PRELIMINARY SEWER MASTER PLAN/CAPACITY STUDY

PORTION OF NORTHWEST SMD No. 2

PLACER COUNTY FACILITY SERVICES DEPARTMENT SPECIAL DISTRICTS DIVISION

October 1, 2008

Prepared as a supplement f or:

Rancho del Oro Subdivision
Tentative Map Application

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Attachments

Abbreviations Used in This Report

SPWA	**South Placer Wastewater Authority**
SMD 2	**Placer County Sewer Maintenance District 2**
WWTP	**Wastewater Treatment Plant**
SSMH	**Sanitary Sewer Manhole**
RMC Report	**South Placer Regional Wastewater and Recycled Water Systems Evaluation**
TLA	**Terrance Lowell Associates - Engineers**
MHP	**Mobile Home Park**
GBCP	**Granite Bay Community Plan**
SMD No. 2	**Placer County Sewer Maintenance District No. 2**
MGD	**Million Gallons per Day**
LDR	**Low Density Residential 0.4-0.9 Ac. Min.**
RLDR	**Rural Low Density Residential 0.9-2.3 Ac. Min.**
MDR	**Medium Density Residential 2-4 DU/ AC**
HDR	**High Density Residential 4-10 DU/AC**
RR	**Rural Residential 2.3-4.6 Ac. Min.**
DU	**Dwelling Unit**
Ac. or AC	**Acres**
(E)	**Existing**
(N)	**Proposed**

PURPOSE

The purpose of this report, as requested by Placer County Facility Services Special Districts, is to:

1. Assess the need for a new sewer lift station to be located on Open Space "G" between proposed Lots 5 & 6 as depicted on the Rancho del Oro Subdivision tentative map and the Master Sewer Plan that is included in this report.
2. Study the possible abandonment of two existing sewer lift stations, the Lawrence Drive and Winterhawk stations, and analyze the feasibility for gravity flow from these stations to the new Rancho del Oro lift station.
3. Analyze the capacity of the existing Olive Ranch Road 12" trunk line from proposed SSMH E10-10A to (E) SSMH E9-8. These two manholes are located in Olive Ranch Road near the SW corner of Rancho del Oro Subd and Cavitt-Stallman Road respectively.
4. Analyze the possibility of 127 acres (Shed 2), located north of Miners Ravine, to be served by a gravity sewer that crosses Miners Ravine Creek and connects to the new Rancho del Oro lift station.

INTRODUCTION

Rancho del Oro Subdivision is a proposed 89 lot rural residential subdivision planned for construction on 119.4 acres (APN: 046-090-012) located on the north side of Olive Ranch Road approximately ½ mile east of Sierra College Boulevard in south Placer County. The property is within the boundaries of Placer County Sewer Maintenance District No. 2 (SMD No. 2). Miners Ravine, a major creek, traverses the northerly edge of the property. Lawrence Estates Subdivision abuts the westerly property line and undeveloped properties abut the easterly property line. The Rollingwood and Grosvenor Downs Subdivisions lie south of Olive Ranch Road across from the Rancho del Oro site.

Approximately eight of the proposed Rancho del Oro lots can be served by gravity sewer services connected to the existing sewer main located in Olive Ranch Road in lieu of individually pumping to the proposed onsite sewer lateral that will be located in proposed Road 'A'. The remainder of the lots can be served by gravity lines within the proposed subdivision, although, some of the lots will require individual sewer pumps. These gravity lines will flow to the proposed lift station in Open Space "G". The lift station force main will discharge into proposed SSMH E10-10A that will be constructed on the existing 12" trunk sewer in Olive Ranch Road.

OVERVIEW

The Study Area is existing residential and undeveloped properties with the exception of a single, ¾ acre, neighborhood - commercial parcel fronting Barton Road, two schools, one park and a nursery business on Douglas Boulevard. The Study Area has been broken into Sheds 1 – 4. Shed 1 – 3 lie mostly north of Olive Ranch Road and Shed 4 lies mostly south of Olive Ranch Road.

Currently, sanitary sewer disposal for the Study Area is either provided by individual on-site septic systems or connection to existing public gravity lines. The majority of the developed residential properties north of Miners Ravine within the Study Area have individual on-site septic systems with the exception of the mobile home park that has a private onsite sewer lift station and a force main that extends west in Cavitt-Stallman Road to County lift station (LS4) next to Miners Ravine. Currently, this lift station discharges into the Cavitt-Stallman Trunk Sewer.

All of the Study Area sewer system flows to the existing 15" Cavitt-Stallman Road trunk line. This trunk line continues south and connects to the Strap Ravine trunk line that continues west through the City of Roseville and enters the Dry Creek Wastewater Treatment Plant.

DETERMINATION OF SHED LIMITS

A recent Sewer Study that essentially covers the same Study Area (except Shed 4) entitled "Wastewater Service Study – Portion of Northwest SMD No.2", dated January 31, 2006 (revised), by Terrance Lowell & Associates, Inc. was prepared for the proposed Olive Ranch Subdivision property that is 150' east of the easterly boundary of Rancho del Oro Subdivision. Many of the same assumptions and data included in the TLA report, pertaining to the shed limits, etc., have been incorporated herein.

The Study Area has been broken into four Sheds as shown on Sewer Exhibit A.

Shed 1: All properties that could be served by the future gravity line that would extend from the existing Winterhawk Subdivision lift station to the easterly boundary line of the proposed Rancho del Oro Subdivision and including all properties that are currently served by the Winterhawk lift station. Shed 1 is 341.5 acres.

Shed 2: Properties north of Miners Ravine, including the existing mobile home park, that could connect to a future gravity sewer main located on the north side of Miners Ravine. Gravity Sewer "B" could cross Miners Ravine and connect to the proposed Rancho del Oro lift station.
The northerly line of this Shed coincides with the northerly boundary of SMD 2. There are 28 acres included in this Shed that are currently outside of SMD 2. Shed 2 is 127.3 acres.

Shed 3: Rancho del Oro Subdivision – 119.4 acres proposed for 89 residential lots

plus 6 lots in Lawrence Estates 2 that could be served by abandoning lift station LS70. Shed 3 is 119.4 acres (current) and 97.23 acres (with project).

Shed 4: These properties are primarily located north of Douglas Boulevard, south of Olive Ranch Road and west of Berg Road. This Shed was needed for the analysis of the Olive Ranch Road (E) 12" Trunk Line. Shed 4 is 442.4 acres

FLOW GENERATION RATES AND PIPE SIZING METHODOLOGY

The estimated Average Dry Weather Flow (ADWF) Unit Flow and Peaking Factors for the four Sheds within the Study Area were calculated based upon methodology set forth in Appendices 'G' & 'X' (TM 2c – Wet Weather Flow Projection for Ultimate Service Area and TM 3a – Unit Flow Factor Sets and Sewer Design Criteria respectively) in the RMC study. Generally, all properties, except for a single, ¾ acre, neighborhood - commercial parcel fronting Barton Road, two schools, one park and a nursery business on Douglas Boulevard, are residential ranging in size from 10,000 s.f. (0.25 acres) to 100,000 s.f. (2.3 acres) excluding several larger undeveloped parcels and the commercial nursery. To determine peak flows for each shed, existing and future dwelling units (DU) for each parcel were obtained from data base in Appendix X (CD containing Land Use GIS Database) in the RMC Study except, in Shed 4, some parcels were counted from mapping (example: Rollingwood Subd) then summed and divided by corresponding total acreage to determine actual densities for portions of the Shed for current conditions.

Shed 1 This 341.5 acre shed abuts the easterly property line of the proposed Rancho del Oro Subdivision. A large portion of this shed is currently served by the Winterhawk lift station. If this lift station is abandoned in the future, flows will be carried to the proposed Rancho del Oro lift station via future trunk sewer line 'A'.

Shed 2 This shed lies north of Miners Ravine and includes an existing 38-unit mobile home park and 28 acres outside of the SMD 2 boundary. The MHP is currently connected to the SMD 2 system via a private onsite lift station and a private force main in Cavitt-Stallman Road that discharges into County lift station LS4 that is located north of Miners Ravine on the east side of Cavitt-Stallman Road. Shed 2 would be served by the proposed Rancho del Oro lift station via a 6" sewer main that will extend from the lift station, cross Miners Ravine, and provide gravity service for Shed 2.

