0				0.0				0.0		0.0	
D17	0.0				0.0		0.0				0.0				0.0		0.0	
D18	0.0				0.0		0.0				0.0				0.0		0.0	
D19	0.0				0.0		0.0				0.0				0.0		0.0	
D20	0.0				0.0		0.0				0.0				0.0		0.0	
D21	0.0				0.0		0.0				0.0				0.0		0.0	
D22	0.0				0.0		0.0				0.0				0.0		0.0	
D23	0.0				0.0		0.0				0.0				0.0		0.0	
D24	0.0				0.0		0.0				0.0				0.0		0.0	
D25	0.0	132.0			88.4		88.4				0.0	50.0			50.0		50.0	50.0
D25-A	0.0				0.0		0.0				0.0				0.0		0.0	
D26	0.0				0.0		0.0				0.0				0.0		0.0	
D27	0.0				0.0		0.0				0.0				0.0		0.0	
D28	0.0				0.0		0.0				0.0				0.0		0.0	
D29	0.0		4.3		17.2		17.2				0.0				0.0		0.0	
D30	135.0		9.9		174.6		174.6			7.7	30.8			1.0	4.0		4.0	34.8
E1	5.0				5.0		5.0				0.0				0.0		0.0	
E2	16.0				16.0		16.0				0.0				0.0		0.0	
E3	80.0				80.0		80.0	41.0			41.0	179.0			179.0		179.0	220.0
E4	8.0				8.0		8.0				0.0				0.0		0.0	
E5	4.0				4.0		4.0				0.0				0.0		0.0	
E6	7.0				7.0		7.0				0.0				0.0		0.0	
E7	22.0				22.0		22.0				0.0				0.0		0.0	
E8	5.0				5.0		5.0				0.0				0.0		0.0	
E9	78.0				78.0		78.0	66.0		8.6	100.4	292.0	19.6	2.1	378.8		378.8	479.2
E9-1	38.0				38.0		38.0	8.0			8.0				0.0		0.0	8.0
E9-A	0.0				0.0		0.0				0.0				0.0		0.0	
<b>Total</b>	<b>3514.0</b>	<b>870.0</b>	<b>23.0</b>	<b>8.1</b>	<b>4221.3</b>	<b>1710.0</b>	<b>4308.8</b>	<b>186.0</b>	<b>16.0</b>	<b>17.0</b>	<b>264.7</b>	<b>4416.0</b>	<b>27.3</b>	<b>8.4</b>	<b>4558.8</b>	<b>1810.0</b>	<b>4651.4</b>	<b>4916.1</b>

<sup>1</sup> Future acreage and student counts for public land use and schools are estimated proportional to infill/future versus existing dwelling unit counts (SFR and MFR).

<sup>2</sup> SFR = single-family residential, MDF = multi-family residential, C = commercial, P = public, SCH = school

**Appendix K Sewer Model Output**

**APPENDIX K-1  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
A1	4,789.60	MGSD Outfall	4,784.60	525	0.013	18	0.05	159,036	4.33	15,180,131	0.11	7.21	FALSE	4,796.10	4,796.10	5.07
A10	4,804.60	A9	4,800.30	349.2	0.013	12	0.012	98,233	2.43	2,555,068	0.13	13.39	FALSE	4,809.50	4,807.30	4.29
A11	4,809.00	A10	4,804.60	342.8	0.013	12	0.013	98,233	2.46	2,608,565	0.13	13.26	FALSE	4,814.10	4,809.50	4.43
A12	4,821.60	A11	4,809.00	340.7	0.013	12	0.037	97,803	3.56	4,428,353	0.1	10.27	FALSE	4,828.50	4,814.10	12.6
A13	4,831.00	A12	4,821.60	356.1	0.013	12	0.026	97,803	3.16	3,740,955	0.11	11.14	FALSE	4,837.90	4,828.50	9.45
A14	4,833.00	A13	4,831.00	346.2	0.013	12	0.006	97,803	1.86	1,750,057	0.16	16.05	FALSE	4,843.80	4,837.90	2
A15	4,837.20	A14	4,833.00	436.1	0.013	12	0.01	49,041	1.81	2,259,545	0.1	10.19	FALSE	4,847.60	4,843.80	4.15
A16	4,839.50	A15	4,837.20	212.9	0.013	12	0.011	47,107	1.86	2,393,111	0.1	9.72	FALSE	4,850.50	4,847.60	2.3
A17	4,843.80	A16	4,839.50	353.2	0.013	12	0.012	40,012	1.85	2,540,472	0.09	8.74	FALSE	4,853.70	4,850.50	4.29
A18	4,847.40	A17	4,843.80	174.9	0.013	12	0.021	38,507	2.19	3,303,075	0.08	7.59	FALSE	4,855.10	4,853.70	3.6
A19	4,848.70	A18	4,847.40	169.6	0.013	12	0.008	38,507	1.55	2,015,848	0.1	9.59	FALSE	4,854.70	4,855.10	1.3
A1-A	4,791.00	A1	4,789.60	163.3	0.013	12	0.009	159,036	2.46	2,131,885	0.18	18.5	FALSE	4,798.00	4,796.10	1.42
A2	4,791.30	A1-A	4,791.00	15.5	0.013	12	0.019	159,036	3.28	3,201,095	0.15	15.16	FALSE	4,797.70	4,798.00	0.35
A20	4,850.40	A19	4,848.70	171.7	0.013	12	0.01	38,507	1.70	2,290,959	0.09	9.02	FALSE	4,857.50	4,854.70	1.71
A21	4,852.70	A20	4,850.40	367.3	0.013	12	0.006	37,861	1.44	1,822,182	0.1	9.98	FALSE	4,857.90	4,857.50	2.3
A22	4,854.70	A21	4,852.70	328.7	0.013	12	0.006	37,432	1.42	1,796,052	0.1	9.99	FALSE	4,860.40	4,857.90	2
A23	4,857.30	A22	4,854.70	378.8	0.013	12	0.007	36,786	1.47	1,907,552	0.1	9.63	FALSE	4,863.20	4,860.40	2.6
A24	4,859.30	A23	4,857.30	361.7	0.013	12	0.006	36,142	1.36	1,712,292	0.1	10.05	FALSE	4,865.70	4,863.20	2
A25	4,861.90	A24	4,859.30	389.3	0.013	12	0.007	35,496	1.44	1,881,661	0.1	9.55	FALSE	4,870.20	4,865.70	2.6
A26	4,863.90	A25	4,861.90	366.1	0.013	12	0.005	33,992	1.33	1,701,903	0.1	9.79	FALSE	4,872.10	4,870.20	2
A27	4,866.40	A26	4,863.90	391.1	0.013	12	0.006	33,562	1.40	1,840,897	0.09	9.38	FALSE	4,875.60	4,872.10	2.5
A28	4,867.90	A27	4,866.40	301.9	0.013	12	0.004	32,272	1.20	1,510,934	0.1	10.11	FALSE	4,877.00	4,875.60	1.31
A29	4,869.10	A28	4,868.00	313.1	0.013	12	0.004	31,626	1.11	1,364,756	0.11	10.51	FALSE	4,877.50	4,877.00	1.12
A3	4,792.30	A2	4,791.30	382.2	0.013	12	0.003	158,606	1.62	1,177,749	0.25	24.79	FALSE	4,800.00	4,797.70	1.04
A30	4,870.60	A29	4,869.10	344.6	0.013	12	0.004	30,981	1.19	1,519,250	0.1	9.89	FALSE	4,879.40	4,877.50	1.49
A31	4,872.20	A30	4,870.60	351.6	0.013	12	0.005	30,122	1.20	1,553,249	0.1	9.66	FALSE	4,879.20	4,879.40	1.6
A32	4,872.90	A31	4,872.20	353.9	0.013	12	0.002	29,261	0.89	1,024,107	0.12	11.62	FALSE	4,879.50	4,879.20	0.72
A33	4,873.80	A32	4,872.90	394.4	0.013	12	0.002	28,617	0.93	1,099,936	0.11	11.11	FALSE	4,882.60	4,879.50	0.9
A33-A	4,874.20	A33	4,873.80	255.2	0.013	12	0.002	28,401	0.81	911,553	0.12	12.09	FALSE	4,884.00	4,882.60	0.41
A34	4,874.80	A33-A	4,874.20	200.5	0.013	8	0.003	28,401	1.07	427,231	0.12	17.46	FALSE	4,884.70	4,884.00	0.6
A34.1	4,877.50	A34	4,874.90	300.4	0.013	8	0.009	1,720	0.66	726,623	0.02	3.6	FALSE	4,885.90	4,884.70	2.6
A34.2	4,880.10	A34.1	4,877.50	300.7	0.013	8	0.009	1,075	0.58	726,171	0.02	2.88	FALSE	4,887.20	4,885.90	2.6
A34.3	4,882.80	A34.2	4,880.10	298.4	0.013	8	0.009	430	0.45	742,923	0.01	1.86	FALSE	4,888.60	4,887.20	2.69
A34.4	4,884.20	A34.3	4,882.80	137.3	0.013	8	0.01	215	0.37	788,642	0.01	1.32	FALSE	4,889.40	4,888.60	1.4
A4	4,794.50	A3	4,792.30	387.8	0.013	12	0.006	157,745	2.12	1,734,221	0.2	20.38	FALSE	4,802.60	4,800.00	2.16
A5	4,796.10	A4	4,794.50	368.4	0.013	12	0.004	156,885	1.93	1,517,545	0.22	21.71	FALSE	4,804.60	4,802.60	1.61
A6	4,797.40	A5	4,796.10	288	0.013	12	0.005	156,240	1.95	1,546,925	0.21	21.46	FALSE	4,806.70	4,804.60	1.3
A7	4,798.70	A6	4,797.40	341	0.013	12	0.004	155,810	1.84	1,421,661	0.22	22.35	FALSE	4,808.20	4,806.70	1.31
A8	4,799.20	A7	4,798.70	324.4	0.013	12	0.002	98,233	1.17	904,027	0.22	22.26	FALSE	4,810.80	4,808.20	0.5
A9	4,800.30	A8	4,799.20	235.8	0.013	12	0.005	98,233	1.73	1,572,636	0.17	16.94	FALSE	4,807.30	4,810.80	1.05
B1	4,766.60	MGSD Outfall	4,761.60	388.1	0.013	18	0.05	917,418	7.33	15,180,131	0.25	16.66	FALSE	4,774.50	4,774.50	5.2
B10	4,808.60	B9	4,805.10	413.7	0.013	15	0.008	650,040	3.60	3,840,035	0.35	27.85	FALSE	4,816.20	4,811.40	3.5
B11	4,811.30	B10	4,808.60	301.2	0.013	15	0.009	649,610	3.68	3,952,479	0.34	27.42	FALSE	4,818.90	4,816.20	2.7
B12	4,815.20	B11	4,811.30	378.8	0.013	15	0.01	631,765	3.84	4,236,112	0.33	26.1	FALSE	4,822.10	4,818.90	3.89
B13	4,818.00	B12	4,815.20	390.8	0.013	15	0.007	630,905	3.37	3,533,931	0.36	28.62	FALSE	4,823.70	4,822.10	2.8
B14	4,820.50	B13	4,818.00	350	0.013	15	0.007	630,475	3.36	3,528,514	0.36	28.63	FALSE	4,826.10	4,823.70	2.5
B15	4,822.10	B14	4,820.50	287	0.013	15	0.006	618,220	3.06	3,116,896	0.38	30.2	FALSE	4,827.80	4,826.10	1.6
B16	4,823.50	B15	4,822.10	301.2	0.013	15	0.005	617,575	2.87	2,846,268	0.4	31.64	FALSE	4,830.40	4,827.80	1.41
B17	4,827.00	B16	4,823.50	401.9	0.013	15	0.009	591,775	3.55	3,895,904	0.33	26.34	FALSE	4,833.60	4,830.40	3.48
B18	4,831.30	B17	4,827.00	417.8	0.013	15	0.01	588,249	3.76	4,235,340	0.31	25.18	FALSE	4,838.50	4,833.60	4.3
B19	4,833.10	B18	4,831.30	280.7	0.013	15	0.006	587,389	3.17	3,343,380	0.35	28.36	FALSE	4,841.10	4,838.50	1.8
B19-A	4,833.80	B19	4,833.10	108.2	0.013	15	0.006	585,806	3.18	3,358,582	0.35	28.26	FALSE	4,841.10	4,841.10	0.7
B2	4,769.10	B1	4,766.60	208.7	0.013	15	0.012	912,903	4.50	4,568,983	0.38	30.31	FALSE	4,780.80	4,774.50	2.59

**APPENDIX K-1  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B20	4,834.30	B19-A	4,833.80	138.7	0.013	15	0.004	585,591	2.58	2,506,315	0.41	32.88	FALSE	4,842.40	4,841.10	0.54
B20-A	4,835.20	B20	4,834.30	161.5	0.013	15	0.006	581,416	3.01	3,116,967	0.37	29.26	FALSE	4,843.80	4,842.40	0.86
B21	4,836.30	B21-A	4,835.40	210.6	0.013	15	0.004	581,416	2.73	2,728,952	0.39	31.34	FALSE	4,845.40	4,844.30	0.83
B21-A	4,835.40	B20-A	4,835.20	85.3	0.013	15	0.002	581,416	2.20	2,021,457	0.46	36.72	FALSE	4,844.30	4,843.80	0.29
B22	4,837.60	B22-A	4,837.00	91	0.013	15	0.007	555,749	3.15	3,390,235	0.34	27.38	FALSE	4,845.50	4,845.80	0.58
B22-A	4,837.00	B21	4,836.30	167.3	0.013	15	0.004	555,749	2.68	2,700,821	0.38	30.78	FALSE	4,845.80	4,845.40	0.69
B23	4,838.20	B22	4,837.60	277.2	0.013	15	0.002	555,749	2.11	1,942,456	0.46	36.62	FALSE	4,845.90	4,845.50	0.69
B24	4,839.20	B23	4,838.20	194.5	0.013	15	0.005	539,409	2.86	2,993,806	0.36	28.75	FALSE	4,846.60	4,845.90	0.9
B25	4,840.20	B24	4,839.20	206.6	0.013	15	0.005	539,409	2.80	2,904,362	0.36	29.19	FALSE	4,847.80	4,846.60	1.01
B26	4,842.33	B26-A	4,841.44	161.2	0.013	15	0.006	531,927	2.92	3,102,088	0.35	28.01	FALSE	4,849.90	4,849.60	0.9
B26-A	4,841.44	B25	4,840.20	206.7	0.013	15	0.006	531,927	3.01	3,233,182	0.34	27.43	FALSE	4,849.60	4,847.80	1.23
B27	4,844.40	B26	4,842.33	392.8	0.013	15	0.005	487,298	2.80	3,030,669	0.34	27.11	FALSE	4,850.90	4,849.90	2.05
B28	4,845.80	B27	4,844.40	402.9	0.013	15	0.003	487,125	2.42	2,460,866	0.38	30.17	FALSE	4,852.00	4,850.90	1.44
B29	4,846.80	B28	4,845.80	342.5	0.013	15	0.003	379,905	2.11	2,255,882	0.35	27.78	FALSE	4,853.10	4,852.00	0.97
B3	4,772.60	B2	4,769.10	417.3	0.013	15	0.008	683,279	3.64	3,823,620	0.36	28.63	FALSE	4,782.00	4,780.80	3.44
B30	4,848.20	B29	4,846.80	240	0.013	15	0.006	379,260	2.71	3,188,841	0.29	23.27	FALSE	4,855.00	4,853.10	1.35
B30-1	4,851.57	B30	4,848.20	257.6	0.013	6	0.013	12,040	1.45	414,808	0.06	11.71	FALSE	4,856.92	4,855.00	3.14
B30-2	4,854.52	B30-1	4,851.57	243.4	0.013	6	0.012	10,750	1.36	399,206	0.06	11.3	FALSE	4,859.92	4,856.92	2.95
B30-3	4,857.69	B30-2	4,854.52	240.5	0.013	6	0.013	9,460	1.35	416,363	0.05	10.41	FALSE	4,863.19	4,859.92	3.17
B30-4	4,860.17	B30-3	4,857.69	416.1	0.013	6	0.006	6,880	0.93	279,942	0.05	10.81	FALSE	4,865.27	4,863.19	2.48
B30-5	4,865.93	B30-4	4,860.17	426.1	0.013	6	0.014	5,375	1.16	421,646	0.04	7.88	FALSE	4,870.58	4,865.27	5.75
B30-6	4,870.65	B30-5	4,865.93	433.2	0.013	6	0.011	3,225	0.91	378,508	0.03	6.57	FALSE	4,875.81	4,870.58	4.71
B30-7	4,874.91	B30-6	4,870.65	397.8	0.013	6	0.011	860	0.60	375,270	0.02	3.55	FALSE	4,880.21	4,875.81	4.24
B31	4,849.40	B30	4,848.20	397.2	0.013	15	0.003	365,930	2.12	2,294,845	0.34	27	FALSE	4,857.40	4,855.00	1.24
B32	4,850.66	B31	4,849.40	346.5	0.013	15	0.004	362,705	2.26	2,517,615	0.32	25.65	FALSE	4,858.20	4,857.40	1.24
B33	4,851.00	B32	4,850.66	339.6	0.013	15	0.001	361,200	1.42	1,320,920	0.45	35.74	FALSE	4,857.60	4,858.20	0.47
B33-1	4,851.83	B33	4,851.00	312.4	0.013	14	0.003	122,550	1.48	1,790,394	0.21	17.72	FALSE	4,858.61	4,857.60	0.59
B33-12A	4,888.10	B51-1	4,885.51	446.2	0.013	6	0.006	0	0.00	276,270	(N/A)	(N/A)	FALSE	4,893.46	4,893.37	2.53
B33-1A	4,855.74	B33-1	4,851.83	331.4	0.013	6	0.012	23,650	1.71	393,868	0.08	16.61	FALSE	4,861.16	4,858.61	3.8
B33-1B	4,858.88	B33-1A	4,855.74	285	0.013	6	0.011	22,360	1.64	380,610	0.08	16.45	FALSE	4,864.35	4,861.16	3.14
B33-1B1	4,860.58	B33-1B	4,858.88	310.1	0.013	6	0.005	10,320	1.02	268,497	0.07	13.39	FALSE	4,865.40	4,864.35	1.68
B33-1B2	4,863.74	B33-1B1	4,860.58	320.2	0.013	6	0.01	8,600	1.19	360,248	0.05	10.66	FALSE	4,868.08	4,865.40	3.15
B33-1B3	4,866.79	B33-1B2	4,863.74	319.8	0.013	6	0.01	6,880	1.09	354,142	0.05	9.71	FALSE	4,871.80	4,868.08	3.04
B33-1B4	4,869.50	B33-1B3	4,866.79	319.6	0.013	6	0.008	4,945	0.95	333,909	0.04	8.48	FALSE	4,874.32	4,871.80	2.7
B33-1B5	4,871.07	B33-1B4	4,869.50	263.8	0.013	6	0.006	3,225	0.75	279,766	0.04	7.5	FALSE	4,875.12	4,874.32	1.56
B33-1B6	4,872.28	B33-1B5	4,871.07	274.8	0.013	6	0.004	1,505	0.53	240,623	0.03	5.67	FALSE	4,876.69	4,875.12	1.2
B33-1B7	4,873.64	B33-1B6	4,872.28	261.7	0.013	6	0.005	(N/A)	(N/A)	261,422	(N/A)	(N/A)	FALSE	4,878.09	4,876.69	(N/A)
B33-1B7	4,873.64	B33-1C8	4,870.18	174	0.013	6	0.02	(N/A)	(N/A)	511,416	(N/A)	(N/A)	FALSE	4,878.09	4,876.10	(N/A)
B33-1C	4,862.61	B33-1B	4,858.88	265.8	0.013	6	0.014	9,675	1.39	429,590	0.05	10.37	FALSE	4,868.24	4,864.35	3.7
B33-1C2	4,863.92	B33-1C	4,862.61	301.1	0.013	6	0.004	6,665	0.82	239,184	0.06	11.48	FALSE	4,869.13	4,868.24	1.31
B33-1C3	4,865.32	B33-1C2	4,863.92	194.8	0.013	6	0.007	6,020	0.95	307,452	0.05	9.74	FALSE	4,870.26	4,869.13	1.39
B33-1C4	4,866.76	B33-1C3	4,865.32	277.1	0.013	6	0.005	1,075	0.50	261,417	0.02	4.69	FALSE	4,872.23	4,870.26	1.42
B33-1C5	4,866.76	B33-1C3	4,865.32	281.9	0.013	6	0.005	3,010	0.69	259,159	0.04	7.53	FALSE	4,872.02	4,870.26	1.43
B33-1C6	4,867.73	B33-1C5	4,866.76	142.8	0.013	6	0.007	0	0.00	298,859	(N/A)	(N/A)	FALSE	4,873.78	4,872.02	0.93
B33-1C7	4,867.90	B33-1C5	4,866.76	171.1	0.013	6	0.007	2,150	0.68	296,022	0.03	6.09	FALSE	4,873.94	4,872.02	1.13
B33-1C8	4,870.18	B33-1C7	4,867.90	205.5	0.013	6	0.011	860	0.61	381,944	0.02	3.52	FALSE	4,876.10	4,873.94	2.27
B33-1D	4,867.21	B33-1C	4,862.61	297.8	0.013	6	0.015	1,075	0.73	450,680	0.02	3.61	FALSE	4,872.01	4,868.24	4.56
B33-1E	4,854.76	B33-1	4,851.83	363.4	0.013	6	0.008	42,355	1.77	325,619	0.12	24.4	FALSE	4,860.06	4,858.61	2.85
B33-1E1	4,856.57	B33-1E	4,854.76	268.6	0.013	6	0.007	37,840	1.61	297,701	0.12	24.03	FALSE	4,861.56	4,860.06	1.8
B33-1E10	4,888.26	B33-1E9	4,886.57	235.1	0.013	6	0.007	4,945	0.90	307,456	0.04	8.83	FALSE	4,894.17	4,892.37	1.69
B33-1E11	4,889.43	B33-1E10	4,888.26	156.1	0.013	6	0.007	4,300	0.88	313,929	0.04	8.16	FALSE	4,895.25	4,894.17	1.17
B33-1E12	4,891.24	B33-1E11	4,889.43	319.6	0.013	6	0.006	2,150	0.64	272,901	0.03	6.33	FALSE	4,897.04	4,895.25	1.8
B33-1E2	4,859.03	B33-1E1	4,856.57	388.8	0.013	6	0.006	35,475	1.55	288,445	0.12	23.66	FALSE	4,864.23	4,861.56	2.46

**APPENDIX K-1  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B33-1E3	4,863.03	B33-1E2	4,859.03	397.6	0.013	6	0.01	33,110	1.78	363,738	0.1	20.39	FALSE	4,867.78	4,864.23	3.99
B33-1E4	4,866.86	B33-1E3	4,863.03	401	0.013	6	0.01	30,745	1.71	354,413	0.1	19.92	FALSE	4,871.80	4,867.78	3.83
B33-1E5	4,870.67	B33-1E4	4,866.86	421	0.013	6	0.009	28,380	1.64	344,990	0.1	19.44	FALSE	4,877.43	4,871.80	3.81
B33-1E6	4,872.77	B33-1E5	4,870.67	352.3	0.013	6	0.006	23,435	1.34	279,982	0.1	19.59	FALSE	4,878.72	4,877.43	2.1
B33-1E7	4,879.34	B33-1E6	4,872.77	491.2	0.013	6	0.013	15,910	1.59	419,284	0.07	13.31	FALSE	4,884.69	4,878.72	6.54
B33-1E8	4,883.77	B33-1E7	4,879.34	300.4	0.013	6	0.015	15,910	1.64	440,557	0.06	12.99	FALSE	4,889.66	4,884.69	4.45
B33-1E9	4,886.57	B33-1E8	4,883.77	262.9	0.013	6	0.011	6,450	1.11	374,253	0.05	9.14	FALSE	4,892.37	4,889.66	2.77
B33-1F	4,855.88	B33-1E	4,854.76	256.1	0.013	6	0.004	1,935	0.56	239,810	0.03	6.41	FALSE	4,861.23	4,860.06	1.03
B33-1G	4,878.30	B33-1E5	4,870.67	406	0.013	6	0.019	3,010	1.08	497,103	0.03	5.59	FALSE	4,882.96	4,877.43	7.56
B33-1G1	4,883.60	B33-1G	4,878.30	372	0.013	6	0.014	860	0.68	432,872	0.02	3.28	FALSE	4,888.07	4,882.96	5.28
B33-1H	4,874.42	B33-1E6	4,872.77	304	0.013	6	0.005	4,300	0.78	267,156	0.04	8.83	FALSE	4,879.65	4,878.72	1.6
B33-1H1	4,876.11	B33-1H	4,874.42	260.9	0.013	6	0.006	2,150	0.67	291,874	0.03	6.13	FALSE	4,880.82	4,879.65	1.68
B33-1J	4,888.17	B33-1E8	4,883.77	333.9	0.013	6	0.013	6,665	1.22	416,265	0.04	8.81	FALSE	4,893.22	4,889.66	4.37
B33-1J1	4,889.39	B33-1J	4,888.17	235.7	0.013	6	0.005	4,945	0.81	260,905	0.05	9.52	FALSE	4,894.55	4,893.22	1.22
B33-1J2	4,892.63	B33-1J1	4,889.39	197.1	0.013	6	0.016	3,870	1.11	464,909	0.03	6.5	FALSE	4,899.10	4,894.55	3.23
B33-2	4,852.05	B33-1	4,851.83	368.1	0.013	10	0.001	53,320	0.71	346,163	0.22	26.53	FALSE	4,858.57	4,858.61	0.23
B33-3	4,853.78	B33-2	4,852.05	346.3	0.013	10	0.005	36,980	1.35	1,000,846	0.11	13.13	FALSE	4,859.47	4,858.57	1.62
B34	4,851.70	B33	4,851.00	332	0.013	15	0.002	87,290	1.23	1,917,136	0.18	14.53	FALSE	4,858.00	4,857.60	0.44
B35	4,852.20	B34	4,851.70	389.2	0.013	15	0.001	85,570	1.02	1,496,455	0.2	16.23	FALSE	4,856.70	4,858.00	0.52
B36	4,852.80	B35	4,852.20	410.8	0.013	15	0.001	83,635	1.06	1,595,442	0.19	15.56	FALSE	4,858.00	4,856.70	0.59
B37	4,853.50	B36	4,852.80	412	0.013	15	0.002	82,345	1.12	1,720,794	0.19	14.89	FALSE	4,859.40	4,858.00	0.69
B38	4,854.08	B37	4,853.50	403.7	0.013	15	0.001	80,195	1.04	1,582,380	0.19	15.31	FALSE	4,860.90	4,859.40	0.59
B39	4,855.43	B38	4,854.08	417.7	0.013	12	0.003	77,830	1.41	1,309,070	0.17	16.54	FALSE	4,862.30	4,860.90	1.32
B3-A	4,773.90	B3	4,772.60	91.3	0.013	15	0.014	675,969	4.39	4,982,940	0.31	24.88	FALSE	4,783.50	4,782.00	1.3
B4	4,780.10	B3-A	4,773.90	491.7	0.013	15	0.013	675,969	4.20	4,687,825	0.32	25.66	FALSE	4,790.10	4,783.50	6.28
B40	4,855.80	B39	4,855.48	182.4	0.013	12	0.002	75,680	1.13	964,379	0.19	18.93	FALSE	4,863.00	4,862.30	0.37
B41	4,856.30	B40	4,855.80	168.6	0.013	12	0.003	75,680	1.36	1,253,765	0.17	16.65	FALSE	4,863.50	4,863.00	0.48
B42	4,859.90	B41	4,856.30	395.3	0.013	12	0.009	73,960	2.01	2,197,485	0.13	12.55	FALSE	4,865.50	4,863.50	3.57
B43	4,862.30	B42	4,860.00	249.8	0.013	12	0.009	72,670	2.00	2,209,299	0.12	12.41	FALSE	4,869.00	4,865.50	2.31
B44	4,863.90	B43	4,862.30	134.5	0.013	12	0.012	71,595	2.18	2,511,571	0.12	11.61	FALSE	4,871.50	4,869.00	1.6
B45	4,864.50	B44	4,863.90	214.1	0.013	12	0.003	70,735	1.31	1,219,036	0.16	16.35	FALSE	4,872.60	4,871.50	0.63
B46	4,865.30	B45	4,864.50	397.6	0.013	12	0.002	68,800	1.15	1,032,828	0.17	17.48	FALSE	4,874.30	4,872.60	0.81
B46-1	4,866.60	B46	4,865.50	279.4	0.013	10	0.004	2,580	0.56	888,409	0.03	3.95	FALSE	4,873.20	4,874.30	1.11
B46-2	4,866.90	B46-1	4,866.60	385.7	0.013	10	0.001	1,290	0.25	394,905	0.03	4.2	FALSE	4,871.80	4,873.20	0.3
B47	4,866.20	B46	4,865.30	341.5	0.013	12	0.003	64,715	1.25	1,182,004	0.16	15.89	FALSE	4,874.60	4,874.30	0.88
B47-1	4,867.00	B47	4,866.30	260.8	0.013	12	0.003	7,525	0.65	1,192,836	0.06	5.7	FALSE	4,874.40	4,874.60	0.7
B47-2	4,873.10	B47-1	4,867.10	373.6	0.013	8	0.016	5,590	1.18	989,752	0.04	5.4	FALSE	4,879.30	4,874.40	6.01
B47-3	4,875.90	B47-2	4,873.10	359.8	0.013	8	0.008	3,440	0.79	688,944	0.03	5.1	FALSE	4,881.80	4,879.30	2.79
B47-4	4,878.80	B47-3	4,875.90	362.1	0.013	8	0.008	1,935	0.67	698,936	0.03	3.87	FALSE	4,884.90	4,881.80	2.89
B48	4,871.10	B47	4,866.30	327.6	0.013	6	0.015	55,900	2.38	438,934	0.12	24.06	FALSE	4,876.50	4,874.60	4.82
B48-1	4,873.36	B48	4,871.10	222.4	0.013	6	0.01	430	0.48	365,566	0.01	2.58	FALSE	4,878.60	4,876.50	2.13
B49	4,876.80	B48	4,871.10	294.5	0.013	6	0.019	49,450	2.53	504,532	0.11	21.15	FALSE	4,882.80	4,876.50	5.69
B5	4,785.27	B4	4,780.10	506.6	0.013	15	0.01	675,969	3.90	4,217,619	0.34	27.07	FALSE	4,795.02	4,790.10	5.23
B50	4,879.20	B49	4,877.00	401.5	0.013	6	0.005	47,085	1.59	268,439	0.14	28.34	FALSE	4,886.60	4,882.80	2.21
B51	4,881.40	B50	4,879.20	348	0.013	6	0.006	45,150	1.65	288,343	0.13	26.78	FALSE	4,890.20	4,886.60	2.19
B51-1	4,885.51	B51	4,881.40	488.8	0.013	6	0.008	9,675	1.16	332,511	0.06	11.72	FALSE	4,893.37	4,890.20	4.04
B52	4,883.40	B51	4,881.40	404.2	0.013	6	0.005	33,755	1.39	255,092	0.12	24.6	FALSE	4,890.50	4,890.20	1.99
B53	4,885.20	B52	4,883.40	415.8	0.013	6	0.004	31,390	1.30	238,597	0.12	24.53	FALSE	4,892.10	4,890.50	1.8
B53-1	4,886.90	B53	4,885.30	323.4	0.013	6	0.005	20,640	1.21	255,083	0.1	19.19	FALSE	4,893.00	4,892.10	1.61
B53-2	4,888.60	B53-1	4,887.00	290.2	0.013	6	0.006	12,685	1.08	269,274	0.07	14.79	FALSE	4,893.70	4,893.00	1.61
B53-3	4,893.30	B53-2	4,888.60	298.5	0.013	6	0.016	9,030	1.41	455,058	0.05	9.79	FALSE	4,898.60	4,893.70	4.68
B53-4	4,895.30	B53-3	4,893.30	300.2	0.013	6	0.007	6,235	0.94	295,993	0.05	10.04	FALSE	4,900.70	4,898.60	1.99
B53-5	4,897.30	B53-4	4,895.30	376.4	0.013	6	0.005	5,160	0.81	264,332	0.05	9.73	FALSE	4,903.60	4,900.70	2

