TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM(S)
MASTER PLAN

March 2004

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I. EXECUTIVE SUMMARY

The Town of Paradise Redevelopment Agency requested a Master Plan for a clustered wastewater treatment and disposal system for the area defined in Appendix A as the Downtown Revitalization Area. The Master Plan shall be utilized in obtaining grant funding for the final design and construction of the clustered collection, treatment and disposal system(s).

The Downtown Revitalization Area is part of the overall Town of Paradise Redevelopment Project Area. The town does not have an area-wide wastewater collection and treatment infrastructure, and individual houses and commercial establishments have septic tanks and leach fields. Both the Town of Paradise Council and the Town of Paradise Redevelopment Agency are interested in pursuing the concept of clustered wastewater treatment systems throughout the redevelopment area. These small treatment plants will provide clean effluent, utilizing subsurface irrigation disposal. An extended aeration, activated sludge wastewater treatment plant will have no discernable odors. The high quality disinfected effluent will replace existing septic tank effluent emanating from individual houses that now have leach field effluent seeping into the groundwater. Consequently, cleaner effluent will result in an area wide improvement in groundwater. With the new wastewater system infrastructure installed, existing establishments can abandon their existing leach field(s), creating increased available land for the property owner. Additionally, a wastewater treatment system removes any business constraints that may have hindered business decisions in the past. It removes any possible health issues resulting from failed leach fields, together with diminishing the septage load onto a near capacity Neal Road septage receiving station, south of Town.

The clustered wastewater treatment system(s) was part of the original vision of the Downtown Revitalization Committee. It became obvious that revitalization could not progress without some form of wastewater collection and treatment, thus allowing a whole new class of businesses (from Restaurants to Laundromats) to develop in downtown. Additionally, with business establishments having and opportunity for improvements in wastewater discharge, it will allow for conversions of the existing building stock to a higher quality establishment with improved usage. An example would be the conversion of buildings from storage to retail and/or professional services.

Characteristics of the area include high-density commercial, and multi-family residential areas of town. The physical area that has approved on-site wastewater permits is approximately 80 acres. The total area for complete build-out is approximately 100 acres. Presently, on-site permits account for a total flow of 60,146 gallons per day. The Master Plan provides for a collection and treatment system to accommodate 100,000 gallons per day for 93 residential lots and 187 commercial lots.

This Master Plan provides the layout of the anticipated collection system(s), and the methodology behind the initial design. The physical size of the treatment plant(s) and the effluent disposal has also been discussed. Finally, a construction cost has been determined together with an operation and maintenance cost. The Capital Cost and Operation and Maintenance of the master sewer system are presented in Table 1.1. The cost determination in Table 1.1 below includes piping (laterals) to all existing development from the sewer trunk line in the roadway to the house/business property line. Pipework and trenching from the septic tank to the property line, are outside the scope of this study.

TABLE 1.1 TOWN OF PARADISE CONSTRUCTION AND OPERATION AND MAINTENANCE COSTS

Description	Capital Costs ($)	O & M Costs / yr ($)
Collection System	1,528,739	10,000
Treatment Plant	1,145,228	35,000
Effluent Disposal	171,786	35,000
Total	**2,845,753**	**80,000**

After staff evaluation of the single system for the whole Downtown Area (Table 1.1), it was requested that the larger 100-acre Redevelopment Area be broken down into smaller cluster systems. Further review of the total 100-acre Master Plan Development required that the larger tributary area could be divided in three cluster groups. Tributary areas A, B, C+D, would represent each cluster system.

As the majority of the businesses are located along Skyway and Pearson Road, the tributary area "A" is the most critical and should be the first part of development of the master plan. With the success of cluster system "A", the remaining two cluster systems can proceed when financing is made available. Table 1.2, 1.3, 1.4 represent the smaller cluster systems for tributary areas A, B and C&D respectively. The development of these cost estimates can be found in table C.2, C.3 and C.4 in Section "C" of this report.

TABLE 1.2 TOWN OF PARADISE CONSTRUCTION and O&M COSTS - TRIBUTARY AREA "A"		
Description	**Capital Costs ($)**	**O & M Costs / yr ($)**
Collection System	544,925	10,000
Treatment Plant	988,518	35,000
Effluent Disposal	50,078	35,000
Total	**1,583,511**	**80,000**

TABLE 1.3 TOWN OF PARADISE CONSTRUCTION and O&M COSTS – TRIBUTARY AREA "B"		
Description	**Capital Costs ($)**	**O & M Costs / yr ($)**
Collection System	353,873	10,000
Treatment Plant	888,200	35,000
Effluent Disposal	47,355	35,000
Total	**1,289,428**	**80,000**

TABLE 1.4 TOWN OF PARADISE CONSTRUCTION and O&M COSTS – TRIBUTARY AREA "C&D"		
Description	**Capital Costs ($)**	**O & M Costs / yr ($)**
Collection System	742,532	10,000
Treatment Plant	876,807	35,000
Effluent Disposal	46,835	35,000
Total	**1,666,174**	**80,000**

Positive benefits result in both environmental and savings issues with the installation of clustered wastewater treatment and disposal systems. With new clustered system(s) the homeowners responsibility of obtaining septic pumping and evaluation will be removed. With new lot development, there will not be a requirement for engineered system(s) or possessing spare land for leach field replacement, thus allowing greater retail or commercial floor area.

For buildings on the higher elevation side of the trunk sewer line, connection will be made directly to the lateral coming from the buildings. The wastewater will gravity flow via the laterals to the main line in the street. The buildings with higher elevation to the main line in the street will be able to abandon their septic tanks. These abandoned tanks should either be removed, or filled in, according to Town adopted onsite sanitation code regulations. The expense of abandoning the septic tanks shall be at the owner's expense. Where establishments are located on the lower elevation side, a pumped system will be required to raise the sewage to the higher elevation pipe in the street. The existing septic tank can be utilized for this pumpwell situation.

Once the wastewater is treated, disinfected and filtered, the resultant effluent shall be disposed by subsurface dripline emitters located approximately eight inches below the ground surface. Part of the work of this study was to determine if subsurface disposal alone would achieve the total disposal of all the treated effluent. Otherwise, large storage basins would be required to hold the effluent during winter months and discharge during the summer months. A water balance analysis regarding percolation, rainfall and wastewater supply indicate that the effluent can be disposed of completely by percolation and evapotranspiration, even during periods of high rainfall. Consequently, large wet-weather storage ponds are not required. However, approximately six and three quarter acres of land will need to be utilized at the point of ultimate build-out, for the treatment plant(s) and effluent disposal area(s).

It was originally anticipated that the vacant town owned land along the Northeast corner of Pearson Road and Black Olive Drive would be the location for the treatment plant and disposal area. Most recently, the landscape-planning firm of Stantec Inc. has provided a master plan to the Town of Paradise for development of a community park on this property. Dripline effluent disposal and the proposed park would be compatible if the effluent were treated to a Title 22 standard (explained on Page 9). However, to obtain sewage treatment to a Title 22 level requires duplication of equipment, which would add tremendous financial impact to the cost of treatment. If the town property at Pearson and Black Olive is unavailable, a suitable location of the effluent disposal field could be the vacant land on the east side of the bike path south of Black Olive Drive.

Roadwork and sewer pipe installation completed in 1974 by the County of Butte Public Works is incorporated into the master plan. The 609 feet of 8-inch pipeline in Skyway shall be connected to the new 8-inch design line running down the center of Skyway. The eight-inch diameter pipeline is oversized in the advent that someday Skyway may be utilized as a trunk line. It would be simple construction to reverse the pump direction such that flows would go in the westerly direction instead of easterly as they are designed for in this master plan. The Town of Paradise Public Works should verify the location and condition of the existing pipeline prior to the final design.

Operational requirements of the proposed treatment system include labor, equipment, and miscellaneous supplies. The operation and maintenance of the collection system(s), treatment plant(s) and effluent disposal area(s) will likely be contracted with a private organization. It is anticipated that one operator, three days per week, would be required to keep the system(s) operating correctly. The estimated cost of this work is detailed in Table 1.1 above.

In order for the clustered system(s) funding and Final Design to proceed, there are six issues for which the Redevelopment Agency and the Town of Paradise are required to provide direction to staff. These are:

1. **Once the system is established and operational, it will not be mandatory for the existing businesses and residences to connect to the system.**

2. **A connection fee will be required for each establishment to be connected. The amount is yet to be determined.**

3. **Other adjacent property owners outside the Revitalization Area boundary can reach the system. If capacity is available, establishments outside the Downtown Revitalization boundary may be able to connect to the system.**

4. **As part of the original construction contract, the Town of Paradise will construct laterals to the Right-of-Way line. All other connection cost will be the property owner's responsibility.**

5. **The following off-site land areas will be required for the WWTP and effluent disposal. The Town of Paradise has to provide direction to staff as to where these sites will be located.**
    1. **Master system for Tributary areas A, B, C, D..... 6.75 acres**
    2. **Tributary A ..... 2.45 acres**
    3. **Tributary B..... 2.15 acres**
    4. **Tributary C+D... 2.15 acres**

6. **It is <u>recommended</u> that an independent professional financial company, experienced in cost disbursements and rate analysis should be contracted to provide anticipated connection and O&M fees after final plans and construction estimates are completed.**

II. DESIGN METHODOLOGY

A. INTRODUCTION

On August 26th, 2003, the Town of Paradise Redevelopment Agency authorized 7H Technical Services Group Inc. to provide a Master Plan for a clustered wastewater treatment system(s) for the Downtown Revitalization Area.

2. Background

The Downtown Revitalization Area (Figure A-2 of Appendix A) represents the area as outlined and determined by the Downtown Revitalization Committee and the Redevelopment Steering Committee. The boundaries were adopted by the Redevelopment Agency on January 21st, 2003. The area covers land to the north of Elliott Road, south to Pearson Road and west to Skyway. The bike trail or old railroad track is the eastern boundary.