Shed 3 There are currently no sewer hookups for this 119.4 acre that is the undeveloped Rancho del Oro Subdvision property. The developed condition of this shed includes 65 lots in the proposed 89-lot Rancho del Oro Subdivision plus the 6 single family residential lots in Lawrence Estates 2 that are currently being served by Lift Station LS70. The remainder 24 lots in the proposed Rancho del Oro Subdivision will gravity flow to the existing 12" Olive Ranch Road sewer. These 24 lots are included in Shed 4 calculations.

Shed 4 This shed lies mostly south of Olive Ranch Road, north of Douglas Blvd, west of Berg Road, and east of Cavitt-Stallman Road. Except for some undeveloped parcels next to Berg Road and north of Olive Ranch Road, this shed is fully developed.

CONVEYANCE CAPACITIES

Future Rancho del Oro/Winterhawk Gravity Trunk Sewer 'A'

If the Winterhawk Lift Station were abandoned, it is feasible to extend a gravity line from the abandoned lift station to the proposed Rancho del Oro Lift Station. An 8" section of this line would cross several undeveloped parcels between Winterhawk and Rancho del Oro and the onsite section would be 10" diameter. Preliminary Profile for Gravity Sewer 'A' is included in this report along with capacity a calc Exhibits 'A1' (offsite) & 'A2' (onsite) for this sewer.

Future Gravity Trunk Sewer 'B'

This 6" gravity line would serve Shed 2 properties north of Miners Ravine. A creek crossing would be required and would extend between Lot 5 and Open Space 'G'. Preliminary Profile for Gravity Sewer 'B' creek crossing is included in this report along with capacity calc Exhibit 'B' for this sewer. The profile shows that it is feasible to construct a below-creek crossing and still access the lift station at a reasonable depth, although, it would require the lift station wetwell depth to increase by at least 8' – the wetwell depth would be approximately 21'without the Sewer 'B' connection, and 29' with the Sewer 'B' connection. This crossing is the preferred alternative.

We analyzed an alternative stream crossing further upstream between Lots 10 and 11. In order to cross under Miners Ravine at this location, we would have to lower 1500' of the 8" sewer and manholes in Road 'A' an additional 8'. Several of these manholes would be greater than 20' depth. This alternative reveals that the lift station would only be 2' shallower than the preferred crossing described above. This is not a cost effective or desirable alternative.

Future Gravity Sewer 'C'

This 6" gravity line would serve from 1 to 6 lots in the adjoining Lawrence Estates 2 Subdivision west of Rancho del Oro Subdivision. These lots are currently served by County lift station LS70 in Lawrence Drive. We were unable to fully access this lift station, but it appears to be a small rectangular septic tank with two small submersible pumps that lift the sewage a couple of feet and discharge into a 6" gravity line. There is a small electrical contol panel on a pedestal next to the tank. The county record drawings and county personnel are unclear as to the number of lots it serves so, in this study, we assumed that 6 lots could gravity flow from Lawrence Estates to the Rancho del Oro lift station.

Preliminary Profile for Gravity Sewer 'C' is included in this report. This profile shows that this gravity sewer would have to be extremely deep to replace the existing lift station. Nine hundred feet of Sewer 'C' would range between 10' and 25' deep with three of the required manholes being 22' to 25' deep and two manholes being 15' and 17' deep. Construction of this sewer would disturb approximately 150' of Swale 'A' wetlands. Due to the excessive sewer and manhole depths, wetlands disturbance, proximity to existing structures, the required blasting, and extreme financial costs, we do not believe this sewer is feasible or cost effective. With only 6 lots being served by this 6" line, no capacity calcs were prepared for this report.

Shadow Oaks Lane
This 6" gravity line would connect to Future Gravity Trunk Sewer 'A' and extend north in Shadow Oaks Lane approximately 720 feet and could potentially serve 4 existing Shed 1 lots by gravity and an additional 15 pump lots (old Shed 5) could be served by a future low pressure sewer system. All of these lots are located on the south side of Miners Ravine. Old Shed 5 has been incorporated into Shed 1 in this revised study.

Olive Ranch Road Existing 12" Trunk Line
This section of trunk line is located between SSMH's E9-9 and E10-10A on the "Preliminary Sewer Master Plan/Capacity Study Map". This line discharges into existing SSMH E9-9 that discharges into the Cavitt-Stallman Trunk Line described below. The proposed Rancho del Oro lift station force main will discharge into proposed SSMH E10-10A located on the existing 12" trunk line in Olive Ranch Road near the southwest corner of Rancho del Oro Subdivision. The trunk line was analyzed in two segments as follows:

Between SSMH's E9-7 and E10-10A:
The peak flow for this section sewer excludes most of the flows from Whispering Oaks on the south side of Olive Ranch Road and ten lots in Lawrence Estates on the north side of Olive Ranch Road because flows from these areas enter the Olive Ranch Road 12" trunk line at downstream SSMH E9-7. This section of 12" line is approximately 1400 feet in length, the minimum slope is S=0.0026 and the total peak flow is 1.119 mgd including the 2.50 peaking factor. Exhibit 'C' included in this report shows that this section of existing 12" Olive Ranch Road Trunk Line is slightly below maximum capacity.

Between SSMH's E9-7 and E9-9:
This section of Olive Ranch Road 12" trunk line includes all of the total peak flows from Sheds 1 – 4 as listed in Table 1 below. This section of Olive Ranch Road 12" sewer is approximately 168 feet in length, the slope is S= 0.03 and the total peak flow is 1.119 mgd including the 2.50 peaking factor. Exhibit 'D' included in this report shows that this section of existing 12" Olive Ranch Road Trunk Line is well below maximum capacity.

Cavitt-Stallman Road Trunk Line (Area C – Placer County SMD-2)
The following verbiage was lifted from Section 4.2.4 of the Final RMC Report dated June 2007:
"This 15-inch trunk sewer, as of June 2004, serves the northern portion of Granite Bay and a small area (i.e., several parcels) of Roseville. Future development tributary to Area C includes the Placer UGA (which is a very low density development) and approximately 2,700 acres of additional development within the 2005 Regional Service Area boundary in Placer County and SPMUD (see Figure 4-7). This trunk sewer, as of June 2004, serves approximately 600 acres. SPMUD commented that some of this area may ultimately remain on septic tank service. Sixteen pipe reaches in this area experience surcharging of up to 4 feet for approximately 18 hours due to hydraulic capacity deficiencies in the **buildout** PWWF scenario as a result of connections in Placer County and SPMUD. If the 2,700 acres described above are removed from the buildout scenario, there is only minor surcharging (i.e., 0.60 feet) in Area C for one flat pipe segment that is approximately 22 feet deep. No improvement project is needed for this deficiency if the 2,700 acres are removed."

PROPOSED RANCHO del ORO LIFT STATION

This lift station would be constructed on Open Space Lot 'G' and will serve Sheds 1 and 2 and most of Rancho del Oro Subdivision (Shed 3). Lift Station Peak Flow is based upon ultimate shed development. Lift Station Peak Flow is shown in the Cumulative Shed Flows Table. Exhibit 'S' provides calculations for the emergency storage. Exhibit 'T' provides a lift station site layout and Exhibit 'U' is a nomograph showing the force main sized at 8" diameter

TREATMENT PLANT CAPACITY

The following verbiage was lifted from Section 5.1, Introduction, of the RMC study: "The City of Roseville owns and operates two regional wastewater treatment plants (WWTPs) – the Dry Creek WWTP and the Pleasant Grove WWTP – on behalf of the SPWA partner agencies. Flows to both plants are, as of June 2004, well below design flows. The Dry Creek WWTP average dry weather flow is approximately 10.5 mgd, with an ADWF capacity of 18 mgd. Consequently, the plant is well within its discharge flow rate limitations as well. The Pleasant Grove WWTP, as of June 2004, measures ADWF of approximately 7 mgd, with an ADWF capacity of 12 mgd, and is well within its discharge flow rate limitations. Both WWTPs are consistently in compliance with their NPDES discharge permits. Because of the significant increases in wastewater concentration since 2001, the loadings to the plants are, as of April 2007, at both plants' design organic capacity, and plant improvements will be needed in the near term. In addition, SPWA is evaluating regional wastewater systems to determine the effects of projected future flows and loadings as the Service Area builds out. This chapter establishes projected flow and loadings, calculates flow and loading peaking factors, develops facility expansion recommendations to handle the projected flows and loadings at buildout, and presents a timeline for phasing the construction of the improvements."

