M E M O R A N D U M

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DUBLIN SAN RAMON SERVICES DISTRICT
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE 2005

TECHNICAL MEMORANDUM No. 6

SUBJECT:	Sewer Improvement Projects	**DATE:**	March 3, 2005 (draft) April 29, 2005 (final)
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This Technical Memorandum (TM) presents the recommended sewer improvement projects developed based on the results of hydraulic modeling of the DSRSD wastewater collection system conducted for the 2005 Wastewater Collection System Master Plan Update. The TM discusses the five recommended projects needed to address potential capacity deficiencies in the existing trunk sewer system; and trunk extension projects needed to provide service for future development in currently undeveloped portions of Eastern Dublin. The TM also identifies other trunk sewer improvements needed for non-capacity-related reasons, as identified by District efforts outside of this Master Plan study.

This TM is organized into the following sections:
- Capacity Relief Projects
- Trunk Sewer Extensions
- Other Sewer Improvement Projects

Table 1 summarizes the recommended projects. The locations of the proposed projects are shown in **Figure 1**.

CAPACITY RELIEF PROJECTS

Areas of existing and future capacity deficiencies were identified through hydraulic modeling of the trunk sewer system, as presented in TM 5, Hydraulic Model Results. Table 1 of that TM listed five areas of predicted capacity deficiencies. Based on review of model hydraulic profiles (see Attachments to TM 5) and modeling of preliminary solutions, five capacity improvements projects are recommended for implementation by the District.