**APPENDIX K-1  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B53-6	4,898.50	B53-5	4,897.30	265.8	0.013	6	0.005	3,225	0.67	243,657	0.04	8.03	FALSE	4,905.50	4,903.60	1.19
B53-6A	4,901.50	B53-6	4,898.50	246.6	0.013	6	0.012	645	0.57	399,989	0.02	3.04	FALSE	4,906.30	4,905.50	2.98
B53-7	4,899.80	B53-6	4,898.50	202.3	0.013	6	0.006	860	0.50	290,716	0.02	4.02	FALSE	4,904.90	4,905.50	1.28
B53-8	4,900.70	B53-7	4,899.80	159.5	0.013	6	0.006	645	0.44	272,380	0.02	3.6	FALSE	4,904.90	4,904.90	0.9
B53-9	4,901.50	B53-8	4,900.70	229.8	0.013	6	0.003	430	0.34	213,956	0.02	3.3	FALSE	4,905.40	4,904.90	0.8
B54	4,892.50	B53	4,885.50	420.9	0.013	6	0.017	7,740	1.38	467,668	0.04	8.95	FALSE	4,898.20	4,892.10	7.01
B55	4,896.80	B54	4,892.50	413.2	0.013	6	0.01	5,805	1.07	369,931	0.04	8.72	FALSE	4,902.20	4,898.20	4.29
B56	4,901.00	B55	4,896.80	402.3	0.013	6	0.01	3,225	0.89	370,519	0.03	6.64	FALSE	4,907.60	4,902.20	4.19
B57	4,903.10	B56	4,901.00	368.8	0.013	6	0.006	1,290	0.55	273,625	0.02	4.97	FALSE	4,907.60	4,907.60	2.09
B6	4,789.80	B5	4,785.27	211.2	0.013	15	0.021	674,765	5.07	6,114,566	0.28	22.43	FALSE	4,798.00	4,795.02	4.53
B7	4,795.70	B6	4,789.80	405.9	0.013	15	0.015	651,975	4.38	5,033,388	0.3	24.31	FALSE	4,804.00	4,798.00	5.89
B8	4,800.60	B7	4,795.70	394.9	0.013	15	0.012	651,330	4.13	4,650,598	0.32	25.28	FALSE	4,807.00	4,804.00	4.9
B9	4,805.10	B8	4,800.60	379.8	0.013	15	0.012	650,685	4.07	4,544,621	0.32	25.57	FALSE	4,811.40	4,807.00	4.5
C1	4,771.80	B2	4,769.10	244.8	0.013	10	0.011	229,624	3.06	1,487,101	0.22	26.56	FALSE	4,777.80	4,780.80	2.49
C2	4,773.00	C1	4,771.80	211.3	0.013	10	0.006	228,334	2.41	1,067,098	0.26	31.41	FALSE	4,779.70	4,777.80	1.2
C3	4,774.30	C2	4,773.00	303.3	0.013	10	0.004	226,399	2.17	927,005	0.28	33.69	FALSE	4,786.00	4,779.70	1.32
C3-A	4,776.30	C3	4,774.30	282.1	0.013	10	0.007	225,324	2.60	1,192,377	0.25	29.46	FALSE	4,785.70	4,786.00	1.98
C4	4,776.40	C3-A	4,776.30	12.2	0.013	10	0.008	206,834	2.67	1,281,483	0.23	27.17	FALSE	4,786.00	4,785.70	0.09
C4-A	4,778.20	C4	4,776.40	306.6	0.013	10	0.006	206,834	2.37	1,085,049	0.25	29.59	FALSE	4,790.30	4,786.00	1.8
C5	4,778.60	C4-A	4,778.20	69.7	0.013	10	0.006	206,834	2.35	1,072,564	0.25	29.76	FALSE	4,790.30	4,790.30	0.4
D1	4,779.30	C5	4,779.10	62.6	0.013	10	0.003	147,494	1.73	800,432	0.24	29.09	FALSE	4,790.60	4,790.30	0.24
D10	4,792.40	D9	4,791.40	334.4	0.013	8	0.003	74,442	1.42	427,087	0.19	28.25	FALSE	4,801.90	4,803.40	1.03
D11	4,793.60	D10	4,792.40	346.9	0.013	8	0.003	73,152	1.49	459,360	0.18	26.99	FALSE	4,801.80	4,801.90	1.19
D12	4,795.20	D11	4,793.60	347.1	0.013	8	0.005	71,647	1.64	530,227	0.17	24.83	FALSE	4,801.00	4,801.80	1.59
D13	4,796.40	D12	4,795.20	302.5	0.013	8	0.004	70,142	1.55	491,879	0.17	25.51	FALSE	4,803.10	4,801.00	1.2
D14	4,799.10	D13	4,796.40	263.2	0.013	8	0.01	68,637	2.15	791,015	0.13	19.91	FALSE	4,805.80	4,803.10	2.68
D15	4,800.60	D14	4,799.10	352.3	0.013	8	0.004	67,562	1.57	509,593	0.16	24.6	FALSE	4,808.40	4,805.80	1.52
D15-A	4,802.70	D15	4,800.60	343.3	0.013	8	0.006	65,197	1.76	610,820	0.15	22.06	FALSE	4,810.10	4,808.40	2.08
D16	4,803.80	D15-A	4,802.70	97.9	0.013	8	0.011	65,197	2.19	827,729	0.13	18.96	FALSE	4,810.50	4,810.10	1.1
D16-1	4,806.22	D16	4,803.80	284	0.013	6	0.009	3,655	0.86	334,727	0.04	7.38	FALSE	4,813.27	4,810.50	2.31
D16-2	4,810.93	D16-1	4,806.22	301.3	0.013	6	0.016	860	0.70	453,386	0.02	3.2	FALSE	4,816.10	4,813.27	4.69
D17	4,806.50	D16	4,803.80	251.7	0.013	8	0.011	60,252	2.10	808,811	0.12	18.51	FALSE	4,812.90	4,810.50	2.69
D18	4,809.60	D17	4,806.50	321.3	0.013	8	0.01	60,252	2.03	767,066	0.13	18.94	FALSE	4,816.20	4,812.90	3.11
D19	4,812.70	D18	4,809.60	318.2	0.013	8	0.01	60,252	2.03	770,866	0.13	18.9	FALSE	4,820.40	4,816.20	3.11
D1-A	4,780.10	D1	4,779.30	296.1	0.013	10	0.003	147,064	1.63	735,991	0.25	30.31	FALSE	4,791.40	4,790.60	0.81
D2	4,780.60	D1-A	4,780.30	83.9	0.013	10	0.004	146,634	1.80	846,516	0.23	28.14	FALSE	4,791.80	4,791.40	0.33
D20	4,814.70	D19	4,812.70	200.8	0.013	8	0.01	60,252	2.04	779,418	0.13	18.83	FALSE	4,821.30	4,820.40	2.01
D21	4,816.00	D20	4,814.70	256.4	0.013	8	0.005	60,252	1.61	556,056	0.15	22.23	FALSE	4,825.80	4,821.30	1.31
D22	4,817.40	D21	4,816.00	341.7	0.013	8	0.004	60,252	1.50	499,900	0.16	23.45	FALSE	4,828.30	4,825.80	1.41
D23	4,818.80	D22	4,817.40	342.9	0.013	8	0.004	60,252	1.50	499,050	0.16	23.45	FALSE	4,833.10	4,828.30	1.4
D24	4,820.30	D23	4,818.80	341.3	0.013	8	0.004	60,252	1.53	517,776	0.15	23.07	FALSE	4,833.10	4,833.10	1.5
D25	4,821.60	D24	4,820.30	296.1	0.013	8	0.004	60,252	1.53	517,497	0.15	23.08	FALSE	4,830.90	4,833.10	1.3
D26	4,822.20	D25	4,821.60	101.8	0.013	8	0.006	41,237	1.52	599,707	0.12	17.76	FALSE	4,830.50	4,830.90	0.56
D27	4,823.80	D26	4,822.20	418.7	0.013	8	0.004	41,237	1.31	482,779	0.13	19.76	FALSE	4,832.10	4,830.50	1.61
D28	4,825.50	D27	4,823.80	400.1	0.013	8	0.004	41,237	1.35	509,052	0.13	19.28	FALSE	4,831.40	4,832.10	1.7
D29	4,827.20	D28	4,825.50	400.3	0.013	8	0.004	41,237	1.35	508,936	0.13	19.28	FALSE	4,832.40	4,831.40	1.7
D2-A	4,781.60	D2	4,780.60	225.5	0.013	10	0.004	144,484	1.94	943,012	0.22	26.46	FALSE	4,791.30	4,791.80	0.99
D3	4,782.10	D2-A	4,781.60	144.9	0.013	10	0.003	144,484	1.77	831,676	0.24	28.2	FALSE	4,790.80	4,791.30	0.51
D30	4,828.70	D29	4,827.20	402.6	0.013	8	0.004	37,539	1.26	476,674	0.13	18.96	FALSE	4,834.20	4,832.40	1.5
D3-A	4,782.60	D3	4,782.10	151.1	0.013	10	0.003	141,904	1.74	814,585	0.24	28.24	FALSE	4,790.60	4,790.80	0.5
D4	4,783.50	D4-A	4,783.40	57.7	0.013	10	0.002	141,904	1.38	589,402	0.28	33.38	FALSE	4,791.90	4,791.80	0.15
D4-A	4,783.40	D3-A	4,782.60	194.3	0.013	10	0.004	141,904	1.88	908,514	0.22	26.72	FALSE	4,791.80	4,790.60	0.79
D5	4,784.00	D4	4,783.50	112.5	0.013	10	0.004	133,304	1.89	943,840	0.21	25.39	FALSE	4,791.90	4,791.90	0.44

**APPENDIX K-1  
GRGID SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
D7	4,785.50	D5	4,784.10	317.2	0.013	10	0.004	132,229	1.88	940,739	0.21	25.33	FALSE	4,794.70	4,791.90	1.42
D8	4,790.10	D7	4,785.50	305.5	0.013	10	0.015	130,939	2.91	1,737,408	0.15	18.55	FALSE	4,803.00	4,794.70	4.58
D9	4,791.33	D8	4,790.10	247.9	0.013	10	0.005	130,294	1.96	997,413	0.2	24.41	FALSE	4,803.40	4,803.00	1.24
D9-A	4,800.13	D9	4,791.33	283.4	0.013	6	0.031	6,450	1.61	638,987	0.04	7.12	FALSE	4,806.71	4,803.40	8.65
E1	4,779.90	C5	4,778.60	297.6	0.013	10	0.004	56,545	1.46	935,926	0.14	16.66	FALSE	4,789.10	4,790.30	1.19
E2	4,780.90	E1	4,779.90	299.3	0.013	10	0.003	55,470	1.32	818,474	0.15	17.63	FALSE	4,788.00	4,789.10	1.01
E3	4,781.90	E2	4,780.90	305.4	0.013	10	0.003	52,030	1.29	810,331	0.14	17.17	FALSE	4,787.10	4,788.00	1
E4	4,782.90	E3	4,781.90	402.5	0.013	10	0.002	34,830	1.04	705,759	0.13	15.11	FALSE	4,788.00	4,787.10	0.98
E5	4,784.20	E4	4,782.90	399.6	0.013	10	0.003	33,110	1.12	807,616	0.12	13.82	FALSE	4,789.40	4,788.00	1.29
E6	4,784.90	E5	4,784.20	189.1	0.013	10	0.004	32,250	1.17	861,445	0.11	13.22	FALSE	4,790.00	4,789.40	0.69
E7	4,786.00	E6	4,784.90	266.9	0.013	10	0.004	30,745	1.20	909,114	0.1	12.58	FALSE	4,791.10	4,790.00	1.09
E8	4,786.90	E7	4,786.00	209.7	0.013	10	0.004	26,015	1.15	927,603	0.1	11.52	FALSE	4,791.10	4,791.10	0.89
E9	4,788.40	E9A	4,788.20	108.4	0.013	10	0.002	16,770	0.75	608,189	0.1	11.42	FALSE	4,792.60	4,793.30	0.2
E9A	4,788.20	E8	4,787.00	285.8	0.013	10	0.004	24,940	1.13	917,477	0.09	11.35	FALSE	4,793.30	4,791.10	1.21

**APPENDIX K-2  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
A1	4,789.60	MGSD Outfall	4,784.60	525	0.013	18	0.05	294,216	5.21	15,180,131	0.14	9.65	FALSE	4,796.10	4,796.10	5.1
A10	4,804.60	A9	4,800.30	349.2	0.013	12	0.012	181,732	2.91	2,555,068	0.18	18.05	FALSE	4,809.50	4,807.30	4.29
A11	4,809.00	A10	4,804.60	342.8	0.013	12	0.013	181,732	2.96	2,608,565	0.18	17.87	FALSE	4,814.10	4,809.50	4.44
A12	4,821.60	A11	4,809.00	340.7	0.013	12	0.037	180,936	4.28	4,428,353	0.14	13.79	FALSE	4,828.50	4,814.10	12.6
A13	4,831.00	A12	4,821.60	356.1	0.013	12	0.026	180,936	3.80	3,740,955	0.15	14.96	FALSE	4,837.90	4,828.50	9.47
A14	4,833.00	A13	4,831.00	346.2	0.013	12	0.006	180,936	2.23	1,750,057	0.22	21.71	FALSE	4,843.80	4,837.90	2
A15	4,837.20	A14	4,833.00	436.1	0.013	12	0.01	90,727	2.17	2,259,545	0.14	13.68	FALSE	4,847.60	4,843.80	4.14
A16	4,839.50	A15	4,837.20	212.9	0.013	12	0.011	87,147	2.24	2,393,111	0.13	13.04	FALSE	4,850.50	4,847.60	2.3
A17	4,843.80	A16	4,839.50	353.2	0.013	12	0.012	74,021	2.22	2,540,472	0.12	11.73	FALSE	4,853.70	4,850.50	4.29
A18	4,847.40	A17	4,843.80	174.9	0.013	12	0.021	71,237	2.64	3,303,075	0.1	10.16	FALSE	4,855.10	4,853.70	3.6
A19	4,848.70	A18	4,847.40	169.6	0.013	12	0.008	71,237	1.87	2,015,848	0.13	12.85	FALSE	4,854.70	4,855.10	1.31
A1-A	4,791.00	A1	4,789.60	163.3	0.013	12	0.009	294,216	2.95	2,131,885	0.25	25.09	FALSE	4,798.00	4,796.10	1.43
A2	4,791.30	A1-A	4,791.00	15.5	0.013	12	0.019	294,216	3.93	3,201,095	0.2	20.48	FALSE	4,797.70	4,798.00	0.37
A20	4,850.40	A19	4,848.70	171.7	0.013	12	0.01	71,237	2.05	2,290,959	0.12	12.08	FALSE	4,857.50	4,854.70	1.71
A21	4,852.70	A20	4,850.40	367.3	0.013	12	0.006	70,044	1.73	1,822,182	0.13	13.39	FALSE	4,857.90	4,857.50	2.3
A22	4,854.70	A21	4,852.70	328.7	0.013	12	0.006	69,248	1.71	1,796,052	0.13	13.41	FALSE	4,860.40	4,857.90	2
A23	4,857.30	A22	4,854.70	378.8	0.013	12	0.007	68,055	1.77	1,907,552	0.13	12.91	FALSE	4,863.20	4,860.40	2.6
A24	4,859.30	A23	4,857.30	361.7	0.013	12	0.006	66,862	1.63	1,712,292	0.13	13.49	FALSE	4,865.70	4,863.20	2
A25	4,861.90	A24	4,859.30	389.3	0.013	12	0.007	65,669	1.74	1,881,661	0.13	12.77	FALSE	4,870.20	4,865.70	2.59
A26	4,863.90	A25	4,861.90	366.1	0.013	12	0.005	62,884	1.60	1,701,903	0.13	13.13	FALSE	4,872.10	4,870.20	2
A27	4,866.40	A26	4,863.90	391.1	0.013	12	0.006	62,089	1.68	1,840,897	0.13	12.56	FALSE	4,875.60	4,872.10	2.5
A28	4,867.90	A27	4,866.40	301.9	0.013	12	0.004	59,702	1.45	1,510,934	0.14	13.57	FALSE	4,877.00	4,875.60	1.31
A29	4,869.10	A28	4,868.00	313.1	0.013	12	0.004	58,509	1.34	1,364,756	0.14	14.12	FALSE	4,877.50	4,877.00	1.12
A3	4,792.30	A2	4,791.30	382.2	0.013	12	0.003	293,420	1.93	1,177,749	0.34	34.02	FALSE	4,800.00	4,797.70	1.06
A30	4,870.60	A29	4,869.10	344.6	0.013	12	0.004	57,316	1.43	1,519,250	0.13	13.27	FALSE	4,879.40	4,877.50	1.49
A31	4,872.20	A30	4,870.60	351.6	0.013	12	0.005	55,725	1.45	1,553,249	0.13	12.95	FALSE	4,879.20	4,879.40	1.6
A32	4,872.90	A31	4,872.20	353.9	0.013	12	0.002	54,134	1.07	1,024,107	0.16	15.62	FALSE	4,879.50	4,879.20	0.73
A33	4,873.80	A32	4,872.90	394.4	0.013	12	0.002	52,941	1.12	1,099,936	0.15	14.93	FALSE	4,882.60	4,879.50	0.89
A33-A	4,874.20	A33	4,873.80	255.2	0.013	12	0.002	52,543	0.98	911,553	0.16	16.3	FALSE	4,884.00	4,882.60	0.41
A34	4,874.80	A33-A	4,874.20	200.5	0.013	8	0.003	52,543	1.29	427,231	0.16	23.66	FALSE	4,884.70	4,884.00	0.59
A34.1	4,877.50	A34	4,874.90	300.4	0.013	8	0.009	3,182	0.81	726,623	0.03	4.77	FALSE	4,885.90	4,884.70	2.57
A34.2	4,880.10	A34.1	4,877.50	300.7	0.013	8	0.009	1,989	0.70	726,171	0.03	3.85	FALSE	4,887.20	4,885.90	2.59
A34.3	4,882.80	A34.2	4,880.10	298.4	0.013	8	0.009	796	0.54	742,923	0.02	2.47	FALSE	4,888.60	4,887.20	2.69
A34.4	4,884.20	A34.3	4,882.80	137.3	0.013	8	0.01	398	0.46	788,642	0.01	1.73	FALSE	4,889.40	4,888.60	1.4
A4	4,794.50	A3	4,792.30	387.8	0.013	12	0.006	291,829	2.54	1,734,221	0.28	27.77	FALSE	4,802.60	4,800.00	2.14
A5	4,796.10	A4	4,794.50	368.4	0.013	12	0.004	290,238	2.30	1,517,545	0.3	29.64	FALSE	4,804.60	4,802.60	1.62
A6	4,797.40	A5	4,796.10	288	0.013	12	0.005	289,045	2.33	1,546,925	0.29	29.28	FALSE	4,806.70	4,804.60	1.3
A7	4,798.70	A6	4,797.40	341	0.013	12	0.004	288,249	2.20	1,421,661	0.31	30.54	FALSE	4,808.20	4,806.70	1.31
A8	4,799.20	A7	4,798.70	324.4	0.013	12	0.002	181,732	1.39	904,027	0.3	30.41	FALSE	4,810.80	4,808.20	0.5
A9	4,800.30	A8	4,799.20	235.8	0.013	12	0.005	181,732	2.07	1,572,636	0.23	22.96	FALSE	4,807.30	4,810.80	1.03
B1	4,766.60	MGSD Outfall	4,761.60	388.1	0.013	18	0.05	1,697,223	8.78	15,180,131	0.34	22.58	FALSE	4,774.50	4,774.50	5.28
B10	4,808.60	B9	4,805.10	413.7	0.013	15	0.008	1,202,573	4.28	3,840,035	0.48	38.45	FALSE	4,816.20	4,811.40	3.5
B11	4,811.30	B10	4,808.60	301.2	0.013	15	0.009	1,201,778	4.37	3,952,479	0.47	37.82	FALSE	4,818.90	4,816.20	2.7
B12	4,815.20	B11	4,811.30	378.8	0.013	15	0.01	1,168,764	4.56	4,236,112	0.45	35.91	FALSE	4,822.10	4,818.90	3.89
B13	4,818.00	B12	4,815.20	390.8	0.013	15	0.007	1,167,174	4.00	3,533,931	0.49	39.56	FALSE	4,823.70	4,822.10	2.8
B14	4,820.50	B13	4,818.00	350	0.013	15	0.007	1,166,378	3.99	3,528,514	0.49	39.58	FALSE	4,826.10	4,823.70	2.5
B15	4,822.10	B14	4,820.50	287	0.013	15	0.006	1,143,706	3.63	3,116,896	0.52	41.91	FALSE	4,827.80	4,826.10	1.59
B16	4,823.50	B15	4,822.10	301.2	0.013	15	0.005	1,142,513	3.39	2,846,268	0.55	44.08	FALSE	4,830.40	4,827.80	1.42
B17	4,827.00	B16	4,823.50	401.9	0.013	15	0.009	1,094,783	4.22	3,895,904	0.45	36.26	FALSE	4,833.60	4,830.40	3.47
B18	4,831.30	B17	4,827.00	417.8	0.013	15	0.01	1,088,260	4.47	4,235,340	0.43	34.58	FALSE	4,838.50	4,833.60	4.3
B19	4,833.10	B18	4,831.30	280.7	0.013	15	0.006	1,086,669	3.77	3,343,380	0.49	39.22	FALSE	4,841.10	4,838.50	1.8
B19-A	4,833.80	B19	4,833.10	108.2	0.013	15	0.006	1,083,741	3.78	3,358,582	0.49	39.07	FALSE	4,841.10	4,841.10	0.7
B2	4,769.10	B1	4,766.60	208.7	0.013	15	0.012	1,688,870	5.33	4,568,983	0.53	42.09	FALSE	4,780.80	4,774.50	2.62