The South Placer Wastewater Authority (SPWA) partner agencies are: City of Roseville, South Placer Municipal Utility District, and Placer County.

The proposed Rancho del Oro Subdivision is located within the existing SMD 2 service area, and is not within the area designated as an "Urban Growth Area" in the RMC study.

CONCLUSIONS AND RECOMMENDATIONS

1. A County-maintained sewer lift station is needed for development of the Rancho del Oro Subdivision to carry sewer flows to the existing 12" trunk line in Olive Ranch Road.
2. Even though we left the 6 lots in Lawrence Estates in this revised study, we do not believe it is feasible or cost effective to abandon the Lawrence Estates lift station and extend gravity sewer 'C' to the proposed Rancho del Oro lift station, therefore, construction of sewer 'C' is not recommended.

   It is possible to abandon the Winterhawk lift station and extend gravity line "A" to the proposed Rancho del Oro lift station.
3. The analysis of the existing 12" Olive Ranch Road Trunk Line included in this report shows that there is adequate capacity in this trunk line for ultimate development of Sheds 1 – 3 including Rancho del Oro Subdivision.
4. Shed 2 north of Miners Ravine could be served by the proposed Rancho del Oro lift station. The sewer for Shed 2 is shown in this revised study as Sewer 'B'. This sewer will require a creek crossing. The profile for this creek crossing shows that it is feasible to construct a below creek crossing and still access the lift station, although, it would require the lift station wetwell depth to increase by at least 8' –

without the Sewer 'B' connection, the wetwell depth would be approximately 21' and 29' with the Sewer 'B' connection. Also, this sewer would have to be constructed at a maximum depth of about 21' near the lift station.

TABLE 1

SHED 1 CURRENT FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RR	151.9	96	190	0.0182	2.000	0.0365	3.48	0.127
RLDR	188.9	123	190	0.0234	2.000	0.0467	3.25	0.152
HDR	0.6	4	190	0.0008	2.000	0.0015	3.63	0.006
TOTALS	341.5	223		0.0424	2.000	0.0847	3.28	0.278

SHED 1 CURRENT FLOWS + PROJECT FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RR	151.9	96	190	0.0182	2.000	0.0365	3.48	0.127
RLDR	188.9	123	190	0.0234	2.000	0.0467	3.25	0.152
HDR	0.6	4	190	0.0008	2.000	0.0015	3.63	0.006
TOTALS	341.5	223		0.0424	2.000	0.0847	3.28	0.278

SHED 1 CURRENT FLOWS + PROJECT FLOWS + ULTIMATE FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RR	151.9	136.71	190	0.0260	2.000	0.0519	3.41	0.177
RLDR	188.9	159.3	190	0.0303	2.000	0.0605	3.37	0.204
HDR	0.6	4	190	0.0008	2.000	0.0015	3.63	0.006
TOTALS	341.5	300.01		0.0570	2.000	0.1140	3.18	0.363

(1), (3) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems Evaluation – Final Report – Appendix X (Land Use Data Base). Prepared by RMC Water and Environment. Dated June 2007.

(2) Obtained from County sewer system and development mapping.

(4), (6) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems Evaluation – Final Report – Appendix G (Unit Flow Factor Sets and Sewer Design Criteria). Prepared by RMC Water and Environment. Dated June 2007.

(5) Multiply (3) x (4) to obtain ADWF (5).

(7) Multiply (5) x (6) to obtain ADWF x Safety Factor (7).

(8) Peaking Factor Chart attached. Obtained from "South Placer Regional Wasterwater and Recycled Water Systems Evaluation – Final Report – Appendix G (Unit Flow Factor Sets and Sewer Design Criteria) - Figure 1. Prepared by RMC Water and Environment. Dated June 2007.

(9) Multiply (7) x (8)/10*6 to obtain Peak Flow, mgd (9).

(10) Maximum depth = 0.7d/D

TABLE 1

SHED 2 CURRENT FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RR	117.5	9	190	0.0017	2.000	0.0034	3.62	0.012
MOBILE HOME PARK	9 8	38	190	0 0072	2 000	0 0144	3 57	0 052
TOTALS	127.3	47		0.0089	2.000	0.0179	3.56	0.064

SHED 2 CURRENT FLOWS + PROJECT FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RR	117.5	9	190	0.0017	2.000	0.0034	3.62	0.012
MOBILE HOME PARK	9 8	38	190	0 0072	2 000	0 0144	3 57	0 052
TOTALS	127.3	47		0.0089	2.000	0.0179	3.56	0.064

SHED 2 CURRENT FLOWS + PROJECT FLOWS + ULTIMATE FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RR	117.5	27	190	0.0051	2.000	0.0103	3.58	0.037
MOBILE HOME PARK	9 8	38	190	0 0072	2 000	0 0144	3 57	0 052
TOTALS	127.3	65		0.0124	2.00	0.0247	3.52	0.087

(1), (3) Obtained from "South Placer Regional Wasterwater and Recycled Water
(2) Obtained from County sewer system and development mapping
(4), (6) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems
(5) Multiply (3) x (4) to obtain ADWF (5)
(7) Multiply (5) x (6) to obtain ADWF x Safety Factor (7)
(8) Peaking Factor Chart attached Obtained from "South Placer Regional Wasterwater and
(9) Multiply (7) x (8)/10*6 to obtain Peak Flow, mgd (9)
(10) Maximum depth = 0 7d/D

TABLE 1

SHED 4 CURRENT FLOWS

LAND USE (1)	ACREAGE (2)	EQUIV. DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
HDR	5.2	41	190	0.0078	2	0.016	3.54	0.055
LDR	184.3	306	190	0.0581	2	0.116	3.17	0.369
RLDR	150.9	13	190	0.0025	2	0.005	3.62	0.018
MDR	67.2	281	190	0.0534	2	0.107	3.18	0.340
PARKS	4 7	0.24	10	0 000002	2	0.000005	3.64	0.000
SCHOOLS	16.3	13.28	170	0.0023	2	0.005	3.62	0.016
QUASI / PUBLIC (FIRE STATION)	1 0	3 16	660	0 0021	2	0 004	3.62	0.015
NURSERY (LDR)	12.9	1	190	0.0002	2	0.0004	3.64	0.001
TOTALS	442.4	658.68		0.1263	2	0.253	2.78	0.702

SHED 4 CURRENT + PROJECT FLOWS

LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
HDR	5.2	41	190	0.0078	2	0.016	3.54	0.055
LDR	184.3	306	190	0.0581	2	0.116	3.17	0.369
RLDR	150.9	37	190	0.0070	2	0.014	3.56	0.050
MDR	67.2	281	190	0.0534	2	0.107	3.18	0.340
PARKS	4.7	0.24	10	0.000002	2	0.000005	3.64	0.000
SCHOOLS	16.3	13.28	170	0.0023	2	0.005	3.62	0.016
QUASI / PUBLIC (FIRE STATION)	1 0	3.16	660	0 0021	2	0.004	3 62	0.015
NURSERY (LDR)	12.9	1	190	0.0002	2	0.0004	3.64	0.001
TOTALS	442.4	682.68		0.1309	2	0.262	2.77	0.725