3. Land Use

Plans were developed for the study area delineating the Assessor Parcel Number (APN), the parcel boundary dimensions and acreage, and the present zoning, either Residential or Commercial. Appendix B provides these developed plans. This information served as the basis in determining contributing flow to the collection system.

4. Collection System

The Town of Paradise provided electronic-formatted Topographic maps of the redevelopment area. These maps were utilized to determine tributary areas. Upon initially defining the four tributary areas (A, B, C & D), an on-site inspection was also carried out to verify the tributary areas. Appendix C provides the plans indicating the respective areas. It was discovered during the review process, that in 1974, as part of the Skyway Improvements, 4-inch sewer laterals were placed under newly constructed concrete sidewalk and gutters. At the intersection of Skyway and Elliott Road, 609 feet of 8-inch pipe was laid in anticipation of a future sewer trunk line running down Skyway to some future treatment plant. It is anticipated to use the existing pipeline as part of the new collection system. However, field verification of the existence of the lines and elevations should be performed prior to final design.

B. DESIGN

1. Flow Determination

Presently, each developed lot has an on-site wastewater permit approving the use of a select number of gallons of wastewater flow per day. Utilizing the topographic map, contours were studied to assess the direction of flow from each lot. Specific areas or tributaries were delineated to contribute flow to specific sewer lines in the streets. There were four areas. These were labeled A, B, C, and D. (see Appendix C). Each tributary area flows were determined using existing permitted flows. Vacant areas were allocated 250 gpd per acre for the Commercial lots while 225 gpd per residence was allocated for undeveloped residential lots. This provided a determination, based on the existing flows regulated by the on-site wastewater permits. The overall existing residential and commercial flow per acre was 902 gallons per day per acre, for a total flow of 60,146 gallons per day. For design purposes this was increased to 1,000 gallons per day per acre. Tabulating the individual tributary flows resulted in the quantifying flows at each proposed manhole. For the purposes of cleaning and access, a manhole spacing of 400 feet distance along a pipeline is used as the standard. Manholes were included at the beginning of pipelines to allow for any future connections or for cleanout access. Appendix D provides the plans showing flow volumes per day entering and exiting each manhole. The rolling terrain of the Paradise area results in the requirement of three pump lift stations within the collection system. One lift station would be in the dip in Pearson Road east of Skyway (Tributary A), and the other would be at the top end of a line in Tributary D at the bike path. The final lift station would be at the southernmost point in the collection system, which would then pump the sewage to the treatment plant. Each lift station is required to raise the wastewater to another manhole where sewage gravity flows to the treatment plant. If a single treatment plant and effluent disposal were constructed to accommodate the total Downtown Revitalization Area, the plant capacity for tributary areas A+B+C+D would be a 100,000 gpd plant. Following the concept of smaller clustered systems, it was determined that three cluster plants could be brought on-line at various times. A treatment plant to accommodate Tributary "A" would be a 40,000 gpd plant. Two additional 30,000 gpd plants would also be required to accommodate the flows of Tributary "B" and Tributary "C+D". The cost for these cluster systems is tabulated in Table C.1, C.2, C.3, and C.4 in Section C titled "Final Design and Construction"

The eight-inch diameter pipeline that is reported to be in Skyway at Elliott Road, has excess capacity for the clustered design. However, the existing 8-inch line shall be utilized within the new design so that the whole of the pipeline in Skyway shall be 8 inch. This was designed in anticipation of some future requirement that Skyway may require a trunk line, and the 2,654 feet of the clustered system pipeline in Skyway, will not have to be upgraded.

2. Wastewater Treatment Plant

On January 6, 1977, the State Water Quality Control Board adopted Resolution No.77-1, "Policy with Respect to Water Reclamation in California". This policy requires the regional water boards to conduct reclamation surveys and specifies reclamation actions to be implemented by the State and Regional water boards as well as other agencies (Water Control Plan 1993).

The California Department of Health Services (DHS) has established statewide reclamation criteria in Chapter 3, Division 4, Title 22, of the California Code of Regulations (CCR) (hereafter Title 22) and developed guidelines for the use of reclaimed water. There are two main designations that are required by Title 22 regulations; these include restricted and unrestricted use. A restricted use can be defined as a use in which limitations are imposed on bodily contact with the water of concern to protect public health. An unrestricted use can be defined as a use in which limitations are not imposed on bodily contact with the water of concern. Table B-1 summarizes the Title 22 regulatory requirements for restricted and unrestricted use.

Table B-1. Required Level of Treatment for Reclaimed Wastewater Uses

Restricted Use	**Minimum Level of Treatment**
Restricted impoundment limited to fishing, boating, and other non-body-contact water recreation activities.	Secondary – adequately disinfected and oxidized
Golf Courses (limited), cemeteries, freeway landscapes	Secondary – adequately disinfected and oxidized
Parks (limited)	Secondary – adequately disinfected and oxidized
Crops or pasture for non-milking animals	Secondary – adequately disinfected and oxidized
Fodder, fiber, and seed crops	Primary – floating and settable solids adequately removed
Restricted landscape impoundment limited to aesthetic enjoyment not intended for public contact	Secondary – adequately disinfected and oxidized
Unrestricted Use	**Minimal Level of Treatment**
Golf courses, parks, playgrounds, schoolyards. Unrestricted impound with no limitations on body contact	Tertiary – adequately disinfected, oxidized, coagulated, clarified and filtered.

Note also that the Title 22 regulatory process for reclaimed wastewater use projects involves approval from at least the Regional Water Quality Control Board, Central Valley Region, and DHS Redding District. The DHS would review the planned disposal and make recommendations to the RWQCB pertaining to public health issues (i.e. title 22 regulations). The RWQCB, Central Valley Region has the authority to issue a permit to the Town of Paradise for effluent discharge.

To achieve Title 22 approval, duplication of storage tanks, pumps, controls, filters and disinfection is required in case of some form of breakdown. Consequently the additional requirements add substantially to the original cost of a treatment plant that would provide treated effluent for subsurface emitter disposal. A standard batch treatment plant is selected for the clustered wastewater treatment plant so as to provide a minimal cost to the users.

A master wastewater treatment plant would be required to accommodate the 100,000 gpd flows. Otherwise, three plants would be installed to accommodate one 40,000 gpd, and two 30,000 gpd flows. The batch plant system would require equalization tanks to balance the high and low flow spikes within the treatment system, including an aeration basin, an anoxic basin, a clarifier and a disinfection chamber. A control building would be required to accommodate the blowers, controls, and disinfection as well as multimedia filters for final effluent polishing before disposal. Appendix E indicates a possible layout and sizing of the required 100,000 gpd plant. An area of 0.5 acres is required to accommodate the master treatment plant and control building.

The extended aeration sequencing batch treatment plant will have no odors. Effluent disinfection shall be ozonation or ultraviolet light. Whichever the case, no chemicals will be used on the site. Stabilized and digested solids will be removed from the system in liquid form at approximately 2.5% solids concentration. Removal will be by use of a septic tank pumper truck approximately every three months. The size of the plant was calculated from the influent sewage organic loading characteristics of the following:

BOD.....300 mg/l

TSS.....250 mg/l

Total Nitrogen.....50 mg/l.

Final effluent quality projection after the treatment process is the following:

BOD .....10 mg/l
TSS.....10 mg/l
Total Nitrogen.....15 mg/l

Calculating the required sizes for the master plant using the above criteria, the following was determined:

Equalization Basin.....60,000 gallons
Digester..... 20,000 gallons
Aerobic Tank.....70,000 gallons
Anoxic Tank.....40,000 gallons
Clarifier Tank.....35,000 gallons
Disinfection Tank.....20,000.gallons

3. Effluent Disposal

Disposal of the effluent is achieved by the subsurface irrigation/disposal through the use of buried tubular emitters. The system selected is manufactured by Geoflow™. This disposal system selection is not new or innovative in the wastewater field. This disposal method utilizes both percolation and evapotranspiration. Briefly, this method involves the use of subsurface emitters placed six (6) to eight (8) inches below the ground, spaced on 24-inch centers. Turf grass is planted above the driplines. The grass is maintained and mowed on a regular basis to promote growth and aid evapotranspiration year round. The emitters are operated on a "pulsed" basis over a 24-hour period and controlled by moisture sensors and computer. Remote computer access to the control panel informs the system operator of the actual situation of the effluent disposal.

The old railroad station site along Black Olive Drive provides a percolation rate of 1.1 gallons per day, per square foot (gpd/sf). To determine what effluent disposal acreage would be required and if pond storage would be necessary during wet weather, a water balance study is essential. (Figure F-2 in Appendix F is the water balance spreadsheet for the total tributary areas

A+B+C+D). The mathematical model measures the amount of rainfall per month onto the soil together with the dosing rate of the dripline emitters. The applied effluent is disposed either by percolation or evapotranspiration or both. If there were an excess of effluent, the excess effluent would need to be stored in ponds. The developed water balance study (Figure F-2) using a design flow of 100,000 gpd, and a percolation rate of the soil as 1.1gpd/sf, a dosing rate of 0.88 gpd/sf (80 percent of the percolation rate), indicates 2.77 acres of land would be able to accommodate the effluent disposal without winter storage. The Regional Water Quality Control Board require 100% additional set aside area in case the disposal field fails and a new field has to be installed. Hence the total required area for effluent disposal is 5.54 acres. The required distance from wells or streams should separate this specific area, otherwise, additional acreage would be required for setback areas.