**APPENDIX K-2  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B20	4,834.30	B19-A	4,833.80	138.7	0.013	15	0.004	1,083,344	3.05	2,506,315	0.57	45.94	FALSE	4,842.40	4,841.10	0.56
B20-A	4,835.20	B20	4,834.30	161.5	0.013	15	0.006	1,075,619	3.57	3,116,967	0.51	40.53	FALSE	4,843.80	4,842.40	0.84
B21	4,836.30	B21-A	4,835.40	210.6	0.013	15	0.004	1,075,619	3.23	2,728,952	0.55	43.64	FALSE	4,845.40	4,844.30	0.8
B21-A	4,835.40	B20-A	4,835.20	85.3	0.013	15	0.002	1,075,619	2.59	2,021,457	0.65	51.88	FALSE	4,844.30	4,843.80	0.33
B22	4,837.60	B22-A	4,837.00	91	0.013	15	0.007	1,028,136	3.75	3,390,235	0.47	37.77	FALSE	4,845.50	4,845.80	0.57
B22-A	4,837.00	B21	4,836.30	167.3	0.013	15	0.004	1,028,136	3.18	2,700,821	0.53	42.77	FALSE	4,845.80	4,845.40	0.69
B23	4,838.20	B22	4,837.60	277.2	0.013	15	0.002	1,028,136	2.48	1,942,456	0.65	51.72	FALSE	4,845.90	4,845.50	0.75
B24	4,839.20	B23	4,838.20	194.5	0.013	15	0.005	997,907	3.40	2,993,806	0.5	39.76	FALSE	4,846.60	4,845.90	0.85
B25	4,840.20	B24	4,839.20	206.6	0.013	15	0.005	997,907	3.32	2,904,362	0.51	40.43	FALSE	4,847.80	4,846.60	1.01
B26	4,842.33	B26-A	4,841.44	161.2	0.013	15	0.006	984,065	3.47	3,102,088	0.48	38.71	FALSE	4,849.90	4,849.60	0.9
B26-A	4,841.44	B25	4,840.20	206.7	0.013	15	0.006	984,065	3.58	3,233,182	0.47	37.84	FALSE	4,849.60	4,847.80	1.22
B27	4,844.40	B26	4,842.33	392.8	0.013	15	0.005	901,500	3.33	3,030,669	0.47	37.38	FALSE	4,850.90	4,849.90	2.05
B28	4,845.80	B27	4,844.40	402.9	0.013	15	0.003	901,182	2.86	2,460,866	0.52	41.86	FALSE	4,852.00	4,850.90	1.46
B29	4,846.80	B28	4,845.80	342.5	0.013	15	0.003	702,824	2.51	2,255,882	0.48	38.35	FALSE	4,853.10	4,852.00	0.96
B3	4,772.60	B2	4,769.10	417.3	0.013	15	0.008	1,264,065	4.33	3,823,620	0.49	39.58	FALSE	4,782.00	4,780.80	3.41
B30	4,848.20	B29	4,846.80	240	0.013	15	0.006	701,631	3.22	3,188,841	0.4	31.87	FALSE	4,855.00	4,853.10	1.33
B30-1	4,851.57	B30	4,848.20	257.6	0.013	6	0.013	22,274	1.74	414,808	0.08	15.74	FALSE	4,856.92	4,855.00	3.05
B30-2	4,854.52	B30-1	4,851.57	243.4	0.013	6	0.012	19,888	1.64	399,206	0.08	15.18	FALSE	4,859.92	4,856.92	2.94
B30-3	4,857.69	B30-2	4,854.52	240.5	0.013	6	0.013	17,501	1.63	416,363	0.07	13.96	FALSE	4,863.19	4,859.92	3.16
B30-4	4,860.17	B30-3	4,857.69	416.1	0.013	6	0.006	12,728	1.11	279,942	0.07	14.56	FALSE	4,865.27	4,863.19	2.47
B30-5	4,865.93	B30-4	4,860.17	426.1	0.013	6	0.014	9,944	1.38	421,646	0.05	10.6	FALSE	4,870.58	4,865.27	5.75
B30-6	4,870.65	B30-5	4,865.93	433.2	0.013	6	0.011	5,966	1.10	378,508	0.04	8.74	FALSE	4,875.81	4,870.58	4.71
B30-7	4,874.91	B30-6	4,870.65	397.8	0.013	6	0.011	1,591	0.74	375,270	0.02	4.69	FALSE	4,880.21	4,875.81	4.24
B31	4,849.40	B30	4,848.20	397.2	0.013	15	0.003	676,970	2.52	2,294,845	0.47	37.2	FALSE	4,857.40	4,855.00	1.26
B32	4,850.66	B31	4,849.40	346.5	0.013	15	0.004	671,004	2.69	2,517,615	0.44	35.25	FALSE	4,858.20	4,857.40	1.24
B33	4,851.00	B32	4,850.66	339.6	0.013	15	0.001	668,220	1.67	1,320,920	0.63	50.33	FALSE	4,857.60	4,858.20	0.52
B33-1	4,851.83	B33	4,851.00	312.4	0.013	14	0.003	226,718	1.77	1,790,394	0.28	24.03	FALSE	4,858.61	4,857.60	0.48
B33-12A	4,888.10	B51-1	4,885.51	446.2	0.013	6	0.006	0	0.00	276,270	(N/A)	(N/A)	FALSE	4,893.46	4,893.37	2.51
B33-1A	4,855.74	B33-1	4,851.83	331.4	0.013	6	0.012	43,753	2.04	393,868	0.11	22.53	FALSE	4,861.16	4,858.61	3.76
B33-1B	4,858.88	B33-1A	4,855.74	285	0.013	6	0.011	41,366	1.96	380,610	0.11	22.27	FALSE	4,864.35	4,861.16	3.14
B33-1B1	4,860.58	B33-1B	4,858.88	310.1	0.013	6	0.005	19,092	1.22	268,497	0.09	18.07	FALSE	4,865.40	4,864.35	1.67
B33-1B2	4,863.74	B33-1B1	4,860.58	320.2	0.013	6	0.01	15,910	1.43	360,248	0.07	14.29	FALSE	4,868.08	4,865.40	3.15
B33-1B3	4,866.79	B33-1B2	4,863.74	319.8	0.013	6	0.01	12,728	1.32	354,142	0.06	12.96	FALSE	4,871.80	4,868.08	3.04
B33-1B4	4,869.50	B33-1B3	4,866.79	319.6	0.013	6	0.008	9,148	1.14	333,909	0.06	11.39	FALSE	4,874.32	4,871.80	2.7
B33-1B5	4,871.07	B33-1B4	4,869.50	263.8	0.013	6	0.006	5,966	0.89	279,766	0.05	10.1	FALSE	4,875.12	4,874.32	1.56
B33-1B6	4,872.28	B33-1B5	4,871.07	274.8	0.013	6	0.004	2,784	0.64	240,623	0.04	7.51	FALSE	4,876.69	4,875.12	1.2
B33-1B7	4,873.64	B33-1B6	4,872.28	261.7	0.013	6	0.005	(N/A)	(N/A)	261,422	(N/A)	(N/A)	FALSE	4,878.09	4,876.69	(N/A)
B33-1B7	4,873.64	B33-1C8	4,870.18	174	0.013	6	0.02	(N/A)	(N/A)	511,416	(N/A)	(N/A)	FALSE	4,878.09	4,876.10	(N/A)
B33-1C	4,862.61	B33-1B	4,858.88	265.8	0.013	6	0.014	17,899	1.68	429,590	0.07	13.89	FALSE	4,868.24	4,864.35	3.69
B33-1C2	4,863.92	B33-1C	4,862.61	301.1	0.013	6	0.004	12,330	0.99	239,184	0.08	15.43	FALSE	4,869.13	4,868.24	1.31
B33-1C3	4,865.32	B33-1C2	4,863.92	194.8	0.013	6	0.007	11,137	1.15	307,452	0.07	13.01	FALSE	4,870.26	4,869.13	1.39
B33-1C4	4,866.76	B33-1C3	4,865.32	277.1	0.013	6	0.005	1,989	0.61	261,417	0.03	6.23	FALSE	4,872.23	4,870.26	1.41
B33-1C5	4,866.76	B33-1C3	4,865.32	281.9	0.013	6	0.005	5,568	0.83	259,159	0.05	10.14	FALSE	4,872.02	4,870.26	1.43
B33-1C6	4,867.73	B33-1C5	4,866.76	142.8	0.013	6	0.007	0	0.00	298,859	(N/A)	(N/A)	FALSE	4,873.78	4,872.02	0.92
B33-1C7	4,867.90	B33-1C5	4,866.76	171.1	0.013	6	0.007	3,978	0.82	296,022	0.04	8.09	FALSE	4,873.94	4,872.02	1.13
B33-1C8	4,870.18	B33-1C7	4,867.90	205.5	0.013	6	0.011	1,591	0.74	381,944	0.02	4.69	FALSE	4,876.10	4,873.94	2.26
B33-1D	4,867.21	B33-1C	4,862.61	297.8	0.013	6	0.015	1,989	0.89	450,680	0.02	4.79	FALSE	4,872.01	4,868.24	4.55
B33-1E	4,854.76	B33-1	4,851.83	363.4	0.013	6	0.008	78,357	2.11	325,619	0.17	33.38	FALSE	4,860.06	4,858.61	2.82
B33-1E1	4,856.57	B33-1E	4,854.76	268.6	0.013	6	0.007	70,004	1.92	297,701	0.16	32.99	FALSE	4,861.56	4,860.06	1.8
B33-1E10	4,888.26	B33-1E9	4,886.57	235.1	0.013	6	0.007	9,148	1.08	307,456	0.06	11.85	FALSE	4,894.17	4,892.37	1.68
B33-1E11	4,889.43	B33-1E10	4,888.26	156.1	0.013	6	0.007	7,955	1.05	313,929	0.05	10.97	FALSE	4,895.25	4,894.17	1.17
B33-1E12	4,891.24	B33-1E11	4,889.43	319.6	0.013	6	0.006	3,978	0.78	272,901	0.04	8.42	FALSE	4,897.04	4,895.25	1.8
B33-1E2	4,859.03	B33-1E1	4,856.57	388.8	0.013	6	0.006	65,629	1.84	288,445	0.16	32.41	FALSE	4,864.23	4,861.56	2.46

**APPENDIX K-2  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B33-1E3	4,863.03	B33-1E2	4,859.03	397.6	0.013	6	0.01	61,254	2.13	363,738	0.14	27.74	FALSE	4,867.78	4,864.23	3.99
B33-1E4	4,866.86	B33-1E3	4,863.03	401	0.013	6	0.01	56,878	2.04	354,413	0.14	27.13	FALSE	4,871.80	4,867.78	3.82
B33-1E5	4,870.67	B33-1E4	4,866.86	421	0.013	6	0.009	52,503	1.96	344,990	0.13	26.38	FALSE	4,877.43	4,871.80	3.8
B33-1E6	4,872.77	B33-1E5	4,870.67	352.3	0.013	6	0.006	43,355	1.60	279,982	0.13	26.62	FALSE	4,878.72	4,877.43	2.09
B33-1E7	4,879.34	B33-1E6	4,872.77	491.2	0.013	6	0.013	29,433	1.90	419,284	0.09	17.94	FALSE	4,884.69	4,878.72	6.54
B33-1E8	4,883.77	B33-1E7	4,879.34	300.4	0.013	6	0.015	29,433	1.97	440,557	0.09	17.51	FALSE	4,889.66	4,884.69	4.45
B33-1E9	4,886.57	B33-1E8	4,883.77	262.9	0.013	6	0.011	11,932	1.35	374,253	0.06	12.22	FALSE	4,892.37	4,889.66	2.76
B33-1F	4,855.88	B33-1E	4,854.76	256.1	0.013	6	0.004	3,580	0.69	239,810	0.04	8.51	FALSE	4,861.23	4,860.06	0.99
B33-1G	4,878.30	B33-1E5	4,870.67	406	0.013	6	0.019	5,568	1.29	497,103	0.04	7.47	FALSE	4,882.96	4,877.43	7.53
B33-1G1	4,883.60	B33-1G	4,878.30	372	0.013	6	0.014	1,591	0.81	432,872	0.02	4.4	FALSE	4,888.07	4,882.96	5.28
B33-1H	4,874.42	B33-1E6	4,872.77	304	0.013	6	0.005	7,955	0.94	267,156	0.06	11.85	FALSE	4,879.65	4,878.72	1.58
B33-1H1	4,876.11	B33-1H	4,874.42	260.9	0.013	6	0.006	3,978	0.81	291,874	0.04	8.14	FALSE	4,880.82	4,879.65	1.67
B33-1J	4,888.17	B33-1E8	4,883.77	333.9	0.013	6	0.013	12,330	1.46	416,265	0.06	11.82	FALSE	4,893.22	4,889.66	4.36
B33-1J1	4,889.39	B33-1J	4,888.17	235.7	0.013	6	0.005	9,148	0.96	260,905	0.06	12.8	FALSE	4,894.55	4,893.22	1.22
B33-1J2	4,892.63	B33-1J1	4,889.39	197.1	0.013	6	0.016	7,159	1.34	464,909	0.04	8.64	FALSE	4,899.10	4,894.55	3.23
B33-2	4,852.05	B33-1	4,851.83	368.1	0.013	10	0.001	98,642	0.85	346,163	0.3	36.56	FALSE	4,858.57	4,858.61	0.24
B33-3	4,853.78	B33-2	4,852.05	346.3	0.013	10	0.005	68,413	1.62	1,000,846	0.15	17.7	FALSE	4,859.47	4,858.57	1.57
B34	4,851.70	B33	4,851.00	332	0.013	15	0.002	161,487	1.47	1,917,136	0.25	19.62	FALSE	4,858.00	4,857.60	0.32
B35	4,852.20	B34	4,851.70	389.2	0.013	15	0.001	158,305	1.23	1,496,455	0.27	21.96	FALSE	4,856.70	4,858.00	0.53
B36	4,852.80	B35	4,852.20	410.8	0.013	15	0.001	154,725	1.27	1,595,442	0.26	21.04	FALSE	4,858.00	4,856.70	0.59
B37	4,853.50	B36	4,852.80	412	0.013	15	0.002	152,338	1.34	1,720,794	0.25	20.11	FALSE	4,859.40	4,858.00	0.69
B38	4,854.08	B37	4,853.50	403.7	0.013	15	0.001	148,361	1.25	1,582,380	0.26	20.69	FALSE	4,860.90	4,859.40	0.59
B39	4,855.43	B38	4,854.08	417.7	0.013	12	0.003	143,986	1.70	1,309,070	0.22	22.39	FALSE	4,862.30	4,860.90	1.32
B3-A	4,773.90	B3	4,772.60	91.3	0.013	15	0.014	1,250,542	5.23	4,982,940	0.43	34.15	FALSE	4,783.50	4,782.00	1.3
B4	4,780.10	B3-A	4,773.90	491.7	0.013	15	0.013	1,250,542	5.00	4,687,825	0.44	35.27	FALSE	4,790.10	4,783.50	6.31
B40	4,855.80	B39	4,855.48	182.4	0.013	12	0.002	140,008	1.35	964,379	0.26	25.75	FALSE	4,863.00	4,862.30	0.39
B41	4,856.30	B40	4,855.80	168.6	0.013	12	0.003	140,008	1.63	1,253,765	0.23	22.56	FALSE	4,863.50	4,863.00	0.47
B42	4,859.90	B41	4,856.30	395.3	0.013	12	0.009	136,826	2.41	2,197,485	0.17	16.91	FALSE	4,865.50	4,863.50	3.56
B43	4,862.30	B42	4,860.00	249.8	0.013	12	0.009	134,439	2.41	2,209,299	0.17	16.72	FALSE	4,869.00	4,865.50	2.32
B44	4,863.90	B43	4,862.30	134.5	0.013	12	0.012	132,451	2.62	2,511,571	0.16	15.61	FALSE	4,871.50	4,869.00	1.6
B45	4,864.50	B44	4,863.90	214.1	0.013	12	0.003	130,860	1.57	1,219,036	0.22	22.12	FALSE	4,872.60	4,871.50	0.64
B46	4,865.30	B45	4,864.50	397.6	0.013	12	0.002	127,280	1.38	1,032,828	0.24	23.69	FALSE	4,874.30	4,872.60	0.82
B46-1	4,866.60	B46	4,865.50	279.4	0.013	10	0.004	4,773	0.67	888,409	0.04	5.28	FALSE	4,873.20	4,874.30	1.11
B46-2	4,866.90	B46-1	4,866.60	385.7	0.013	10	0.001	2,386	0.31	394,905	0.05	5.58	FALSE	4,871.80	4,873.20	0.3
B47	4,866.20	B46	4,865.30	341.5	0.013	12	0.003	119,723	1.50	1,182,004	0.21	21.49	FALSE	4,874.60	4,874.30	0.88
B47-1	4,867.00	B47	4,866.30	260.8	0.013	12	0.003	13,921	0.79	1,192,836	0.08	7.59	FALSE	4,874.40	4,874.60	0.66
B47-2	4,873.10	B47-1	4,867.10	373.6	0.013	8	0.016	10,342	1.42	989,752	0.05	7.23	FALSE	4,879.30	4,874.40	6.01
B47-3	4,875.90	B47-2	4,873.10	359.8	0.013	8	0.008	6,364	0.95	688,944	0.05	6.83	FALSE	4,881.80	4,879.30	2.79
B47-4	4,878.80	B47-3	4,875.90	362.1	0.013	8	0.008	3,580	0.81	698,936	0.03	5.16	FALSE	4,884.90	4,881.80	2.89
B48	4,871.10	B47	4,866.30	327.6	0.013	6	0.015	103,415	2.83	438,934	0.17	33.02	FALSE	4,876.50	4,874.60	4.83
B48-1	4,873.36	B48	4,871.10	222.4	0.013	6	0.01	796	0.58	365,566	0.02	3.47	FALSE	4,878.60	4,876.50	2.08
B49	4,876.80	B48	4,871.10	294.5	0.013	6	0.019	91,482	3.02	504,532	0.14	28.8	FALSE	4,882.80	4,876.50	5.69
B5	4,785.27	B4	4,780.10	506.6	0.013	15	0.01	1,250,542	4.63	4,217,619	0.47	37.31	FALSE	4,795.02	4,790.10	5.26
B50	4,879.20	B49	4,877.00	401.5	0.013	6	0.005	87,107	1.89	268,439	0.2	39.15	FALSE	4,886.60	4,882.80	2.21
B51	4,881.40	B50	4,879.20	348	0.013	6	0.006	83,528	1.97	288,343	0.18	36.83	FALSE	4,890.20	4,886.60	2.19
B51-1	4,885.51	B51	4,881.40	488.8	0.013	6	0.008	17,899	1.40	332,511	0.08	15.76	FALSE	4,893.37	4,890.20	4.01
B52	4,883.40	B51	4,881.40	404.2	0.013	6	0.005	62,447	1.66	255,092	0.17	33.67	FALSE	4,890.50	4,890.20	1.98
B53	4,885.20	B52	4,883.40	415.8	0.013	6	0.004	58,071	1.55	238,597	0.17	33.57	FALSE	4,892.10	4,890.50	1.8
B53-1	4,886.90	B53	4,885.30	323.4	0.013	6	0.005	38,184	1.44	255,083	0.13	26.16	FALSE	4,893.00	4,892.10	1.61
B53-2	4,888.60	B53-1	4,887.00	290.2	0.013	6	0.006	23,467	1.30	269,274	0.1	19.96	FALSE	4,893.70	4,893.00	1.61
B53-3	4,893.30	B53-2	4,888.60	298.5	0.013	6	0.016	16,705	1.71	455,058	0.07	13.09	FALSE	4,898.60	4,893.70	4.68
B53-4	4,895.30	B53-3	4,893.30	300.2	0.013	6	0.007	11,535	1.13	295,993	0.07	13.48	FALSE	4,900.70	4,898.60	1.99
B53-5	4,897.30	B53-4	4,895.30	376.4	0.013	6	0.005	9,546	0.99	264,332	0.06	12.99	FALSE	4,903.60	4,900.70	2

**APPENDIX K-2  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B53-6	4,898.50	B53-5	4,897.30	265.8	0.013	6	0.005	5,966	0.81	243,657	0.05	10.79	FALSE	4,905.50	4,903.60	1.19
B53-6A	4,901.50	B53-6	4,898.50	246.6	0.013	6	0.012	1,193	0.69	399,989	0.02	4.04	FALSE	4,906.30	4,905.50	2.97
B53-7	4,899.80	B53-6	4,898.50	202.3	0.013	6	0.006	1,591	0.61	290,716	0.03	5.32	FALSE	4,904.90	4,905.50	1.27
B53-8	4,900.70	B53-7	4,899.80	159.5	0.013	6	0.006	1,193	0.54	272,380	0.02	4.79	FALSE	4,904.90	4,904.90	0.9
B53-9	4,901.50	B53-8	4,900.70	229.8	0.013	6	0.003	796	0.40	213,956	0.02	4.43	FALSE	4,905.40	4,904.90	0.8
B54	4,892.50	B53	4,885.50	420.9	0.013	6	0.017	14,319	1.66	467,668	0.06	11.99	FALSE	4,898.20	4,892.10	7.01
B55	4,896.80	B54	4,892.50	413.2	0.013	6	0.01	10,739	1.29	369,931	0.06	11.71	FALSE	4,902.20	4,898.20	4.29
B56	4,901.00	B55	4,896.80	402.3	0.013	6	0.01	5,966	1.08	370,519	0.04	8.83	FALSE	4,907.60	4,902.20	4.18
B57	4,903.10	B56	4,901.00	368.8	0.013	6	0.006	2,386	0.66	273,625	0.03	6.65	FALSE	4,907.60	4,907.60	2.09
B6	4,789.80	B5	4,785.27	211.2	0.013	15	0.021	1,248,314	6.05	6,114,566	0.38	30.65	FALSE	4,798.00	4,795.02	4.53
B7	4,795.70	B6	4,789.80	405.9	0.013	15	0.015	1,206,153	5.21	5,033,388	0.42	33.35	FALSE	4,804.00	4,798.00	5.89
B8	4,800.60	B7	4,795.70	394.9	0.013	15	0.012	1,204,960	4.92	4,650,598	0.43	34.73	FALSE	4,807.00	4,804.00	4.9
B9	4,805.10	B8	4,800.60	379.8	0.013	15	0.012	1,203,767	4.84	4,544,621	0.44	35.14	FALSE	4,811.40	4,807.00	4.5
C1	4,771.80	B2	4,769.10	244.8	0.013	10	0.011	424,805	3.63	1,487,101	0.31	36.61	FALSE	4,777.80	4,780.80	2.41
C2	4,773.00	C1	4,771.80	211.3	0.013	10	0.006	422,418	2.85	1,067,098	0.36	43.7	FALSE	4,779.70	4,777.80	1.21
C3	4,774.30	C2	4,773.00	303.3	0.013	10	0.004	418,839	2.56	927,005	0.39	47.13	FALSE	4,786.00	4,779.70	1.33
C3-A	4,776.30	C3	4,774.30	282.1	0.013	10	0.007	416,850	3.08	1,192,377	0.34	40.84	FALSE	4,785.70	4,786.00	1.96
C4	4,776.40	C3-A	4,776.30	12.2	0.013	10	0.008	382,643	3.17	1,281,483	0.31	37.46	FALSE	4,786.00	4,785.70	0.08
C4-A	4,778.20	C4	4,776.40	306.6	0.013	10	0.006	382,643	2.81	1,085,049	0.34	40.98	FALSE	4,790.30	4,786.00	1.8
C5	4,778.60	C4-A	4,778.20	69.7	0.013	10	0.006	382,643	2.79	1,072,564	0.34	41.25	FALSE	4,790.30	4,790.30	0.4
D1	4,779.30	C5	4,779.10	62.6	0.013	10	0.003	272,864	2.05	800,432	0.34	40.27	FALSE	4,790.60	4,790.30	0.25
D10	4,792.40	D9	4,791.40	334.4	0.013	8	0.003	137,717	1.69	427,087	0.26	39.02	FALSE	4,801.90	4,803.40	1.05
D10	4,792.40	D9	4,791.40	334.4	0.013	8	0.003	137,717	1.69	427,087	0.26	39.02	FALSE	4,801.90	4,803.40	1.05
D11	4,793.60	D10	4,792.40	346.9	0.013	8	0.003	135,330	1.77	459,360	0.25	37.18	FALSE	4,801.80	4,801.90	1.19
D11	4,793.60	D10	4,792.40	346.9	0.013	8	0.003	135,330	1.77	459,360	0.25	37.18	FALSE	4,801.80	4,801.90	1.19
D12	4,795.20	D11	4,793.60	347.1	0.013	8	0.005	132,546	1.95	530,227	0.23	34.11	FALSE	4,801.00	4,801.80	1.58
D12	4,795.20	D11	4,793.60	347.1	0.013	8	0.005	132,546	1.95	530,227	0.23	34.11	FALSE	4,801.00	4,801.80	1.58
D13	4,796.40	D12	4,795.20	302.5	0.013	8	0.004	129,762	1.84	491,879	0.23	35.08	FALSE	4,803.10	4,801.00	1.21
D13	4,796.40	D12	4,795.20	302.5	0.013	8	0.004	129,762	1.84	491,879	0.23	35.08	FALSE	4,803.10	4,801.00	1.21
D14	4,799.10	D13	4,796.40	263.2	0.013	8	0.01	126,978	2.57	791,015	0.18	27.1	FALSE	4,805.80	4,803.10	2.67
D14	4,799.10	D13	4,796.40	263.2	0.013	8	0.01	126,978	2.57	791,015	0.18	27.1	FALSE	4,805.80	4,803.10	2.67
D15	4,800.60	D14	4,799.10	352.3	0.013	8	0.004	124,989	1.87	509,593	0.22	33.7	FALSE	4,808.40	4,805.80	1.52
D15	4,800.60	D14	4,799.10	352.3	0.013	8	0.004	124,989	1.87	509,593	0.22	33.7	FALSE	4,808.40	4,805.80	1.52
D15-A	4,802.70	D15	4,800.60	343.3	0.013	8	0.006	120,614	2.11	610,820	0.2	30.14	FALSE	4,810.10	4,808.40	2.08
D15-A	4,802.70	D15	4,800.60	343.3	0.013	8	0.006	120,614	2.11	610,820	0.2	30.14	FALSE	4,810.10	4,808.40	2.08
D16	4,803.80	D15-A	4,802.70	97.9	0.013	8	0.011	120,614	2.62	827,729	0.17	25.79	FALSE	4,810.50	4,810.10	1.1
D16	4,803.80	D15-A	4,802.70	97.9	0.013	8	0.011	120,614	2.62	827,729	0.17	25.79	FALSE	4,810.50	4,810.10	1.1
D16-1	4,806.22	D16	4,803.80	284	0.013	6	0.009	6,762	1.05	334,727	0.05	9.86	FALSE	4,813.27	4,810.50	2.27
D16-1	4,806.22	D16	4,803.80	284	0.013	6	0.009	6,762	1.05	334,727	0.05	9.86	FALSE	4,813.27	4,810.50	2.27
D16-2	4,810.93	D16-1	4,806.22	301.3	0.013	6	0.016	1,591	0.84	453,386	0.02	4.3	FALSE	4,816.10	4,813.27	4.68
D16-2	4,810.93	D16-1	4,806.22	301.3	0.013	6	0.016	1,591	0.84	453,386	0.02	4.3	FALSE	4,816.10	4,813.27	4.68
D17	4,806.50	D16	4,803.80	251.7	0.013	8	0.011	111,465	2.52	808,811	0.17	25.08	FALSE	4,812.90	4,810.50	2.69
D17	4,806.50	D16	4,803.80	251.7	0.013	8	0.011	111,465	2.52	808,811	0.17	25.08	FALSE	4,812.90	4,810.50	2.69
D18	4,809.60	D17	4,806.50	321.3	0.013	8	0.01	111,465	2.42	767,066	0.17	25.76	FALSE	4,816.20	4,812.90	3.12
D18	4,809.60	D17	4,806.50	321.3	0.013	8	0.01	111,465	2.42	767,066	0.17	25.76	FALSE	4,816.20	4,812.90	3.12
D19	4,812.70	D18	4,809.60	318.2	0.013	8	0.01	111,465	2.43	770,866	0.17	25.69	FALSE	4,820.40	4,816.20	3.12
D19	4,812.70	D18	4,809.60	318.2	0.013	8	0.01	111,465	2.43	770,866	0.17	25.69	FALSE	4,820.40	4,816.20	3.12
D1-A	4,780.10	D1	4,779.30	296.1	0.013	10	0.003	272,069	1.93	735,991	0.35	42.09	FALSE	4,791.40	4,790.60	0.81
D1-A	4,780.10	D1	4,779.30	296.1	0.013	10	0.003	272,069	1.93	735,991	0.35	42.09	FALSE	4,791.40	4,790.60	0.81
D2	4,780.60	D1-A	4,780.30	83.9	0.013	10	0.004	271,273	2.14	846,516	0.32	38.95	FALSE	4,791.80	4,791.40	0.34
D2	4,780.60	D1-A	4,780.30	83.9	0.013	10	0.004	271,273	2.14	846,516	0.32	38.95	FALSE	4,791.80	4,791.40	0.34
D20	4,814.70	D19	4,812.70	200.8	0.013	8	0.01	111,465	2.45	779,418	0.17	25.55	FALSE	4,821.30	4,820.40	2.02
D20	4,814.70	D19	4,812.70	200.8	0.013	8	0.01	111,465	2.45	779,418	0.17	25.55	FALSE	4,821.30	4,820.40	2.02

**APPENDIX K-2  
GRGID SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
D21	4,816.00	D20	4,814.70	256.4	0.013	8	0.005	111,465	1.93	556,056	0.2	30.37	FALSE	4,825.80	4,821.30	1.31
D21	4,816.00	D20	4,814.70	256.4	0.013	8	0.005	111,465	1.93	556,056	0.2	30.37	FALSE	4,825.80	4,821.30	1.31
D22	4,817.40	D21	4,816.00	341.7	0.013	8	0.004	111,465	1.79	499,900	0.21	32.06	FALSE	4,828.30	4,825.80	1.41
D22	4,817.40	D21	4,816.00	341.7	0.013	8	0.004	111,465	1.79	499,900	0.21	32.06	FALSE	4,828.30	4,825.80	1.41
D23	4,818.80	D22	4,817.40	342.9	0.013	8	0.004	111,465	1.78	499,050	0.21	32.08	FALSE	4,833.10	4,828.30	1.4
D23	4,818.80	D22	4,817.40	342.9	0.013	8	0.004	111,465	1.78	499,050	0.21	32.08	FALSE	4,833.10	4,828.30	1.4
D24	4,820.30	D23	4,818.80	341.3	0.013	8	0.004	111,465	1.83	517,776	0.21	31.53	FALSE	4,833.10	4,833.10	1.5
D24	4,820.30	D23	4,818.80	341.3	0.013	8	0.004	111,465	1.83	517,776	0.21	31.53	FALSE	4,833.10	4,833.10	1.5
D25	4,821.60	D24	4,820.30	296.1	0.013	8	0.004	111,465	1.83	517,497	0.21	31.54	FALSE	4,830.90	4,833.10	1.3
D25	4,821.60	D24	4,820.30	296.1	0.013	8	0.004	111,465	1.83	517,497	0.21	31.54	FALSE	4,830.90	4,833.10	1.3
D26	4,822.20	D25	4,821.60	101.8	0.013	8	0.006	76,288	1.82	599,707	0.16	24.12	FALSE	4,830.50	4,830.90	0.55
D26	4,822.20	D25	4,821.60	101.8	0.013	8	0.006	76,288	1.82	599,707	0.16	24.12	FALSE	4,830.50	4,830.90	0.55
D27	4,823.80	D26	4,822.20	418.7	0.013	8	0.004	76,288	1.56	482,779	0.18	26.88	FALSE	4,832.10	4,830.50	1.62
D27	4,823.80	D26	4,822.20	418.7	0.013	8	0.004	76,288	1.56	482,779	0.18	26.88	FALSE	4,832.10	4,830.50	1.62
D28	4,825.50	D27	4,823.80	400.1	0.013	8	0.004	76,288	1.62	509,052	0.17	26.16	FALSE	4,831.40	4,832.10	1.7
D28	4,825.50	D27	4,823.80	400.1	0.013	8	0.004	76,288	1.62	509,052	0.17	26.16	FALSE	4,831.40	4,832.10	1.7
D29	4,827.20	D28	4,825.50	400.3	0.013	8	0.004	76,288	1.62	508,936	0.17	26.16	FALSE	4,832.40	4,831.40	1.7
D29	4,827.20	D28	4,825.50	400.3	0.013	8	0.004	76,288	1.62	508,936	0.17	26.16	FALSE	4,832.40	4,831.40	1.7
D2-A	4,781.60	D2	4,780.60	225.5	0.013	10	0.004	267,296	2.30	943,012	0.3	36.45	FALSE	4,791.30	4,791.80	0.98
D2-A	4,781.60	D2	4,780.60	225.5	0.013	10	0.004	267,296	2.30	943,012	0.3	36.45	FALSE	4,791.30	4,791.80	0.98
D3	4,782.10	D2-A	4,781.60	144.9	0.013	10	0.003	267,296	2.10	831,676	0.33	39.01	FALSE	4,790.80	4,791.30	0.52
D3	4,782.10	D2-A	4,781.60	144.9	0.013	10	0.003	267,296	2.10	831,676	0.33	39.01	FALSE	4,790.80	4,791.30	0.52
D30	4,828.70	D29	4,827.20	402.6	0.013	8	0.004	69,447	1.51	476,674	0.17	25.79	FALSE	4,834.20	4,832.40	1.5
D30	4,828.70	D29	4,827.20	402.6	0.013	8	0.004	69,447	1.51	476,674	0.17	25.79	FALSE	4,834.20	4,832.40	1.5
D3-A	4,782.60	D3	4,782.10	151.1	0.013	10	0.003	262,523	2.06	814,585	0.33	39.06	FALSE	4,790.60	4,790.80	0.5
D3-A	4,782.60	D3	4,782.10	151.1	0.013	10	0.003	262,523	2.06	814,585	0.33	39.06	FALSE	4,790.60	4,790.80	0.5
D4	4,783.50	D4-A	4,783.40	57.7	0.013	10	0.002	262,523	1.62	589,402	0.39	46.75	FALSE	4,791.90	4,791.80	0.17
D4	4,783.50	D4-A	4,783.40	57.7	0.013	10	0.002	262,523	1.62	589,402	0.39	46.75	FALSE	4,791.90	4,791.80	0.17
D4-11	0.00	D4-10	0.00	180.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D4-12	0.00	D4-11	0.00	154.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D4-13	0.00	D4-12	0.00	203.4	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D4-A	4,783.40	D3-A	4,782.60	194.3	0.013	10	0.004	262,523	2.23	908,514	0.31	36.78	FALSE	4,791.80	4,790.60	0.78
D4-A	4,783.40	D3-A	4,782.60	194.3	0.013	10	0.004	262,523	2.23	908,514	0.31	36.78	FALSE	4,791.80	4,790.60	0.78
D5	4,784.00	D4	4,783.50	112.5	0.013	10	0.004	246,613	2.25	943,840	0.29	34.89	FALSE	4,791.90	4,791.90	0.41
D5	4,784.00	D4	4,783.50	112.5	0.013	10	0.004	246,613	2.25	943,840	0.29	34.89	FALSE	4,791.90	4,791.90	0.41
D7	4,785.50	D5	4,784.10	317.2	0.013	10	0.004	244,624	2.24	940,739	0.29	34.8	FALSE	4,794.70	4,791.90	1.42
D7	4,785.50	D5	4,784.10	317.2	0.013	10	0.004	244,624	2.24	940,739	0.29	34.8	FALSE	4,794.70	4,791.90	1.42
D8	4,790.10	D7	4,785.50	305.5	0.013	10	0.015	242,238	3.47	1,737,408	0.21	25.22	FALSE	4,803.00	4,794.70	4.58
D8	4,790.10	D7	4,785.50	305.5	0.013	10	0.015	242,238	3.47	1,737,408	0.21	25.22	FALSE	4,803.00	4,794.70	4.58
D9	4,791.33	D8	4,790.10	247.9	0.013	10	0.005	241,044	2.33	997,413	0.28	33.45	FALSE	4,803.40	4,803.00	1.24
D9	4,791.33	D8	4,790.10	247.9	0.013	10	0.005	241,044	2.33	997,413	0.28	33.45	FALSE	4,803.40	4,803.00	1.24
D9-4A	0.00	D9-4	0.00	333.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4A1	0.00	D9-4A	0.00	330.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4A2	0.00	D9-4A1	0.00	126.5	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4A3	0.00	D9-4A2	0.00	303.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4B	0.00	D9-4A	0.00	137.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4C	0.00	D9-4B	0.00	362.3	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4D	0.00	D9-4C	0.00	233.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-A	4,800.13	D9	4,791.33	283.4	0.013	6	0.031	11,932	1.95	638,987	0.05	9.48	FALSE	4,806.71	4,803.40	8.59
D9-A	4,800.13	D9	4,791.33	283.4	0.013	6	0.031	11,932	1.95	638,987	0.05	9.48	FALSE	4,806.71	4,803.40	8.59
D9-C	0.00	D9-A	4,800.13	354	0.013	12	-13.56	(N/A)	(N/A)	84,789,143	(N/A)	(N/A)	FALSE	0.00	4,806.71	(N/A)
D9-E	0.00	D9-C	0.00	311.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-F	0.00	D9-E	0.00	364.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)