SHED 4 CURRENT + PROJECT + ULTIMATE FLOWS

LAND USE (1)	ACREAGE (2)	EQUIV. DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
HDR	5.2	41	190	0.0078	2	0.016	3.54	0.055
LDR	184.3	306	190	0.0581	2	0.116	3.17	0.369
RLDR	150.9	65	190	0.0124	2	0.025	3.52	0.087
MDR	67.2	281	190	0.0534	2	0.107	3.18	0.340
PARKS	4.7	0.24	10	0.000002	2	0.000005	3.64	0.000
SCHOOLS	16.3	13.28	170	0.0023	2	0.005	3.62	0.016
QUASI / PUBLIC (FIRE STATION)	1 0	3 16	660	0 0021	2	0 004	3 62	0.015
NURSERY (LDR)	12.9	27	190	0.0051	2	0.0103	3.57	0.037
TOTALS	442.4	736.68		0.1411	2	0.282	2.71	0.765

(1), (3) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems
(2) Obtained from County sewer system and development mapping.
(4), (6) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems
(5) Multiply (3) x (4) to obtain ADWF (5).
(7) Multiply (5) x (6) to obtain ADWF x Safety Factor (7).
(8) Peaking Factor Chart attached. Obtained from "South Placer Regional Wasterwater and
(9) Multiply (7) x (8)/10*6 to obtain Peak Flow, mgd (9).
(10) Maximum depth = 0 7d/D

TABLE 1

SHED 3 CURRENT FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
RLDR	119.4	0	190	0.0000	2.000	0.0000	0.000	0.000
TOTALS	119.4	0	190	0.0000	2.000	0.0000	0.000	0.000

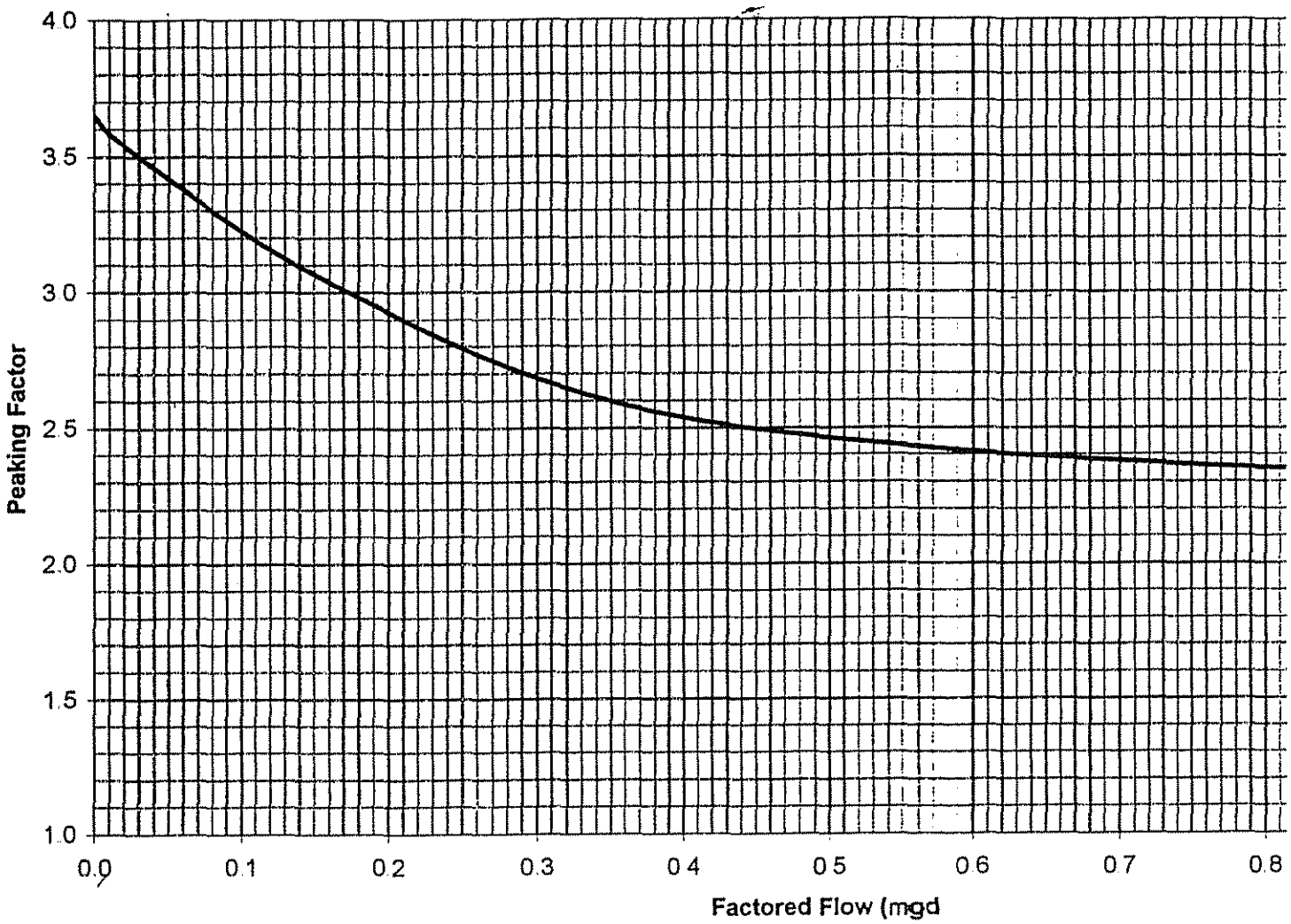
SHED 3 CURRENT + PROJECT FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
LDR	5.63	6	190	0.0011	2.000	0.0023	3.64	0.008
RLDR	91.6	65	190	0.0124	2.000	0.0247	3.52	0.087
TOTALS	97.23	71		0.0135	2.000	0.0270	3.51	0.095

SHED 3 CURRENT + PROJECT FLOWS + ULTIMATE FLOWS								
LAND USE (1)	ACREAGE (2)	EQUIV DU (3)	UNIT FLOW FACTOR (4)	ADWF MGD (5)	SAFETY FACTOR (6)	ADWF MGD x SAFETY FACTOR (7)	PEAKING FACTOR (8)	PEAK FLOW MGD (9)
LDR	5.63	6	190	0.0011	2.000	0.0023	3.64	0.008
RLDR	91.6	65	190	0.0124	2.000	0.0247	3.52	0.087
TOTALS	97.23	71		0.0135	2.000	0.0270	3.51	0.095

(1), (3) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems
(2) Obtained from County sewer system and development mapping.
(4), (6) Obtained from "South Placer Regional Wasterwater and Recycled Water Systems
(5) Multiply (3) x (4) to obtain ADWF (5).
(7) Multiply (5) x (6) to obtain ADWF x Safety Factor (7).
(8) Peaking Factor Chart attached Obtained from "South Placer Regional Wasterwater and
(9) Multiply (7) x (8)/10*6 to obtain Peak Flow, mgd (9).
(10) Maximum depth = 0.7d/D.