The 5.54 acres is the absolute area required for the driplines. A ten-foot wide additional space has to be provided around the disposal field for maintenance truck access, as no vehicles are allowed on the disposal field. This additional area surrounding the driplines totals 0.81 acres. The total area required for effluent disposal is 6.35 acres. Figure F-1 indicates the layout of the disposal field. Figure F-3 and F-4 represent the water balance study for Tributary area A and Tributary area B and Tributary area C+D.

Previous wastewater treatment and disposal studies have indicated that the Town owned land (which was the old railroad station along Black Olive Drive and Pearson Road) would be satisfactory for effluent disposal. However, this approximate 4.25-acre area has been recently subjected to a town adopted "Paradise Community Park Master Plan" developed by Stantec Inc. of Sacramento. Consequently, it appears that, not only is the prior mentioned property too small to accommodate the 100,000 gpd effluent disposal plus replacement, the area is only available for parkland. Therefore other parcels in the vicinity of the master plan area will have to be defined by the Town of Paradise Redevelopment Agency to accept the effluent disposal.

The effluent disposal fields should contain turf grass or native vegetation. The Geoflow™ dripline has a Rootgard® which protects emitters from root intrusion. Tree and shrub roots will not enter the dripline, however, large growing trees with surfacing roots may lift the driplines out

of the ground. This could result in effluent being emitted into the atmosphere or have surface standing effluent. A disposal field without trees is what is required.

C. FINAL DESIGN AND CONSTRUCTION

Final Design

After approval of the wastewater master plan and the selection of a satisfactory disposal area(s), a contract shall be commenced with a professional engineering firm to survey, design and provide plans and specifications for the collection system(s), the wastewater treatment plant(s) and the effluent disposal field in accordance with this master plan. Additionally, a Report of Waste Discharge shall be provided to the Water Quality Control Board for their approval. To obtain this approval, one of their requirements shall be to have an approved Environmental Assessment (CEQA). This may be in the form of a negative declaration or a complete Environmental Impact Report. The environmental document should be completed prior to preparation of the plans and specifications.

Construction

The Town of Paradise developed over the last century with on-site sanitation and no citywide infrastructure in place. Consequently, the construction process of the completely new collection system will be very disruptive to both traffic and business. It is essential that the contractor complete the work as quickly as possible. Costs presented in Table C.1 (for the total tributary area) are planning estimates only and are not necessarily representative of actual costs required to construct this plan. The final design will provide a revised cost estimate. Table C.2, C.3, and C.4 are for the smaller cluster systems for Tributary A, Tributary B, and Tributary C+D. A major expense in the construction will be the connection of laterals to the mainline in the roadways. For this construction cost determination, the anticipated pipe length for each lateral in the roadway is 20 feet.

Table C.1 Estimated Cost for construction of WWTP and disposal for areas A+B+C+D				
Description	**Qty**	**Unit**	**Unit Cost**	**Total**
Mobilization/ Demobilization	2	Ea	25,000	50,000
48" dia. Manholes	51	Ea	2,500	127,500
24" wide trenching / excavation and backfill	17,606	Lf	12	211,272
6"' dia. Main Line	15,596	Lf	6	93,576
8" dia. Main Line	2100	Lf	8	16,800
Lateral Crossings / Excavation and backfill and pipe	275	Ea	200	55,000
Asphalt replacement x 3' wide, 3" deep	21,041	Lf	13	273,533
Pump lift station including Pumps and controls	3	Ea	65,000	195,000
Control Building + S/B Generator for Lift Station	3	Ea	30,000	90,000
100,000 gpd Wastewater Treatment Plant	1	Ea	800,000	800,000
100,000 gpd Effluent disposal to fields.	3	acre	40,000	120,000
			sub total	**2,032,681**
Engineering/Admin/Const Management (20%)				406,536
Contingency (20%)				406,536
			TOTAL	**2,845,753**

Table C.2 Estimated Cost for construction of WWTP and disposal (Tributary area A)				
Description	**Qty**	**Unit**	**Unit Cost**	**Total ($)**
Mobilization/ Demobilization	2	Ea	25,000	50,000
48" dia. Manholes	16	Ea	2,500	40,000
24" wide trenching / excavation and backfill	5,609	Lf	12	67,308
6"' dia. Main Line	3,509	Lf	6	21,054
8" dia. Main Line	2100	Lf	8	16,800
Lateral Crossings / Excavation and backfill and pipe	100	Ea	200	20,000
Asphalt replacement x 3' wide, 3" deep	8609	Lf	13	111,917
Pump lift station including Pumps and controls	1	Ea	65,000	65,000
Control Building + S/B Generator for Lift Station	1	Ea	30,000	30,000
100,000gpd Wastewater Treatment Plant	1	Ea	675,000	675,000
100,000 gpd effluent disposal to fields.	1	ea	34,000	34,000
			sub total	**1,131,079**
Engineering/Admin/Const Management (20%)				226,216
Contingency (20%)				226,216
			TOTAL	**1,583,511**

Table C.3 Estimated Cost for construction of WWTP and disposal (Tributary area B)				
Description	**Qty**	**Unit**	**Unit Cost**	**Total ($)**
Mobilization/ Demobilization	2	Ea	25,000	50,000
48" dia. Manholes	9	Ea	2,500	22,500
24" wide trenching / excavation and backfill	3,000	Lf	12	36,000
6"' dia. Main Line	3,000	Lf	6	18,000
8" dia. Main Line	0	Lf	8	0
Lateral Crossings / Excavation and backfill and pipe	62	Ea	200	12,400
Asphalt replacement x 3' wide, 3" deep	4240	Lf	13	55,120
Pump lift station including Pumps and controls	1	Ea	65,000	65,000
Control Building + S/B Generator for Lift Station	1	Ea	30,000	30,000
100,000gpd Wastewater Treatment Plant	1	Ea	600,000	600,000
100,000 gpd effluent disposal to fields.	1	Ea	32,000	32,000
			sub total	**921,020**
Engineering/Admin/Const Management (20%)				184,204
Contingency (20%)				184,204
			TOTAL	**1,289,428**

Table C.4 Estimated Cost for construction of WWTP and disposal (Tributary area C+D)				
Description	**Qty**	**Unit**	**Unit Cost**	**Total ($)**
Mobilization/ Demobilization	2	Ea	25,000	50,000
48" dia. Manholes	25	Ea	2,500	62,500
24" wide trenching / excavation and backfill	8,309	Lf	12	99,708
6"' dia. Main Line	8,309	Lf	6	49,854
8" dia. Main Line	0	Lf	8	0
Lateral Crossings / Excavation and backfill and pipe	71	Ea	200	14,200
Asphalt replacement x 3' wide, 3" deep	9374	Lf	13	121,862
Pump lift station including Pumps and controls	2	Ea	65,000	130,000
Control Building + S/B Generator for Lift Station	1	Ea	30,000	30,000
30,000gpd Wastewater Treatment Plant	1	Ea	600,000	600,000
100,000 gpd effluent disposal to fields.	1	Ea	32,000	32,000
			sub total	**1,190,124**
Engineering/Admin/Const Management (20%)				238,025
Contingency (20%)				238,025
			TOTAL	**1,666,174**

APPENDIX A

TOWN OF PARADISE

FILE PATH: C:\WORK\MISC\
FILE NAME: DOWNTOWN REVITAL (PROJECT).DWG
PLOT DATE: 02-05-2003
PLOT TIME: 3:55 pm

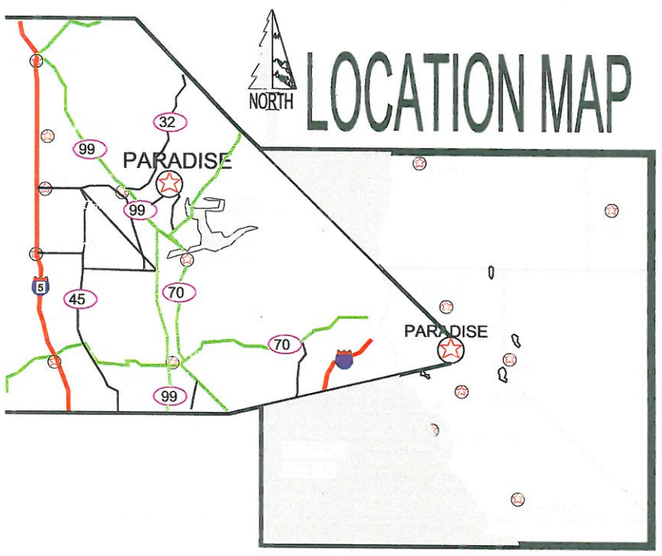
REDEVELOPMENT PROJECT AREA
ADOPTED 01-21-03

- BOUNDARY OF REDEVELOPMENT
- BOUNDARY OF DOWNTOWN REVITALIZATION
- PROJECT AREA= 708 ACRES
- MODERATE & LOW INCOME BOUNDARY
- MODERATE & LOW INCOME AREA= 1,725 ACRES

0' 1800' 3600' 5400'

NORTH

LOCATION MAP



GATE LN.

PENTZ RD.

SKYWAY

WAGSTAFF RD.

HARVEY RD.

CLARK RD.

BILLE RD.

REDEVELOPMENT PROJECT AREA

DOWNTOWN REVITALIZATION AREA

YOUNG AVE.

SAWMILL RD.

KIBLER RD.

VALLEY VIEW DR.

ELLIOTT RD.

SKYWAY

NUNNELEY RD.

HONEY RUN RD.

PEARSON RD.

BUSCHMANN RD.

PEARSON RD.

CIRCLEWOOD DR.

NEAL RD.