**APPENDIX K-2  
GRGID SEWER MASTER PLAN  
MODEL OUTPUT: EXISTING PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
D9-G	0.00	D9-F	0.00	215.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
E1	4,779.90	C5	4,778.60	297.6	0.013	10	0.004	104,608	1.75	935,926	0.19	22.57	FALSE	4,789.10	4,790.30	1.14
E1	4,779.90	C5	4,778.60	297.6	0.013	10	0.004	104,608	1.75	935,926	0.19	22.57	FALSE	4,789.10	4,790.30	1.14
E2	4,780.90	E1	4,779.90	299.3	0.013	10	0.003	102,620	1.58	818,474	0.2	23.94	FALSE	4,788.00	4,789.10	1.01
E2	4,780.90	E1	4,779.90	299.3	0.013	10	0.003	102,620	1.58	818,474	0.2	23.94	FALSE	4,788.00	4,789.10	1.01
E3	4,781.90	E2	4,780.90	305.4	0.013	10	0.003	96,255	1.55	810,331	0.19	23.25	FALSE	4,787.10	4,788.00	0.99
E3	4,781.90	E2	4,780.90	305.4	0.013	10	0.003	96,255	1.55	810,331	0.19	23.25	FALSE	4,787.10	4,788.00	0.99
E4	4,782.90	E3	4,781.90	402.5	0.013	10	0.002	64,435	1.25	705,759	0.17	20.42	FALSE	4,788.00	4,787.10	0.98
E4	4,782.90	E3	4,781.90	402.5	0.013	10	0.002	64,435	1.25	705,759	0.17	20.42	FALSE	4,788.00	4,787.10	0.98
E5	4,784.20	E4	4,782.90	399.6	0.013	10	0.003	61,254	1.35	807,616	0.16	18.62	FALSE	4,789.40	4,788.00	1.28
E5	4,784.20	E4	4,782.90	399.6	0.013	10	0.003	61,254	1.35	807,616	0.16	18.62	FALSE	4,789.40	4,788.00	1.28
E6	4,784.90	E5	4,784.20	189.1	0.013	10	0.004	59,663	1.40	861,445	0.15	17.82	FALSE	4,790.00	4,789.40	0.69
E6	4,784.90	E5	4,784.20	189.1	0.013	10	0.004	59,663	1.40	861,445	0.15	17.82	FALSE	4,790.00	4,789.40	0.69
E7	4,786.00	E6	4,784.90	266.9	0.013	10	0.004	56,878	1.44	909,114	0.14	16.95	FALSE	4,791.10	4,790.00	1.09
E7	4,786.00	E6	4,784.90	266.9	0.013	10	0.004	56,878	1.44	909,114	0.14	16.95	FALSE	4,791.10	4,790.00	1.09
E8	4,786.90	E7	4,786.00	209.7	0.013	10	0.004	48,128	1.39	927,603	0.13	15.48	FALSE	4,791.10	4,791.10	0.89
E8	4,786.90	E7	4,786.00	209.7	0.013	10	0.004	48,128	1.39	927,603	0.13	15.48	FALSE	4,791.10	4,791.10	0.89
E9	4,788.40	E9A	4,788.20	108.4	0.013	10	0.002	31,025	0.90	608,189	0.13	15.36	FALSE	4,792.60	4,793.30	0.2
E9	4,788.40	E9A	4,788.20	108.4	0.013	10	0.002	31,025	0.90	608,189	0.13	15.36	FALSE	4,792.60	4,793.30	0.2
E9-1	4,789.00	E9A	4,788.20	193.2	0.013	6	0.004	15,115	1.04	233,322	0.09	17.24	FALSE	4,793.00	4,793.30	0.76
E9A	4,788.20	E8	4,787.00	285.8	0.013	10	0.004	46,139	1.36	917,477	0.13	15.25	FALSE	4,793.30	4,791.10	1.21
E9A	4,788.20	E8	4,787.00	285.8	0.013	10	0.004	46,139	1.36	917,477	0.13	15.25	FALSE	4,793.30	4,791.10	1.21

**APPENDIX K-3  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
A1	4,789.60	MGSD Outfall	4,784.60	525	0.013	18	0.05	725,775	6.83	15,180,131	0.22	14.88	FALSE	4,796.10	4,796.10	5.17
A10	4,804.60	A9	4,800.30	349.2	0.013	12	0.012	650,354	4.20	2,555,068	0.34	34.4	FALSE	4,809.50	4,807.30	4.27
A11	4,809.00	A10	4,804.60	342.8	0.013	12	0.013	648,848	4.26	2,608,565	0.34	34	FALSE	4,814.10	4,809.50	4.4
A12	4,821.60	A11	4,809.00	340.7	0.013	12	0.037	648,204	6.23	4,428,353	0.26	25.85	FALSE	4,828.50	4,814.10	12.6
A13	4,831.00	A12	4,821.60	356.1	0.013	12	0.026	647,988	5.52	3,740,955	0.28	28.19	FALSE	4,837.90	4,828.50	9.4
A14	4,833.00	A13	4,831.00	346.2	0.013	12	0.006	647,558	3.19	1,750,057	0.42	42.11	FALSE	4,843.80	4,837.90	2
A15	4,837.20	A14	4,833.00	436.1	0.013	12	0.01	598,366	3.76	2,259,545	0.35	35.13	FALSE	4,847.60	4,843.80	4.18
A16	4,839.50	A15	4,837.20	212.9	0.013	12	0.011	596,431	3.91	2,393,111	0.34	34.03	FALSE	4,850.50	4,847.60	2.3
A17	4,843.80	A16	4,839.50	353.2	0.013	12	0.012	589,122	4.07	2,540,472	0.33	32.75	FALSE	4,853.70	4,850.50	4.3
A18	4,847.40	A17	4,843.80	174.9	0.013	12	0.021	587,617	4.92	3,303,075	0.29	28.53	FALSE	4,855.10	4,853.70	3.6
A19	4,848.70	A18	4,847.40	169.6	0.013	12	0.008	587,617	3.45	2,015,848	0.37	36.96	FALSE	4,854.70	4,855.10	1.33
A1-A	4,791.00	A1	4,789.60	163.3	0.013	12	0.009	725,775	3.80	2,131,885	0.4	40.24	FALSE	4,798.00	4,796.10	1.44
A2	4,791.30	A1-A	4,791.00	15.5	0.013	12	0.019	725,775	5.11	3,201,095	0.32	32.35	FALSE	4,797.70	4,798.00	0.41
A20	4,850.40	A19	4,848.70	171.7	0.013	12	0.01	587,617	3.78	2,290,959	0.35	34.54	FALSE	4,857.50	4,854.70	1.75
A21	4,852.70	A20	4,850.40	367.3	0.013	12	0.006	586,972	3.20	1,822,182	0.39	39.04	FALSE	4,857.90	4,857.50	2.31
A22	4,854.70	A21	4,852.70	328.7	0.013	12	0.006	586,112	3.16	1,796,052	0.39	39.32	FALSE	4,860.40	4,857.90	2
A23	4,857.30	A22	4,854.70	378.8	0.013	12	0.007	585,036	3.31	1,907,552	0.38	37.99	FALSE	4,863.20	4,860.40	2.6
A24	4,859.30	A23	4,857.30	361.7	0.013	12	0.006	583,961	3.05	1,712,292	0.4	40.27	FALSE	4,865.70	4,863.20	2
A25	4,861.90	A24	4,859.30	389.3	0.013	12	0.007	583,101	3.27	1,881,661	0.38	38.2	FALSE	4,870.20	4,865.70	2.6
A26	4,863.90	A25	4,861.90	366.1	0.013	12	0.005	580,091	3.03	1,701,903	0.4	40.26	FALSE	4,872.10	4,870.20	2
A27	4,866.40	A26	4,863.90	391.1	0.013	12	0.006	579,661	3.21	1,840,897	0.39	38.57	FALSE	4,875.60	4,872.10	2.49
A28	4,867.90	A27	4,866.60	301.9	0.013	12	0.004	556,871	2.75	1,510,934	0.42	42.02	FALSE	4,877.00	4,875.60	1.33
A29	4,869.10	A28	4,868.00	313.1	0.013	12	0.004	556,226	2.55	1,364,756	0.44	44.47	FALSE	4,877.50	4,877.00	1.16
A3	4,792.30	A2	4,791.30	382.2	0.013	12	0.003	725,345	2.44	1,177,749	0.57	56.75	FALSE	4,800.00	4,797.70	1.12
A30	4,870.60	A29	4,869.10	344.6	0.013	12	0.004	534,082	2.73	1,519,250	0.41	40.96	FALSE	4,879.40	4,877.50	1.46
A31	4,872.20	A30	4,870.60	351.6	0.013	12	0.005	508,067	2.74	1,553,249	0.39	39.37	FALSE	4,879.20	4,879.40	1.58
A32	4,872.90	A31	4,872.20	353.9	0.013	12	0.002	482,051	1.99	1,024,107	0.48	48.25	FALSE	4,879.50	4,879.20	0.79
A33	4,873.80	A32	4,872.90	394.4	0.013	12	0.002	481,406	2.10	1,099,936	0.46	46.27	FALSE	4,882.60	4,879.50	0.88
A33-A	4,874.20	A33	4,873.80	255.2	0.013	12	0.002	265,869	1.56	911,553	0.37	36.97	FALSE	4,884.00	4,882.60	0.31
A34	4,874.80	A33-A	4,874.20	200.5	0.013	8	0.003	28,832	1.08	427,231	0.12	17.59	FALSE	4,884.70	4,884.00	0.35
A34.1	4,877.50	A34	4,874.90	300.4	0.013	8	0.009	1,720	0.66	726,623	0.02	3.6	FALSE	4,885.90	4,884.70	2.6
A34.2	4,880.10	A34.1	4,877.50	300.7	0.013	8	0.009	1,075	0.58	726,171	0.02	2.88	FALSE	4,887.20	4,885.90	2.6
A34.3	4,882.80	A34.2	4,880.10	298.4	0.013	8	0.009	430	0.45	742,923	0.01	1.86	FALSE	4,888.60	4,887.20	2.69
A34.4	4,884.20	A34.3	4,882.80	137.3	0.013	8	0.01	215	0.37	788,642	0.01	1.32	FALSE	4,889.40	4,888.60	1.4
A39	0.00	A38	0.00	156.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A39-1	0.00	A39	0.00	200.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A4	4,794.50	A3	4,792.30	387.8	0.013	12	0.006	723,841	3.26	1,734,221	0.45	45.08	FALSE	4,802.60	4,800.00	2.08
A40	0.00	A39	0.00	241.4	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A41	0.00	A40	0.00	257.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A41-1	0.00	A41	0.00	273.4	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A41-2	0.00	A41-1	0.00	314.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A42	0.00	A41	0.00	330.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A43	0.00	A42	0.00	276.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A44	0.00	A43	0.00	222.3	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A44-1	0.00	A44	0.00	118.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A44-2	0.00	A44-1	0.00	257.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A45	0.00	A44	0.00	141.3	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A46	0.00	A45	0.00	349.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A47	0.00	A46	0.00	164.4	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A47-1	0.00	A47	0.00	357.3	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A47-1A	0.00	A47-1	0.00	159	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A47-2	0.00	A47-1	0.00	399.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
A47-A	0.00	A47	0.00	376.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)

**APPENDIX K-3  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
A5	4,796.10	A4	4,794.50	368.4	0.013	12	0.004	722,980	2.95	1,517,545	0.49	48.59	FALSE	4,804.60	4,802.60	1.64
A6	4,797.40	A5	4,796.10	288	0.013	12	0.005	722,336	3.00	1,546,925	0.48	48.03	FALSE	4,806.70	4,804.60	1.29
A7	4,798.70	A6	4,797.40	341	0.013	12	0.004	721,906	2.81	1,421,661	0.5	50.45	FALSE	4,808.20	4,806.70	1.32
A8	4,799.20	A7	4,798.70	324.4	0.013	12	0.002	650,998	1.94	904,027	0.63	62.85	FALSE	4,810.80	4,808.20	0.62
A9	4,800.30	A8	4,799.20	235.8	0.013	12	0.005	650,998	2.95	1,572,636	0.45	44.87	FALSE	4,807.30	4,810.80	0.92
B1	4,766.60	MGSD Outfall	4,761.60	388.1	0.013	18	0.05	1,396,481	8.29	15,180,131	0.31	20.49	FALSE	4,774.50	4,774.50	5.25
B10	4,808.60	B9	4,805.10	413.7	0.013	15	0.008	958,199	4.02	3,840,035	0.43	34.04	FALSE	4,816.20	4,811.40	3.5
B11	4,811.30	B10	4,808.60	301.2	0.013	15	0.009	957,769	4.10	3,952,479	0.42	33.53	FALSE	4,818.90	4,816.20	2.7
B12	4,815.20	B11	4,811.30	378.8	0.013	15	0.01	939,494	4.29	4,236,112	0.4	32	FALSE	4,822.10	4,818.90	3.9
B13	4,818.00	B12	4,815.20	390.8	0.013	15	0.007	938,634	3.77	3,533,931	0.44	35.19	FALSE	4,823.70	4,822.10	2.8
B14	4,820.50	B13	4,818.00	350	0.013	15	0.007	938,204	3.76	3,528,514	0.44	35.21	FALSE	4,826.10	4,823.70	2.5
B15	4,822.10	B14	4,820.50	287	0.013	15	0.006	925,304	3.43	3,116,896	0.47	37.34	FALSE	4,827.80	4,826.10	1.6
B16	4,823.50	B15	4,822.10	301.2	0.013	15	0.005	924,659	3.21	2,846,268	0.49	39.21	FALSE	4,830.40	4,827.80	1.42
B17	4,827.00	B16	4,823.50	401.9	0.013	15	0.009	898,644	3.99	3,895,904	0.41	32.66	FALSE	4,833.60	4,830.40	3.48
B18	4,831.30	B17	4,827.00	417.8	0.013	15	0.01	895,118	4.23	4,235,340	0.39	31.21	FALSE	4,838.50	4,833.60	4.3
B19	4,833.10	B18	4,831.30	280.7	0.013	15	0.006	894,258	3.57	3,343,380	0.44	35.32	FALSE	4,841.10	4,838.50	1.8
B19-A	4,833.80	B19	4,833.10	108.2	0.013	15	0.006	892,676	3.58	3,358,582	0.44	35.2	FALSE	4,841.10	4,841.10	0.7
B2	4,769.10	B1	4,766.60	208.7	0.013	15	0.012	1,391,966	5.06	4,568,983	0.47	37.86	FALSE	4,780.80	4,774.50	2.61
B20	4,834.30	B19-A	4,833.80	138.7	0.013	15	0.004	892,461	2.89	2,506,315	0.52	41.24	FALSE	4,842.40	4,841.10	0.55
B20-A	4,835.20	B20	4,834.30	161.5	0.013	15	0.006	888,285	3.39	3,116,967	0.46	36.54	FALSE	4,843.80	4,842.40	0.85
B21	4,836.30	B21-A	4,835.40	210.6	0.013	15	0.004	888,285	3.07	2,728,952	0.49	39.25	FALSE	4,845.40	4,844.30	0.81
B21-A	4,835.40	B20-A	4,835.20	85.3	0.013	15	0.002	888,285	2.47	2,021,457	0.58	46.38	FALSE	4,844.30	4,843.80	0.31
B22	4,837.60	B22-A	4,837.00	91	0.013	15	0.007	862,619	3.57	3,390,235	0.43	34.4	FALSE	4,845.50	4,845.80	0.57
B22-A	4,837.00	B21	4,836.30	167.3	0.013	15	0.004	862,619	3.03	2,700,821	0.49	38.86	FALSE	4,845.80	4,845.40	0.7
B23	4,838.20	B22	4,837.60	277.2	0.013	15	0.002	862,619	2.38	1,942,456	0.58	46.67	FALSE	4,845.90	4,845.50	0.73
B24	4,839.20	B23	4,838.20	194.5	0.013	15	0.005	846,064	3.25	2,993,806	0.45	36.37	FALSE	4,846.60	4,845.90	0.87
B25	4,840.20	B24	4,839.20	206.6	0.013	15	0.005	846,064	3.17	2,904,362	0.46	36.98	FALSE	4,847.80	4,846.60	1.01
B26	4,842.33	B26-A	4,841.44	161.2	0.013	15	0.006	838,582	3.32	3,102,088	0.44	35.52	FALSE	4,849.90	4,849.60	0.9
B26-A	4,841.44	B25	4,840.20	206.7	0.013	15	0.006	838,582	3.42	3,233,182	0.43	34.75	FALSE	4,849.60	4,847.80	1.23
B27	4,844.40	B26	4,842.33	392.8	0.013	15	0.005	792,726	3.22	3,030,669	0.44	34.9	FALSE	4,850.90	4,849.90	2.06
B28	4,845.80	B27	4,844.40	402.9	0.013	15	0.003	791,953	2.76	2,460,866	0.49	39.01	FALSE	4,852.00	4,850.90	1.45
B28-10	0	B28-9	0	277.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0	0	(N/A)
B28-11	0	B28-10	0	261.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0	0	(N/A)
B28-12	0.00	B28-11	0.00	223	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B28-13	0.00	B28-12	0.00	326.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B28-14	0.00	B28-13	0.00	402.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B28-14A	0	B28-14	0	392.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0	0	(N/A)
B28-15	0.00	B28-14	0.00	232.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B28-15A	0.00	B28-15	0.00	70.5	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B28-8	0	B28-7	0	185.3	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0	0	(N/A)
B28-9	0	B28-8	0	344.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0	0	(N/A)
B29	4,846.80	B28	4,845.80	342.5	0.013	15	0.003	682,582	2.49	2,255,882	0.47	37.72	FALSE	4,853.10	4,852.00	0.98
B3	4,772.60	B2	4,769.10	417.3	0.013	15	0.008	995,996	4.05	3,823,620	0.44	34.83	FALSE	4,782.00	4,780.80	3.41
B30	4,848.20	B29	4,846.80	240	0.013	15	0.006	681,937	3.20	3,188,841	0.39	31.4	FALSE	4,855.00	4,853.10	1.33
B30-1	4,851.57	B30	4,848.20	257.6	0.013	6	0.013	11,825	1.44	414,808	0.06	11.61	FALSE	4,856.92	4,855.00	3.03
B30-2	4,854.52	B30-1	4,851.57	243.4	0.013	6	0.012	10,535	1.35	399,206	0.06	11.19	FALSE	4,859.92	4,856.92	2.95
B30-3	4,857.69	B30-2	4,854.52	240.5	0.013	6	0.013	9,245	1.34	416,363	0.05	10.3	FALSE	4,863.19	4,859.92	3.17
B30-4	4,860.17	B30-3	4,857.69	416.1	0.013	6	0.006	6,880	0.93	279,942	0.05	10.81	FALSE	4,865.27	4,863.19	2.48
B30-5	4,865.93	B30-4	4,860.17	426.1	0.013	6	0.014	5,375	1.16	421,646	0.04	7.88	FALSE	4,870.58	4,865.27	5.75
B30-6	4,870.65	B30-5	4,865.93	433.2	0.013	6	0.011	3,225	0.91	378,508	0.03	6.57	FALSE	4,875.81	4,870.58	4.71
B30-7	4,874.91	B30-6	4,870.65	397.8	0.013	6	0.011	860	0.60	375,270	0.02	3.55	FALSE	4,880.21	4,875.81	4.24
B31	4,849.40	B30	4,848.20	397.2	0.013	15	0.003	668,607	2.51	2,294,845	0.46	36.99	FALSE	4,857.40	4,855.00	1.26
B32	4,850.66	B31	4,849.40	346.5	0.013	15	0.004	665,382	2.68	2,517,615	0.44	35.1	FALSE	4,858.20	4,857.40	1.24

**APPENDIX K-3  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B33	4,851.00	B32	4,850.66	339.6	0.013	15	0.001	663,662	1.67	1,320,920	0.63	50.13	FALSE	4,857.60	4,858.20	0.52
B33-1	4,851.83	B33	4,851.00	312.4	0.013	14	0.003	131,580	1.51	1,790,394	0.21	18.35	FALSE	4,858.61	4,857.60	0.42
B33-10A	0.00	B33-10	0.00	233.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-11	0.00	B33-10	0.00	495	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-12	0.00	B33-11	0.00	284.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-12A	4,888.10	B51-1	4,885.51	446.2	0.013	6	0.006	0	0.00	276,270	(N/A)	(N/A)	FALSE	4,893.46	4,893.37	2.53
B33-12A	4,888.10	B33-12	0.00	362.4	0.013	12	13.488	(N/A)	(N/A)	84,565,618	(N/A)	(N/A)	FALSE	4,893.46	0.00	(N/A)
B33-13	0.00	B33-12	0.00	353.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-14	0.00	B33-13	0.00	362.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-15	0.00	B33-14	0.00	231.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-15	0.00	A47-A	0.00	404.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-1A	4,855.74	B33-1	4,851.83	331.4	0.013	6	0.012	24,725	1.73	393,868	0.08	16.98	FALSE	4,861.16	4,858.61	3.79
B33-1B	4,858.88	B33-1A	4,855.74	285	0.013	6	0.011	23,435	1.66	380,610	0.08	16.82	FALSE	4,864.35	4,861.16	3.14
B33-1B1	4,860.58	B33-1B	4,858.88	310.1	0.013	6	0.005	10,320	1.02	268,497	0.07	13.39	FALSE	4,865.40	4,864.35	1.67
B33-1B2	4,863.74	B33-1B1	4,860.58	320.2	0.013	6	0.01	8,600	1.19	360,248	0.05	10.66	FALSE	4,868.08	4,865.40	3.15
B33-1B3	4,866.79	B33-1B2	4,863.74	319.8	0.013	6	0.01	6,880	1.09	354,142	0.05	9.71	FALSE	4,871.80	4,868.08	3.04
B33-1B4	4,869.50	B33-1B3	4,866.79	319.6	0.013	6	0.008	4,945	0.95	333,909	0.04	8.48	FALSE	4,874.32	4,871.80	2.7
B33-1B5	4,871.07	B33-1B4	4,869.50	263.8	0.013	6	0.006	3,225	0.75	279,766	0.04	7.5	FALSE	4,875.12	4,874.32	1.56
B33-1B6	4,872.28	B33-1B5	4,871.07	274.8	0.013	6	0.004	1,505	0.53	240,623	0.03	5.67	FALSE	4,876.69	4,875.12	1.2
B33-1B7	4,873.64	B33-1B6	4,872.28	261.7	0.013	6	0.005	(N/A)	(N/A)	261,422	(N/A)	(N/A)	FALSE	4,878.09	4,876.69	(N/A)
B33-1B7	4,873.64	B33-1C8	4,870.18	174	0.013	6	0.02	(N/A)	(N/A)	511,416	(N/A)	(N/A)	FALSE	4,878.09	4,876.10	(N/A)
B33-1C	4,862.61	B33-1B	4,858.88	265.8	0.013	6	0.014	10,750	1.43	429,590	0.05	10.91	FALSE	4,868.24	4,864.35	3.7
B33-1C2	4,863.92	B33-1C	4,862.61	301.1	0.013	6	0.004	7,740	0.86	239,184	0.06	12.31	FALSE	4,869.13	4,868.24	1.31
B33-1C3	4,865.32	B33-1C2	4,863.92	194.8	0.013	6	0.007	7,095	1.00	307,452	0.05	10.49	FALSE	4,870.26	4,869.13	1.39
B33-1C4	4,866.76	B33-1C3	4,865.32	277.1	0.013	6	0.005	1,075	0.50	261,417	0.02	4.69	FALSE	4,872.23	4,870.26	1.41
B33-1C5	4,866.76	B33-1C3	4,865.32	281.9	0.013	6	0.005	4,085	0.75	259,159	0.04	8.74	FALSE	4,872.02	4,870.26	1.43
B33-1C6	4,867.73	B33-1C5	4,866.76	142.8	0.013	6	0.007	1,075	0.56	298,859	0.02	4.35	FALSE	4,873.78	4,872.02	0.95
B33-1C7	4,867.90	B33-1C5	4,866.76	171.1	0.013	6	0.007	2,150	0.68	296,022	0.03	6.09	FALSE	4,873.94	4,872.02	1.13
B33-1C8	4,870.18	B33-1C7	4,867.90	205.5	0.013	6	0.011	860	0.61	381,944	0.02	3.52	FALSE	4,876.10	4,873.94	2.27
B33-1D	4,867.21	B33-1C	4,862.61	297.8	0.013	6	0.015	1,075	0.73	450,680	0.02	3.61	FALSE	4,872.01	4,868.24	4.56
B33-1E	4,854.76	B33-1	4,851.83	363.4	0.013	6	0.008	50,310	1.86	325,619	0.13	26.59	FALSE	4,860.06	4,858.61	2.85
B33-1E1	4,856.57	B33-1E	4,854.76	268.6	0.013	6	0.007	45,795	1.70	297,701	0.13	26.53	FALSE	4,861.56	4,860.06	1.81
B33-1E10	4,888.26	B33-1E9	4,886.57	235.1	0.013	6	0.007	4,945	0.90	307,456	0.04	8.83	FALSE	4,894.17	4,892.37	1.69
B33-1E11	4,889.43	B33-1E10	4,888.26	156.1	0.013	6	0.007	4,300	0.88	313,929	0.04	8.16	FALSE	4,895.25	4,894.17	1.17
B33-1E12	4,891.24	B33-1E11	4,889.43	319.6	0.013	6	0.006	2,150	0.64	272,901	0.03	6.33	FALSE	4,897.04	4,895.25	1.8
B33-1E2	4,859.03	B33-1E1	4,856.57	388.8	0.013	6	0.006	43,430	1.64	288,445	0.13	26.24	FALSE	4,864.23	4,861.56	2.46
B33-1E3	4,863.03	B33-1E2	4,859.03	397.6	0.013	6	0.01	41,065	1.89	363,738	0.11	22.72	FALSE	4,867.78	4,864.23	3.99
B33-1E4	4,866.86	B33-1E3	4,863.03	401	0.013	6	0.01	38,700	1.83	354,413	0.11	22.33	FALSE	4,871.80	4,867.78	3.83
B33-1E5	4,870.67	B33-1E4	4,866.86	421	0.013	6	0.009	36,335	1.77	344,990	0.11	21.91	FALSE	4,877.43	4,871.80	3.81
B33-1E6	4,872.77	B33-1E5	4,870.67	352.3	0.013	6	0.006	31,390	1.46	279,982	0.11	22.64	FALSE	4,878.72	4,877.43	2.1
B33-1E7	4,879.34	B33-1E6	4,872.77	491.2	0.013	6	0.013	24,295	1.80	419,284	0.08	16.34	FALSE	4,884.69	4,878.72	6.55
B33-1E8	4,883.77	B33-1E7	4,879.34	300.4	0.013	6	0.015	15,910	1.64	440,557	0.06	12.99	FALSE	4,889.66	4,884.69	4.42
B33-1E9	4,886.57	B33-1E8	4,883.77	262.9	0.013	6	0.011	6,450	1.11	374,253	0.05	9.14	FALSE	4,892.37	4,889.66	2.77
B33-1F	4,855.88	B33-1E	4,854.76	256.1	0.013	6	0.004	1,935	0.56	239,810	0.03	6.41	FALSE	4,861.23	4,860.06	1.02
B33-1G	4,878.30	B33-1E5	4,870.67	406	0.013	6	0.019	3,010	1.08	497,103	0.03	5.59	FALSE	4,882.96	4,877.43	7.55
B33-1G1	4,883.60	B33-1G	4,878.30	372	0.013	6	0.014	860	0.68	432,872	0.02	3.28	FALSE	4,888.07	4,882.96	5.28
B33-1H	4,874.42	B33-1E6	4,872.77	304	0.013	6	0.005	3,870	0.76	267,156	0.04	8.39	FALSE	4,879.65	4,878.72	1.58
B33-1H1	4,876.11	B33-1H	4,874.42	260.9	0.013	6	0.006	2,150	0.67	291,874	0.03	6.13	FALSE	4,880.82	4,879.65	1.68
B33-1H2	4,875.58	B33-2H	0.00	159.5	0.013	12	30.563	(N/A)	(N/A)	127,295,665	(N/A)	(N/A)	FALSE	4,882.25	0.00	(N/A)
B33-1H2	4,875.58	B33-1H1	4,876.11	322.4	0.013	6	-0.002	(N/A)	(N/A)	147,040	(N/A)	(N/A)	FALSE	4,882.25	4,880.82	(N/A)
B33-1J	4,888.17	B33-1E8	4,883.77	333.9	0.013	6	0.013	6,665	1.22	416,265	0.04	8.81	FALSE	4,893.22	4,889.66	4.37
B33-1J1	4,889.39	B33-1J	4,888.17	235.7	0.013	6	0.005	4,945	0.81	260,905	0.05	9.52	FALSE	4,894.55	4,893.22	1.22
B33-1J2	4,892.63	B33-1J1	4,889.39	197.1	0.013	6	0.016	3,870	1.11	464,909	0.03	6.5	FALSE	4,899.10	4,894.55	3.23

