# CHAPTER 5. STORM DRAIN SYSTEM ANALYSIS

The City's storm drain system was reviewed and analyzed with objectives to assess the system's capability to collect, convey and treat stormwater runoff, to identify problem areas, and to recommend improvements to drainage facilities that will protect property and meet the City's design standards. The review and analysis was undertaken through:

- Discussions with City staff
- Review of previous studies, reports and problem identification
- Review of plans, design drawings and as-built construction drawings
- Formulation of a dynamic model of the system based on the XP-SWMM software package
- Model analysis to identify potential problems
- Model studies to evaluate alternative projects

Drains are discussed with a description of each drain, identification of flood problems, results of the analysis, discussion of potential solutions and recommendations for improvement projects. The Master Plan focuses on the primary drainage system from the detention basin downstream including pumps and SSJID drains to the FCOC and the San Joaquin River. Included are:

- FCOC
- Drain 3 Complex including Drain 3A and Drain 3N
- Drain 4
- Drain 5 and the Drain 5 Interceptor
- Drain 7
- Drain 8
- South Drain
- SSJID Laterals

## MASTER PLAN ANALYSIS

A key part of the Master Plan analysis was model studies using the XP-SWMM models developed for the City. Two basic models were developed and several other modified models were used to study specific alternative solutions to identified problems. The two models that are referenced in this Master Plan are the existing conditions model of drainage facilities in 2003 and the Master Plan model. The Master Plan model includes the General Plan land uses in the October 2003 Land Use Map that includes additional lands to be developed and changes in land uses in the previous General Plan. The Master Plan model also includes the projects identified in the plan, the operation plan for detention basins/pumps and facilities to serve new areas including Drain 3 North and the South Drain.

The Existing Conditions model was used to identify problems and evaluate solutions. The Master Plan model includes the facilities identified in the Master Plan and serves the General Plan lands.

The Master Plan analysis discussed in this chapter, including model runs, results shown on flow tables and node and flooding tables are all based on assumptions that the recommended Master Plan improvements are completed and functional. The initial analysis studied operation of detention basins and pumps with the objective of defining operation criteria that would optimize the use of detention storage in the basins to minimize downstream flooding. Basin and pump operation reflect the recommendations that resulted from these operation studies conducted with the XP-SWMM model.

## SOUTH SAN JOAQUIN IRRIGATION DISTRICT REQUIREMENTS

The agreement between the City and the SSJID that governed the City's use of District drains and laterals for urban drainage expired in 1995. Drafts of new agreements have been proposed in the intervening years but at this time there is no formal agreement. Three major restrictions of the District impacted the development of the Master Plan. These are:

1. The City will not pump drainage into a SSJID drain that will exceed the capacity of the drain.
2. SSJID laterals are limited to 25 cfs of drainage inflow.
3. Stormwater entering a SSJID drain or lateral must have been treated with best management practices (BMP) in accordance with the City's NPDES permit and requirements placed on the SSJID. All discharges shall meet the requirements of the latest applicable discharge agreement with SSJID.

SSJID facilities not previously used by the City are a part of the Master Plan for use in the future including future Drain 3N flows to Drain 3, Drain 10 and Drain 11. To meet SSJID limitations, monitoring of water surface elevations and control of upstream pumps will be expanded and will be included with future pump installations.

## DETENTION BASIN / PUMP OPERATION CRITERIA

Model analyses to define the existing conditions showed a number of shallow flooding areas along most drains. It was found that adjusting detention basin and pump operating criteria would alleviate much of this flooding and eliminate the violation of City standards. In the future the City XP-SWMM model can be used to optimize operation under a range of operating conditions and reduce downstream flooding problems and violations of SSJID restrictions. With the model, the City will use SSJID facilities more efficiently and remain within the District's restrictions.

A general approach to improving basin and pump operation was adopted for Master Plan analyses. The approach was to hold back on pumping from the basins allowing a greater volume of runoff to be stored. In a design storm, the objective is to fill a large percentage of the storage volume and maximize the basin's impact on downstream flows. At least one foot of freeboard was maintained in basins. Pumps were programmed to turn on when the depth in a basin reached from two to four feet below the top. It is also necessary to have a safety factor in storage if downstream monitoring and control shuts down basin pumps for a period of time.

## FRENCH CAMP OUTLET CANAL

Irrigation runoff and drainage flows from the SSJID facilities and from City urban land uses terminate in the FCOC. The FCOC is owned and operated by the SSJID and the City operates under restrictions imposed by the District when the City pumps drainage runoff into drains and laterals that flow into the FCOC.