TABLE 2
PROPOSED SEWER IMPROVEMENT PROJECTS

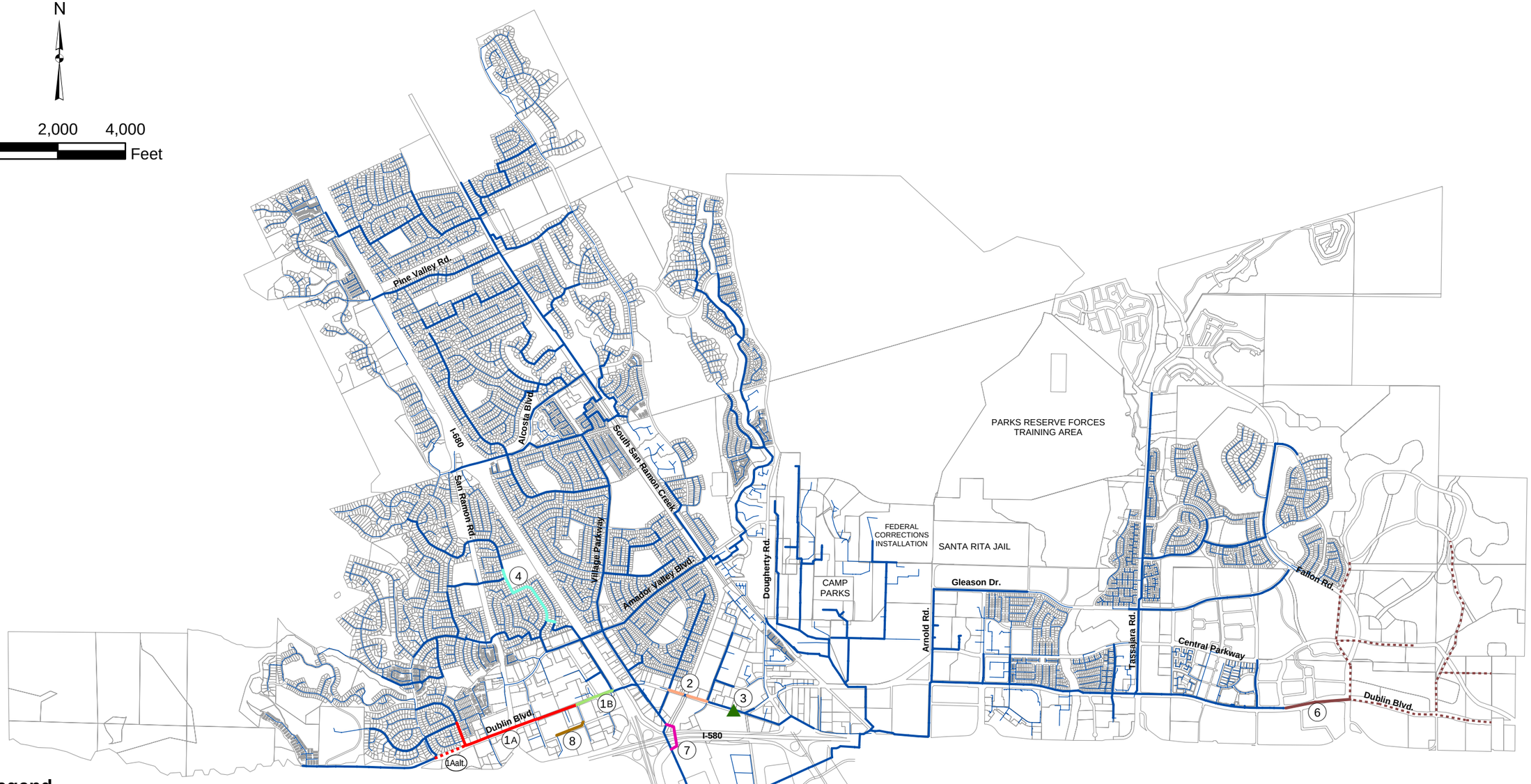
Project ID	Project Name	Capacity Deficiency (a)	Recommended Project					
			US MH ID	DS MH ID	Location	Description	Length (ft.)	Design Flow (b) (mgd)
1A	Dublin Blvd. West Relief Sewer	1	T20D1-1	U20C2-12	Hansen Dr. (Belten Dr. to Dublin Blvd.)	Upsize existing 8-inch pipe to 10-inch using open cut construction	718	0.82
			U20C2-12	U20C2-1	Dublin Blvd. (Hansen Dr. to San Ramon Rd.)	Upsize existing 8-inch pipe to 10-inch using open cut construction	1,446	0.87 - 1.12
			U20C2-1	U20D1-15	Dublin Blvd. (San Ramon Rd. to Golden Gate Way)	Upsize existing 8-inch pipe to 10-inch using pipe bursting	1,965	1.12 - 1.25
1A alt.	Dublin Blvd. West Relief Sewer (alternative)	1	T20D1-10	U20C2-12	Dublin Blvd. (Silvergate Dr. to Hansen Dr.)	Construct new 8-inch sewer using horizontal directional drilling	1,000	0.32
			U20C2-12	U20C2-1	Dublin Blvd. (Hansen Dr. to San Ramon Blvd.)	Same as Project 1A		
			U20C2-1	U20D1-15	Dublin Blvd. (San Ramon Rd. to Golden Gate Way)	Same as Project 1A		
1B	Dublin Blvd. West Relief Sewer Extension	(c)	U20D1-15	U20D1-7	Dublin Blvd. (Golden Gate Way to I-680)	Upsize existing 10-inch pipe to 12-inch using pipe bursting (d)	1,133	1.43
2	Dublin Blvd. East Relief Sewer	2	V20A2-2	V20A1-3	Dublin Blvd. (Clark Ave. to Sierra Ct.)	Upsize existing 10-inch pipe to 12-inch using open cut construction (existing siphons to remain as is)	1,053	0.85
3	Dublin Blvd. Lift Station Expansion	3			Dublin Blvd. east of Sierra Ct.	Replace pumps, motors, control panel (3-HP to 5-HP).	--	0.44
4	Donahue Dr./Vomac Rd. Relief Sewer	4a	U19C6-15	U19C4-15	Donahue Dr., Landale Ave., Vomac Rd. (Irving Way to north of Shannon)	Upsize existing 8-inch pipe to 10-inch using pipe bursting (d)	2,453	0.69 - 0.96
		4b	U19C4-15	U19C4-6	Irving Way (Ironwood to Donohue)	Upsize existing 10-inch pipe to 12-inch using pipe bursting (d)	260	1.1
5	Dublin Trunk Relief Sewer	5b	V21A3-2	TP01	Easement parallel to and crossing Johnson Dr. and Stoneridge Dr., WWTP access road	Construct new 36-inch parallel relief sewer using microtunneling and/or open cut construction	2,200	12.2
6	Eastern Dublin Trunk Sewer Extension	--			Dublin Blvd. from east of Tassajara Rd. to Fallon Rd.	Construct new 18-inch trunk sewer	1,900	1.9 - 2.0
7	Alamo Creek and I-580 Crossing Sewer Replacement	--	U20B2-2	V21A2-14	Easement crossing Alamo Creek and I-580 to Johnson Dr.	Construct new 39-inch sewer and twin 24-inch siphons under Alamo Creek by combination of microtunneling and open cut construction	1,024	13.0
8	OSH Sewer Replacement	--	U20D1-23	U20D1-17	Easement west of Golden Gate Way	Replace existing 6-inch sewer with new 8-inch pipe	954	(e)