**APPENDIX K-3  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B33-1J3	4,893.63	B33-1J2	4,892.63	190	0.013	6	0.005	0	0.00	263,055	(N/A)	(N/A)	FALSE	4,899.00	4,899.10	0.96
B33-2	4,852.05	B33-1	4,851.83	368.1	0.013	10	0.001	53,320	0.71	346,163	0.22	26.53	FALSE	4,858.57	4,858.61	0.23
B33-2I	0.00	B33-2H	0.00	175.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-2J	0.00	B33-2I	0.00	253.5	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-2K	0.00	B33-2J	0.00	241.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-3	4,853.78	B33-2	4,852.05	346.3	0.013	10	0.005	36,980	1.35	1,000,846	0.11	13.13	FALSE	4,859.47	4,858.57	1.62
B33-5B5	0.00	B33-5B4	0.00	131.1	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-5F1	0.00	B33-5F	0.00	274.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-5G	0.00	B33-5F	0.00	269.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B33-5H	0.00	B33-5G	0.00	185.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
B34	4,851.70	B33	4,851.00	332	0.013	15	0.002	379,432	1.88	1,917,136	0.38	30.16	FALSE	4,858.00	4,857.60	0.45
B35	4,852.20	B34	4,851.70	389.2	0.013	15	0.001	377,712	1.57	1,496,455	0.43	34.25	FALSE	4,856.70	4,858.00	0.55
B36	4,852.80	B35	4,852.20	410.8	0.013	15	0.001	375,777	1.65	1,595,442	0.41	33.02	FALSE	4,858.00	4,856.70	0.58
B37	4,853.50	B36	4,852.80	412	0.013	15	0.002	374,487	1.73	1,720,794	0.4	31.69	FALSE	4,859.40	4,858.00	0.68
B38	4,854.08	B37	4,853.50	403.7	0.013	15	0.001	372,337	1.63	1,582,380	0.41	33	FALSE	4,860.90	4,859.40	0.6
B39	4,855.43	B38	4,854.08	417.7	0.013	12	0.003	369,972	2.22	1,309,070	0.36	36.38	FALSE	4,862.30	4,860.90	1.3
B3-A	4,773.90	B3	4,772.60	91.3	0.013	15	0.014	986,708	4.89	4,982,940	0.38	30.17	FALSE	4,783.50	4,782.00	1.3
B4	4,780.10	B3-A	4,773.90	491.7	0.013	15	0.013	986,708	4.68	4,687,825	0.39	31.14	FALSE	4,790.10	4,783.50	6.3
B40	4,855.80	B39	4,855.48	182.4	0.013	12	0.002	367,822	1.77	964,379	0.43	42.82	FALSE	4,863.00	4,862.30	0.43
B41	4,856.30	B40	4,855.80	168.6	0.013	12	0.003	367,822	2.15	1,253,765	0.37	37.09	FALSE	4,863.50	4,863.00	0.44
B42	4,859.90	B41	4,856.30	395.3	0.013	12	0.009	261,096	2.91	2,197,485	0.23	23.26	FALSE	4,865.50	4,863.50	3.49
B43	4,862.30	B42	4,860.00	249.8	0.013	12	0.009	259,806	2.91	2,209,299	0.23	23.18	FALSE	4,869.00	4,865.50	2.33
B44	4,863.90	B43	4,862.30	134.5	0.013	12	0.012	258,731	3.19	2,511,571	0.22	21.67	FALSE	4,871.50	4,869.00	1.6
B45	4,864.50	B44	4,863.90	214.1	0.013	12	0.003	257,871	1.91	1,219,036	0.31	31.22	FALSE	4,872.60	4,871.50	0.65
B46	4,865.30	B45	4,864.50	397.6	0.013	12	0.002	255,936	1.69	1,032,828	0.34	33.93	FALSE	4,874.30	4,872.60	0.83
B46-1	4,866.60	B46	4,865.50	279.4	0.013	10	0.004	54,180	1.39	888,409	0.14	16.74	FALSE	4,873.20	4,874.30	1.1
B46-2	4,866.90	B46-1	4,866.60	385.7	0.013	10	0.001	52,890	0.78	394,905	0.21	24.72	FALSE	4,871.80	4,873.20	0.37
B47	4,866.20	B46	4,865.30	341.5	0.013	12	0.003	200,251	1.74	1,182,004	0.28	27.83	FALSE	4,874.60	4,874.30	0.84
B47-1	4,867.00	B47	4,866.30	260.8	0.013	12	0.003	109,220	1.46	1,192,836	0.2	20.45	FALSE	4,874.40	4,874.60	0.73
B47-2	4,873.10	B47-1	4,867.10	373.6	0.013	8	0.016	55,685	2.37	989,752	0.11	16.1	FALSE	4,879.30	4,874.40	6.03
B47-3	4,875.90	B47-2	4,873.10	359.8	0.013	8	0.008	53,535	1.81	688,944	0.13	18.85	FALSE	4,881.80	4,879.30	2.8
B47-4	4,878.80	B47-3	4,875.90	362.1	0.013	8	0.008	52,030	1.81	698,936	0.12	18.5	FALSE	4,884.90	4,881.80	2.9
B48	4,871.10	B47	4,866.30	327.6	0.013	6	0.015	89,741	2.71	438,934	0.15	30.71	FALSE	4,876.50	4,874.60	4.83
B48-1	4,873.36	B48	4,871.10	222.4	0.013	6	0.01	430	0.48	365,566	0.01	2.58	FALSE	4,878.60	4,876.50	2.09
B49	4,876.80	B48	4,871.10	294.5	0.013	6	0.019	83,291	2.95	504,532	0.14	27.44	FALSE	4,882.80	4,876.50	5.69
B5	4,785.27	B4	4,780.10	506.6	0.013	15	0.01	986,708	4.34	4,217,619	0.41	32.91	FALSE	4,795.02	4,790.10	5.25
B50	4,879.20	B49	4,877.00	401.5	0.013	6	0.005	80,926	1.85	268,439	0.19	37.65	FALSE	4,886.60	4,882.80	2.21
B51	4,881.40	B50	4,879.20	348	0.013	6	0.006	78,991	1.94	288,343	0.18	35.72	FALSE	4,890.20	4,886.60	2.19
B51-1	4,885.51	B51	4,881.40	488.8	0.013	6	0.008	9,675	1.16	332,511	0.06	11.72	FALSE	4,893.37	4,890.20	3.99
B52	4,883.40	B51	4,881.40	404.2	0.013	6	0.005	67,381	1.69	255,092	0.18	35.13	FALSE	4,890.50	4,890.20	2
B53	4,885.20	B52	4,883.40	415.8	0.013	6	0.004	65,016	1.60	238,597	0.18	35.72	FALSE	4,892.10	4,890.50	1.8
B53-1	4,886.90	B53	4,885.30	323.4	0.013	6	0.005	31,390	1.37	255,083	0.12	23.67	FALSE	4,893.00	4,892.10	1.61
B53-2	4,888.60	B53-1	4,887.00	290.2	0.013	6	0.006	23,435	1.30	269,274	0.1	19.95	FALSE	4,893.70	4,893.00	1.61
B53-3	4,893.30	B53-2	4,888.60	298.5	0.013	6	0.016	19,780	1.80	455,058	0.07	14.19	FALSE	4,898.60	4,893.70	4.69
B53-4	4,895.30	B53-3	4,893.30	300.2	0.013	6	0.007	16,985	1.27	295,993	0.08	16.26	FALSE	4,900.70	4,898.60	2
B53-5	4,897.30	B53-4	4,895.30	376.4	0.013	6	0.005	15,910	1.15	264,332	0.08	16.63	FALSE	4,903.60	4,900.70	2
B53-6	4,898.50	B53-5	4,897.30	265.8	0.013	6	0.005	13,975	1.04	243,657	0.08	16.26	FALSE	4,905.50	4,903.60	1.2
B53-6A	4,901.50	B53-6	4,898.50	246.6	0.013	6	0.012	6,020	1.15	399,989	0.04	8.55	FALSE	4,906.30	4,905.50	2.97
B53-7	4,899.80	B53-6	4,898.50	202.3	0.013	6	0.006	6,235	0.93	290,716	0.05	10.13	FALSE	4,904.90	4,905.50	1.27
B53-8	4,900.70	B53-7	4,899.80	159.5	0.013	6	0.006	6,020	0.88	272,380	0.05	10.28	FALSE	4,904.90	4,904.90	0.9
B53-9	4,901.50	B53-8	4,900.70	229.8	0.013	6	0.003	5,805	0.73	213,956	0.06	11.34	FALSE	4,905.40	4,904.90	0.81
B54	4,892.50	B53	4,885.50	420.9	0.013	6	0.017	30,616	2.08	467,668	0.09	17.33	FALSE	4,898.20	4,892.10	7.02
B55	4,896.80	B54	4,892.50	413.2	0.013	6	0.01	18,361	1.52	369,931	0.08	15.15	FALSE	4,902.20	4,898.20	4.28

**APPENDIX K-3  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B56	4,901.00	B55	4,896.80	402.3	0.013	6	0.01	15,781	1.45	370,519	0.07	14.07	FALSE	4,907.60	4,902.20	4.19
B57	4,903.10	B56	4,901.00	368.8	0.013	6	0.006	13,846	1.13	273,625	0.08	15.3	FALSE	4,907.60	4,907.60	2.1
B6	4,789.80	B5	4,785.27	211.2	0.013	15	0.021	985,504	5.66	6,114,566	0.34	27.15	FALSE	4,798.00	4,795.02	4.53
B7	4,795.70	B6	4,789.80	405.9	0.013	15	0.015	960,134	4.89	5,033,388	0.37	29.6	FALSE	4,804.00	4,798.00	5.89
B8	4,800.60	B7	4,795.70	394.9	0.013	15	0.012	959,489	4.62	4,650,598	0.39	30.82	FALSE	4,807.00	4,804.00	4.9
B9	4,805.10	B8	4,800.60	379.8	0.013	15	0.012	958,844	4.54	4,544,621	0.39	31.18	FALSE	4,811.40	4,807.00	4.5
C1	4,771.80	B2	4,769.10	244.8	0.013	10	0.011	393,347	3.56	1,487,101	0.29	35.12	FALSE	4,777.80	4,780.80	2.46
C2	4,773.00	C1	4,771.80	211.3	0.013	10	0.006	392,057	2.80	1,067,098	0.35	41.94	FALSE	4,779.70	4,777.80	1.21
C3	4,774.30	C2	4,773.00	303.3	0.013	10	0.004	390,122	2.52	927,005	0.38	45.24	FALSE	4,786.00	4,779.70	1.33
C3-A	4,776.30	C3	4,774.30	282.1	0.013	10	0.007	389,047	3.02	1,192,377	0.33	39.32	FALSE	4,785.70	4,786.00	1.96
C4	4,776.40	C3-A	4,776.30	12.2	0.013	10	0.008	370,557	3.15	1,281,483	0.31	36.79	FALSE	4,786.00	4,785.70	0.09
C4-A	4,778.20	C4	4,776.40	306.6	0.013	10	0.006	370,557	2.78	1,085,049	0.34	40.31	FALSE	4,790.30	4,786.00	1.8
C5	4,778.60	C4-A	4,778.20	69.7	0.013	10	0.006	370,557	2.76	1,072,564	0.34	40.57	FALSE	4,790.30	4,790.30	0.4
D1	4,779.30	C5	4,779.10	62.6	0.013	10	0.003	169,042	1.80	800,432	0.26	31.2	FALSE	4,790.60	4,790.30	0.24
D10	4,792.40	D9	4,791.40	334.4	0.013	8	0.003	105,660	1.57	427,087	0.23	33.93	FALSE	4,801.90	4,803.40	1.04
D11	4,793.60	D10	4,792.40	346.9	0.013	8	0.003	104,370	1.65	459,360	0.22	32.39	FALSE	4,801.80	4,801.90	1.19
D12	4,795.20	D11	4,793.60	347.1	0.013	8	0.005	102,865	1.82	530,227	0.2	29.86	FALSE	4,801.00	4,801.80	1.58
D13	4,796.40	D12	4,795.20	302.5	0.013	8	0.004	101,360	1.72	491,879	0.21	30.81	FALSE	4,803.10	4,801.00	1.21
D14	4,799.10	D13	4,796.40	263.2	0.013	8	0.01	99,640	2.40	791,015	0.16	23.93	FALSE	4,805.80	4,803.10	2.67
D15	4,800.60	D14	4,799.10	352.3	0.013	8	0.004	98,565	1.75	509,593	0.2	29.82	FALSE	4,808.40	4,805.80	1.52
D15-A	4,802.70	D15	4,800.60	343.3	0.013	8	0.006	95,985	1.97	610,820	0.18	26.8	FALSE	4,810.10	4,808.40	2.08
D16	4,803.80	D15-A	4,802.70	97.9	0.013	8	0.011	95,985	2.44	827,729	0.15	23.03	FALSE	4,810.50	4,810.10	1.1
D16-1	4,806.22	D16	4,803.80	284	0.013	6	0.009	3,655	0.86	334,727	0.04	7.38	FALSE	4,813.27	4,810.50	2.28
D16-2	4,810.93	D16-1	4,806.22	301.3	0.013	6	0.016	860	0.70	453,386	0.02	3.2	FALSE	4,816.10	4,813.27	4.69
D17	4,806.50	D16	4,803.80	251.7	0.013	8	0.011	91,040	2.37	808,811	0.15	22.66	FALSE	4,812.90	4,810.50	2.7
D18	4,809.60	D17	4,806.50	321.3	0.013	8	0.01	91,040	2.29	767,066	0.15	23.24	FALSE	4,816.20	4,812.90	3.12
D19	4,812.70	D18	4,809.60	318.2	0.013	8	0.01	91,040	2.30	770,866	0.15	23.18	FALSE	4,820.40	4,816.20	3.12
D1-A	4,780.10	D1	4,779.30	296.1	0.013	10	0.003	168,612	1.69	735,991	0.27	32.53	FALSE	4,791.40	4,790.60	0.81
D2	4,780.60	D1-A	4,780.30	83.9	0.013	10	0.004	168,182	1.87	846,516	0.25	30.22	FALSE	4,791.80	4,791.40	0.33
D20	4,814.70	D19	4,812.70	200.8	0.013	8	0.01	91,040	2.32	779,418	0.15	23.04	FALSE	4,821.30	4,820.40	2.02
D21	4,816.00	D20	4,814.70	256.4	0.013	8	0.005	91,040	1.82	556,056	0.18	27.39	FALSE	4,825.80	4,821.30	1.31
D22	4,817.40	D21	4,816.00	341.7	0.013	8	0.004	91,040	1.68	499,900	0.19	28.94	FALSE	4,828.30	4,825.80	1.41
D23	4,818.80	D22	4,817.40	342.9	0.013	8	0.004	80,290	1.62	499,050	0.18	27.14	FALSE	4,833.10	4,828.30	1.39
D24	4,820.30	D23	4,818.80	341.3	0.013	8	0.004	80,290	1.67	517,776	0.18	26.62	FALSE	4,833.10	4,833.10	1.5
D25	4,821.60	D24	4,820.30	296.1	0.013	8	0.004	80,290	1.67	517,497	0.18	26.63	FALSE	4,830.90	4,833.10	1.3
D26	4,822.20	D25	4,821.60	101.8	0.013	8	0.006	50,525	1.62	599,707	0.13	19.62	FALSE	4,830.50	4,830.90	0.55
D27	4,823.80	D26	4,822.20	418.7	0.013	8	0.004	50,525	1.39	482,779	0.15	21.84	FALSE	4,832.10	4,830.50	1.61
D28	4,825.50	D27	4,823.80	400.1	0.013	8	0.004	50,525	1.44	509,052	0.14	21.27	FALSE	4,831.40	4,832.10	1.7
D29	4,827.20	D28	4,825.50	400.3	0.013	8	0.004	48,719	1.42	508,936	0.14	20.9	FALSE	4,832.40	4,831.40	1.7
D2-A	4,781.60	D2	4,780.60	225.5	0.013	10	0.004	166,032	2.02	943,012	0.24	28.39	FALSE	4,791.30	4,791.80	0.98
D3	4,782.10	D2-A	4,781.60	144.9	0.013	10	0.003	166,032	1.84	831,676	0.25	30.3	FALSE	4,790.80	4,791.30	0.52
D30	4,828.70	D29	4,827.20	402.6	0.013	8	0.004	45,021	1.33	476,674	0.14	20.76	FALSE	4,834.20	4,832.40	1.5
D3-A	4,782.60	D3	4,782.10	151.1	0.013	10	0.003	163,452	1.81	814,585	0.25	30.38	FALSE	4,790.60	4,790.80	0.5
D4	4,783.50	D4-A	4,783.40	57.7	0.013	10	0.002	163,452	1.43	589,402	0.3	36.02	FALSE	4,791.90	4,791.80	0.16
D4-11	0.00	D4-10	0.00	180.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D4-12	0.00	D4-11	0.00	154.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D4-13	0.00	D4-12	0.00	203.4	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D4-A	4,783.40	D3-A	4,782.60	194.3	0.013	10	0.004	163,452	1.95	908,514	0.24	28.75	FALSE	4,791.80	4,790.60	0.79
D5	4,784.00	D4	4,783.50	112.5	0.013	10	0.004	154,852	1.97	943,840	0.23	27.41	FALSE	4,791.90	4,791.90	0.43
D7	4,785.50	D5	4,784.10	317.2	0.013	10	0.004	153,777	1.97	940,739	0.23	27.35	FALSE	4,794.70	4,791.90	1.42
D8	4,790.10	D7	4,785.50	305.5	0.013	10	0.015	152,487	3.03	1,737,408	0.17	20.02	FALSE	4,803.00	4,794.70	4.58
D9	4,791.33	D8	4,790.10	247.9	0.013	10	0.005	151,842	2.04	997,413	0.22	26.37	FALSE	4,803.40	4,803.00	1.24
D9-4A	0.00	D9-4	0.00	333.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)

**APPENDIX K-3  
GRGID SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE ADF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
D9-4A1	0.00	D9-4A	0.00	330.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4A2	0.00	D9-4A1	0.00	126.5	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4A3	0.00	D9-4A2	0.00	303.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4B	0.00	D9-4A	0.00	137.6	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4C	0.00	D9-4B	0.00	362.3	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-4D	0.00	D9-4C	0.00	233.7	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-A	4,800.13	D9	4,791.33	283.4	0.013	6	0.031	6,450	1.61	638,987	0.04	7.12	FALSE	4,806.71	4,803.40	8.63
D9-C	0.00	D9-A	4,800.13	354	0.013	12	-13.56	(N/A)	(N/A)	84,789,143	(N/A)	(N/A)	FALSE	0.00	4,806.71	(N/A)
D9-E	0.00	D9-C	0.00	311.8	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-F	0.00	D9-E	0.00	364.2	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
D9-G	0.00	D9-F	0.00	215.9	0.013	12	0	(N/A)	(N/A)	23,026	(N/A)	(N/A)	FALSE	0.00	0.00	(N/A)
E1	4,779.90	C5	4,778.60	297.6	0.013	10	0.004	198,720	2.11	935,926	0.26	31.28	FALSE	4,789.10	4,790.30	1.22
E2	4,780.90	E1	4,779.90	299.3	0.013	10	0.003	197,645	1.91	818,474	0.28	33.44	FALSE	4,788.00	4,789.10	1.02
E3	4,781.90	E2	4,780.90	305.4	0.013	10	0.003	194,205	1.89	810,331	0.28	33.31	FALSE	4,787.10	4,788.00	1
E4	4,782.90	E3	4,781.90	402.5	0.013	10	0.002	129,705	1.52	705,759	0.24	29.05	FALSE	4,788.00	4,787.10	0.96
E5	4,784.20	E4	4,782.90	399.6	0.013	10	0.003	127,985	1.67	807,616	0.22	26.91	FALSE	4,789.40	4,788.00	1.28
E6	4,784.90	E5	4,784.20	189.1	0.013	10	0.004	127,125	1.75	861,445	0.22	25.96	FALSE	4,790.00	4,789.40	0.69
E7	4,786.00	E6	4,784.90	266.9	0.013	10	0.004	125,620	1.81	909,114	0.21	25.11	FALSE	4,791.10	4,790.00	1.09
E8	4,786.90	E7	4,786.00	209.7	0.013	10	0.004	120,890	1.82	927,603	0.2	24.38	FALSE	4,791.10	4,791.10	0.89
E9	4,788.40	E9A	4,788.20	108.4	0.013	10	0.002	109,925	1.31	608,189	0.24	28.81	FALSE	4,792.60	4,793.30	0.24
E9-1	4,789.00	E9A	4,788.20	193.2	0.013	6	0.004	9,890	0.91	233,322	0.07	14.07	FALSE	4,793.00	4,793.30	0.67
E9A	4,788.20	E8	4,787.00	285.8	0.013	10	0.004	119,815	1.80	917,477	0.2	24.41	FALSE	4,793.30	4,791.10	1.22

**APPENDIX K-4  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
A1	4,789.60	MGSD Outfall	4,784.60	525	0.013	18	0.05	1,342,685	8.20	15,180,131	0.3	20.1	FALSE	4,796.10	4,796.10	5.24
A10	4,804.60	A9	4,800.30	349.2	0.013	12	0.012	1,203,154	4.96	2,555,068	0.48	48.26	FALSE	4,809.50	4,807.30	4.21
A11	4,809.00	A10	4,804.60	342.8	0.013	12	0.013	1,200,370	5.03	2,608,565	0.48	47.63	FALSE	4,814.10	4,809.50	4.4
A12	4,821.60	A11	4,809.00	340.7	0.013	12	0.037	1,199,176	7.41	4,428,353	0.36	35.55	FALSE	4,828.50	4,814.10	12.6
A13	4,831.00	A12	4,821.60	356.1	0.013	12	0.026	1,198,779	6.56	3,740,955	0.39	38.93	FALSE	4,837.90	4,828.50	9.4
A14	4,833.00	A13	4,831.00	346.2	0.013	12	0.006	1,197,983	3.71	1,750,057	0.61	60.74	FALSE	4,843.80	4,837.90	2.03
A15	4,837.20	A14	4,833.00	436.1	0.013	12	0.041	1,106,978	4.43	2,259,545	0.49	49.39	FALSE	4,847.60	4,843.80	4.15
A16	4,839.50	A15	4,837.20	212.9	0.013	12	0.011	1,103,398	4.62	2,393,111	0.48	47.68	FALSE	4,850.50	4,847.60	2.3
A17	4,843.80	A16	4,839.50	353.2	0.013	12	0.012	1,089,875	4.82	2,540,472	0.46	45.74	FALSE	4,853.70	4,850.50	4.3
A18	4,847.40	A17	4,843.80	174.9	0.013	12	0.021	1,087,091	5.83	3,303,075	0.39	39.5	FALSE	4,855.10	4,853.70	3.6
A19	4,848.70	A18	4,847.40	169.6	0.013	12	0.008	1,087,091	4.05	2,015,848	0.52	52.3	FALSE	4,854.70	4,855.10	1.33
A1-A	4,791.00	A1	4,789.60	163.3	0.013	12	0.009	1,342,685	4.44	2,131,885	0.58	57.56	FALSE	4,798.00	4,796.10	1.44
A2	4,791.30	A1-A	4,791.00	15.5	0.013	12	0.019	1,342,685	6.03	3,201,095	0.45	45.2	FALSE	4,797.70	4,798.00	0.44
A20	4,850.40	A19	4,848.70	171.7	0.013	12	0.01	1,087,091	4.46	2,290,959	0.48	48.48	FALSE	4,857.50	4,854.70	1.77
A21	4,852.70	A20	4,850.40	367.3	0.013	12	0.006	1,085,897	3.75	1,822,182	0.56	55.59	FALSE	4,857.90	4,857.50	2.3
A22	4,854.70	A21	4,852.70	328.7	0.013	12	0.006	1,084,306	3.70	1,796,052	0.56	56.04	FALSE	4,860.40	4,857.90	2
A23	4,857.30	A22	4,854.70	378.8	0.013	12	0.007	1,082,318	3.88	1,907,552	0.54	53.93	FALSE	4,863.20	4,860.40	2.59
A24	4,859.30	A23	4,857.30	361.7	0.013	12	0.006	1,080,329	3.57	1,712,292	0.58	57.63	FALSE	4,865.70	4,863.20	2.03
A25	4,861.90	A24	4,859.30	389.3	0.013	12	0.007	1,078,738	3.83	1,881,661	0.54	54.27	FALSE	4,870.20	4,865.70	2.57
A26	4,863.90	A25	4,861.90	366.1	0.013	12	0.005	1,073,169	3.54	1,701,903	0.58	57.6	FALSE	4,872.10	4,870.20	2.03
A27	4,866.40	A26	4,863.90	391.1	0.013	12	0.006	1,072,374	3.76	1,840,897	0.55	54.81	FALSE	4,875.60	4,872.10	2.47
A28	4,867.90	A27	4,866.40	301.9	0.013	12	0.004	1,030,212	3.20	1,510,934	0.61	60.59	FALSE	4,877.00	4,875.60	1.37
A29	4,869.10	A28	4,868.00	313.1	0.013	12	0.004	1,029,019	2.95	1,364,756	0.65	64.87	FALSE	4,877.50	4,877.00	1.21
A3	4,792.30	A2	4,791.30	382.2	0.013	12	0.003	1,341,889	2.64	1,177,749	(N/A)	(N/A)	TRUE	4,800.00	4,797.70	1.42
A30	4,870.60	A29	4,869.10	344.6	0.013	12	0.004	988,051	3.19	1,519,250	0.59	58.76	FALSE	4,879.40	4,877.50	1.44
A31	4,872.20	A30	4,870.60	351.6	0.013	12	0.005	939,923	3.20	1,553,249	0.56	56.13	FALSE	4,879.20	4,879.40	1.57
A32	4,872.90	A31	4,872.20	353.9	0.013	12	0.002	891,795	2.27	1,024,107	0.72	72.19	FALSE	4,879.50	4,879.20	0.86
A33	4,873.80	A32	4,872.90	394.4	0.013	12	0.002	890,602	2.41	1,099,936	0.68	68.25	FALSE	4,882.60	4,879.50	0.86
A33-A	4,874.20	A33	4,873.80	255.2	0.013	12	0.002	491,858	1.83	911,553	0.52	52.32	FALSE	4,884.00	4,882.60	0.26
A34	4,874.80	A33-A	4,874.20	200.5	0.013	8	0.003	53,338	1.29	427,231	0.16	23.83	FALSE	4,884.70	4,884.00	0.22
A34.1	4,877.50	A34	4,874.90	300.4	0.013	8	0.009	3,182	0.81	726,623	0.03	4.77	FALSE	4,885.90	4,884.70	2.57
A34.2	4,880.10	A34.1	4,877.50	300.7	0.013	8	0.009	1,989	0.70	726,171	0.03	3.85	FALSE	4,887.20	4,885.90	2.59
A34.3	4,882.80	A34.2	4,880.10	298.4	0.013	8	0.009	796	0.54	742,923	0.02	2.47	FALSE	4,888.60	4,887.20	2.69
A34.4	4,884.20	A34.3	4,882.80	137.3	0.013	8	0.01	398	0.46	788,642	0.01	1.73	FALSE	4,889.40	4,888.60	1.4
A4	4,794.50	A3	4,792.30	387.8	0.013	12	0.006	1,339,105	3.77	1,734,221	0.66	65.96	TRUE	4,802.60	4,800.00	1.82
A5	4,796.10	A4	4,794.50	368.4	0.013	12	0.004	1,337,514	3.37	1,517,545	0.73	72.89	FALSE	4,804.60	4,802.60	1.67
A6	4,797.40	A5	4,796.10	288	0.013	12	0.005	1,336,321	3.43	1,546,925	0.72	71.72	FALSE	4,806.70	4,804.60	1.29
A7	4,798.70	A6	4,797.40	341	0.013	12	0.004	1,335,525	3.18	1,421,661	0.77	77	FALSE	4,808.20	4,806.70	1.35
A8	4,799.20	A7	4,798.70	324.4	0.013	12	0.002	1,204,347	2.37	904,027	(N/A)	(N/A)	TRUE	4,810.80	4,808.20	0.89
A9	4,800.30	A8	4,799.20	235.8	0.013	12	0.005	1,204,347	3.41	1,572,636	0.66	65.57	TRUE	4,807.30	4,810.80	0.61
B1	4,766.60	MGSD Outfall	4,761.60	388.1	0.013	18	0.05	2,583,490	9.92	15,180,131	0.42	27.9	FALSE	4,774.50	4,774.50	5.35
B10	4,808.60	B9	4,805.10	413.7	0.013	15	0.008	1,772,668	4.75	3,840,035	0.6	47.71	FALSE	4,816.20	4,811.40	3.5
B11	4,811.30	B10	4,808.60	301.2	0.013	15	0.009	1,771,873	4.85	3,952,479	0.59	46.94	FALSE	4,818.90	4,816.20	2.7
B12	4,815.20	B11	4,811.30	378.8	0.013	15	0.01	1,738,064	5.08	4,236,112	0.56	44.63	FALSE	4,822.10	4,818.90	3.89
B13	4,818.00	B12	4,815.20	390.8	0.013	15	0.007	1,736,473	4.44	3,533,931	0.62	49.48	FALSE	4,823.70	4,822.10	2.8
B14	4,820.50	B13	4,818.00	350	0.013	15	0.007	1,735,678	4.43	3,528,514	0.62	49.51	FALSE	4,826.10	4,823.70	2.5
B15	4,822.10	B14	4,820.50	287	0.013	15	0.006	1,711,813	4.02	3,116,896	0.66	52.87	FALSE	4,827.80	4,826.10	1.6
B16	4,823.50	B15	4,822.10	301.2	0.013	15	0.005	1,710,619	3.75	2,846,268	0.7	55.89	FALSE	4,830.40	4,827.80	1.44
B17	4,827.00	B16	4,823.50	401.9	0.013	15	0.009	1,662,492	4.71	3,895,904	0.57	45.64	FALSE	4,833.60	4,830.40	3.44
B18	4,831.30	B17	4,827.00	417.8	0.013	15	0.01	1,655,968	5.01	4,235,340	0.54	43.44	FALSE	4,838.50	4,833.60	4.3
B19	4,833.10	B18	4,831.30	280.7	0.013	15	0.006	1,654,377	4.21	3,343,380	0.62	49.68	FALSE	4,841.10	4,838.50	1.8
B19-A	4,833.80	B19	4,833.10	108.2	0.013	15	0.006	1,651,450	4.22	3,358,582	0.62	49.5	FALSE	4,841.10	4,841.10	0.7
B2	4,769.10	B1	4,766.60	208.7	0.013	15	0.012	2,575,137	5.93	4,568,983	0.67	53.71	FALSE	4,780.80	4,774.50	2.64