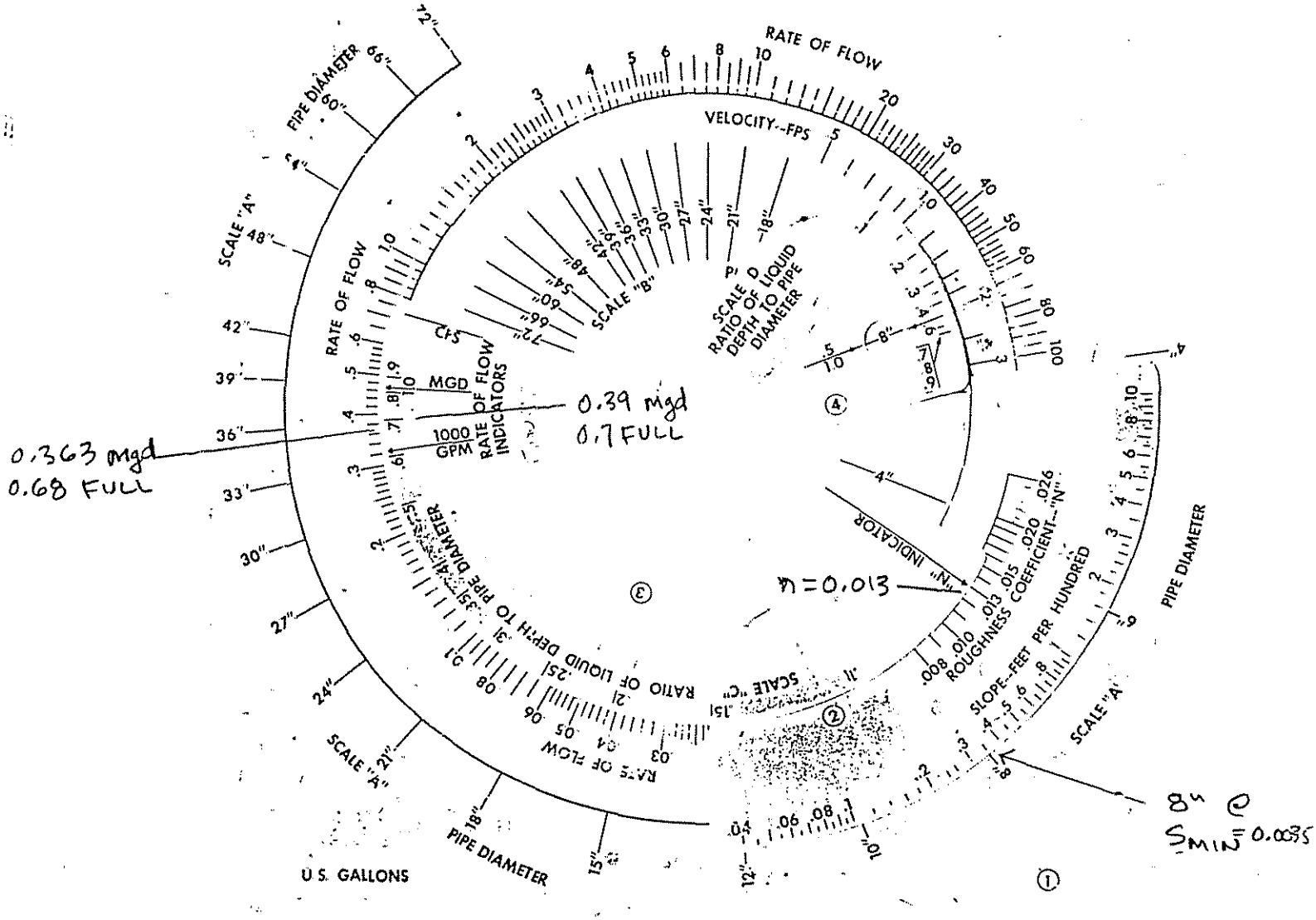
CUMULATIVE SHED FLOWS								
	ADWF MGD x SAFETY FACTOR SHED 1	ADWF MGD x SAFETY FACTOR SHED 2	ADWF MGD x SAFETY FACTOR SHED 3	ADWF MGD x SAFETY FACTOR SHED 4	TOTAL ADWF MGD x SAFETY FACTOR	PEAKING FACTOR	PEAK FLOW MGD	COMMENTS
SHEDS 1-4 CURRENT FLOWS	0.0847	0.0179	0.0000	0.2530	0.356	2.59	0.921	
SHEDS 1-4 CURRENT + PROJECT FLOWS	0.0847	0.0179	0.0270	0.2620	0.392	3.50	1.371	
SHEDS 1-4 CURRENT + PROJECT + ULTIMATE FLOWS	0.1140	0.0247	0.0270	0.2820	0.448	2.50	1.119	PEAK FLOW TO EXISTING 12" SEWER IN OLIVE RANCH ROAD
SHEDS 1-3 CURRENT + PROJECT + ULTIMATE FLOWS	0.1140	0.0247	0.0270	0.0000	0.166	3.35	0.555	PEAK FLOW FOR SIZING LIFT STATION AND FORCE MAIN
SHEDS 1 & 3 CURRENT + PROJECT + ULTIMATE FLOWS	0.1140	0.0000	0.0270	0.0000	0.141	3.09	0.436	PEAK FLOW FOR SIZING ONSITE SEWER 'A'

Figure 1
Proposed SPWA Design Peaking Factor Curve



PEAKING FACTOR
CHART
(from RMC REPORT

14



FEILD'S HYDRAULICS CALCULATOR FOR GRAVITY FLOW IN PIPES

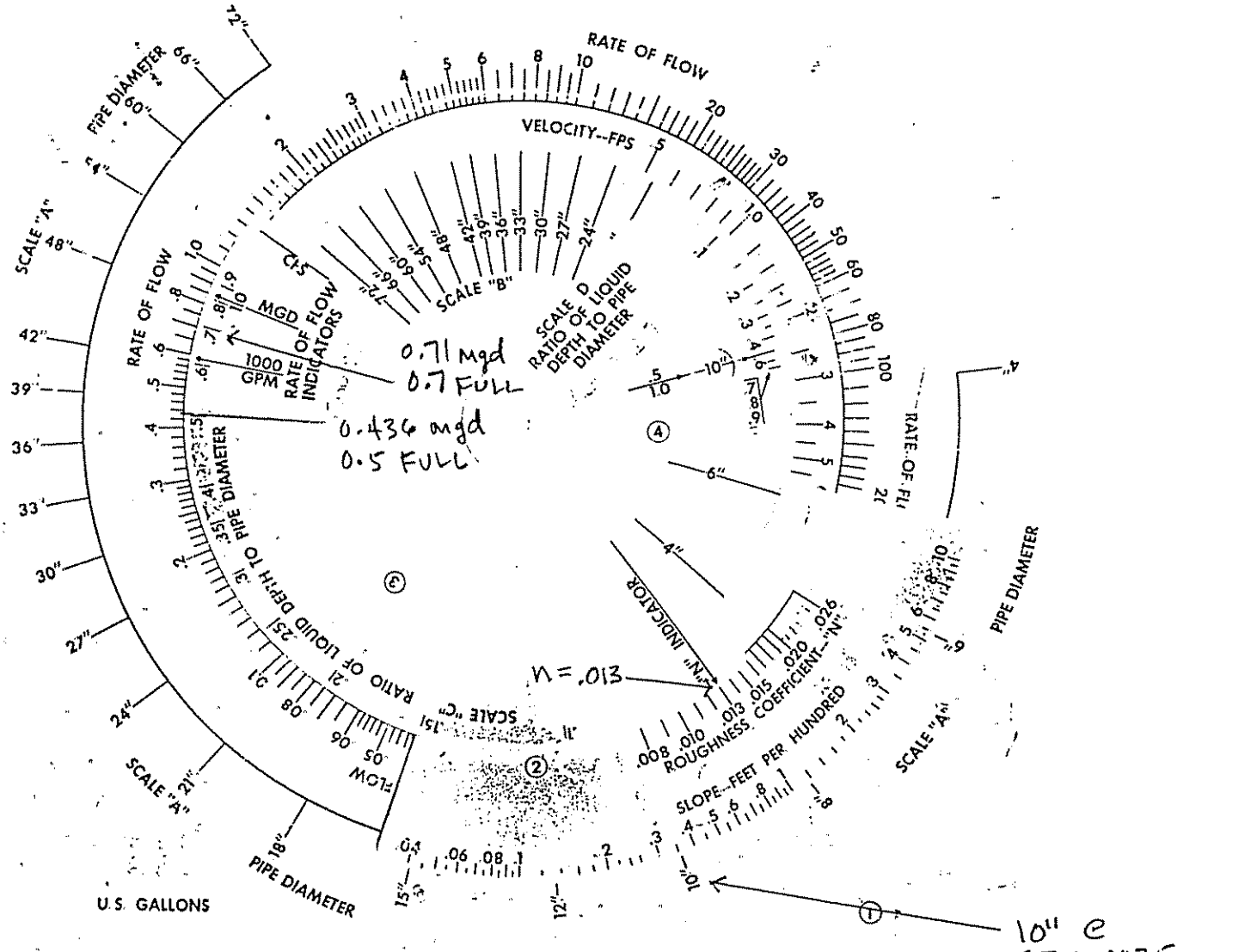
BASED ON THE MANNING FORMULA

Slide Chart by FERRYGRAF Maywood, Ill.