(a) See TM 5, Table 1
(b) Design flow based on buildout peak wet weather flow for 20-year design storm.
(c) Model indicates very minor capacity deficiency (~0.5 ft. surcharge under buildout PWWF for 20-year storm)
(d) TV inspection data for existing pipes not provided; suitability for pipe bursting needs to be confirmed prior to or during design.
(e) Collector sewer, not modeled.

N

0 2,000 4,000

Feet



Legend

- 1A Dublin Blvd. West Relief Sewer
- 1Aalt Dublin Blvd. West Relief Sewer Alternative
- 1B Dublin Blvd. West Relief Sewer Extension
- 2 Dublin Blvd. East Relief Sewer
- 3 Dublin Blvd. Lift Station Expansion
- 4 Donahue Dr./Vomac Rd. Relief Sewer
- 5 Dublin Trunk Relief Sewer
- 6 Eastern Dublin Trunk Extension
- 7 Alamo Creek Crossing Sewer Replacement
- 8 OSH Sewer Replacement
- EDPO Sewer Extensions (Conceptual)
- Modeled sewer
- Unmodeled sewer
- Parcels

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DUBLIN SAN RAMON SERVICES DISTRICT
WASTEWATER COLLECTION SYSTEM
MASTER PLAN UPDATE 2005

PROPOSED SEWER IMPROVEMENT PROJECTS

FIGURE 1

The five projects listed in Table 1 of this TM were evaluated in further detail through site visits, discussions with District engineering and field operations staff, and review of available television inspection data. The following paragraphs describe the issues and recommendations for each project. The recommended Master Plan Capital Improvement Program (CIP), including estimated project costs and proposed project priorities and phasing, will be presented in a subsequent TM.

Construction Considerations

Appropriate methods of construction were considered for each proposed sewer improvement project based on site conditions and technical requirements. Construction methods considered included trenchless methods such as pipe bursting and microtunneling, as well as traditional open-cut construction. Trenchless construction methods have a significantly lower construction "footprint" as compared to traditional open-cut construction and therefore result in much less damage to pavement and less disruption to traffic and adjacent residential and commercial activities.

Pipe bursting is a trenchless construction method for pipe replacement in which a new pipe is pulled inside an existing pipe. The existing pipe is broken during the process and pushed outwards into the surrounding soils. The new pipe can match the original pipe diameter or, with the right soil conditions, have a larger diameter. Several issues have a bearing on the use of pipe bursting: soil conditions, proximity to existing utilities, sags in the existing sewer, and lateral connections. Existing stiff soils and existing utilities in close proximity, especially asbestos cement pipe, may limit the ability to pipe burst. If an existing pipeline has vertical and horizontal deviations (sags and bends), the new pipe will follow those deviations. Although minor sags (e.g., less than ¾ inch) may be overlooked, significant sags can result in loss of capacity and potential maintenance problems, and therefore, pipe bursting in these cases cannot be recommended. Numerous lateral connections also result in the need to perform open cut excavations at those locations to complete service reconnections.