The FCOC begins at the confluence of Drains 7 and 8 just north of Highway 120. The canal follows the Union Pacific Railroad north to French Camp Slough in Stockton. Along its course north, the FCOC receives City inflow from Drain 8, Drain 7 including Laterals Y and Z, Drain 5 including Lateral Tb, Drain 4, Drain 3 including Drain 3A, Drain 3N and Laterals Re and T. Lateral Rf receives flow from Drain 3A and Pump Station 15, but in the future Drain 3A flow is expected to discharge into Drain 3N and not to the lateral. Also in the future, a portion of South Drain flow will be pumped into Drain 8 and the FCOC.

SSJID and the City sponsored an evaluation of the hydraulic capacity of the FCOC in 2001. CH2M Hill conducted the study using the Danish Hydraulic Institute (DHI) model, MIKE 11. The study evaluated the FCOC under existing conditions and with reconstruction of the several road crossings. The study found that to convey existing flows, the road crossings required improvement.

The MIKE 11 model provides a snap shot in time. Because of the complexity of the system with all the detention basins and pumps, the City elected to prepare a dynamic model, one which would take time into account and allow operation studies that would modify downstream peak flows by how basins and pumps are operated. This Master Plan update includes the dynamic model using XP-SWMM. The model was discussed in Chapter 3 and was instrumental in refining the needs for the FCOC.

The Master Plan analysis showed that reconstructing the road crossings would provide the added capacity needed to convey the Master Plan flows within the existing canal banks. The analysis showed that after reconstruction of the crossings and implementation of other upstream Master Plan improvements the FCOC would have capacity for an additional 80 cfs. The Master Plan uses this 80 cfs capacity to accommodate the flows from the first phase of the South Drain.

This Master Plan limits flow to the FCOC that can be conveyed after reconstructed road crossings but without widening the channel. If the FCOC receives flows, in addition to the Master Plan flows that include the first phase South Drain, the canal would have to be widened.

### Results of Analysis

The Master Plan analysis of the FCOC included certain key assumptions. With all scenarios, there will be an increase in FCOC flows to accommodate the additional runoff. The Master Plan analysis includes all proposed FCOC road crossing improvements as having been completed. Figure 5-1 shows a schematic with model nodes labeled and Figure 5-2 shows the plan view of the FCOC.