Price $3.00
Copyright 1950, James W. Feild
3314 Alabama Avenue
Alexandria, Virginia
PAT. 2,422,563

Q = 0.39 mgd @ 0.7 Full
DESIGN FLOW = 0.363 mgd
n = 0.013
S_{MIN} = 0.0035
D = 8"

CAPACITY CALC FOR SEWER 'A' (UPPER SECTION - WINTERHAWK LIFT STATION TO E. BORY RANCHO del ORO = SHED 1)



FEILD'S HYDRAULICS CALCULATOR FOR GRAVITY FLOW IN PIPES

BASED ON THE MANNING FORMULA

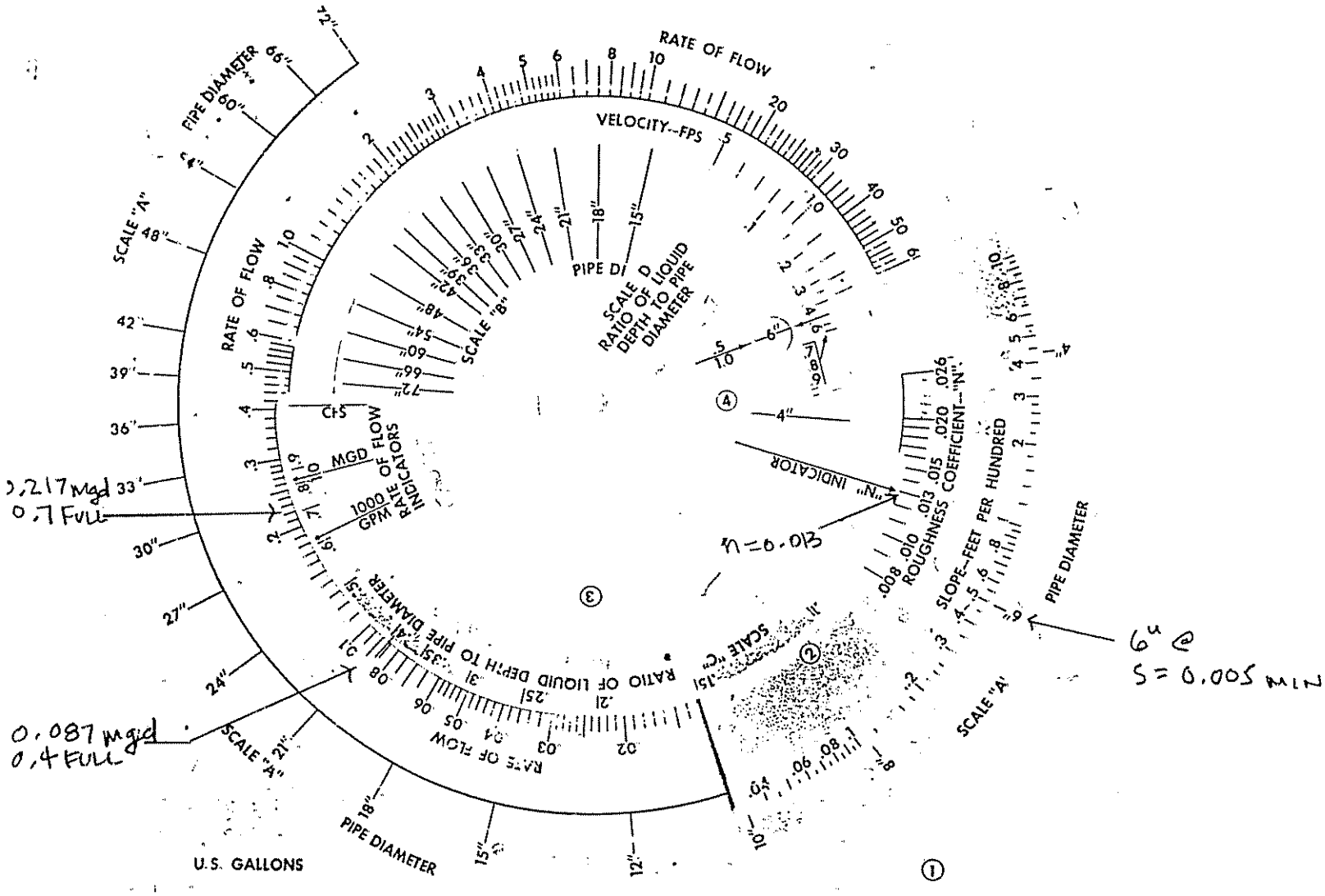
Price $3.00
Copyright 1950, James W. Feild
3314 Alabama Avenue
Alexandria, Virginia
PAT. 2,422,543

Slide Chart . PERRYGRAF Maywood, Ill.

Q = 0.71 mgd @ 0.7 FULL
DESIGN FLOW = 0.436 mgd
n = .013
S_{MIN} = 0.0035
D = 10"

CAPACITY CALC FOR SEWER 'A' (LOWER SECTION - E. BDRY TO LIFT STATION = SHEDS 1 + 3).

EXHIBIT 'A' 16



FEILD'S HYDRAULICS CALCULATOR FOR GRAVITY FLOW IN PIPES

BASED ON THE MANNING FORMULA

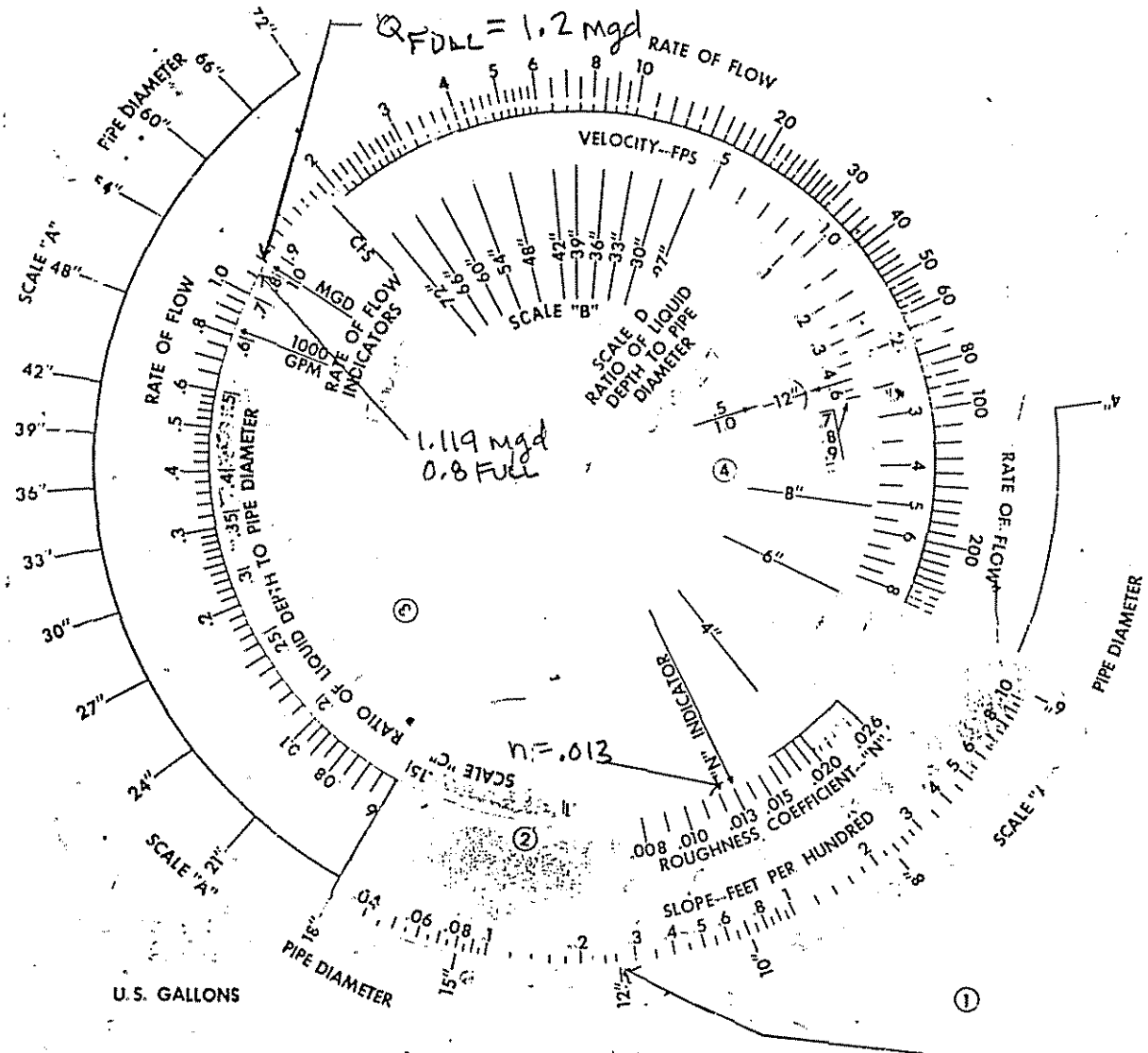
Slide Chart by PERRYGRAF Maywood, Ill.