Another benefit of trenchless construction methods is that the surface disruption is much less than traditional open-cut construction. With pipe bursting, the new sewer is pulled in from pits spaced at approximately 400-foot intervals. However, as noted above, one important pipe bursting consideration is the number of lateral connections. If the sewer main contains too many lateral connections, the amount of pavement excavation may nullify the benefit realized through pipe bursting the sewer main.

For key projects in which pipe bursting was considered as a sewer replacement method, the District provided television inspection videotapes of the existing sewer pipelines. The videotapes were reviewed to assess construction issues such as sags and lateral connections in order to determine the appropriate construction method for each project. The focus of these reviews, as discussed below for Projects 1 and 2, was primarily to asses whether pipe bursting could be used in the busy areas of Dublin Boulevard. Although recommendations have been made based on the available videotapes and site visits to the project areas, more detailed geotechnical and utility investigations would be required during the design phase of projects to confirm the selected construction methods.

The paragraphs below discuss each of the proposed capacity improvement projects and describe the recommended improvements, construction considerations, and construction methods recommended for each project.

Project 1 – Dublin Boulevard West Relief Sewer

This project would consist of construction of a relief trunk sewer in Dublin Boulevard west of highway I-680. This project was identified in the District's previous Master Plan Update 2000, and the District has recently initiated the design phase of the project based on the recommendations of the previous Master Plan. The project is divided into two parts: the upstream portion from Golden Gate Way to Hansen Drive (Project 1A), and the downstream portion from the easement immediately west of I-680 to Golden Gate Way (Project 1B). The project would serve existing residential and commercial development west of I-680, as well as the future Schaefer Ranch development in western Dublin, new development in the vicinity of the proposed West Dublin BART station, and potential redevelopment and/or densification in the downtown Dublin area.

Project 1A would address the predicted capacity deficiency in the existing 8-inch sewer extending upstream from Golden Gate Way to Hansen Drive at Betlen Drive. This sewer was identified as a significant capacity deficiency with predicted surcharge up to 6 feet above the pipe crown under existing 20-year design storm peak flow conditions, and potential overflows under future conditions. A 10-inch pipe would be required to provide needed sewer capacity.

Project 1B would upsize the existing 10-inch sewer downstream of Golden Gate Way to a 12-inch pipe. Based on the hydraulic modeling, the potential surcharge in this sewer is predicted to be minor (less than one foot), and therefore, this section was not included in the deficiency table in TM 5. However, the District has indicated its intent to include this portion of the sewer in the project due to anticipated growth in the upstream area and the desire to address all potential construction needs in this busy portion of Dublin Boulevard at one time.

Dublin Boulevard, particularly east of San Ramon Road, is a busy commercial area with heavy traffic. A major freeway interchange (I-580) is located immediately south of the Dublin Boulevard/San Ramon Road intersection. From San Ramon Road east, the existing sewer is located in the westbound (north side of the street) center lane. From San Ramon Road west to Hansen Drive it is located in the northernmost lane. The pipe averages about 10 feet deep, and there are manholes at each street intersection. Hansen Drive from Dublin Boulevard to Betlen Drive is a wide residential street with the sewer located in the center of the street. The primary issues with respect to construction of this project are the potential impacts on traffic and businesses along Dublin Boulevard and at the Dublin Boulevard/San Ramon Road intersection. Therefore, trenchless construction methods would be highly desirable.

The television inspection video of the existing sewer pipes indicate the pipe to be in fair condition east of San Ramon Road; however, the pipe contains several severe sags west of San Ramon Road. Furthermore, there are very few lateral connections east of San Ramon Road, but more lateral connections west of San Ramon Road and especially on Hansen Drive. It is therefore recommended that pipe bursting be used to upsize the existing sewer east of San Ramon Road, and open-cut construction be used west of San Ramon Road and on Hansen Drive.

(Note that there were no TV inspection videotapes provided for the portion of the project from about 200 feet east of Golden Gate Way to I-680; therefore, suitability for pipe bursting in this portion of the alignment would need to be confirmed prior to or during design.) Nighttime construction would likely be required to minimize disruption to traffic and commercial activities on Dublin Boulevard, but Hansen Drive is a residential area that would require normal daytime construction scheduling.