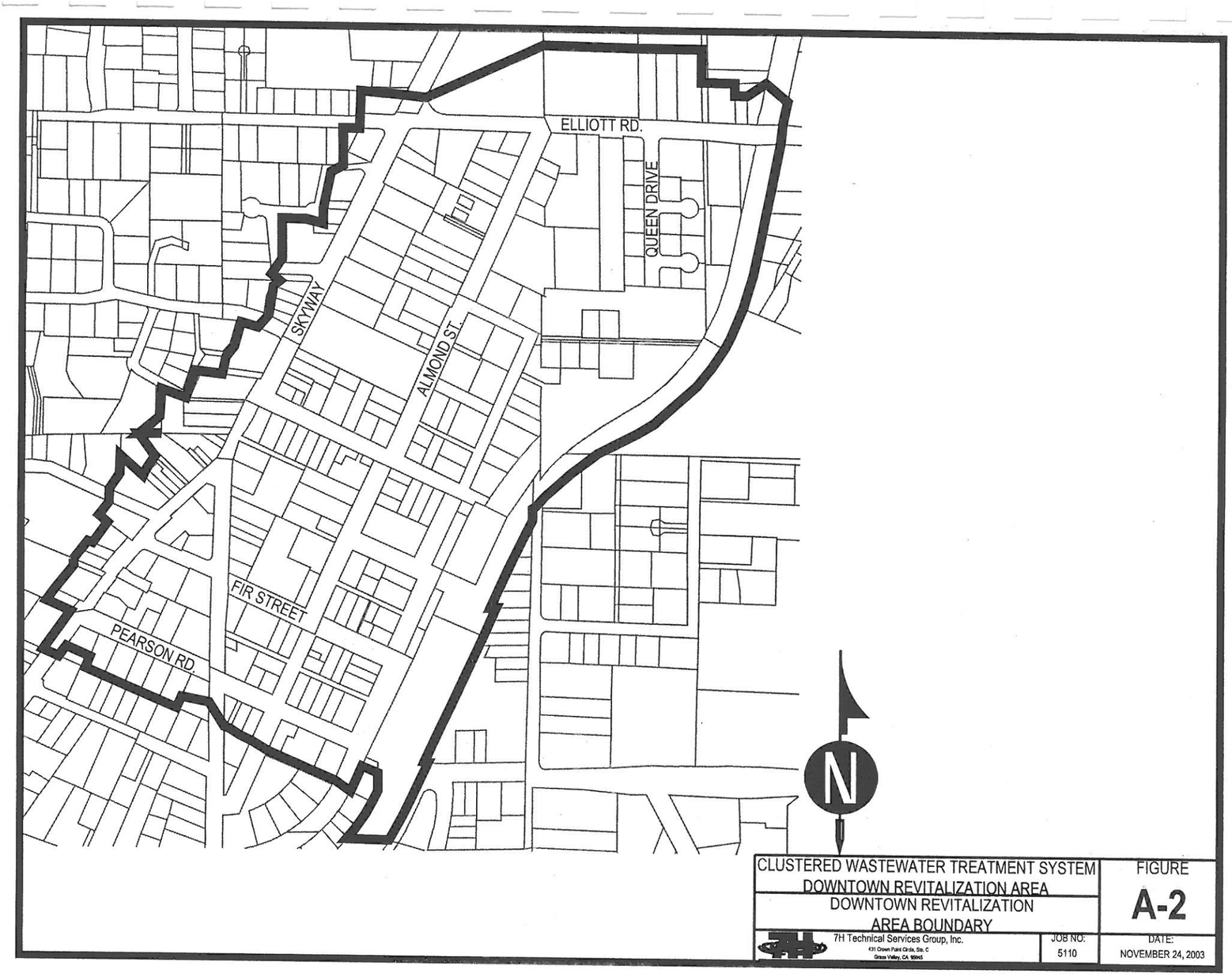
FOSTER RD.

SCOTTWOOD RD.

CLARK RD.

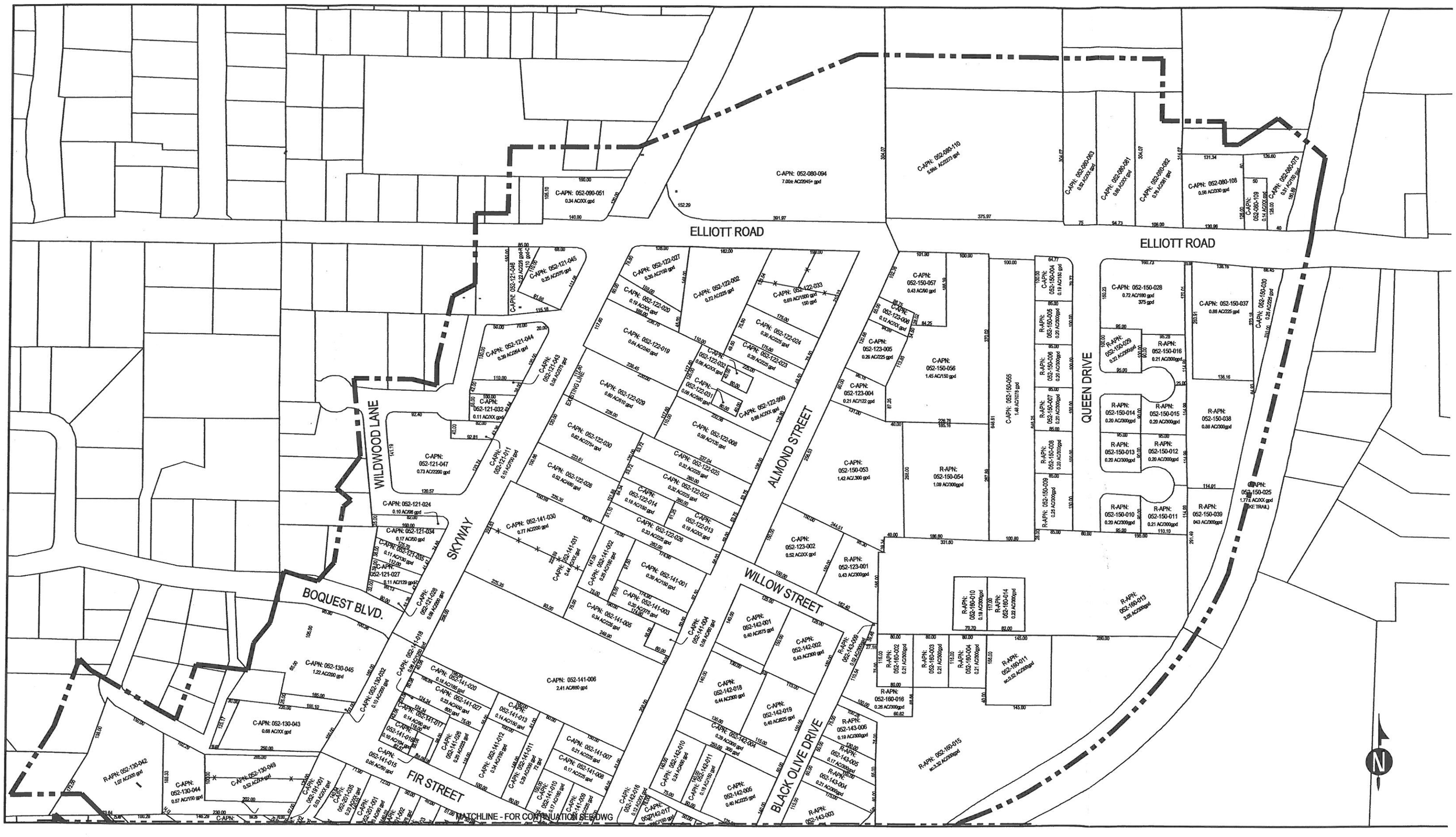
ROE RD.

FIGURE:



CLUSTERED WASTEWATER TREATMENT SYSTEM DOWNTOWN REVITALIZATION AREA DOWNTOWN REVITALIZATION AREA BOUNDARY		FIGURE A-2
7H Technical Services Group, Inc. 431 Crown Point Circle, Ste. C Grass Valley, CA 95945	JOB NO: 5110	DATE: NOVEMBER 24, 2003

APPENDIX B



Technical Services Group, Inc.

REVISIONS		
NO.		DATE BY

PROJECT NO. 5100
PROJECT MGR: Mark T Kahl
PROJECT DATE: JULY, 2003
DESIGNED: MTK
DESIGNED:

DRAWING SCALE:

LENGTH EQUALS ONE INCH WHEN PLOTTED TO SCALE.

TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM

CONTRIBUTING AREA
APN'S, LOT DIMENSIONS & PERMITTED FLOWS

DRAWING NUMBER
B.1

chnical Services
Group, Inc.
Crown Point Circle #C
Valley, California 95945
530-271-1600

REVISIONS

NO		DATE	BY

PROJECT NO.	5100
PROJECT MGR:	Mark T Kahl
PROJECT DATE:	JULY, 2003
DESIGNED:	Initials
DESIGNED:	initials
CHECKED:	initials
CAD DRAFTER:	initials

DRAWING SCALE:

LENGTH EQUALS ONE INCH WHEN PLOTTED TO SCALE.

TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM
BUTTE COUNTY, CA

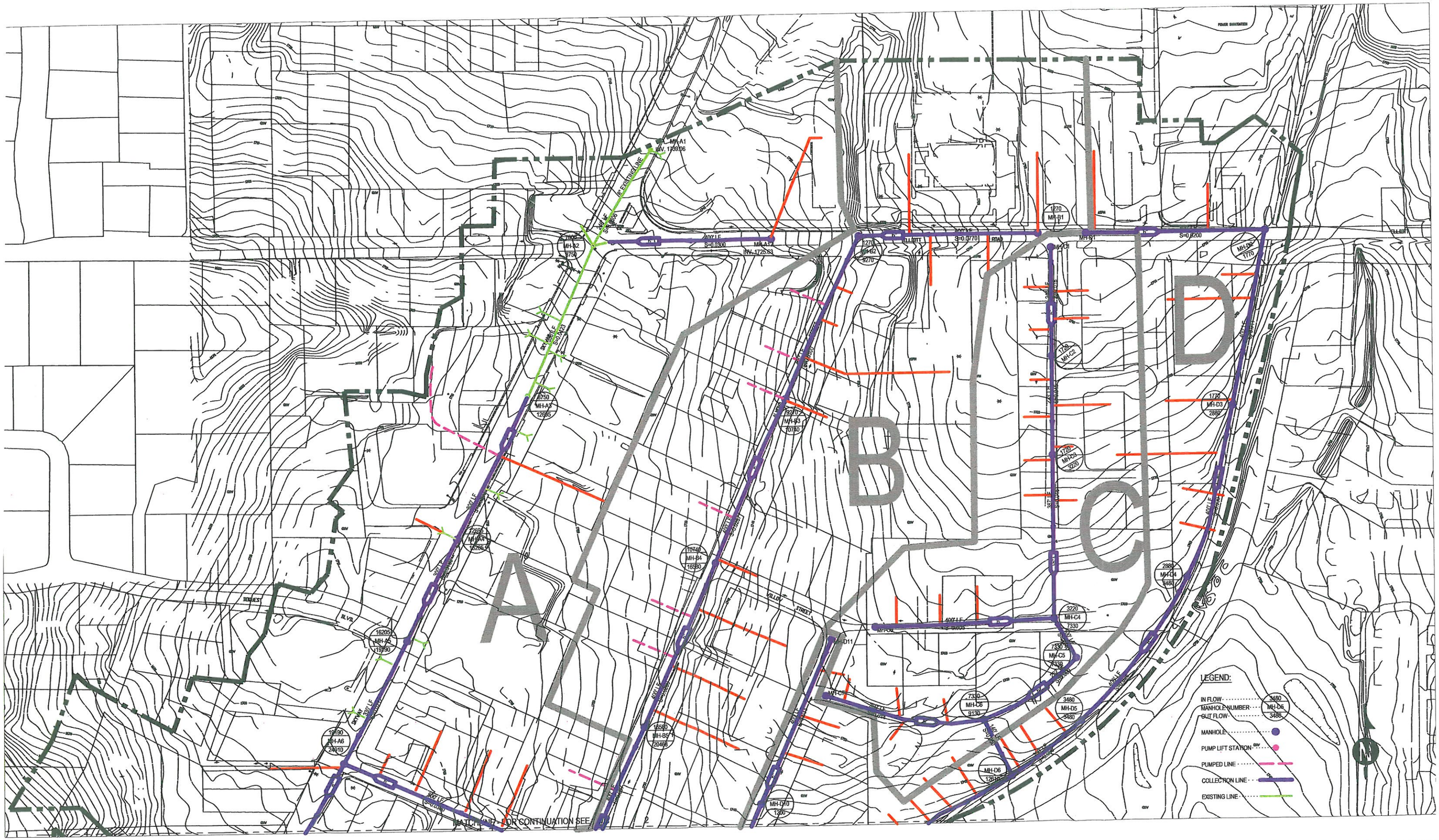
CONTRIBUTING AREA
APN'S, LOT DIMENSIONS & PERMITTED FLOWS

DRAWING NUMBER

B.2

APPENDIX C

B C D E F G H I J K L M N O P



REVISIONS		
NO.	DATE	BY

PROJECT NO. 5100
PROJECT MGR: Mark T Kahl
PROJECT DATE: JULY, 2003

DRAWING SCALE:

LENGTH EQUALS ONE INCH

TOWN OF PARADISE

DOWNTOWN REVITALIZATION AREA

COLLECTION SYSTEM, TRIBUTARY ZONES

DRAWING NUMBER

C-1

al Services
, Inc.
t, Circle #C

REVISIONS			
NO.		DATE	BY

PROJECT NO. 5100
PROJECT MGR: Mark T Kahl
PROJECT DATE: JULY, 2003
DESIGNED: initials
DESIGNED: initials
CHECKED: initials

DRAWING SCALE:

LENGTH EQUALS ONE INCH WHEN PLOTTED TO SCALE.

TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM

COLLECTION SYSTEM, TRIBUTARY ZONES AND PIPELINE LAYOUT W/TOPOGRAPHIC CONTOURS

DRAWING NUMBER
C.2

Technical Services Group, Inc.
31 Crown Point Circle #C
Grass Valley, California 95945
530-271-1600

REVISIONS			
NO.		DATE	BY

PROJECT NO.	5100
PROJECT MGR:	Mark T Kahl
PROJECT DATE:	JULY, 2003
DESIGNED:	MTK
DESIGNED:	
CHECKED:	LDH
CAD DRAFTER:	CLK

DRAWING SCALE: 1"=100'

LENGTH EQUALS ONE INCH WHEN PLOTTED TO SCALE.

TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM
BUTTE COUNTY, CA

COLLECTION SYSTEM, TRIBUTARY ZONES "A", "B", "C & D" AND PIPELINE LAYOUT

DRAWING NUMBER

C.3

APPENDIX D

B C D E F G H I J K L M N O P

MH-A1
INV. 1739.06

8" EXISTING LINE

4" FORCE MAIN
SCH 80 PVC
150 PSI

7000
MH-A2
8750

400' LF
S=0.0300

MH-A3
INV. 1725.63

300' LF
S=0.0423

8750
MH-A3
12695

12695
MH-A4
16205

300' LF
S=0.0300

16205
MH-A5
19790

300' LF
S=0.0300

19790
MH-A6
24910

500' LF
S=0.0360

1270
MH-B2
9270

400' LF
S=0.0770

ELLIOTT ROAD

9270
MH-B3
10740

400' LF
S=0.0300

10740
MH-B4
16580

400' LF
S=0.0300

16580
MH-B5
20466

400' LF
S=0.0300

MH-D10
1200

1270
MH-B1

MH-D1

400' LF
S=0.0200

1270
MH-C2

1270
MH-C3
3220

300' LF
S=0.0300

3220
MH-C4
7330

400' LF
S=0.0300

7330
MH-C5
7330

300' LF
S=0.0300

7330
MH-C6
9130

400' LF
S=0.0300

9130
MH-D6
12610

400' LF
S=0.0300

1770
MH-D2
1770

400' LF
S=0.0300

1770
MH-D3
2880

300' LF
S=0.0300

2880
MH-D4
3480

400' LF
S=0.0300

3480
MH-D5
3480

400' LF
S=0.0300

A

B

C

D

MATCH LINE - FOR CONTINUATION SEE 2

LEGEND:

- IN FLOW · · · · · · · · · · · · 3480
- MANHOLE NUMBER · · · · MH-D5
- OUT FLOW · · · · · · · · · · · · 3480
- MANHOLE
- PUMP LIFT STATION
- PUMPED LINE
- COLLECTION LINE
- EXISTING LINE

N

REVISIONS

NO.		DATE	BY

PROJECT NO. 5100
PROJECT MGR: Mark T Kahl
PROJECT DATE: JULY, 2003
DESIGNED: MTK

DRAWING SCALE:
1"=100'

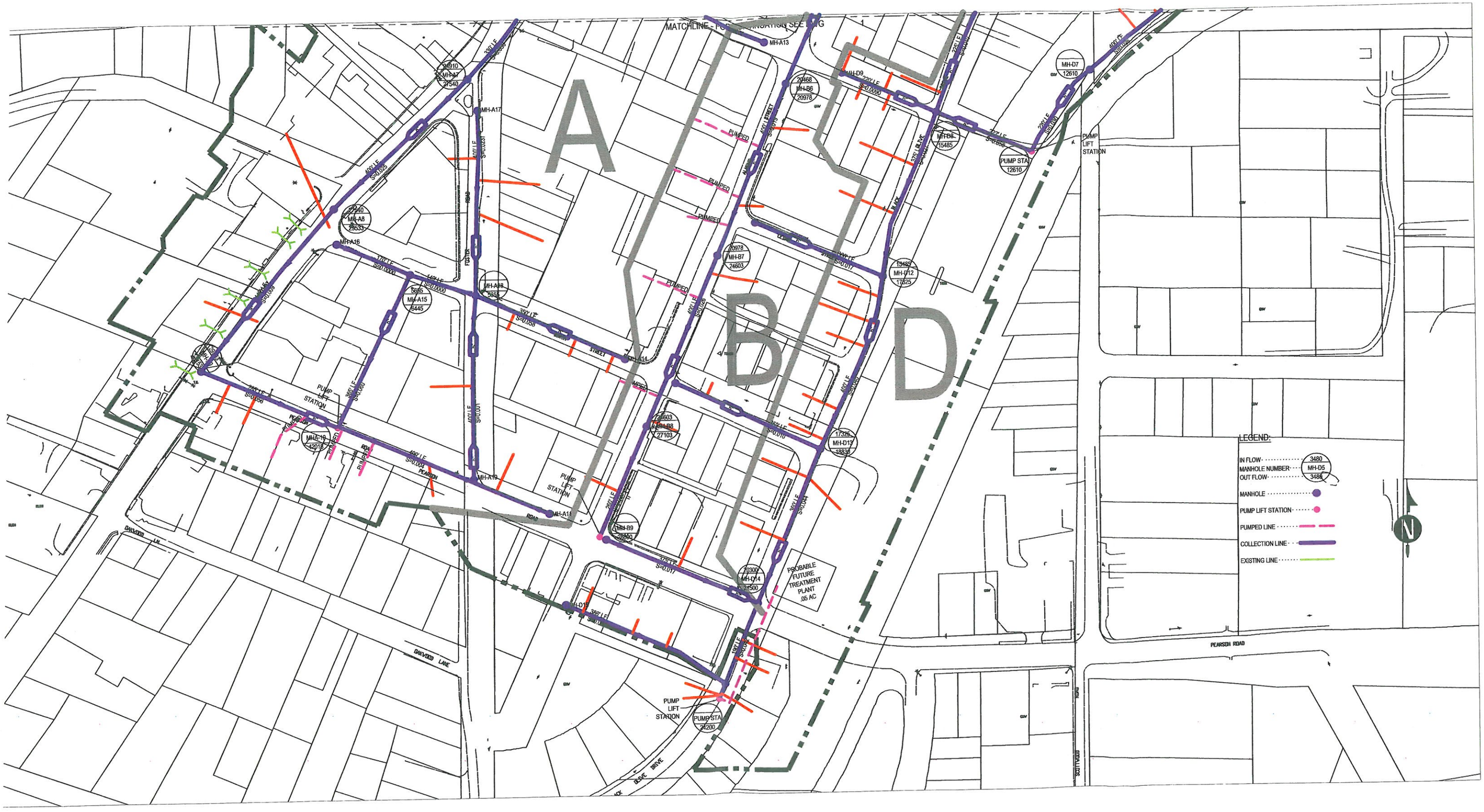
LENGTH EQUALS ONE INCH WHEN PLOTTED TO SCALE.

TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM

COLLECTION SYSTEM, TRIBUTARY ZONES AND PIPELINE LAYOUT

DRAWING NUMBER
D-1

Tech\5110-Paradise\Sewer Plan\Eng-CAD\5110-DWNTWN REVIT-N02.DWG
IK 1234.33



chnical Services
Group, Inc

REVISIONS			
NO.		DATE	BY

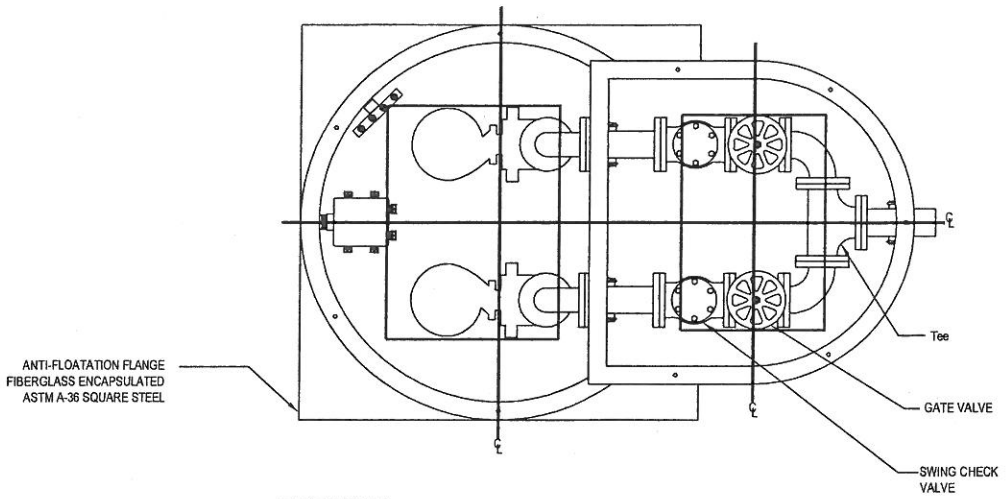
PROJECT NO. 5100
PROJECT MGR: Mark T Kahl
PROJECT DATE: JULY, 2003
DESIGNED: MTK
DESIGNED:

DRAWING SCALE:
1"=100'
LENGTH EQUALS ONE INCH WHEN PLOTTED TO SCALE.

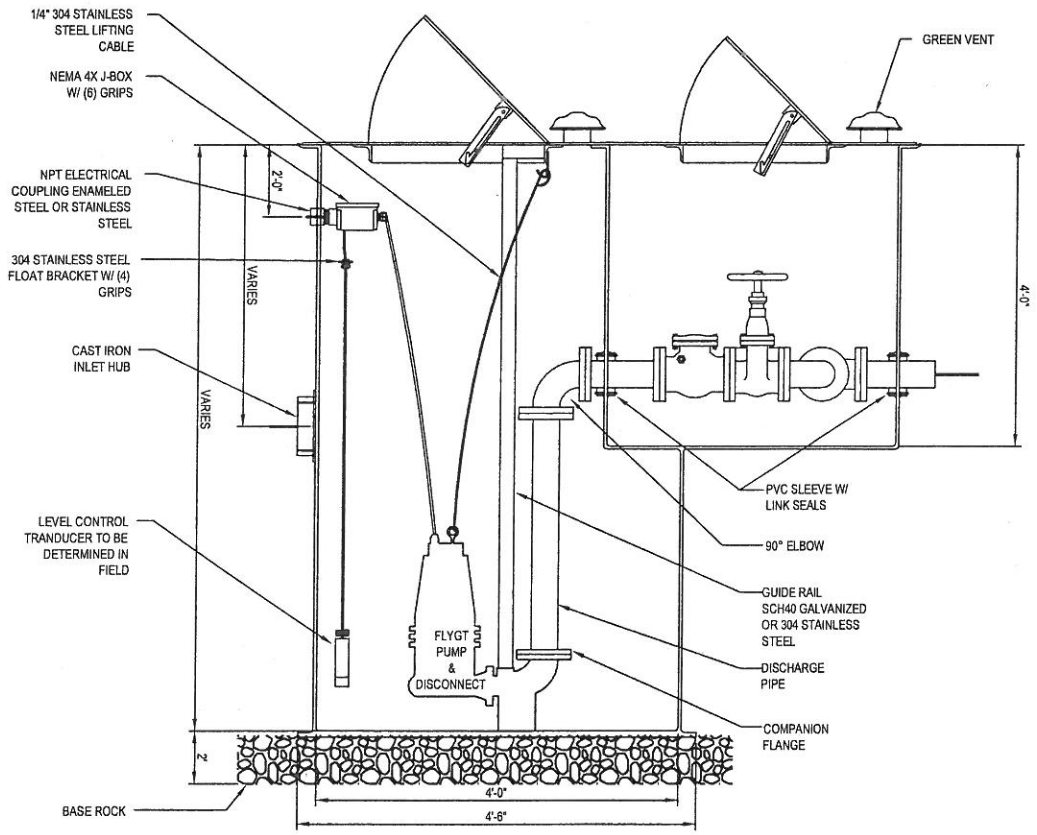
TOWN OF PARADISE
DOWNTOWN REVITALIZATION AREA
CLUSTERED WASTEWATER TREATMENT SYSTEM

COLLECTION SYSTEM, TRIBUTARY ZONES AND PIPELINE LAYOUT

DRAWING NUMBER
D.2



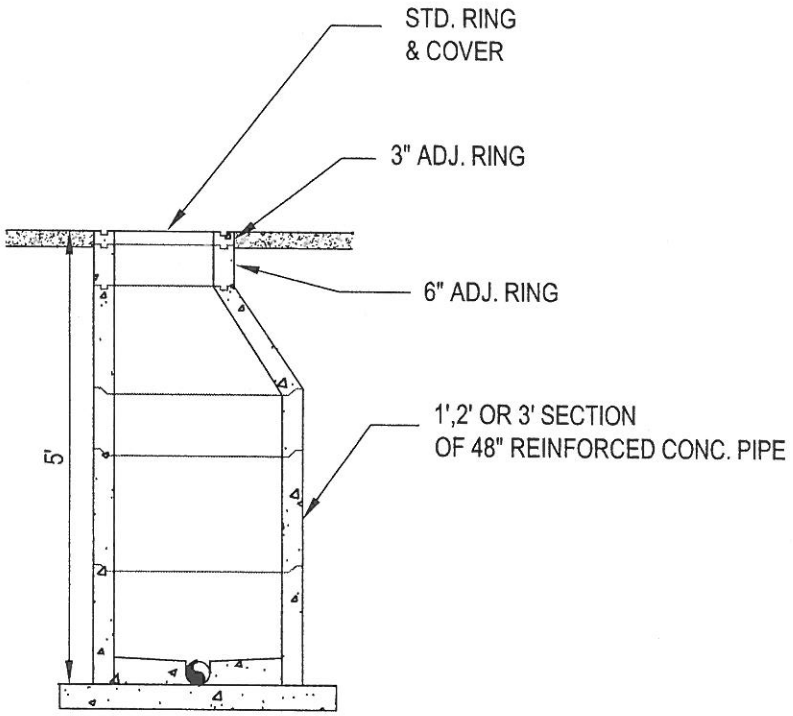
TOP VIEW



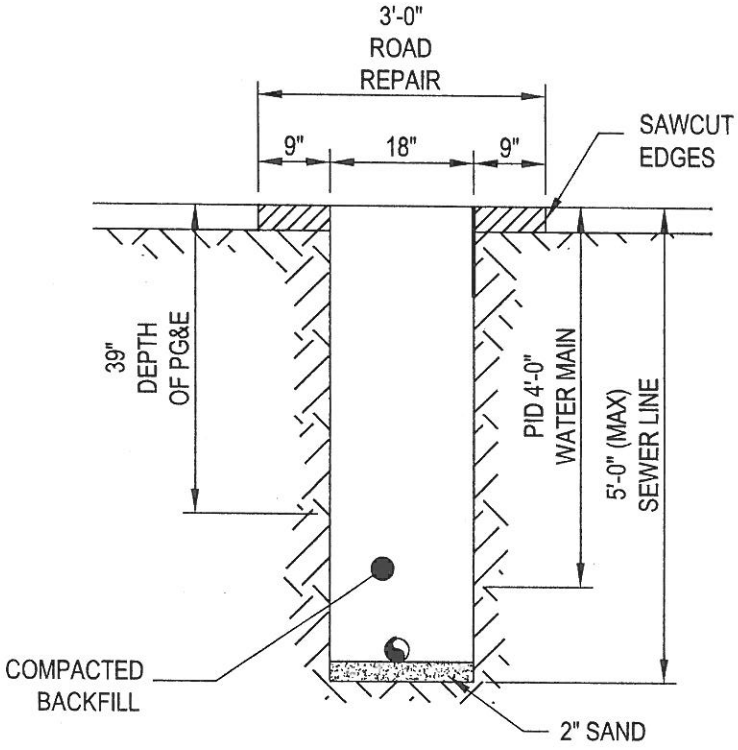
SIDE VIEW

PREFABRICATED FIBERGLASS DUPLEX PUMP STATION

CLUSTERED WASTEWATER TREATMENT SYSTEM DOWNTOWN REVITALIZATION AREA TYPICAL PUMP STATION		FIGURE D-3
7H Technical Services Group, Inc. 431 Crown Point Circle, Ste. C Grass Valley, CA 95945	JOB NO: 5110	DATE: NOVEMBER 24, 2003