Price $3.00
Copyright 1950, James W. Feild
3314 Alabama Avenue
Alexandria, Virginia
PAT 2,422,563

Q = 0.217 @ 0.7 FULL
DESIGN FLOW = 0.87 @ 0.4 FULL
n = 0.013
S_{MIN} = 0.005
D = 6"

CAPACITY CALC FOR GRAVITY SEWER "B"

EXHIBIT 'B' 17



FEILD'S HYDRAULICS CALCULATOR FOR GRAVITY FLOW IN PIPES

BASED ON THE MANNING FORMULA

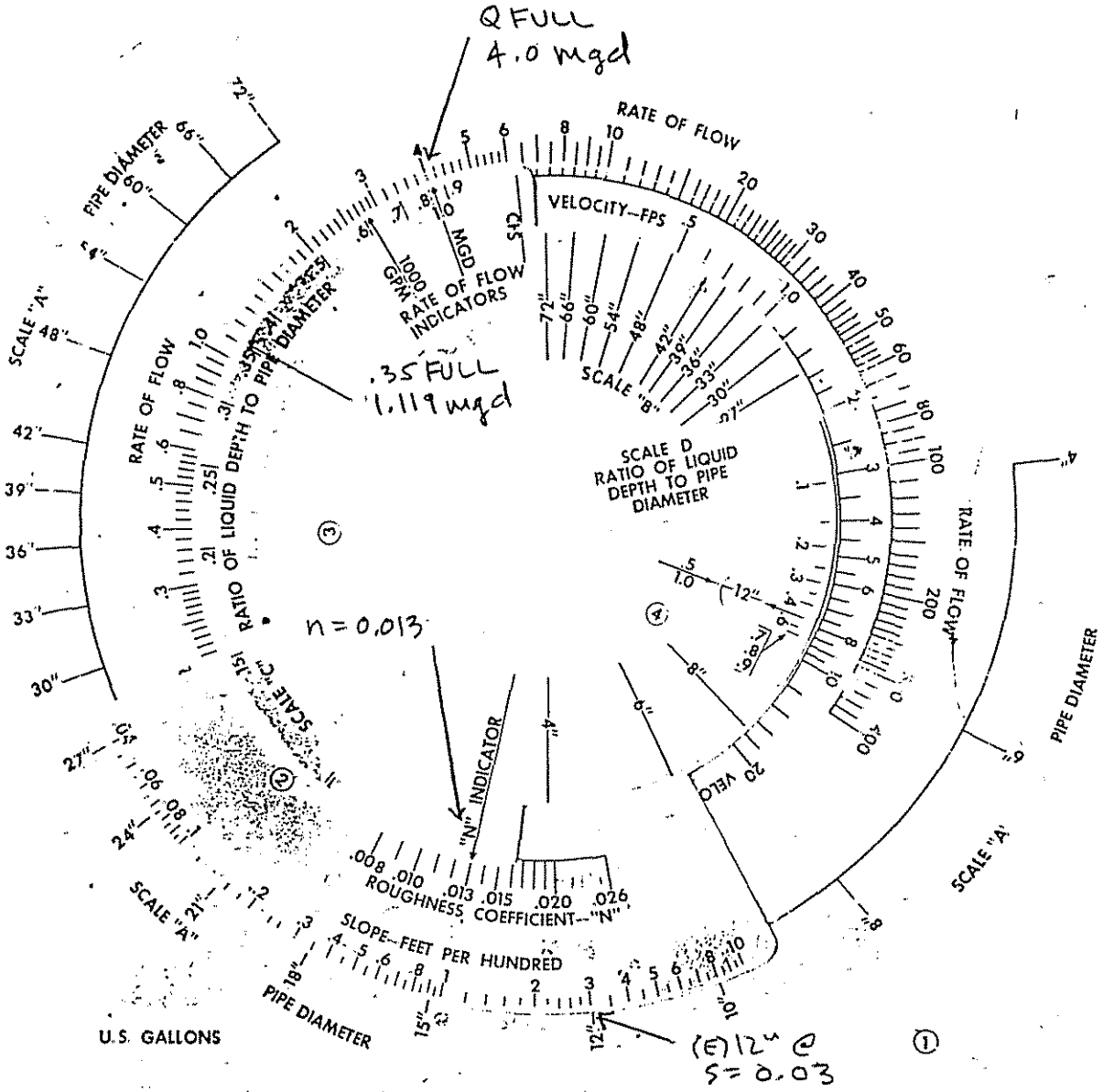
Slide Chart by PERRYGRAF Maywood, Ill.

Price $3.00
Copyright 1950, James W. Feild
3314 Alabama Avenue
Alexandria, Virginia
PAT. 2,472,563

Q_{FULL} = 1.2 mgd
ULTIMATE FLOW = 1.119 mgd
n = 0.013
$S_{(E)}$ = 0.0026 MIN
D = 12" (E)

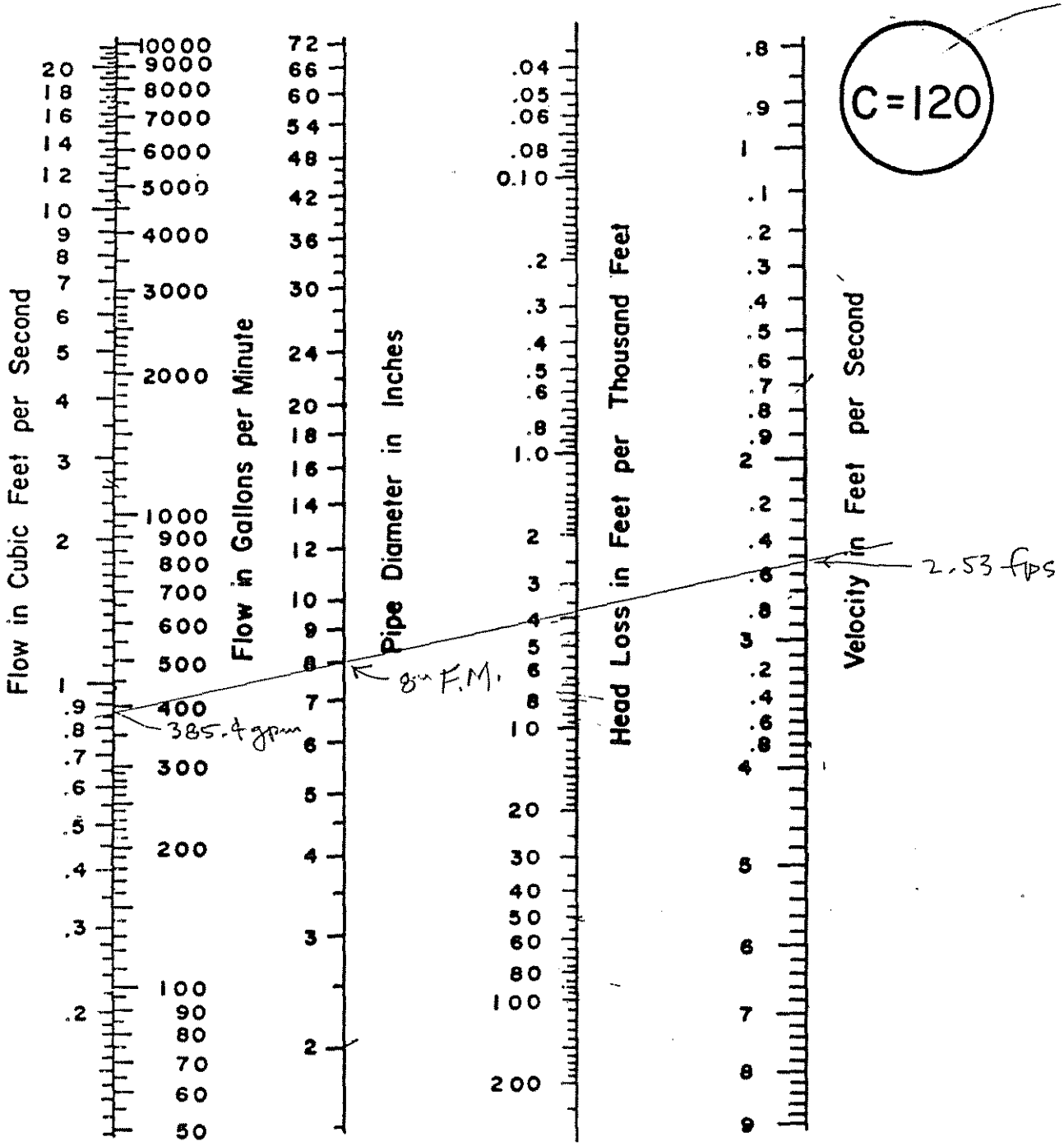
CAPACITY CALC FOR
(E) 12" SS TRUNK LINE
OLIVE RANCH ROAD
BTWN SS MH'S E9-7 AND
E10-10A.