An alternative to the pipe replacement on the block of Hansen Drive between Dublin Boulevard and Betlen Drive would be to construct a new 8-inch sewer in Dublin Boulevard between Hansen Drive and Silvergate Drive and divert flow at the intersection of Dublin Boulevard and Silvergate Drive into the new sewer (Project 1A alt). This alternative would avoid the need to open cut the sewer in Hansen Drive and reconnect multiple residential service laterals. The alternative alignment in this portion of Dublin Boulevard has a fairly steep slope; however, there is ample room at the Dublin Boulevard/Silvergate Drive intersection for construction activity. Because the roadway is relatively narrow in this section with an embankment on either side, the new sewer would probably be constructed by a trenchless method, such as horizontal directional drilling. The decision on whether to construct this alternative sewer or replace the existing sewer in Hansen Drive would likely be made on the basis of cost and non-monetary considerations such as traffic and potential impacts on the residential neighborhood along Hansen Drive.

Project 2 – Dublin Boulevard East Relief Sewer

This project would consist of construction of a relief trunk sewer in Dublin Boulevard between Clark Avenue and Sierra Court. This project was identified in the District's previous Master Plan Update 2000, although in that plan, the project extended further upstream to the Dublin Boulevard Lift Station. The current modeling predicts 2 to 3 feet of surcharge in the existing 10-inch pipe under future, 20-year storm peak wet weather flow conditions. Upsizing to a 12-inch pipe would provide sufficient capacity. Note that the existing pipe alignment also crosses under the Alamo Canal via twin 4- and 8-inch inverted siphons. However, hydraulic analysis indicates that the velocities through the siphons would not be excessive under peak flow conditions, and District field operations staff have indicated no particular maintenance problems with these siphons; therefore, replacement of the siphons is not included as part of the project.

Although not as busy as the portion west of I-680, this portion of Dublin Boulevard is also characterized by commercial development and relatively heavy traffic. The City of Dublin Civic Center is located on the south side of the street immediately west of Sierra Court. The existing sewer is located in the westbound, center lane, and the pavement is relatively new. The television inspection identified only two lateral connections but showed the existing pipeline to have severe sags. This would indicate that trenchless construction methods would not be recommended and open-cut construction is warranted.

Project 3 – Dublin Boulevard Lift Station Expansion

The District's only sewage pumping station, the Dublin Boulevard Lift Station, is located on the north side of Dublin Boulevard approximately 800 feet east of Sierra Court. The station has two submersible pumps in a 6-foot diameter wet well located under the sidewalk. The station has a rated firm capacity of approximately 0.32 mgd. The existing peak wet weather flow for a 20-

year design storm is estimated to be 0.38 mgd, and the predicted future peak wet weather flow to the lift station is estimated to be 0.44 mgd. Potential higher intensity, mixed use development (such as the proposed Bancor Pak-in-Save development at the intersection of Dublin Boulevard and Dougherty Road) could result in possibly higher flows.

A hydraulic analysis of the existing pump station indicates that pumping capacity could be expanded by replacement of the existing 3-HP pumps (Flygt model CP 3085) with new 5-HP pumps (Flygt model NP3201). Hydraulic calculations indicate that the existing 4-inch diameter effluent force main would be adequate to handle the flows from the larger pumps. Replacement elements would include pumps, motors, guide rails, control panels, and miscellaneous electrical conduit and wiring. Construction activities should be able to be contained within the existing pump station facility without significantly impacting the Dublin Boulevard roadway. If closure of a traffic lane is required, the work could be done at night to minimize impact.

The existing gravity sewers in Dublin Boulevard upstream and downstream of the lift station are 10-inch diameter. The influent pipe to the lift station is a 6-inch line. Although this line is slightly undersized for the predicted peak flows, the potential surcharge is minor and does not warrant replacement with a larger line. Analysis of the existing 10-inch pump station bypass line indicates that the line has more than adequate capacity (2.42 mgd) to handle the predicted future peak wet weather flow. Although there is a potential for backup of flow upstream of the lift station during a pump outage, it is not possible to lower the bypass line due to the higher elevation of the discharge manhole downstream of the lift station.