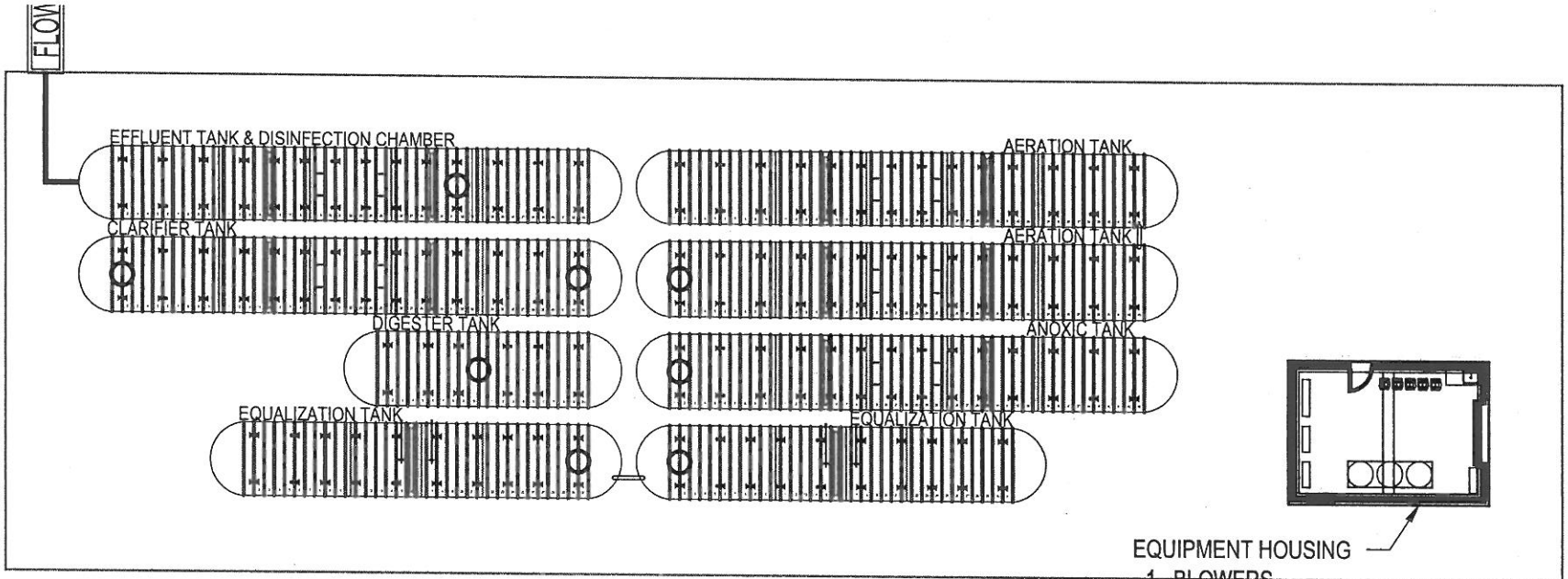
SEWER MANHOLE



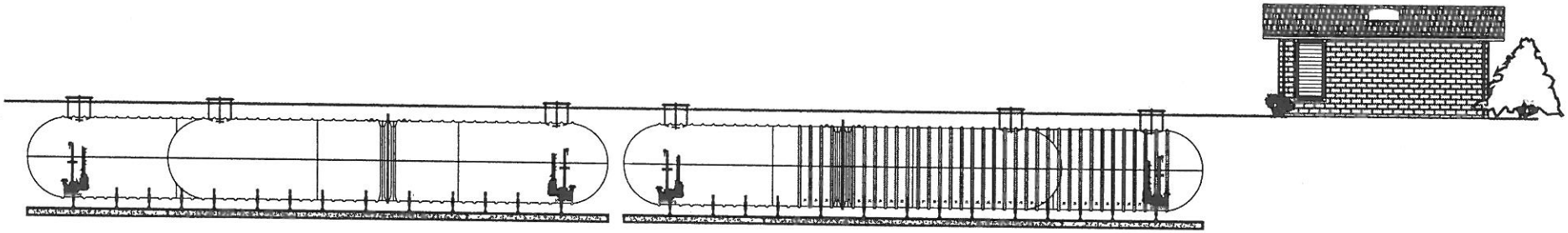
TYPICAL MAINLINE TRENCH

CLUSTERED WASTEWATER TREATMENT SYSTEM DOWNTOWN REVITALIZATION AREA PRECAST CONCRETE SEWER MANHOLE AND TYPICAL MAINLINE TRENCH	FIGURE **D-4**
7H Technical Services Group, Inc. 431 Crown Point Circle, Ste. C Grass Valley, CA 95945	JOB NO: 5110
	DATE: NOVEMBER 24, 2003

APPENDIX E

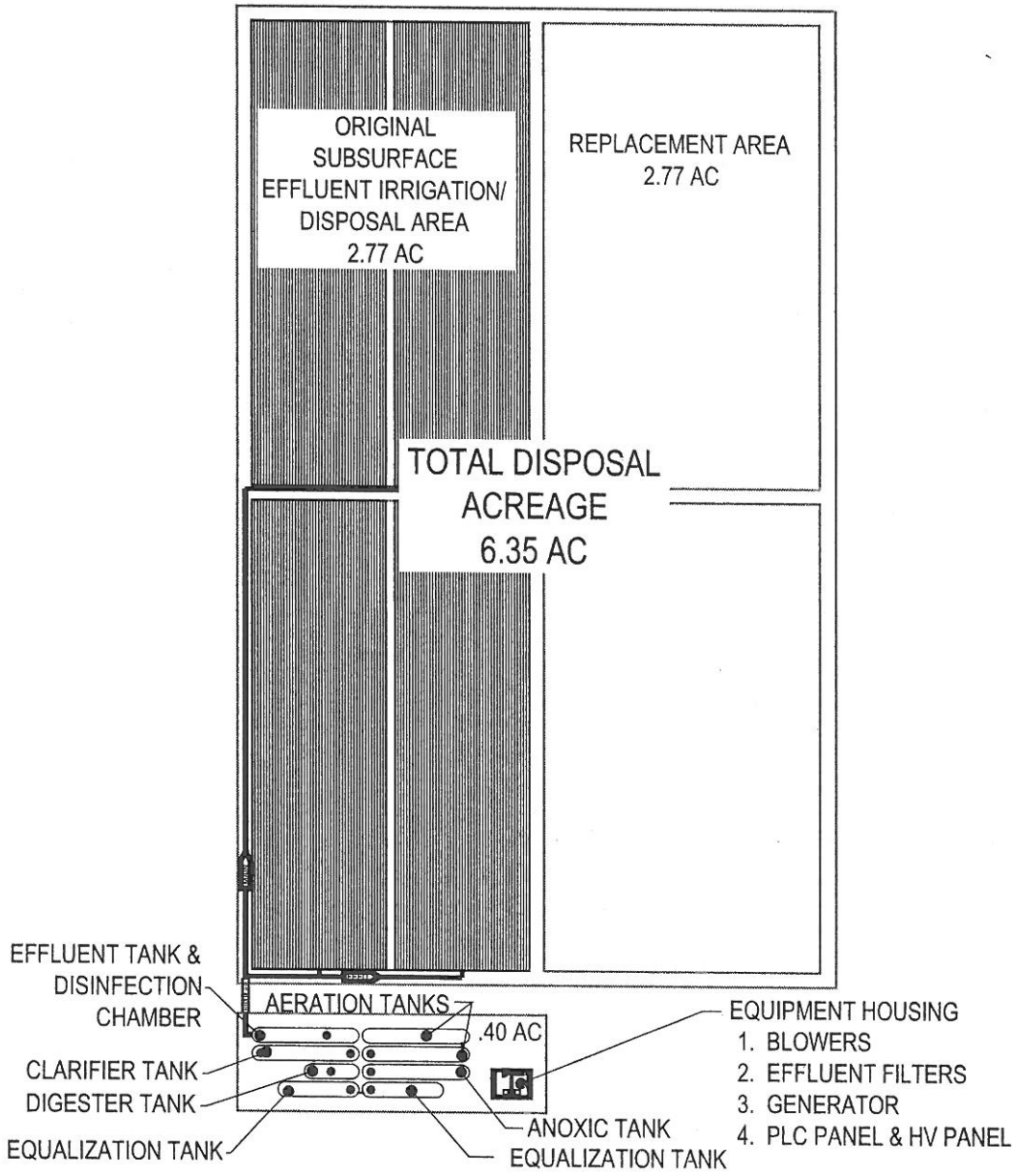


CLUSTERED WASTEWATER TREATMENT SYSTEM DOWNTOWN REVITALIZATION AREA BATCH TREATMENT PLANT LAYOUT		FIGURE E-1
7H Technical Services Group, Inc. 431 Crown Point Circle, Ste. C Grass Valley, CA 95945	JOB NO: 5110	DATE: NOVEMBER 24, 2003