EXHIBIT 'C' 18



Q_{FULL} = 4.0 mgd
ULTIMATE FLOW = 1.119 mgd
n = 0.013
$S_{(E)}$ = 0.03
D = 12" (E)

CAPACITY CALC FOR (E) 12" SS TRUNK LINE OLIVE RANCH ROAD BTWN SSMH'S E9-7 AND E9-9.



Hydraulic Design Of Water Distribution Mains

By FREDERICK E. McJUNKIN*

■ Although Hazen-Williams nomographs for "C" values (roughness coefficient) of 100 are quite ubiquitous and solutions for "C" values other than 100 may be determined on such nomographs through slide rule manipulation of the discharge or slope scales, the author has observed in both classrooms and consulting offices that such practices are slow and prone to confusion and error. Therefore seven nomographs for the commonly used "C" values of 80, 90, 100, 110, 120, 130 and 140 have been prepared. Use of these nomographs offers several advantages: reduced chance of error, particularly for infrequent users; increased speed particularly for iterative manual solution of networks containing mains differing roughness coefficients; and increased speed in designing new systems inasmuch as "C" values of 120 or 140, rather than 100, are commonly used in today's waterworks practice.

The fifth nomograph, for "C" value of 120, is presented above.

*Author is with the University of North Carolina, Chapel Hill, N. C.

.555 Mgd = 385.4 gpm

RANCH del ORO
LIFT STATION
FORCE MAIN SIZING
EXHIBIT 'U'

20

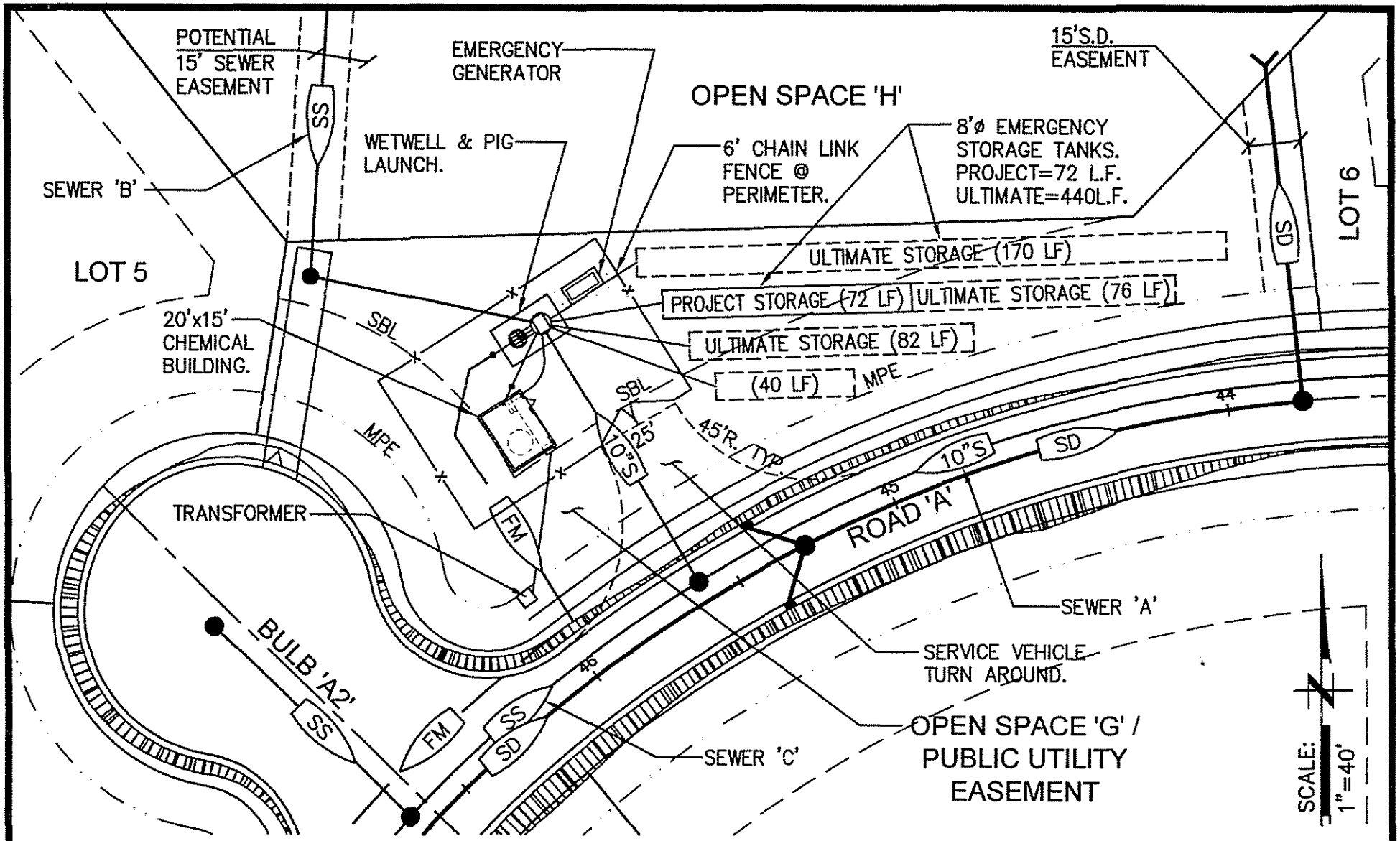


EXHIBIT "T"
LIFT STATION SCHEMATIC
SCALE: 1"=40'

A.R. ASSOCIATES
275 NEVADA STREET AUBURN, CA 95603
ph: (530) 888-1288

A.R. ASSOCIATES
275 Nevada Street
Auburn, CA 95603
(530) 888-1288 • (530) 888-8762 FAX
(916) 624-4135 Roseville Area

JOB RANCHO del ORO
SHEET NO ____ OF ____
CALCULATED BY GHA DATE OCT 29, '08
CHECKED BY ____ DATE ____
SCALE ____

CALC LIFT STATION EMERGENCY STORAGE:

FROM "CUMULATIVE SHED FLOWS" CHART:

ADWF x 2.0 SAFETY FACTOR:

SHED 1 = .1140

SHED 2 = .0247

SHED 3 = .0270 (RANCHO del ORO)

.1657 mgd = 165,700 gal = 22,154 ft³

TRY 96" ϕ RCP (50.27 S.F. END AREA)

22,154/ft³ / 50.27 ft² = 440 LF

RANCHO del ORO SHARE:

$$\frac{.0270 \text{ mgd}}{.1657 \text{ mgd}} = 16.30\%$$

16.3%(440) = 72 L.F. 96" ϕ RCP