Project 4 – Donahue Drive/Vomac Road Relief Sewer

This project would involve upsizing the existing 8-inch pipes in Donahue Drive, Landale Avenue, and Vomac Road from Irving Way to north of Shannon Avenue and the 10-inch pipe in Irving Way between Ironwood Drive and Donahue Drive. Flow monitoring conducted for the Master Plan indicated that the area tributary to this sewer contributes higher-than-average infiltration/inflow during wet weather (see results for Flow Meter 10 in TM 4). The hydraulic model predicts that the sewer would surcharge and potentially overflow during a 20-year design storm peak flow condition. A 10-inch pipe (12-inch in Irving Way) would provide sufficient capacity.

The project area is primarily residential with relatively wide streets. The existing sewers range from about 6 to 12 feet deep. Pipe bursting the existing would be a viable replacement method (assuming that the condition of the existing pipes is suitable, e.g., do not have significant sags; sewer television inspections were not reviewed as a part of this TM). Due to the proximity of Dublin Elementary School on Vomac Road, mitigation of construction impacts by limiting construction hours or conducting work during the summer or school vacation periods may be necessary.

It is also recommended that the District conduct further investigation of the area tributary to the Donohue Drive sewer to confirm the high I/I flows through additional flow monitoring and identify potential sources of I/I through field methods such as smoke testing and television inspection. Based on these results, more detailed analysis could indicate that I/I correction might be a viable alternative to construction of the relief sewer project.

Project 5 – Dublin Trunk Relief Sewer

This project, also identified in the previous 2000 Master Plan Update, would involve construction of a parallel relief sewer for the existing 42-inch Dublin Trunk Sewer from the connection of the Camp Parks Trunk Sewer downstream to the wastewater treatment plant (WWTP) influent line (to the point where it becomes 48-inch pipe and turns west into the plant). As previously proposed, flow from the Camp Parks Trunk would be diverted into the new relief sewer, leaving the existing 42-inch pipe to handle the flows from Central Dublin and San Ramon. Based on the model results, a 36-inch relief sewer would be adequate to handle the projected peak wet weather flows (although a larger diameter, e.g., 42-inch, could be considered for providing greater operating flexibility and potential redundancy for the existing 42-inch trunk sewer).

During the last Master Plan, extensive coordination was conducted with engineers involved in other District projects in the vicinity of the WWTP, including the plant expansion, LAVWMA facilities, and recycled water (DERWA and CWR) facilities. Numerous wastewater and other utility pipelines are installed in the area around Johnson Drive, Stoneridge Drive, and in the WWTP access road, making pipeline construction in this area a significant challenge. In addition, drainage canals limit the availability of pipeline corridors. An alignment east of and parallel to the existing Dublin Trunk Sewer, west of the existing facultative sludge lagoons, appeared to be the most feasible location for the relief pipeline. The sewer would likely be constructed by microtunneling or a combination of microtunneling and open cut construction.

The surcharge predicted in the lower Dublin Trunk is partially caused by the proposed operating level at the WWTP headworks. Modeling of the pipeline utilized conservative assumptions based on the hydraulic profile shown on the WWTP expansion drawings. The hydraulic gradeline at the WWTP influent would appear to surcharge the trunk sewer for several hundred feet upstream of the headworks under future peak flow conditions (see hydraulic profile attachments to TM 5).

With the proposed relief sewer in place, the modeling also shows that the predicted surcharge further upstream (in the vicinity of the Commerce Circle area of Pleasanton) would be reduced to only a minor amount (barely above the crown of the pipe) under 20-year storm peak flow conditions. Therefore, capacity relief for this portion of the Dublin Trunk (Deficiency No. 5a in TM 5) would not be required.