CLUSTERED WASTEWATER TREATMENT SYSTEM DOWNTOWN REVITALIZATION AREA TREATMENT PLANT CONTROL BUILDING ELEVATION	FIGURE **E-2**
7H Technical Services Group, Inc. 431 Crown Point Circle, Ste. C Grass Valley, CA. 95945	JOB NO: 5110
	DATE: NOVEMBER 24, 2003

APPENDIX F



CLUSTERED WASTEWATER TREATMENT SYSTEM DOWNTOWN REVITALIZATION AREA DISPOSAL FACILITY & SUBSURFACE EFFLUENT DISPOSAL PLAN	FIGURE F-1
7H Technical Services Group, Inc. 431 Crown Point Circle, Ste. C Grass Valley, CA 95945	JOB NO: 5110
	DATE: NOVEMBER 24, 2003

Town of Paradise,
Downtown Revitalization Area,
Tributary Area A+B+C+D
Butte County
Wastewater Effluent Water Balance

2.77 acres
1.10 gpd/sf percolation rate
100,000 gpd wastewater flow rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	PRECIPITATION		**RAINFALL with 50% absorption**		**WASTEFLOW**		**PERCOLATION CAPACITY 1.1 gpd/sf**		**ETo EVAP OTRANS**		**Eff. Disposal Result (0.83gpd/Sf)**	**REQUIRED STORAGE**
	inches	m. galls	inches	m.galls	inches	m.galls	inches	m.galls	inches	m.galls	m.galls	gallons
MONTH											(4)+(6)-(8)-(10)	
October	3.01	0.2264	1.51	0.1132	76.11	3.1000	151.5	4.1145	3.7	0.2783	(1.1796)	0
November	7.44	0.5596	3.72	0.2798	73.66	3.0000	146.6	3.9818	1.7	0.1279	(0.8299)	0
December	6.58	0.4949	3.29	0.2474	76.11	3.1000	151.5	4.1145	1	0.0752	(0.8423)	0
January	9.58	0.7205	4.79	0.3603	76.11	3.1000	151.5	4.1145	1.2	0.0903	(0.7445)	0
February	6.33	0.4761	3.17	0.2380	68.75	2.8000	136.9	3.7164	1.8	0.1354	(0.8137)	0
March	7.15	0.5378	3.58	0.2689	76.11	3.1000	151.5	4.1145	2.9	0.2181	(0.9638)	0
April	3.06	0.2301	1.53	0.1151	73.66	3.0000	146.6	3.9818	4.7	0.3535	(1.2202)	0
May	1.03	0.0775	0.52	0.0387	76.11	3.1000	151.5	4.1145	6.1	0.4588	(1.4346)	0
June	0.61	0.0459	0.31	0.0229	73.66	3.0000	146.6	3.9818	7.4	0.5566	(1.5154)	0
July	0.06	0.0045	0.03	0.0023	76.11	3.1000	151.5	4.1145	8.5	0.6393	(1.6516)	0
August	0.38	0.0286	0.19	0.0143	76.11	3.1000	151.5	4.1145	7.3	0.5490	(1.5493)	0
September	0.93	0.0699	0.47	0.0350	73.66	3.0000	146.6	3.9818	5.4	0.4061	(1.3530)	0
Total	46.16		23.08		896.18		1784.2		51.7			0

(1) Precipitation from State Climatologist DWR Utilizing 100 Year Return Period (Station:- A40 6685 Paradise Monthly)
(6) Wasteflow determined in Report text
(4) Absorption based on SCS Technical Report where I=0.2S and S=(1000/CN) -10 where CN = 80
(7) Percolation determined from existing data of area
(9) Evaporation-Transpiration data from UC Davis Publication 21426 for Butte County, Chico
(11) "( )" sign represents excess disposal capacity for dosing rate of 0.83 gpsf/d
(12) Positive value represents requirement for pond storage

Town of Paradise,
Downtown Revitalization Area,
Tributary Area "A"
Butte County
Wastewater Effluent Water Balance

0.90 acres
1.10 gpd/sf percolation rate
40,000 gpd wastewater flow rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	PRECIPITATION		RAINFALL with 50% absorption		WASTEFLOW		PERCOLATION CAPACITY 1.1 gpd/sf		ETo EVAP OTRANS		Eff. Disposal Result (0.83gpd/Sf)	REQUIRED STORAGE
	inches	m. galls	inches	m.galls	inches	m.galls	inches	m.galls	inches	m.galls	m.galls	gallons
MONTH											(4)+(6)-(8)-(10)	
October	3.01	0.0736	1.51	0.0368	30.45	1.2400	49.2	1.3369	3.7	0.0904	(0.1505)	0
November	7.44	0.1818	3.72	0.0909	29.46	1.2000	47.6	1.2937	1.7	0.0415	(0.0444)	0
December	6.58	0.1608	3.29	0.0804	30.45	1.2400	49.2	1.3369	1	0.0244	(0.0409)	0
January	9.58	0.2341	4.79	0.1171	30.45	1.2400	49.2	1.3369	1.2	0.0293	(0.0091)	0
February	6.33	0.1547	3.17	0.0773	27.50	1.1200	44.5	1.2075	1.8	0.0440	(0.0541)	0
March	7.15	0.1747	3.58	0.0874	30.45	1.2400	49.2	1.3369	2.9	0.0709	(0.0804)	0
April	3.06	0.0748	1.53	0.0374	29.46	1.2000	47.6	1.2937	4.7	0.1149	(0.1712)	0
May	1.03	0.0252	0.52	0.0126	30.45	1.2400	49.2	1.3369	6.1	0.1491	(0.2333)	0
June	0.61	0.0149	0.31	0.0075	29.46	1.2000	47.6	1.2937	7.4	0.1808	(0.2671)	0
July	0.06	0.0015	0.03	0.0007	30.45	1.2400	49.2	1.3369	8.5	0.2077	(0.3038)	0
August	0.38	0.0093	0.19	0.0046	30.45	1.2400	49.2	1.3369	7.3	0.1784	(0.2706)	0
September	0.93	0.0227	0.47	0.0114	29.46	1.2000	47.6	1.2937	5.4	0.1320	(0.2143)	0
Total	46.16		23.08		358.47		579.7		51.7			0

(1) Precipitation from State Climatologist DWR Utilizing 100 Year Return Period (Station:- A40 6685 Paradise Monthly)
(6) Wasteflow determined in Report text
(4) Absorption based on SCS Technical Report where I=0.2S and S=(1000/CN) -10 where CN = 80
(7) Percolation determined from existing data of area
(9) Evaporation-Transpiration data from UC Davis Publication 21426 for Butte County, Chico
(11) "( )" sign represents excess disposal capacity for dosing rate of 0.83 gpsf/d
(12) Positive value represents requirement for pond storage

Town of Paradise,
Downtown Revitalization Area,
Tributary Area "B", "C+D"
Butte County
Wastewater Effluent Water Balance

0.70 acres
1.10 gpd/sf percolation rate
30,000 gpd wastewater flow rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	PRECIPITATION		**RAINFALL with 50% absorption**		**WASTEFLOW**		**PERCOLATION CAPACITY 1.1 gpd/sf**		**ETo EVAP OTRANS**		**Eff. Disposal Result (0.83gpd/Sf)**	**REQUIRED STORAGE**
MONTH	inches	m. galls	inches	m.galls	inches	m.galls	inches	m.galls	inches	m.galls	m.galls (4)+(6)-(8)-(10)	gallons
October	3.01	0.0572	1.51	0.0286	22.83	0.9300	38.3	1.0398	3.7	0.0703	(0.1515)	0
November	7.44	0.1414	3.72	0.0707	22.10	0.9000	37.1	1.0062	1.7	0.0323	(0.0678)	0
December	6.58	0.1251	3.29	0.0625	22.83	0.9300	38.3	1.0398	1	0.0190	(0.0663)	0
January	9.58	0.1821	4.79	0.0910	22.83	0.9300	38.3	1.0398	1.2	0.0228	(0.0415)	0
February	6.33	0.1203	3.17	0.0602	20.62	0.8400	34.6	0.9392	1.8	0.0342	(0.0732)	0
March	7.15	0.1359	3.58	0.0679	22.83	0.9300	38.3	1.0398	2.9	0.0551	(0.0969)	0
April	3.06	0.0582	1.53	0.0291	22.10	0.9000	37.1	1.0062	4.7	0.0893	(0.1665)	0
May	1.03	0.0196	0.52	0.0098	22.83	0.9300	38.3	1.0398	6.1	0.1159	(0.2159)	0
June	0.61	0.0116	0.31	0.0058	22.10	0.9000	37.1	1.0062	7.4	0.1406	(0.2411)	0
July	0.06	0.0011	0.03	0.0006	22.83	0.9300	38.3	1.0398	8.5	0.1616	(0.2708)	0
August	0.38	0.0072	0.19	0.0036	22.83	0.9300	38.3	1.0398	7.3	0.1387	(0.2449)	0
September	0.93	0.0177	0.47	0.0088	22.10	0.9000	37.1	1.0062	5.4	0.1026	(0.2000)	0
Total	46.16		23.08		268.85		450.9		51.7			0

(1) Precipitation from State Climatologist DWR Utilizing 100 Year Return Period (Station:- A40 6685 Paradise Monthly)
(6) Wasteflow determined in Report text
(4) Absorption based on SCS Technical Report where I=0.2S and S=(1000/CN) -10 where CN = 80
(7) Percolation determined from existing data of area
(9) Evaporation-Transpiration data from UC Davis Publication 21426 for Butte County, Chico
(11) "( )" sign represents excess disposal capacity for dosing rate of 0.83 gpsf/d
(12) Positive value represents requirement for pond storage