SHED BOUNDARY

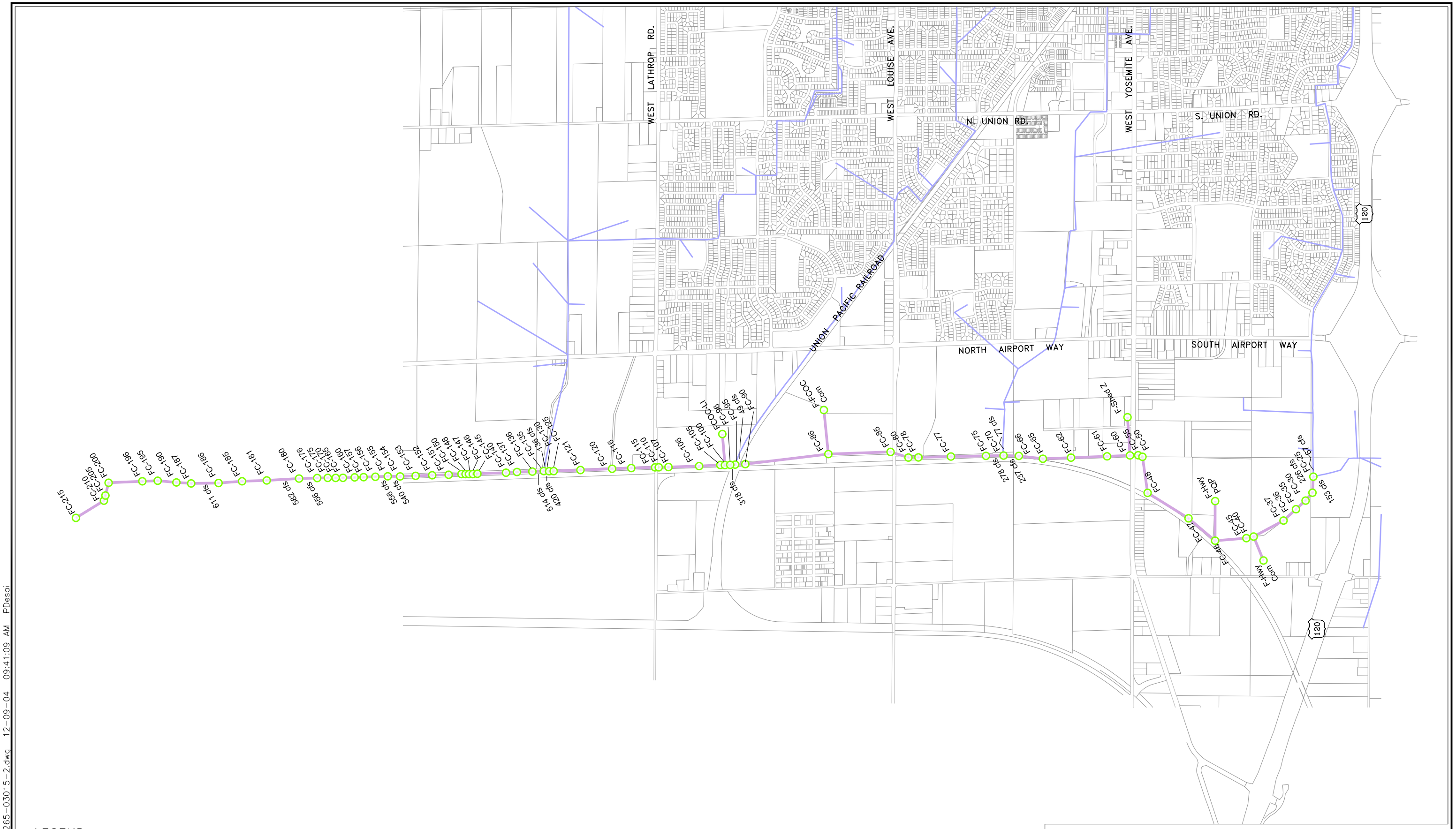
Figure 5-1

City of Manteca
Storm Drain Master Plan
FCOC SCHEMATIC

N

0 1000 2000
SCALE IN FEET

WEST YOST & ASSOCIATES




LEGEND

- EXISTING PIPE
- PROPOSED PIPE
- OPEN CHANNEL
- PROPOSED OPEN CHANNEL
- ASSUMED LOCATION OF INFLOW FROM ADJOINING PROPERTY
- ASSUMED DETENTION STORAGE
- OTHER CHANNELS/PIPES

N

0 1000 2000

SCALE IN FEET

**Figure 5-2**

**City of Manteca**
**Storm Drain Master Plan**
**FCOC DRAIN**

WEST YOST & ASSOCIATES

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Table 5-1, FCOC Flows, shows the peak flow rate and the maximum water surface elevation computed at each model node. Table 5-2, FCOC Water Surface Elevations, shows model output data and flooding depths at each model node. In the table, the column headed "Flood Depth" shows the water surface elevation relative to ground surface. A minus number denotes a water level below ground; a positive number (shaded) is the depth of flooding above the ground. The last column when shaded denotes a situation where City standards are violated with a water level less than six inches below ground level.

Eight individual locations show some flooding. Most are only a few inches and are still contained within the channel banks. Two locations, FC-135 and FC-137, show 0.9- and 0.7-foot potential flooding, respectively. After more detailed review, the potential flooding can be eliminated by more vigorous maintenance activities without the need for a capital project.

**Master Plan Projects**

The Master Plan recommended projects along the FCOC include the following replacement culverts:

| Location | Recommended Improvement |
|---|---|
| • French Camp Road | Replace 66-inch culvert with two 10-foot by 10-foot box culverts |
| • Roth Road | Replace 42-inch and 48-inch culverts with two 10-foot by 10-foot box culverts |
| • Union Pacific Railroad | Replace 42-inch and 36-inch culverts with two 10-foot by 10-foot box culverts |
| • Louise Road | Replace 48-inch and 36-inch culverts with two 10-foot by 10-foot box culverts |
| • Farm Road | Replace 2-36-inch culverts with 10-foot by 8-foot box culvert |

The list of FCOC road/railroad crossing culverts are summarized in Table 5-3.

## DRAIN 3 AND TRIBUTARY DRAINS

Drains 3, 3A and the proposed 3N serve the northern portion of Manteca from Louise Avenue to Northland Road. Drain 3 drains 2,144 acres from Austin Road to the FCOC and has been a key facility for Manteca for many years. Drain 3A drains 385 aces north of Drain 3 from east of Highway 99 to the old Tidewater Railroad and Pump Station 15. At that point, Drain 3A flow is pumped into Lateral Rf. Drain 3N is proposed to drain 1,424 acres between Lathrop Road and Northland Road to a confluence with Drain 3 near London Road. Flows in all three drains will be combined in Drain 3 upstream of Airport Way.