TRUNK SEWER EXTENSIONS

The existing Eastern Dublin Trunk Sewer currently ends about 1,900 feet west of Fallon Road. At this point, the trunk is a 24-inch diameter pipe. Significant future development is projected for the area east of Fallon Road (known as the "EDPO" area or Fallon Village), and the existing trunk sewer system would need to be extended east and north to serve the new developments. A conceptual layout of future sewers was developed for this Master Plan based on currently available development plans and topographic mapping, as shown in Figure 1. Based on the flows predicted through the hydraulic modeling, the existing Eastern Dublin Trunk Sewer would need to be extended to Fallon Road as an 18-inch diameter pipe. Other sewer extensions would

be smaller in diameter (typically 8 to 12 inches) and would be constructed by developers as the area develops. The sewer configuration shown on Figure 1 would likely be modified based on development patterns, grading, and the final location of roads.

OTHER SEWER IMPROVEMENT PROJECTS

The District has identified several other sewer improvements needed to address structural, operational, and/or reliability issues. These projects are described below and included in this Master Plan in order to develop a complete Capital Improvement Program for sewer improvements.

Alamo Creek Sewer Crossing

The existing Dublin Trunk Sewer crosses Alamo Creek in an exposed pipeline crossing north of highway I-580. This pipe is a 33-inch steel pipe that is encased in a 39-inch casing pipe. The District and Alameda County Flood Control District are concerned about the potential for pipeline failure and sewage release in the event of high flow conditions in the creek channel. While the existing trunk sewer in this location appears to have adequate hydraulic capacity based on the modeling conducted for this study, replacement of the exposed crossing is recommended to minimize the potential for structural damage and sewer overflows, as this line is a critical element for a large portion of the District's service area, and failure of this line could have significant adverse service and water quality impacts.

Over the past few years, the District has evaluated alternatives and developed a conceptual design for a replacement of this crossing with a triple-barrel inverted siphon under Alamo Creek located slightly east of the existing crossing. Downstream of the proposed siphon, the proposed new pipeline would turn south and cross under highway I-580 and the BART tracks, connecting to the existing trunk sewer at manhole V21A2-14 on Johnson Drive. This proposed new alignment would not only eliminate the exposed crossing across Alamo Creek but also a similar crossing of the flood control channel south of I-580.

The District commissioned two studies in the past (in 1996 and 2002) to evaluate alternatives for replacing the existing creek crossing. Both studies recommended the triple-barrel inverted siphon alternative. In 2003, another study was performed to examine two additional alternatives to the triple-barrel inverted siphon. This study also concluded that the triple-barrel inverted siphon was the recommended alternative. All of these prior studies were based on the higher flow projections contained in the 2000 Master Plan Update and previous reports.

The basis for the triple-barrel inverted siphon recommendation was as follows:

1. The first and smallest pipe is sized to convey the dry weather minimum flow with a 3 feet per second (fps) conveyance velocity.
2. The second pipe is sized to convey the dry weather maximum flow with a 3 fps conveyance velocity.
3. The third and largest pipe is sized to convey the peak wet weather flow with a 3 fps conveyance velocity.

In addition, having three pipes instead of two pipes would allow the District the flexibility of isolating one of the pipes during the dry weather season.

While a triple-barrel siphon does provide increased flexibility to handle a wide range of flows and greater redundancy for maintenance purposes, the additional cost and operational complexity of the extra barrel may not be warranted. The range of flows predicted for the pipeline is not great (6.4 mgd peak dry weather flow to 12.9 mgd peak wet weather flow), and providing 3 fps conveyance velocity is not necessarily required for *minimum* flow conditions as long as this velocity is reached for a reasonable length of time (e.g., 1 to 3 hours) each day. Calculations indicate that a double-barrel siphon could provide adequate hydraulic capacity by sizing one pipe to handle the dry weather flow with a minimum velocity of at least 3 fps achieved at the peak daily flow, and the other pipe sized so that both pipes together can handle the peak wet weather flow. A side overflow weir in the siphon inlet structure would direct the flow to the second pipe when the capacity of the first pipe was reached. Based on these considerations, construction of a dual 24-inch double-barrel siphon is recommended for this project. The sizing of the siphons should be reviewed and refined, if necessary, during project design.