**APPENDIX K-4  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B20	4,834.30	B19-A	4,833.80	138.7	0.013	15	0.004	1,651,052	3.37	2,506,315	0.74	59.24	FALSE	4,842.40	4,841.10	0.6
B20-A	4,835.20	B20	4,834.30	161.5	0.013	15	0.006	1,643,328	3.98	3,116,967	0.64	51.59	FALSE	4,843.80	4,842.40	0.8
B21	4,836.30	B21-A	4,835.40	210.6	0.013	15	0.004	1,643,328	3.60	2,728,952	0.7	55.95	FALSE	4,845.40	4,844.30	0.78
B21-A	4,835.40	B20-A	4,835.20	85.3	0.013	15	0.002	1,643,328	2.84	2,021,457	0.86	68.46	FALSE	4,844.30	4,843.80	0.38
B22	4,837.60	B22-A	4,837.00	91	0.013	15	0.007	1,595,845	4.21	3,390,235	0.6	48.25	FALSE	4,845.50	4,845.80	0.54
B22-A	4,837.00	B21	4,836.30	167.3	0.013	15	0.004	1,595,845	3.55	2,700,821	0.69	55.3	FALSE	4,845.80	4,845.40	0.69
B23	4,838.20	B22	4,837.60	277.2	0.013	15	0.002	1,595,845	2.73	1,942,456	0.86	68.99	FALSE	4,845.90	4,845.50	0.83
B24	4,839.20	B23	4,838.20	194.5	0.013	15	0.005	1,565,218	3.82	2,993,806	0.64	51.34	FALSE	4,846.60	4,845.90	0.78
B25	4,840.20	B24	4,839.20	206.6	0.013	15	0.005	1,565,218	3.73	2,904,362	0.65	52.28	FALSE	4,847.80	4,846.60	1.01
B26	4,842.33	B26-A	4,841.44	161.2	0.013	15	0.006	1,551,376	3.91	3,102,088	0.62	49.99	FALSE	4,849.90	4,849.60	0.9
B26-A	4,841.44	B25	4,840.20	206.7	0.013	15	0.006	1,551,376	4.04	3,233,182	0.61	48.79	FALSE	4,849.60	4,847.80	1.21
B27	4,844.40	B26	4,842.33	392.8	0.013	15	0.005	1,466,544	3.79	3,030,669	0.61	49.03	FALSE	4,850.90	4,849.90	2.06
B28	4,845.80	B27	4,844.40	402.9	0.013	15	0.003	1,465,112	3.24	2,460,866	0.69	55.56	FALSE	4,852.00	4,850.90	1.48
B29	4,846.80	B28	4,845.80	342.5	0.013	15	0.003	1,262,777	2.92	2,255,882	0.67	53.49	FALSE	4,853.10	4,852.00	0.97
B3	4,772.60	B2	4,769.10	417.3	0.013	15	0.008	1,842,593	4.78	3,823,620	0.61	48.91	FALSE	4,782.00	4,780.80	3.37
B30	4,848.20	B29	4,846.80	240	0.013	15	0.006	1,261,583	3.78	3,188,841	0.55	43.73	FALSE	4,855.00	4,853.10	1.29
B30-1	4,851.57	B30	4,848.20	257.6	0.013	6	0.013	21,876	1.73	414,808	0.08	15.61	FALSE	4,856.92	4,855.00	2.9
B30-2	4,854.52	B30-1	4,851.57	243.4	0.013	6	0.012	19,490	1.63	399,206	0.08	15.03	FALSE	4,859.92	4,856.92	2.94
B30-3	4,857.69	B30-2	4,854.52	240.5	0.013	6	0.013	17,103	1.62	416,363	0.07	13.78	FALSE	4,863.19	4,859.92	3.16
B30-4	4,860.17	B30-3	4,857.69	416.1	0.013	6	0.006	12,728	1.11	279,942	0.07	14.56	FALSE	4,865.27	4,863.19	2.47
B30-5	4,865.93	B30-4	4,860.17	426.1	0.013	6	0.014	9,944	1.38	421,646	0.05	10.6	FALSE	4,870.58	4,865.27	5.75
B30-6	4,870.65	B30-5	4,865.93	433.2	0.013	6	0.011	5,966	1.10	378,508	0.04	8.74	FALSE	4,875.81	4,870.58	4.71
B30-7	4,874.91	B30-6	4,870.65	397.8	0.013	6	0.011	1,591	0.74	375,270	0.02	4.69	FALSE	4,880.21	4,875.81	4.24
B31	4,849.40	B30	4,848.20	397.2	0.013	15	0.003	1,236,923	2.95	2,294,845	0.65	52.28	FALSE	4,857.40	4,855.00	1.3
B32	4,850.66	B31	4,849.40	346.5	0.013	15	0.004	1,230,957	3.16	2,517,615	0.62	49.33	FALSE	4,858.20	4,857.40	1.22
B33	4,851.00	B32	4,850.66	339.6	0.013	15	0.001	1,227,775	1.89	1,320,920	0.95	76.27	FALSE	4,857.60	4,858.20	0.62
B33-1	4,851.83	B33	4,851.00	312.4	0.013	14	0.003	243,423	1.81	1,790,394	0.29	24.91	FALSE	4,858.61	4,857.60	0.22
B33-12A	4,888.10	B51-1	4,885.51	446.2	0.013	6	0.006	0	0.00	276,270	(N/A)	(N/A)	FALSE	4,893.46	4,893.37	2.51
B33-1A	4,855.74	B33-1	4,851.83	331.4	0.013	6	0.012	45,741	2.08	393,868	0.11	22.97	FALSE	4,861.16	4,858.61	3.75
B33-1B	4,858.88	B33-1A	4,855.74	285	0.013	6	0.011	43,355	1.99	380,610	0.11	22.83	FALSE	4,864.35	4,861.16	3.14
B33-1B1	4,860.58	B33-1B	4,858.88	310.1	0.013	6	0.005	19,092	1.22	268,497	0.09	18.07	FALSE	4,865.40	4,864.35	1.66
B33-1B2	4,863.74	B33-1B1	4,860.58	320.2	0.013	6	0.01	15,910	1.43	360,248	0.07	14.29	FALSE	4,868.08	4,865.40	3.15
B33-1B3	4,866.79	B33-1B2	4,863.74	319.8	0.013	6	0.01	12,728	1.32	354,142	0.06	12.96	FALSE	4,871.80	4,868.08	3.04
B33-1B4	4,869.50	B33-1B3	4,866.79	319.6	0.013	6	0.008	9,148	1.14	333,909	0.06	11.39	FALSE	4,874.32	4,871.80	2.7
B33-1B5	4,871.07	B33-1B4	4,869.50	263.8	0.013	6	0.006	5,966	0.89	279,766	0.05	10.1	FALSE	4,875.12	4,874.32	1.56
B33-1B6	4,872.28	B33-1B5	4,871.07	274.8	0.013	6	0.004	2,784	0.64	240,623	0.04	7.51	FALSE	4,876.69	4,875.12	1.2
B33-1B7	4,873.64	B33-1B6	4,872.28	261.7	0.013	6	0.005	(N/A)	(N/A)	261,422	(N/A)	(N/A)	FALSE	4,878.09	4,876.69	(N/A)
B33-1B7	4,873.64	B33-1C8	4,870.18	174	0.013	6	0.02	(N/A)	(N/A)	511,416	(N/A)	(N/A)	FALSE	4,878.09	4,876.10	(N/A)
B33-1C	4,862.61	B33-1B	4,858.88	265.8	0.013	6	0.014	19,888	1.72	429,590	0.07	14.68	FALSE	4,868.24	4,864.35	3.69
B33-1C2	4,863.92	B33-1C	4,862.61	301.1	0.013	6	0.004	14,319	1.04	239,184	0.08	16.59	FALSE	4,869.13	4,868.24	1.31
B33-1C3	4,865.32	B33-1C2	4,863.92	194.8	0.013	6	0.007	13,126	1.21	307,452	0.07	14.07	FALSE	4,870.26	4,869.13	1.39
B33-1C4	4,866.76	B33-1C3	4,865.32	277.1	0.013	6	0.005	1,989	0.61	261,417	0.03	6.23	FALSE	4,872.23	4,870.26	1.4
B33-1C5	4,866.76	B33-1C3	4,865.32	281.9	0.013	6	0.005	7,557	0.91	259,159	0.06	11.73	FALSE	4,872.02	4,870.26	1.43
B33-1C6	4,867.73	B33-1C5	4,866.76	142.8	0.013	6	0.007	1,989	0.67	298,859	0.03	5.84	FALSE	4,873.78	4,872.02	0.94
B33-1C7	4,867.90	B33-1C5	4,866.76	171.1	0.013	6	0.007	3,978	0.82	296,022	0.04	8.09	FALSE	4,873.94	4,872.02	1.12
B33-1C8	4,870.18	B33-1C7	4,867.90	205.5	0.013	6	0.011	1,591	0.74	381,944	0.02	4.69	FALSE	4,876.10	4,873.94	2.26
B33-1D	4,867.21	B33-1C	4,862.61	297.8	0.013	6	0.015	1,989	0.89	450,680	0.02	4.79	FALSE	4,872.01	4,868.24	4.54
B33-1E	4,854.76	B33-1	4,851.83	363.4	0.013	6	0.008	93,073	2.22	325,619	0.18	36.56	FALSE	4,860.06	4,858.61	2.83
B33-1E1	4,856.57	B33-1E	4,854.76	268.6	0.013	6	0.007	84,721	2.02	297,701	0.18	36.47	FALSE	4,861.56	4,860.06	1.8
B33-1E10	4,888.26	B33-1E9	4,886.57	235.1	0.013	6	0.007	9,148	1.08	307,456	0.06	11.85	FALSE	4,894.17	4,892.37	1.68
B33-1E11	4,889.43	B33-1E10	4,888.26	156.1	0.013	6	0.007	7,955	1.05	313,929	0.05	10.97	FALSE	4,895.25	4,894.17	1.17
B33-1E12	4,891.24	B33-1E11	4,889.43	319.6	0.013	6	0.006	3,978	0.78	272,901	0.04	8.42	FALSE	4,897.04	4,895.25	1.8
B33-1E2	4,859.03	B33-1E1	4,856.57	388.8	0.013	6	0.006	80,346	1.95	288,445	0.18	36.05	FALSE	4,864.23	4,861.56	2.46

**APPENDIX K-4  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B33-1E3	4,863.03	B33-1E2	4,859.03	397.6	0.013	6	0.01	75,970	2.26	363,738	0.16	31.05	FALSE	4,867.78	4,864.23	3.99
B33-1E4	4,866.86	B33-1E3	4,863.03	401	0.013	6	0.01	71,595	2.18	354,413	0.15	30.52	FALSE	4,871.80	4,867.78	3.82
B33-1E5	4,870.67	B33-1E4	4,866.86	421	0.013	6	0.009	67,220	2.10	344,990	0.15	29.96	FALSE	4,877.43	4,871.80	3.8
B33-1E6	4,872.77	B33-1E5	4,870.67	352.3	0.013	6	0.006	58,071	1.74	279,982	0.15	30.94	FALSE	4,878.72	4,877.43	2.1
B33-1E7	4,879.34	B33-1E6	4,872.77	491.2	0.013	6	0.013	44,946	2.16	419,284	0.11	22.11	FALSE	4,884.69	4,878.72	6.54
B33-1E8	4,883.77	B33-1E7	4,879.34	300.4	0.013	6	0.015	29,433	1.97	440,557	0.09	17.51	FALSE	4,889.66	4,884.69	4.41
B33-1E9	4,886.57	B33-1E8	4,883.77	262.9	0.013	6	0.011	11,932	1.35	374,253	0.06	12.22	FALSE	4,892.37	4,889.66	2.76
B33-1F	4,855.88	B33-1E	4,854.76	256.1	0.013	6	0.004	3,580	0.69	239,810	0.04	8.51	FALSE	4,861.23	4,860.06	0.97
B33-1G	4,878.30	B33-1E5	4,870.67	406	0.013	6	0.019	5,568	1.29	497,103	0.04	7.47	FALSE	4,882.96	4,877.43	7.52
B33-1G1	4,883.60	B33-1G	4,878.30	372	0.013	6	0.014	1,591	0.81	432,872	0.02	4.4	FALSE	4,888.07	4,882.96	5.28
B33-1H	4,874.42	B33-1E6	4,872.77	304	0.013	6	0.005	7,159	0.91	267,156	0.06	11.27	FALSE	4,879.65	4,878.72	1.55
B33-1H1	4,876.11	B33-1H	4,874.42	260.9	0.013	6	0.006	3,978	0.81	291,874	0.04	8.14	FALSE	4,880.82	4,879.65	1.67
B33-1J	4,888.17	B33-1E8	4,883.77	333.9	0.013	6	0.013	12,330	1.46	416,265	0.06	11.82	FALSE	4,893.22	4,889.66	4.36
B33-1J1	4,889.39	B33-1J	4,888.17	235.7	0.013	6	0.005	9,148	0.96	260,905	0.06	12.8	FALSE	4,894.55	4,893.22	1.22
B33-1J2	4,892.63	B33-1J1	4,889.39	197.1	0.013	6	0.016	7,159	1.34	464,909	0.04	8.64	FALSE	4,899.10	4,894.55	3.23
B33-2	4,852.05	B33-1	4,851.83	368.1	0.013	10	0.001	98,642	0.85	346,163	0.3	36.56	FALSE	4,858.57	4,858.61	0.23
B33-3	4,853.78	B33-2	4,852.05	346.3	0.013	10	0.005	68,413	1.62	1,000,846	0.15	17.7	FALSE	4,859.47	4,858.57	1.57
B34	4,851.70	B33	4,851.00	332	0.013	15	0.002	701,949	2.23	1,917,136	0.52	41.86	FALSE	4,858.00	4,857.60	0.33
B35	4,852.20	B34	4,851.70	389.2	0.013	15	0.001	698,767	1.86	1,496,455	0.6	48.03	FALSE	4,856.70	4,858.00	0.58
B36	4,852.80	B35	4,852.20	410.8	0.013	15	0.001	695,187	1.94	1,595,442	0.58	46.15	FALSE	4,858.00	4,856.70	0.58
B37	4,853.50	B36	4,852.80	412	0.013	15	0.002	692,801	2.05	1,720,794	0.55	44.16	FALSE	4,859.40	4,858.00	0.67
B38	4,854.08	B37	4,853.50	403.7	0.013	15	0.001	688,823	1.93	1,582,380	0.58	46.13	FALSE	4,860.90	4,859.40	0.6
B39	4,855.43	B38	4,854.08	417.7	0.013	12	0.003	684,448	2.61	1,309,070	0.51	51.34	FALSE	4,862.30	4,860.90	1.29
B3-A	4,773.90	B3	4,772.60	91.3	0.013	15	0.014	1,825,410	5.80	4,982,940	0.52	41.87	FALSE	4,783.50	4,782.00	1.3
B4	4,780.10	B3-A	4,773.90	491.7	0.013	15	0.013	1,825,410	5.54	4,687,825	0.54	43.35	FALSE	4,790.10	4,783.50	6.33
B40	4,855.80	B39	4,855.48	182.4	0.013	12	0.002	680,471	2.06	964,379	0.62	61.99	FALSE	4,863.00	4,862.30	0.47
B41	4,856.30	B40	4,855.80	168.6	0.013	12	0.003	680,471	2.52	1,253,765	0.52	52.5	FALSE	4,863.50	4,863.00	0.41
B42	4,859.90	B41	4,856.30	395.3	0.013	12	0.009	483,028	3.47	2,197,485	0.32	31.86	FALSE	4,865.50	4,863.50	3.44
B43	4,862.30	B42	4,860.00	249.8	0.013	12	0.009	480,641	3.48	2,209,299	0.32	31.68	FALSE	4,869.00	4,865.50	2.34
B44	4,863.90	B43	4,862.30	134.5	0.013	12	0.012	478,652	3.81	2,511,571	0.3	29.58	FALSE	4,871.50	4,869.00	1.6
B45	4,864.50	B44	4,863.90	214.1	0.013	12	0.003	477,061	2.26	1,219,036	0.43	43.43	FALSE	4,872.60	4,871.50	0.67
B46	4,865.30	B45	4,864.50	397.6	0.013	12	0.002	473,482	1.99	1,032,828	0.48	47.53	FALSE	4,874.30	4,872.60	0.84
B46-1	4,866.60	B46	4,865.50	279.4	0.013	10	0.004	100,233	1.67	888,409	0.19	22.68	FALSE	4,873.20	4,874.30	1.01
B46-2	4,866.90	B46-1	4,866.60	385.7	0.013	10	0.001	97,846	0.93	394,905	0.28	33.94	FALSE	4,871.80	4,873.20	0.39
B47	4,866.20	B46	4,865.30	341.5	0.013	12	0.003	370,464	2.06	1,182,004	0.38	38.48	FALSE	4,874.60	4,874.30	0.81
B47-1	4,867.00	B47	4,866.30	260.8	0.013	12	0.003	202,057	1.75	1,192,836	0.28	27.82	FALSE	4,874.40	4,874.60	0.69
B47-2	4,873.10	B47-1	4,867.10	373.6	0.013	8	0.016	103,017	2.84	989,752	0.15	21.78	FALSE	4,879.30	4,874.40	6.04
B47-3	4,875.90	B47-2	4,873.10	359.8	0.013	8	0.008	99,040	2.17	688,944	0.17	25.62	FALSE	4,881.80	4,879.30	2.8
B47-4	4,878.80	B47-3	4,875.90	362.1	0.013	8	0.008	96,255	2.17	698,936	0.17	25.07	FALSE	4,884.90	4,881.80	2.9
B48	4,871.10	B47	4,866.30	327.6	0.013	6	0.015	166,021	3.22	438,934	0.21	42.62	FALSE	4,876.50	4,874.60	4.77
B48-1	4,873.36	B48	4,871.10	222.4	0.013	6	0.01	796	0.58	365,566	0.02	3.47	FALSE	4,878.60	4,876.50	2.02
B49	4,876.80	B48	4,871.10	294.5	0.013	6	0.019	154,088	3.49	504,532	0.19	37.91	FALSE	4,882.80	4,876.50	5.69
B5	4,785.27	B4	4,780.10	506.6	0.013	15	0.01	1,825,410	5.13	4,217,619	0.57	45.97	FALSE	4,795.02	4,790.10	5.27
B50	4,879.20	B49	4,877.00	401.5	0.013	6	0.005	149,713	2.17	268,439	0.27	53.37	FALSE	4,886.60	4,882.80	2.23
B51	4,881.40	B50	4,879.20	348	0.013	6	0.006	146,133	2.28	288,343	0.25	50.39	FALSE	4,890.20	4,886.60	2.19
B51-1	4,885.51	B51	4,881.40	488.8	0.013	6	0.008	17,899	1.40	332,511	0.08	15.76	FALSE	4,893.37	4,890.20	3.94
B52	4,883.40	B51	4,881.40	404.2	0.013	6	0.005	124,655	2.00	255,092	0.25	49.31	FALSE	4,890.50	4,890.20	1.99
B53	4,885.20	B52	4,883.40	415.8	0.013	6	0.004	120,280	1.88	238,597	0.25	50.23	FALSE	4,892.10	4,890.50	1.8
B53-1	4,886.90	B53	4,885.30	323.4	0.013	6	0.005	58,071	1.63	255,083	0.16	32.42	FALSE	4,893.00	4,892.10	1.61
B53-2	4,888.60	B53-1	4,887.00	290.2	0.013	6	0.006	43,355	1.55	269,274	0.14	27.17	FALSE	4,893.70	4,893.00	1.61
B53-3	4,893.30	B53-2	4,888.60	298.5	0.013	6	0.016	36,593	2.16	455,058	0.1	19.14	FALSE	4,898.60	4,893.70	4.68
B53-4	4,895.30	B53-3	4,893.30	300.2	0.013	6	0.007	31,422	1.52	295,993	0.11	22	FALSE	4,900.70	4,898.60	1.99
B53-5	4,897.30	B53-4	4,895.30	376.4	0.013	6	0.005	29,433	1.37	264,332	0.11	22.56	FALSE	4,903.60	4,900.70	2

**APPENDIX K-4  
GRGD SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
B53-6	4,898.50	B53-5	4,897.30	265.8	0.013	6	0.005	25,854	1.25	243,657	0.11	21.99	FALSE	4,905.50	4,903.60	1.2
B53-6A	4,901.50	B53-6	4,898.50	246.6	0.013	6	0.012	11,137	1.38	399,989	0.06	11.48	FALSE	4,906.30	4,905.50	2.95
B53-7	4,899.80	B53-6	4,898.50	202.3	0.013	6	0.006	11,535	1.11	290,716	0.07	13.61	FALSE	4,904.90	4,905.50	1.26
B53-8	4,900.70	B53-7	4,899.80	159.5	0.013	6	0.006	11,137	1.05	272,380	0.07	13.84	FALSE	4,904.90	4,904.90	0.9
B53-9	4,901.50	B53-8	4,900.70	229.8	0.013	6	0.003	10,739	0.88	213,956	0.08	15.24	FALSE	4,905.40	4,904.90	0.81
B54	4,892.50	B53	4,885.50	420.9	0.013	6	0.017	56,640	2.50	467,668	0.12	23.45	FALSE	4,898.20	4,892.10	7.03
B55	4,896.80	B54	4,892.50	413.2	0.013	6	0.01	33,968	1.82	369,931	0.1	20.47	FALSE	4,902.20	4,898.20	4.27
B56	4,901.00	B55	4,896.80	402.3	0.013	6	0.01	29,195	1.74	370,519	0.09	18.96	FALSE	4,907.60	4,902.20	4.19
B57	4,903.10	B56	4,901.00	368.8	0.013	6	0.006	25,615	1.35	273,625	0.1	20.67	FALSE	4,907.60	4,907.60	2.1
B6	4,789.80	B5	4,785.27	211.2	0.013	15	0.021	1,823,183	6.73	6,114,566	0.47	37.43	FALSE	4,798.00	4,795.02	4.53
B7	4,795.70	B6	4,789.80	405.9	0.013	15	0.015	1,776,248	5.79	5,033,388	0.51	41.04	FALSE	4,804.00	4,798.00	5.89
B8	4,800.60	B7	4,795.70	394.9	0.013	15	0.012	1,775,055	5.47	4,650,598	0.54	42.83	FALSE	4,807.00	4,804.00	4.9
B9	4,805.10	B8	4,800.60	379.8	0.013	15	0.012	1,773,862	5.37	4,544,621	0.54	43.4	FALSE	4,811.40	4,807.00	4.5
C1	4,771.80	B2	4,769.10	244.8	0.013	10	0.011	727,692	4.20	1,487,101	0.41	49.35	FALSE	4,777.80	4,780.80	2.36
C2	4,773.00	C1	4,771.80	211.3	0.013	10	0.006	725,305	3.25	1,067,098	0.5	60.46	FALSE	4,779.70	4,777.80	1.23
C3	4,774.30	C2	4,773.00	303.3	0.013	10	0.004	721,725	2.91	927,005	0.55	66.36	FALSE	4,786.00	4,779.70	1.35
C3-A	4,776.30	C3	4,774.30	282.1	0.013	10	0.007	719,737	3.54	1,192,377	0.47	56.04	FALSE	4,785.70	4,786.00	1.92
C4	4,776.40	C3-A	4,776.30	12.2	0.013	10	0.008	685,530	3.70	1,281,483	0.43	52.05	FALSE	4,786.00	4,785.70	0.09
C4-A	4,778.20	C4	4,776.40	306.6	0.013	10	0.006	685,530	3.26	1,085,049	0.48	57.68	FALSE	4,790.30	4,786.00	1.82
C5	4,778.60	C4-A	4,778.20	69.7	0.013	10	0.006	685,530	3.23	1,072,564	0.48	58.1	FALSE	4,790.30	4,790.30	0.4
D1	4,779.30	C5	4,779.10	62.6	0.013	10	0.003	312,727	2.13	800,432	0.36	43.39	FALSE	4,790.60	4,790.30	0.26
D10	4,792.40	D9	4,791.40	334.4	0.013	8	0.003	195,470	1.85	427,087	0.32	47.48	FALSE	4,801.90	4,803.40	1.06
D11	4,793.60	D10	4,792.40	346.9	0.013	8	0.003	193,084	1.95	459,360	0.3	45.21	FALSE	4,801.80	4,801.90	1.19
D12	4,795.20	D11	4,793.60	347.1	0.013	8	0.005	190,300	2.16	530,227	0.28	41.39	FALSE	4,801.00	4,801.80	1.57
D13	4,796.40	D12	4,795.20	302.5	0.013	8	0.004	187,515	2.03	491,879	0.29	42.8	FALSE	4,803.10	4,801.00	1.21
D14	4,799.10	D13	4,796.40	263.2	0.013	8	0.01	184,333	2.86	791,015	0.22	32.83	FALSE	4,805.80	4,803.10	2.66
D15	4,800.60	D14	4,799.10	352.3	0.013	8	0.004	182,345	2.07	509,593	0.28	41.32	FALSE	4,808.40	4,805.80	1.53
D15-A	4,802.70	D15	4,800.60	343.3	0.013	8	0.006	177,572	2.35	610,820	0.25	36.9	FALSE	4,810.10	4,808.40	2.07
D16	4,803.80	D15-A	4,802.70	97.9	0.013	8	0.011	177,572	2.92	827,729	0.21	31.47	FALSE	4,810.50	4,810.10	1.1
D16-1	4,806.22	D16	4,803.80	284	0.013	6	0.009	6,762	1.05	334,727	0.05	9.86	FALSE	4,813.27	4,810.50	2.23
D16-2	4,810.93	D16-1	4,806.22	301.3	0.013	6	0.016	1,591	0.84	453,386	0.02	4.3	FALSE	4,816.10	4,813.27	4.68
D17	4,806.50	D16	4,803.80	251.7	0.013	8	0.011	168,423	2.83	808,811	0.21	30.98	FALSE	4,812.90	4,810.50	2.69
D18	4,809.60	D17	4,806.50	321.3	0.013	8	0.01	168,423	2.72	767,066	0.21	31.86	FALSE	4,816.20	4,812.90	3.12
D19	4,812.70	D18	4,809.60	318.2	0.013	8	0.01	168,423	2.73	770,866	0.21	31.78	FALSE	4,820.40	4,816.20	3.12
D1-A	4,780.10	D1	4,779.30	296.1	0.013	10	0.003	311,931	2.00	735,991	0.38	45.42	FALSE	4,791.40	4,790.60	0.82
D2	4,780.60	D1-A	4,780.30	83.9	0.013	10	0.004	311,136	2.22	846,516	0.35	41.95	FALSE	4,791.80	4,791.40	0.35
D20	4,814.70	D19	4,812.70	200.8	0.013	8	0.01	168,423	2.75	779,418	0.21	31.59	FALSE	4,821.30	4,820.40	2.02
D21	4,816.00	D20	4,814.70	256.4	0.013	8	0.005	168,423	2.16	556,056	0.25	37.74	FALSE	4,825.80	4,821.30	1.32
D22	4,817.40	D21	4,816.00	341.7	0.013	8	0.004	168,423	2.00	499,900	0.27	40.03	FALSE	4,828.30	4,825.80	1.42
D23	4,818.80	D22	4,817.40	342.9	0.013	8	0.004	148,536	1.93	499,050	0.25	37.39	FALSE	4,833.10	4,828.30	1.38
D24	4,820.30	D23	4,818.80	341.3	0.013	8	0.004	148,536	1.98	517,776	0.24	36.63	FALSE	4,833.10	4,833.10	1.5
D25	4,821.60	D24	4,820.30	296.1	0.013	8	0.004	148,536	1.98	517,497	0.24	36.64	FALSE	4,830.90	4,833.10	1.3
D26	4,822.20	D25	4,821.60	101.8	0.013	8	0.006	93,471	1.93	599,707	0.18	26.69	FALSE	4,830.50	4,830.90	0.53
D27	4,823.80	D26	4,822.20	418.7	0.013	8	0.004	93,471	1.65	482,779	0.2	29.83	FALSE	4,832.10	4,830.50	1.62
D28	4,825.50	D27	4,823.80	400.1	0.013	8	0.004	93,471	1.72	509,052	0.19	29.05	FALSE	4,831.40	4,832.10	1.69
D29	4,827.20	D28	4,825.50	400.3	0.013	8	0.004	90,130	1.70	508,936	0.19	28.47	FALSE	4,832.40	4,831.40	1.7
D2-A	4,781.60	D2	4,780.60	225.5	0.013	10	0.004	307,158	2.39	943,012	0.33	39.29	FALSE	4,791.30	4,791.80	0.98
D3	4,782.10	D2-A	4,781.60	144.9	0.013	10	0.003	307,158	2.18	831,676	0.35	42.06	FALSE	4,790.80	4,791.30	0.52
D30	4,828.70	D29	4,827.20	402.6	0.013	8	0.004	83,289	1.59	476,674	0.19	28.28	FALSE	4,834.20	4,832.40	1.5
D3-A	4,782.60	D3	4,782.10	151.1	0.013	10	0.003	302,385	2.14	814,585	0.35	42.21	FALSE	4,790.60	4,790.80	0.5
D4	4,783.50	D4-A	4,783.40	57.7	0.013	10	0.002	302,385	1.68	589,402	0.42	50.76	FALSE	4,791.90	4,791.80	0.18
D4-A	4,783.40	D3-A	4,782.60	194.3	0.013	10	0.004	302,385	2.32	908,514	0.33	39.75	FALSE	4,791.80	4,790.60	0.78
D5	4,784.00	D4	4,783.50	112.5	0.013	10	0.004	286,475	2.35	943,840	0.31	37.78	FALSE	4,791.90	4,791.90	0.41