The proposed alignment begins just upstream of existing manhole U20B2-2, which is located in the Clark Commercial Building parking lot. A new manhole would intercept the existing trunk sewer and redirect the flow to the new siphon inlet structure. The siphon pipes would cross under Alamo Creek and exit in a siphon outlet structure located in the City of Dublin Library parking lot. After exiting the siphon, the flow would return to a 39-inch gravity sewer operation, heading south and crossing I-580/BART. The pipe would then be directed southwest at the edge of Johnson Drive and follow the roadway to existing manhole V21A2-14, where it would be reconnected to the existing 39-inch diameter trunk sewer.

Construction of the siphon could be accomplished by microtunneling. In this method, a pit would be excavated on each side of Alamo Creek to a depth of approximately 33 feet. A tunneling machine would bore an opening for the new pipe, which is jacked directly behind the machine. The second, adjacent pipeline would be constructed in a similar fashion at a distance of about five feet from the first pipe. Upon completion of the tunneling activity, the vertical bends of the siphons would be installed, followed by construction of the inlet and outlet structures. The siphon inlet structure would contain weirs to direct flows into the correct siphon pipe, and the siphon outlet structure would contain channels to direct the flow back into the gravity sewer pipeline.

An alternative to microtunneling each of the siphon pipes separately would be to place both siphon pipes within a larger diameter casing (60- to 72-inch). This would require only a single microtunnel bore that could result in construction savings. It may be advisable to consider both options during design and construction bidding.

Construction of the gravity sewer under I-580/BART would be similar to the method of constructing the siphons. An important consideration with this portion of the gravity sewer is the tight grade tolerance required (approximately 0.4 feet). Meeting this tolerance may be difficult, and corrective measures, should it not be met, would be very limited under I-580/BART. Therefore, although direct pipe jacking under freeways has been allowed by Caltrans for gravity sewers, it may be advisable to place the 39-inch sewer in a larger diameter casing (60- to 72-

inch) to allow for grade adjustments to the 39-inch carrier pipe. Another consideration is the cost advantage of coordinating the microtunnel diameters at the siphon and I-580/BART crossing so that only one microtunneling machine is needed on the project site.

Orchard Supply Hardware (OSH) Sewer Replacement

In 2002, the District conducted an evaluation of the existing 6-inch diameter sewer located in an easement west of Golden Gate Way adjacent to the former Orchard Supply Hardware store. Historically, this line has had high maintenance requirements due to sags in the line and heavy flows and grease discharged from adjacent restaurants. An 8-inch sewer replacement for a portion of the line was designed to the 90 percent completion stage in late 2002.

Future high density mixed use development is projected for this area due to proximity to the proposed West Dublin BART station. The District plans to replace the existing 6-inch sewer to accommodate the new development and alleviate the maintenance problems with the existing line. It is anticipated that this project will be completed in conjunction with the new development when it occurs.

Parks RFTA Sewer Improvements

Over the past five years, the District has conducted an on-going sewer improvement program to rehabilitate the aging infrastructure of the Parks Reserve Forces Training Area (RFTA) sewer system, of which it assumed ownership in 1999. This sewer improvement program is projected to continue through the fiscal year 2008/09. The program consists of rehabilitation and replacement of various sewer pipelines on the RFTA property to address structural deficiencies, maintenance problems, and reduce infiltration/inflow (I/I).

The 2000 Master Plan Update identified Camp Parks as having a very high contribution of I/I, and identified the need for capacity relief for the downstream Camp Parks sewer to handle the wet weather flows, plus relief for the Camp Parks Trunk Sewer to accommodate flows from Camp Parks as well as new development in Eastern Dublin. The flow monitoring and modeling conducted for the current Master Plan show that those relief projects are no longer needed. The reduction in flows appears to be at least partially due to the sewer rehabilitation that has been undertaken as part of the Parks RFTA wastewater utility improvements program.