**APPENDIX K-4  
GRGID SEWER MASTER PLAN  
MODEL OUTPUT: FUTURE PHF**

Upstream MH	Invert (Start) (ft)	Downstream MH	Invert (Stop) (ft)	Length (ft)	Manning's n	Diameter (in)	Slope (Calculated) (ft/ft)	Flow (gal/day)	Velocity (ft/s)	Capacity (Full Flow) (gal/day)	Depth (Normal) (ft)	d/D: Depth (Normal) / Rise (%)	Is Ever Surcharged ?	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Headloss (ft)
D7	4,785.50	D5	4,784.10	317.2	0.013	10	0.004	284,487	2.34	940,739	0.31	37.71	FALSE	4,794.70	4,791.90	1.42
D8	4,790.10	D7	4,785.50	305.5	0.013	10	0.015	282,100	3.63	1,737,408	0.23	27.25	FALSE	4,803.00	4,794.70	4.57
D9	4,791.33	D8	4,790.10	247.9	0.013	10	0.005	280,907	2.43	997,413	0.3	36.32	FALSE	4,803.40	4,803.00	1.24
D9-A	4,800.13	D9	4,791.33	283.4	0.013	6	0.031	11,932	1.95	638,987	0.05	9.48	FALSE	4,806.71	4,803.40	8.56
E1	4,779.90	C5	4,778.60	297.6	0.013	10	0.004	367,632	2.50	935,926	0.36	43.52	FALSE	4,789.10	4,790.30	1.18
E2	4,780.90	E1	4,779.90	299.3	0.013	10	0.003	365,644	2.26	818,474	0.39	46.83	FALSE	4,788.00	4,789.10	1.03
E3	4,781.90	E2	4,780.90	305.4	0.013	10	0.003	359,280	2.23	810,331	0.39	46.62	FALSE	4,787.10	4,788.00	1
E4	4,782.90	E3	4,781.90	402.5	0.013	10	0.002	239,955	1.81	705,759	0.34	40.22	FALSE	4,788.00	4,787.10	0.95
E5	4,784.20	E4	4,782.90	399.6	0.013	10	0.003	236,773	1.99	807,616	0.31	37.08	FALSE	4,789.40	4,788.00	1.27
E6	4,784.90	E5	4,784.20	189.1	0.013	10	0.004	235,182	2.08	861,445	0.3	35.72	FALSE	4,790.00	4,789.40	0.69
E7	4,786.00	E6	4,784.90	266.9	0.013	10	0.004	232,397	2.16	909,114	0.29	34.49	FALSE	4,791.10	4,790.00	1.09
E8	4,786.90	E7	4,786.00	209.7	0.013	10	0.004	223,647	2.17	927,603	0.28	33.41	FALSE	4,791.10	4,791.10	0.89
E9	4,788.40	E9A	4,788.20	108.4	0.013	10	0.002	203,362	1.55	608,189	0.33	39.85	FALSE	4,792.60	4,793.30	0.25
E9A	4,788.20	E8	4,787.00	285.8	0.013	10	0.004	221,658	2.15	917,477	0.28	33.44	FALSE	4,793.30	4,791.10	1.22

## **Appendix L Asset Management Plan & System Replacement Costs**

**APPENDIX L**  
**GRGID SEWER MASTER PLAN**  
**ASSET MANAGEMENT PLAN - SYSTEM REPLACEMENT COSTS**

Components	Quantity	Unit Cost	Current Cost of Replacement	Age (Years)	Cost of Replacement End of Useful Life, 3.7% Inflation	Annual Cost of Replacement, 3.7% Inflation
<b>Remaining Useful Life 25-29 Years, Replace 2048 - 2052</b>					<b>F=P(F/P,3.7%,25 Years)</b>	<b>F=(A/P,3.7%,25)</b>
Springfield Lift Station	1	\$ 500,000	\$ 500,000	25	\$ 1,240,000	\$ 31,000
Pleasantview Lift Station	1	\$ 500,000	\$ 500,000	23	\$ 1,333,500	\$ 29,600
<b>Totals</b>			<b>\$ 1,000,000</b>		<b>\$ 2,573,500</b>	<b>\$ 60,600</b>
<b>Remaining Useful Life 30-34 Years, Replace 2053 - 2057</b>					<b>F=P(F/P,3.7%,30 Years)</b>	<b>F=(A/P,3.7%,30)</b>
Rocky Terrace Lift Station	1	\$ 500,000	\$ 500,000	18	\$ 1,599,200	\$ 26,900
Rainshadow Ranch Lift Station	1	\$ 500,000	\$ 500,000	17	\$ 1,658,300	\$ 26,500
<b>Totals</b>			<b>\$ 1,000,000</b>		<b>\$ 3,257,500</b>	<b>\$ 53,400</b>
<b>Remaining Useful Life 50-54 Years, Replace 2073 - 2077</b>					<b>F=P(F/P,3.7%,50 Years)</b>	<b>F=(A/P,3.7%,50)</b>
6" PVC (LF)	10,177	\$ 225	\$ 2,289,900	46	\$ 16,288,100	\$ 98,600
8" PVC (LF)	69,276	\$ 250	\$ 17,319,000	46	\$ 123,190,100	\$ 745,600
10" PVC (LF)	2,448	\$ 275	\$ 673,100	46	\$ 4,787,800	\$ 29,000
12" PVC (LF)	18,658	\$ 300	\$ 5,597,500	46	\$ 39,815,000	\$ 241,000
15" PVC (LF)	8,815	\$ 350	\$ 3,085,200	46	\$ 21,945,000	\$ 132,800
Manholes (EA)	386	\$ 10,000	\$ 3,860,000	46	\$ 27,456,200	\$ 166,200
<b>Totals</b>			<b>\$ 32,824,700</b>		<b>\$ 233,482,200</b>	<b>\$ 1,413,200</b>
<b>Remaining Useful Life 60-64 Years, Replace 2083 - 2087</b>					<b>F=P(F/P,3.7%,60 Years)</b>	<b>F=(A/P,3.7%,60)</b>
6" PVC (LF)	34,149	\$ 225	\$ 7,683,600	40	\$ 67,965,800	\$ 320,500
8" PVC (LF)	8,294	\$ 250	\$ 2,073,500	40	\$ 18,341,300	\$ 86,500
10" PVC (LF)	5,360	\$ 275	\$ 1,474,000	40	\$ 13,038,400	\$ 61,500
12" PVC (LF)	1,781	\$ 300	\$ 534,300	40	\$ 4,726,200	\$ 22,300
15" PVC (LF)	3,101	\$ 350	\$ 1,085,400	40	\$ 9,601,000	\$ 45,300
Manholes (EA)	173	\$ 10,000	\$ 1,730,000	40	\$ 15,302,800	\$ 72,200
<b>Totals</b>			<b>\$ 14,580,800</b>		<b>\$ 128,975,500</b>	<b>\$ 608,300</b>
<b>Remaining Useful Life 65-69 Years, Replace 2088 - 2092</b>					<b>F=P(F/P,3.7%,65 Years)</b>	<b>F=(A/P,3.7%,65)</b>
6" PVC (LF)	23,262	\$ 225	\$ 5,233,900	35	\$ 55,519,400	\$ 213,800
8" PVC (LF)	11,728	\$ 250	\$ 2,931,900	35	\$ 31,100,600	\$ 119,800
10" PVC (LF)	1,566	\$ 275	\$ 430,700	35	\$ 4,568,700	\$ 17,600
12" PVC (LF)	2,816	\$ 300	\$ 844,800	35	\$ 8,961,300	\$ 34,500
15" PVC (LF)	1,617	\$ 350	\$ 566,000	35	\$ 6,003,900	\$ 23,100
Manholes (EA)	135	\$ 10,000	\$ 1,350,000	35	\$ 14,320,300	\$ 55,100
<b>Totals</b>			<b>\$ 11,357,300</b>		<b>\$ 120,474,200</b>	<b>\$ 463,900</b>
<b>Remaining Useful Life 70-74 Years, Replace 2093 - 2097</b>					<b>F=P(F/P,3.7%,70 Years)</b>	<b>F=(A/P,3.7%,70)</b>
6" PVC (LF)	9,835	\$ 225	\$ 2,212,800	30	\$ 28,148,500	\$ 88,900
8" PVC (LF)	16,027	\$ 250	\$ 4,006,700	30	\$ 50,968,300	\$ 160,900
10" PVC (LF)	2,647	\$ 275	\$ 727,900	30	\$ 9,259,400	\$ 29,200
Manholes (EA)	115	\$ 10,000	\$ 1,150,000	30	\$ 14,628,900	\$ 46,200
<b>Totals</b>			<b>\$ 8,097,400</b>		<b>\$ 103,005,100</b>	<b>\$ 325,200</b>

Remaining Useful Life 75-79 Years, Replace 2098 - 2102						F=P(F/P,3.7%,75 Years)	F=(A/P,3.7%,75)	
2" PVC	2,028	\$	100	\$	202,800	25	\$ 3,093,700	\$ 8,000
8" PVC (LF)	6,969	\$	250	\$	1,742,200	25	\$ 26,576,900	\$ 69,000
Manholes (EA)	30	\$	10,000	\$	300,000	25	\$ 4,576,400	\$ 11,900
<b>Totals</b>		<b>\$</b>		<b>\$</b>	<b>2,245,000</b>		<b>\$ 34,247,000</b>	<b>\$ 88,900</b>

Remaining Useful Life 80-84 Years, Replace 2103-2107						F=P(F/P,3.7%,80 Years)	F=(A/P,3.7%,80)	
4" FM (LF)	4,870	\$	150	\$	730,500	20	\$ 13,363,500	\$ 28,600
6" PVC (LF)	1,613	\$	225	\$	362,900	20	\$ 6,638,800	\$ 14,200
8" PVC (LF)	15,304	\$	250	\$	3,826,000	20	\$ 69,991,500	\$ 149,700
10" PVC (LF)	736	\$	275	\$	202,400	20	\$ 3,702,600	\$ 7,900
Manholes (EA)	40	\$	10,000	\$	400,000	20	\$ 7,317,500	\$ 15,700
<b>Totals</b>		<b>\$</b>		<b>\$</b>	<b>5,521,800</b>		<b>\$ 101,013,900</b>	<b>\$ 216,100</b>

Remaining Useful Life 100-104 Years, Replace 2123-2127						F=P(F/P,3.7%,100 Years)	F=(A/P,3.7%,100)	
6" FM (LF)	890	\$	225	\$	200,300	0	\$ 7,578,000	\$ 7,600
<b>Totals</b>		<b>\$</b>		<b>\$</b>	<b>200,300</b>		<b>\$ 7,578,000</b>	<b>\$ 7,600</b>

<b>TOTAL COST TO REPLACE SYSTEM AT CURRENT YEAR</b>		<b>\$</b>		<b>76,827,300</b>
<b>TOTAL COST TO REPLACE SYSTEM AT END OF USEFUL LIFE</b>		<b>\$</b>		<b>734,606,900</b>
<b>TOTAL TO BE SAVED EACH YEAR TO REPLACE SYSTEM AT END OF USEFUL LIFE (WITHOUT CONSIDERING SEWER FUND RESERVES)</b>		<b>\$</b>		<b>2,557,200</b>

**APPENDIX L**  
**GRGID SEWER MASTER PLAN**  
**ASSET MANAGEMENT PLAN - SYSTEM REPLACEMENT COSTS**

**Replacement Savings Plan - Current Costs**

**Replacement Savings Plan - Future Costs**

YEAR	\$ Saved/Year	Annual Replacement Cost (Current Costs)	Projected Sewer Fund Balance (No Interest)
2023	0	\$ -	\$ 6,473,891
2024	1	\$ 860,000	\$ 6,394,842
2025	2	\$ 860,000	\$ 7,254,842
2026	3	\$ 860,000	\$ 8,114,842
2027	4	\$ 860,000	\$ 8,974,842
2028	5	\$ 860,000	\$ 9,834,842
2029	6	\$ 860,000	\$ 10,694,842
2030	7	\$ 860,000	\$ 11,554,842
2031	8	\$ 860,000	\$ 12,414,842
2032	9	\$ 860,000	\$ 13,274,842
2033	10	\$ 860,000	\$ 14,134,842
2034	11	\$ 860,000	\$ 14,994,842
2035	12	\$ 860,000	\$ 15,854,842
2036	13	\$ 860,000	\$ 16,714,842
2037	14	\$ 860,000	\$ 17,574,842
2038	15	\$ 860,000	\$ 18,434,842
2039	16	\$ 860,000	\$ 19,294,842
2040	17	\$ 860,000	\$ 20,154,842
2041	18	\$ 860,000	\$ 21,014,842
2042	19	\$ 860,000	\$ 21,874,842
2043	20	\$ 860,000	\$ 22,734,842
2044	21	\$ 860,000	\$ 23,594,842
2045	22	\$ 860,000	\$ 24,454,842
2046	23	\$ 860,000	\$ 25,314,842
2047	24	\$ 860,000	\$ 26,174,842
2048	25	\$ 860,000	\$ 26,834,842
2049	26	\$ 860,000	\$ 27,494,842
2050	27	\$ 860,000	\$ 28,154,842
2051	28	\$ 860,000	\$ 28,814,842
2052	29	\$ 860,000	\$ 29,474,842
2053	30	\$ 860,000	\$ 30,134,842
2054	31	\$ 860,000	\$ 30,794,842
2055	32	\$ 860,000	\$ 31,454,842
2056	33	\$ 860,000	\$ 32,114,842
2057	34	\$ 860,000	\$ 32,774,842
2058	35	\$ 860,000	\$ 33,634,842
2059	36	\$ 860,000	\$ 34,494,842
2060	37	\$ 860,000	\$ 35,354,842
2061	38	\$ 860,000	\$ 36,214,842
2062	39	\$ 860,000	\$ 37,074,842
2063	40	\$ 860,000	\$ 37,934,842
2064	41	\$ 860,000	\$ 38,794,842
2065	42	\$ 860,000	\$ 39,654,842
2066	43	\$ 860,000	\$ 40,514,842
2067	44	\$ 860,000	\$ 41,374,842
2068	45	\$ 860,000	\$ 42,234,842
2069	46	\$ 860,000	\$ 43,094,842
2070	47	\$ 860,000	\$ 43,954,842
2071	48	\$ 860,000	\$ 44,814,842
2072	49	\$ 860,000	\$ 45,674,842
2073	50	\$ 860,000	\$ 39,969,902

YEAR	\$ Saved/Year	Annual Replacement Cost (Future Costs, 3.7% Inflation)	Projected Sewer Fund Balance (3.7% Inflation)
2023	0	\$ -	\$ 6,473,891
2024	1	\$ 2,750,000	\$ 8,524,376
2025	2	\$ 2,750,000	\$ 11,589,778
2026	3	\$ 2,750,000	\$ 14,768,600
2027	4	\$ 2,750,000	\$ 18,065,038
2028	5	\$ 2,750,000	\$ 21,483,444
2029	6	\$ 2,750,000	\$ 25,028,332
2030	7	\$ 2,750,000	\$ 28,704,380
2031	8	\$ 2,750,000	\$ 32,516,442
2032	9	\$ 2,750,000	\$ 36,469,550
2033	10	\$ 2,750,000	\$ 40,568,924
2034	11	\$ 2,750,000	\$ 44,819,974
2035	12	\$ 2,750,000	\$ 49,228,313
2036	13	\$ 2,750,000	\$ 53,799,761
2037	14	\$ 2,750,000	\$ 58,540,352
2038	15	\$ 2,750,000	\$ 63,456,345
2039	16	\$ 2,750,000	\$ 68,554,229
2040	17	\$ 2,750,000	\$ 73,840,736
2041	18	\$ 2,750,000	\$ 79,322,843
2042	19	\$ 2,750,000	\$ 85,007,788
2043	20	\$ 2,750,000	\$ 90,903,077
2044	21	\$ 2,750,000	\$ 97,016,490
2045	22	\$ 2,750,000	\$ 103,356,100
2046	23	\$ 2,750,000	\$ 109,930,276
2047	24	\$ 2,750,000	\$ 116,747,696
2048	25	\$ 2,750,000	\$ 123,302,661
2049	26	\$ 2,750,000	\$ 130,100,160
2050	27	\$ 2,750,000	\$ 137,149,166
2051	28	\$ 2,750,000	\$ 144,458,985
2052	29	\$ 2,750,000	\$ 152,039,267
2053	30	\$ 2,750,000	\$ 159,763,220
2054	31	\$ 2,750,000	\$ 167,772,959
2055	32	\$ 2,750,000	\$ 176,079,059
2056	33	\$ 2,750,000	\$ 184,692,484
2057	34	\$ 2,750,000	\$ 193,624,606
2058	35	\$ 2,750,000	\$ 203,538,716
2059	36	\$ 2,750,000	\$ 213,819,649
2060	37	\$ 2,750,000	\$ 224,480,976
2061	38	\$ 2,750,000	\$ 235,536,772
2062	39	\$ 2,750,000	\$ 247,001,632
2063	40	\$ 2,750,000	\$ 258,890,693
2064	41	\$ 2,750,000	\$ 271,219,648
2065	42	\$ 2,750,000	\$ 284,004,775
2066	43	\$ 2,750,000	\$ 297,262,952
2067	44	\$ 2,750,000	\$ 311,011,681
2068	45	\$ 2,750,000	\$ 325,269,113
2069	46	\$ 2,750,000	\$ 340,054,071
2070	47	\$ 2,750,000	\$ 355,386,071
2071	48	\$ 2,750,000	\$ 371,285,356
2072	49	\$ 2,750,000	\$ 387,772,914
2073	50	\$ 2,750,000	\$ 358,174,072

2074	51	\$	860,000	\$	6,564,940	\$	34,264,962	2074	51	\$	2,750,000	\$	46,696,440	\$	327,480,072
2075	52	\$	860,000	\$	6,564,940	\$	28,560,022	2075	52	\$	2,750,000	\$	46,696,440	\$	295,650,395
2076	53	\$	860,000	\$	6,564,940	\$	22,855,082	2076	53	\$	2,750,000	\$	46,696,440	\$	262,643,020
2077	54	\$	860,000	\$	6,564,940	\$	17,150,142	2077	54	\$	2,750,000	\$	46,696,440	\$	228,414,371
2078	55	\$	860,000	\$	-	\$	18,010,142	2078	55	\$	2,750,000	\$	-	\$	239,615,703
2079	56	\$	860,000	\$	-	\$	18,870,142	2079	56	\$	2,750,000	\$	-	\$	251,231,484
2080	57	\$	860,000	\$	-	\$	19,730,142	2080	57	\$	2,750,000	\$	-	\$	263,277,049
2081	58	\$	860,000	\$	-	\$	20,590,142	2081	58	\$	2,750,000	\$	-	\$	275,768,300
2082	59	\$	860,000	\$	-	\$	21,450,142	2082	59	\$	2,750,000	\$	-	\$	288,721,727
2083	60	\$	860,000	\$	2,916,160	\$	19,393,982	2083	60	\$	2,750,000	\$	25,795,100	\$	276,359,331
2084	61	\$	860,000	\$	2,916,160	\$	17,337,822	2084	61	\$	2,750,000	\$	25,795,100	\$	263,539,526
2085	62	\$	860,000	\$	2,916,160	\$	15,281,662	2085	62	\$	2,750,000	\$	25,795,100	\$	250,245,389
2086	63	\$	860,000	\$	2,916,160	\$	13,225,502	2086	63	\$	2,750,000	\$	25,795,100	\$	236,459,368
2087	64	\$	860,000	\$	2,916,160	\$	11,169,342	2087	64	\$	2,750,000	\$	25,795,100	\$	222,163,265
2088	65	\$	860,000	\$	2,271,460	\$	9,757,882	2088	65	\$	2,750,000	\$	24,094,840	\$	209,038,466
2089	66	\$	860,000	\$	2,271,460	\$	8,346,422	2089	66	\$	2,750,000	\$	24,094,840	\$	195,428,049
2090	67	\$	860,000	\$	2,271,460	\$	6,934,962	2090	67	\$	2,750,000	\$	24,094,840	\$	181,314,047
2091	68	\$	860,000	\$	2,271,460	\$	5,523,502	2091	68	\$	2,750,000	\$	24,094,840	\$	166,677,826
2092	69	\$	860,000	\$	2,271,460	\$	4,112,042	2092	69	\$	2,750,000	\$	24,094,840	\$	151,500,066
2093	70	\$	860,000	\$	1,619,480	\$	3,352,562	2093	70	\$	2,750,000	\$	20,601,020	\$	139,254,548
2094	71	\$	860,000	\$	1,619,480	\$	2,593,082	2094	71	\$	2,750,000	\$	20,601,020	\$	126,555,947
2095	72	\$	860,000	\$	1,619,480	\$	1,833,602	2095	72	\$	2,750,000	\$	20,601,020	\$	113,387,497
2096	73	\$	860,000	\$	1,619,480	\$	1,074,122	2096	73	\$	2,750,000	\$	20,601,020	\$	99,731,814
2097	74	\$	860,000	\$	1,619,480	\$	314,642	2097	74	\$	2,750,000	\$	20,601,020	\$	85,570,871
2098	75	\$	860,000	\$	449,000	\$	725,642	2098	75	\$	2,750,000	\$	6,849,400	\$	84,637,593
2099	76	\$	860,000	\$	449,000	\$	1,136,642	2099	76	\$	2,750,000	\$	6,849,400	\$	83,669,784
2100	77	\$	860,000	\$	449,000	\$	1,547,642	2100	77	\$	2,750,000	\$	6,849,400	\$	82,666,166
2101	78	\$	860,000	\$	449,000	\$	1,958,642	2101	78	\$	2,750,000	\$	6,849,400	\$	81,625,414
2102	79	\$	860,000	\$	449,000	\$	2,369,642	2102	79	\$	2,750,000	\$	6,849,400	\$	80,546,155
2103	80	\$	860,000	\$	1,104,360	\$	2,125,282	2103	80	\$	2,750,000	\$	20,202,780	\$	66,073,582
2104	81	\$	860,000	\$	1,104,360	\$	1,880,922	2104	81	\$	2,750,000	\$	20,202,780	\$	51,065,525
2105	82	\$	860,000	\$	1,104,360	\$	1,636,562	2105	82	\$	2,750,000	\$	20,202,780	\$	35,502,169
2106	83	\$	860,000	\$	1,104,360	\$	1,392,202	2106	83	\$	2,750,000	\$	20,202,780	\$	19,362,970
2107	84	\$	860,000	\$	1,104,360	\$	1,147,842	2107	84	\$	2,750,000	\$	20,202,780	\$	2,626,620
2108	85	\$	860,000	\$	-	\$	2,007,842	2108	85	\$	2,750,000	\$	-	\$	5,473,805
2109	86	\$	860,000	\$	-	\$	2,867,842	2109	86	\$	2,750,000	\$	-	\$	8,426,335
2110	87	\$	860,000	\$	-	\$	3,727,842	2110	87	\$	2,750,000	\$	-	\$	11,488,110
2111	88	\$	860,000	\$	-	\$	4,587,842	2111	88	\$	2,750,000	\$	-	\$	14,663,170
2112	89	\$	860,000	\$	-	\$	5,447,842	2112	89	\$	2,750,000	\$	-	\$	17,955,707
2113	90	\$	860,000	\$	-	\$	6,307,842	2113	90	\$	2,750,000	\$	-	\$	21,370,068
2114	91	\$	860,000	\$	-	\$	7,167,842	2114	91	\$	2,750,000	\$	-	\$	24,910,761
2115	92	\$	860,000	\$	-	\$	8,027,842	2115	92	\$	2,750,000	\$	-	\$	28,582,459
2116	93	\$	860,000	\$	-	\$	8,887,842	2116	93	\$	2,750,000	\$	-	\$	32,390,010
2117	94	\$	860,000	\$	-	\$	9,747,842	2117	94	\$	2,750,000	\$	-	\$	36,338,440
2118	95	\$	860,000	\$	-	\$	10,607,842	2118	95	\$	2,750,000	\$	-	\$	40,432,962
2119	96	\$	860,000	\$	-	\$	11,467,842	2119	96	\$	2,750,000	\$	-	\$	44,678,982
2120	97	\$	860,000	\$	-	\$	12,327,842	2120	97	\$	2,750,000	\$	-	\$	49,082,104
2121	98	\$	860,000	\$	-	\$	13,187,842	2121	98	\$	2,750,000	\$	-	\$	53,648,142
2122	99	\$	860,000	\$	-	\$	14,047,842	2122	99	\$	2,750,000	\$	-	\$	58,383,124
2123	100	\$	860,000	\$	40,060	\$	14,867,782	2123	100	\$	2,750,000	\$	1,515,600	\$	61,777,699
2124	101	\$	860,000	\$	40,060	\$	15,687,722	2124	101	\$	2,750,000	\$	1,515,600	\$	65,297,874
2125	102	\$	860,000	\$	40,060	\$	16,507,662	2125	102	\$	2,750,000	\$	1,515,600	\$	68,948,295
2126	103	\$	860,000	\$	40,060	\$	17,327,602	2126	103	\$	2,750,000	\$	1,515,600	\$	72,733,782
2127	104	\$	860,000	\$	40,060	\$	18,147,542	2127	104	\$	2,750,000	\$	1,515,600	\$	76,659,332
<b>TOTAL</b>			<b>\$</b>		<b>\$</b>	<b>37,740,860</b>		<b>TOTAL</b>			<b>\$</b>		<b>\$</b>	<b>265,108,300</b>	

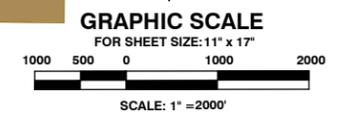
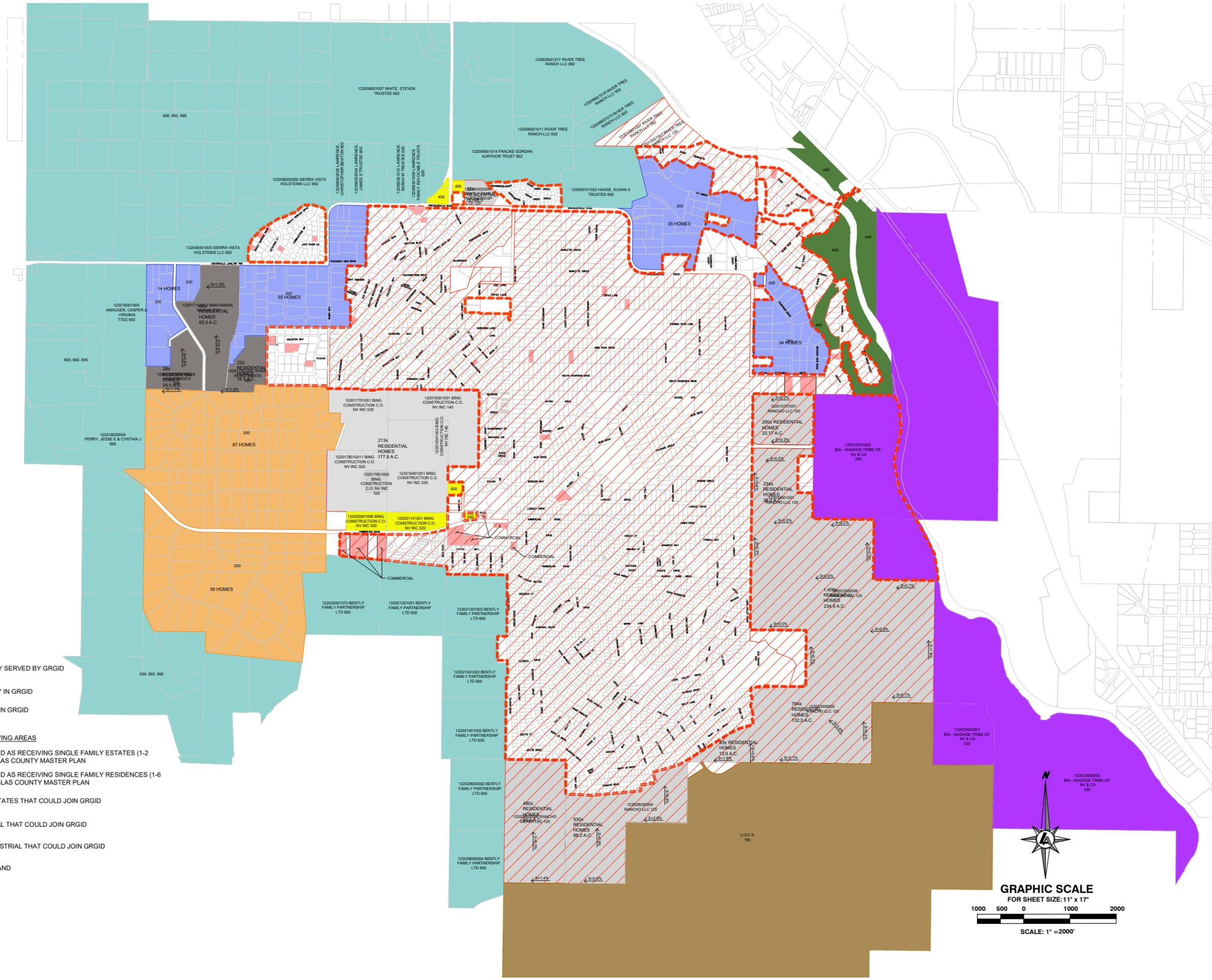
**Appendix M 11"x17" Figures**

L:\LAP\10919.001 - GRGD Sewer MasterPlan\_Update\3-Design\DWG\Civil\Design\10919.001 - GROWTH AND ZONING.dwg, FIG. 5 RECEIVING AREAS & POTENTIAL GROWTH, 05/07/2024 08:58 am emcklenzfc

-  AREAS CURRENTLY SERVED BY GRGD SEWER SYSTEM
-  AREAS CURRENTLY IN GRGD
-  INFILL AREAS WITHIN GRGD

**FUTURE GROWTH/RECEIVING AREAS**

-  AREAS DESIGNATED AS RECEIVING SINGLE FAMILY ESTATES (1-2 AC/UNIT) IN DOUGLAS COUNTY MASTER PLAN
-  AREAS DESIGNATED AS RECEIVING SINGLE FAMILY RESIDENCES (1-6 UNITS/AC) IN DOUGLAS COUNTY MASTER PLAN
-  SINGLE FAMILY ESTATES THAT COULD JOIN GRGD
-  RURAL RESIDENTIAL THAT COULD JOIN GRGD
-  COMMERCIAL/INDUSTRIAL THAT COULD JOIN GRGD
-  WASHOE TRIBAL LAND



GRGD  
**GRGD SEWER MASTER PLAN**  
**RECEIVING AREAS & POTENTIAL GROWTH**

GARDNERVILLE      DOUGLAS COUNTY      NEVADA

REV	DATE	DESCRIPTION	BY

BAR IS 1 INCH ON ORIGINAL DRAWING

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

MAY 2024

L:\Map\10919.001 - GRGD Sewer MasterPlan\_Update\3-Design\DWG\Civil\Design\10919.001 - GROWTH AND ZONING.dwg, FIG 4. CURRENT SERVICE AREAS & ZONING. 05/07/2024 06:58 am emckenzie

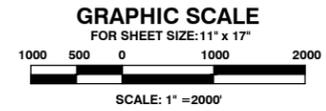
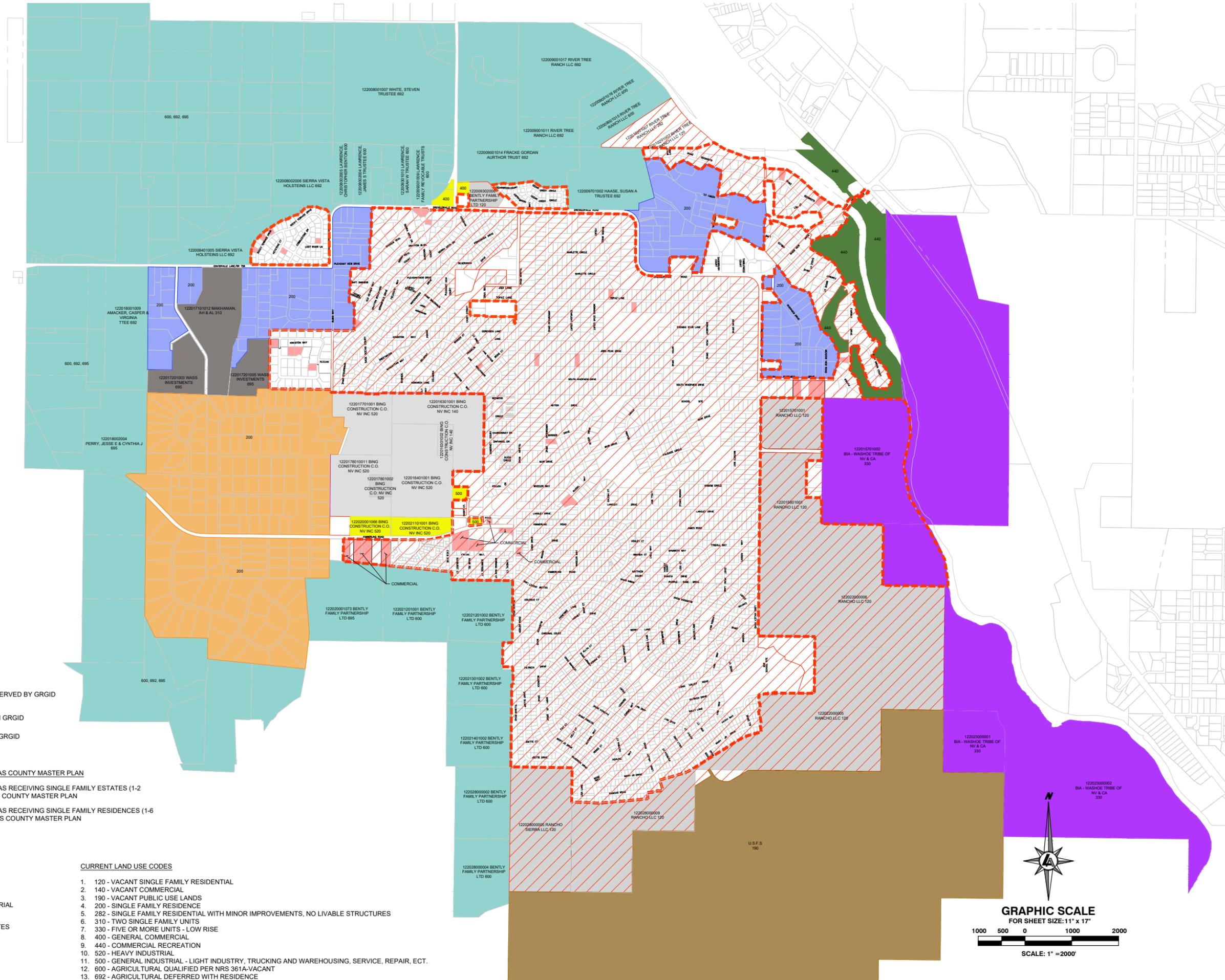
-  AREAS CURRENTLY SERVED BY GRGD SEWER SYSTEM
-  AREAS CURRENTLY IN GRGD
-  INFILL AREAS WITHIN GRGD

**FUTURE LAND USE - DOUGLAS COUNTY MASTER PLAN**

-  AREAS DESIGNATED AS RECEIVING SINGLE FAMILY ESTATES (1-2 AC/UNIT) IN DOUGLAS COUNTY MASTER PLAN
-  AREAS DESIGNATED AS RECEIVING SINGLE FAMILY RESIDENCES (1-6 UNITS/AC) IN DOUGLAS COUNTY MASTER PLAN
-  AGRICULTURAL
-  RURAL RESIDENTIAL
-  U.S. FOREST SERVICE
-  COMMERCIAL/INDUSTRIAL
-  SINGLE FAMILY ESTATES
-  WASHOE TRIBE LAND
-  RECREATION

**CURRENT LAND USE CODES**

1. 120 - VACANT SINGLE FAMILY RESIDENTIAL
2. 140 - VACANT COMMERCIAL
3. 190 - VACANT PUBLIC USE LANDS
4. 200 - SINGLE FAMILY RESIDENCE
5. 282 - SINGLE FAMILY RESIDENTIAL WITH MINOR IMPROVEMENTS, NO LIVABLE STRUCTURES
6. 310 - TWO SINGLE FAMILY UNITS
7. 330 - FIVE OR MORE UNITS - LOW RISE
8. 400 - GENERAL COMMERCIAL
9. 440 - COMMERCIAL RECREATION
10. 520 - HEAVY INDUSTRIAL
11. 500 - GENERAL INDUSTRIAL - LIGHT INDUSTRY, TRUCKING AND WAREHOUSING, SERVICE, REPAIR, ECT.
12. 600 - AGRICULTURAL QUALIFIED PER NRS 361A-VACANT
13. 692 - AGRICULTURAL DEFERRED WITH RESIDENCE
14. 695 - AGRICULTURAL DEFERRED WITH IMPROVEMENTS BUT NO RESIDENCE



GRGD  
**GRGD SEWER MASTER PLAN**  
**CURRENT SERVICE AREAS & ZONING**

GARDNERVILLE      DOUGLAS COUNTY      NEVADA

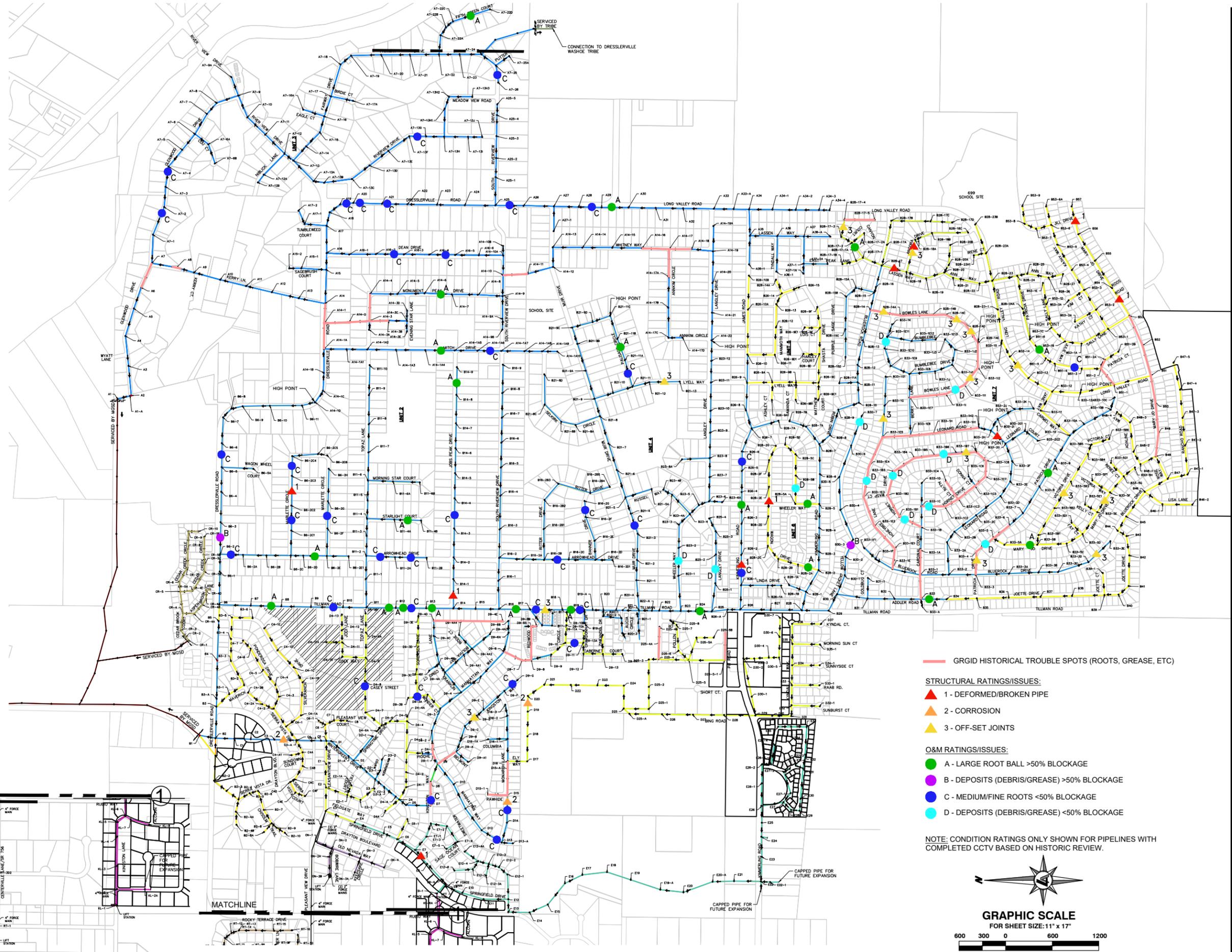
REV	DATE	DESCRIPTION	BY

BAR IS 1 INCH ON ORIGINAL DRAWING

IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

MAY 2024



GRGD HISTORICAL TROUBLE SPOTS (ROOTS, GREASE, ETC)

**STRUCTURAL RATINGS/ISSUES:**

- ▲ 1 - DEFORMED/BROKEN PIPE
- ▲ 2 - CORROSION
- ▲ 3 - OFF-SET JOINTS

**O&M RATINGS/ISSUES:**

- A - LARGE ROOT BALL >50% BLOCKAGE
- B - DEPOSITS (DEBRIS/GREASE) >50% BLOCKAGE
- C - MEDIUM/FINE ROOTS <50% BLOCKAGE
- D - DEPOSITS (DEBRIS/GREASE) <50% BLOCKAGE

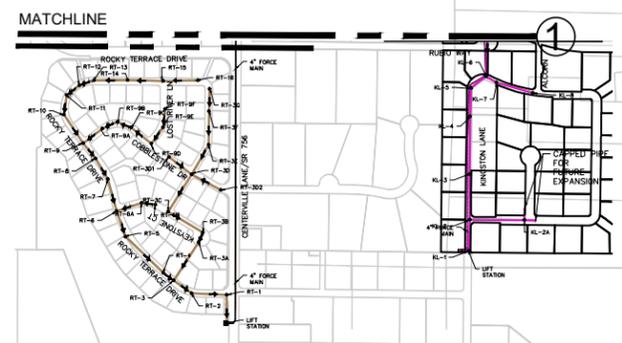
NOTE: CONDITION RATINGS ONLY SHOWN FOR PIPELINES WITH COMPLETED CCTV BASED ON HISTORIC REVIEW.



**GRAPHIC SCALE**  
FOR SHEET SIZE: 11" x 17"



SCALE: 1" = 1200'



GARDNERVILLE  
DOUGLAS COUNTY  
NEVADA

REV	DATE	DESCRIPTION

BAR IS 1 INCH ON ORIGINAL DRAWING  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

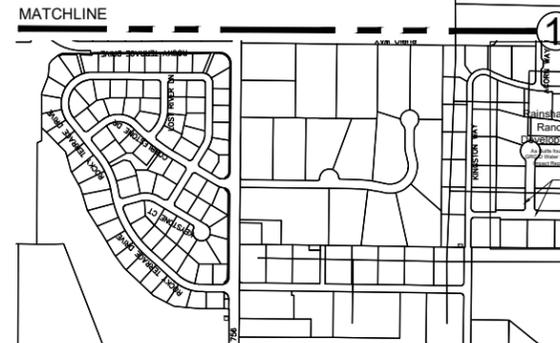
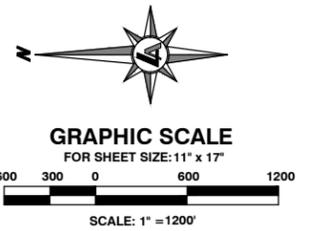
DRAWN BY:  
DESIGNED BY:  
CHECKED BY:  
JOB NO.: 10919.001

L:\A\10919.001 - GRGD Sewer MasterPlan\_Update\3-Design\DWG\Civil\Design\10919.001 - SEWER MODEL.dwg:PG 8 BACKBONE SEWER MODEL  
 05/07/2024 09:02 am emckenzie



- 6" PIPELINE
- 8" PIPELINE
- 10" PIPELINE
- 12" PIPELINE
- 15" PIPELINE

NOTE: SOME MANHOLES SHOWN IN GRGD WERE NOT INCLUDED IN THE SEWER MODEL.



950 SANDHILL ROAD, SUITE 100  
 RENO, NV 89521  
 TEL: 775.827.6111  
 WWW.LUMOSINC.COM  
 INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.

GRGD  
**GRGD SEWER MASTER PLAN  
 BACKBONE SEWER MODEL**  
 GARDNERVILLE DOUGLAS COUNTY NEVADA

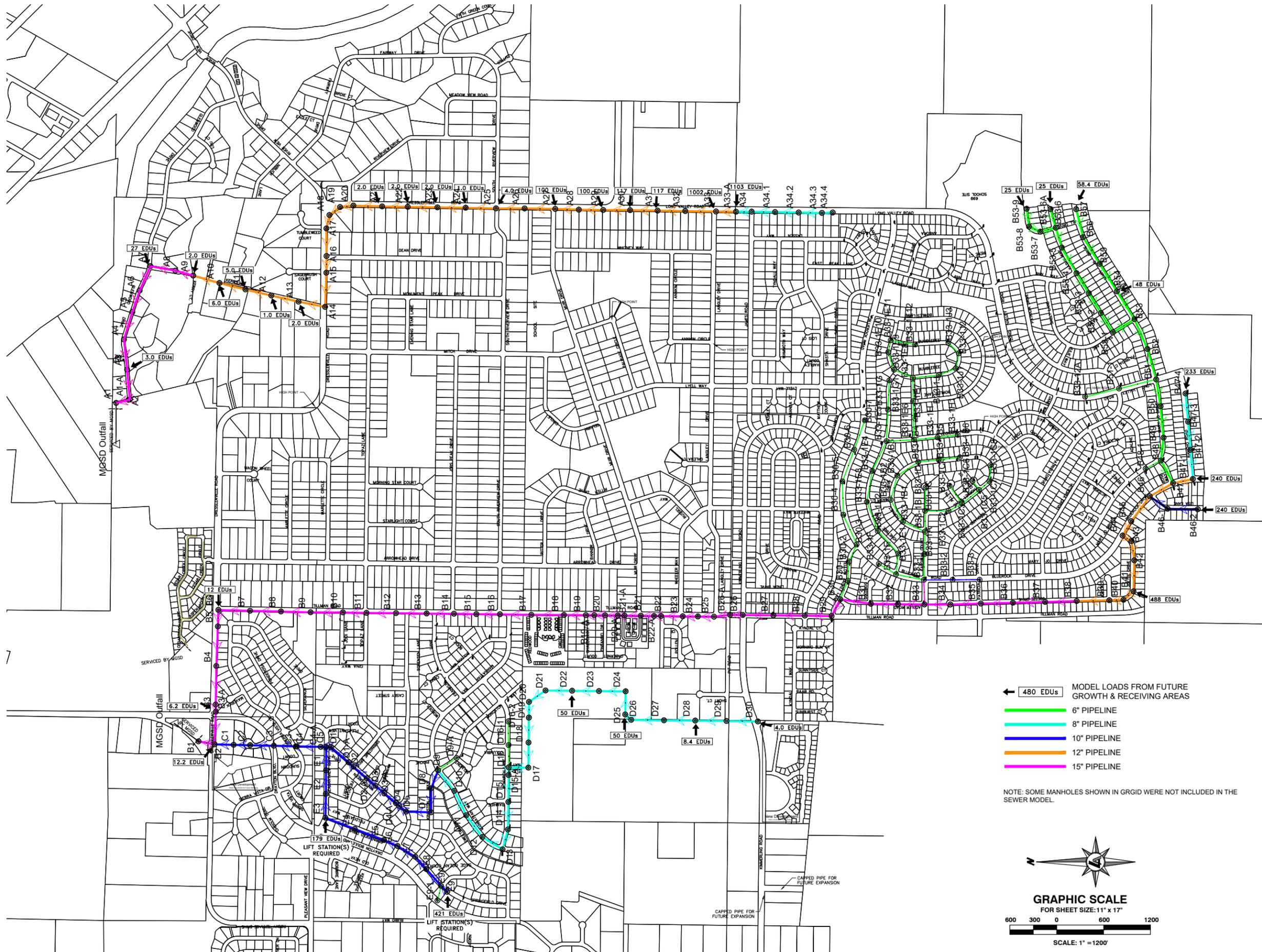
REV	DATE	DESCRIPTION	BY

BAR IS 1 INCH ON ORIGINAL DRAWING  
 0 1"  
 IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY:  
 DESIGNED BY:  
 CHECKED BY:  
 JOB NO.: 10919.001

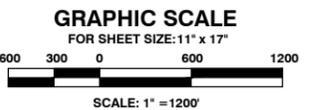
MAY 2024

L:\AP\10919.001 - GRGD Sewer MasterPlan\_Update\3-Design\DWG\Civil\Design\10919.001 - SEWER MODEL.dwg; FIG 9 MODEL LOADS FOR FUTURE GROWTH.  
 05/07/2024 09:02 am emckenzie



- ← 480 EDUs MODEL LOADS FROM FUTURE GROWTH & RECEIVING AREAS
- 6" PIPELINE
- 8" PIPELINE
- 10" PIPELINE
- 12" PIPELINE
- 15" PIPELINE

NOTE: SOME MANHOLES SHOWN IN GRGD WERE NOT INCLUDED IN THE SEWER MODEL.



950 SANDHILL ROAD, SUITE 100  
 RENO, NV 89521  
 TEL: 775.827.6111  
 WWW.LUMOSINC.COM  
 INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.

GRGD  
**GRGD SEWER MASTER PLAN**  
**MODEL LOADS FOR FUTURE GROWTH**

GARDNERVILLE      DOUGLAS COUNTY      NEVADA

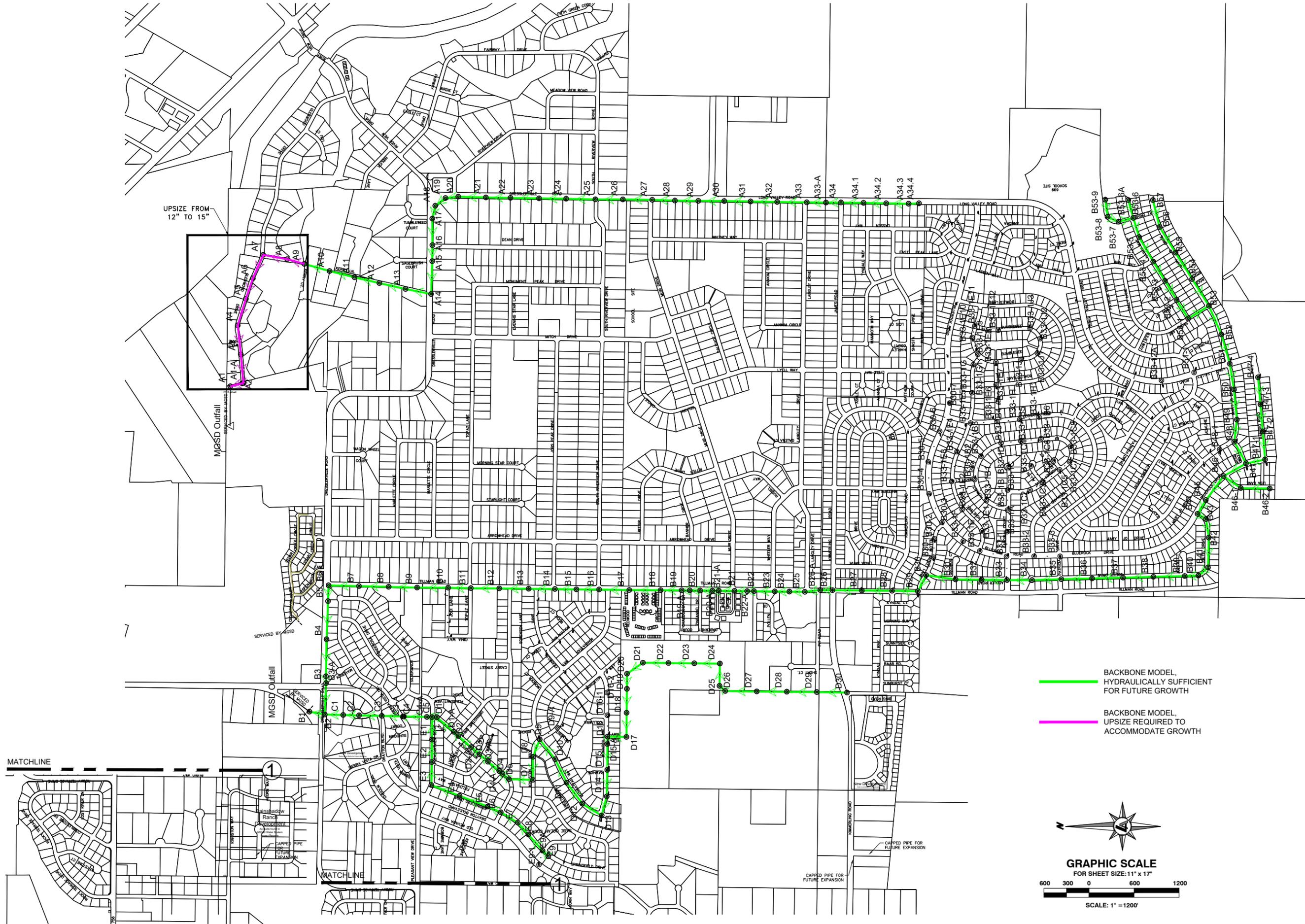
REV	DATE	DESCRIPTION

BAR IS 1 INCH ON ORIGINAL DRAWING  
 0 1"  
 IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

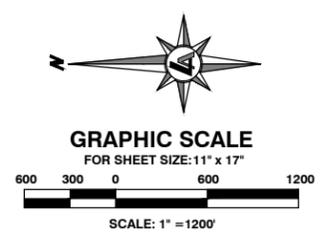
DRAWN BY:  
 DESIGNED BY:  
 CHECKED BY:  
 JOB NO.: 10919.001

MAY 2024

L:\A\10919.001 - GRGD Sewer MasterPlan\_Update\3-Design\DWG\Civil\Design\10919.001 - SEWER MODEL.dwg:FIG 10 CAPACITY IMPROVEMENTS FOR GROWTH.  
 05/07/2024 09:02 am emckenzie



— BACKBONE MODEL, HYDRAULICALLY SUFFICIENT FOR FUTURE GROWTH  
— BACKBONE MODEL, UPSIZE REQUIRED TO ACCOMMODATE GROWTH



950 SANDHILL ROAD, SUITE 100  
 RENO, NV 89521  
 TEL: 775.827.6111  
 WWW.LUMOSINC.COM  
 INFO@LUMOSINC.COM

© LUMOS & ASSOCIATES, INC. THIS DRAWING IS THE PROPERTY OF LUMOS & ASSOCIATES, INC. USE OR REPRODUCTION OF THIS DRAWING, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF LUMOS & ASSOCIATES, INC. IS STRICTLY PROHIBITED. THIS DRAWING IS NOT TO BE USED FOR ANY PROJECT OTHER THAN THE PROJECT FOR WHICH IT WAS PREPARED.

GRGD  
**GRGD SEWER MASTER PLAN**  
**CAPACITY IMPROVEMENTS FOR GROWTH**  
 GARDNERVILLE DOUGLAS COUNTY NEVADA

REV	DATE	DESCRIPTION	BY

BAR IS 1 INCH ON ORIGINAL DRAWING  
 0 1"  
 IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY:  
 DESIGNED BY:  
 CHECKED BY:  
 JOB NO.: 10919.001

MAY 2024