**Table 5-1. French Camp Outlet Canal - Flows**

| Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|
| FC-25 | FC-30 | Natural | OPEN CHANNEL | 191.0 | 21.0 | | |
| FC-30 | FC-35 | Rectangle | BOX CULVERT | 195.8 | 20.9 | 10.0 | 8.0 |
| FC-35 | FC-36 | Natural | OPEN CHANNEL | 186.6 | 20.9 | | |
| FC-36 | FC-37 | Natural | OPEN CHANNEL | 182.0 | 20.9 | | |
| FC-37 | FC-40 | Natural | OPEN CHANNEL | 182.1 | 20.7 | | |
| FC-40 | FC-45 | Circular | PIPE | 185.4 | 20.7 | 8.0 | |
| FC-45 | FC-46 | Natural | OPEN CHANNEL | 184.4 | 20.7 | | |
| FC-46 | FC-47 | Natural | OPEN CHANNEL | 199.3 | 20.6 | | |
| FC-47 | FC-48 | Natural | OPEN CHANNEL | 199.1 | 20.4 | | |
| FC-48 | FC-50 | Natural | OPEN CHANNEL | 199.0 | 20.4 | | |
| FC-50 | FC-55 | Rectangle | BOX CULVERT | 149.4 | 20.4 | 6.0 | 8.0 |
| FC-50 | FC-55 | Rectangle | BOX CULVERT | 76.3 | 20.4 | 6.0 | 8.0 |
| FC-55 | FC-60 | Rectangle | BOX CULVERT | 139.6 | 20.4 | 6.0 | 8.0 |
| FC-55 | FC-60 | Rectangle | BOX CULVERT | 85.4 | 20.4 | 6.0 | 8.0 |
| FC-60 | FC-61 | Natural | OPEN CHANNEL | 236.6 | 20.4 | | |
| FC-61 | FC-62 | Natural | OPEN CHANNEL | 236.5 | 20.3 | | |
| FC-62 | FC-65 | Natural | OPEN CHANNEL | 236.4 | 20.3 | | |
| FC-65 | FC-66 | Natural | OPEN CHANNEL | 236.4 | 20.1 | | |
| FC-66 | FC-70 | Natural | OPEN CHANNEL | 236.3 | 20.1 | | |
| DR-5000 | FC-70 | Circular | PIPE | 72.0 | 20.0 | 7.0 | |
| FC-70 | FC-75 | Natural | OPEN CHANNEL | 277.3 | 20.0 | | |
| FC-75 | FC-77 | Natural | OPEN CHANNEL | 279.7 | 19.8 | | |
| FC-77 | FC-78 | Natural | OPEN CHANNEL | 277.9 | 19.7 | | |
| FC-78 | FC-80 | Natural | OPEN CHANNEL | 278.4 | 19.7 | | |
| FC-80 | FC-85 | Rectangle | BOX CULVERT | 139.2 | 19.7 | 10.0 | 10.0 |
| FC-80 | FC-85 | Rectangle | BOX CULVERT | 139.2 | 19.7 | 10.0 | 10.0 |
| FC-85 | FC-86 | Natural | OPEN CHANNEL | 277.2 | 19.7 | | |
| FC-86 | FC-90 | Natural | OPEN CHANNEL | 282.5 | 19.6 | | |
| FC-90 | FC-95 | Rectangle | BOX CULVERT | 141.5 | 19.5 | 10.0 | 10.0 |
| FC-90 | FC-95 | Rectangle | BOX CULVERT | 141.5 | 19.5 | 10.0 | 10.0 |
| DR-4000 | FC-95 | Natural | OPEN CHANNEL | 49.2 | 19.6 | | |
| FC-95 | FC-96 | Natural | OPEN CHANNEL | 316.7 | 19.6 | | |
| FC-96 | FC-100 | Natural | OPEN CHANNEL | 316.6 | 19.6 | | |
| FC-100 | FC-105 | Rectangle | BOX CULVERT | 171.1 | 19.6 | 10.0 | 10.0 |
| FC-100 | FC-105 | Rectangle | BOX CULVERT | 171.1 | 19.6 | 10.0 | 10.0 |
| FC-105 | FC-106 | Natural | OPEN CHANNEL | 367.0 | 19.6 | | |
| FC-106 | FC-107 | Natural | OPEN CHANNEL | 366.8 | 19.6 | | |
| FC-107 | FC-110 | Natural | OPEN CHANNEL | 366.7 | 19.5 | | |
| FC-110 | FC-115 | Trapezoid | OPEN CHANNEL | 366.8 | 19.5 | | |
| FC-115 | FC-116 | Natural | OPEN CHANNEL | 367.8 | 19.5 | | |
| FC-116 | FC-120 | Natural | OPEN CHANNEL | 366.7 | 19.5 | | |
| FC-120 | FC-121 | Natural | OPEN CHANNEL | 419.5 | 19.5 | | |
| FC-121 | FC-125 | Natural | OPEN CHANNEL | 419.4 | 19.4 | | |
| FC-125 | FC-130 | Rectangle | BOX CULVERT | 209.7 | 19.3 | 10.0 | 10.0 |
| FC-125 | FC-130 | Rectangle | BOX CULVERT | 209.7 | 19.3 | 10.0 | 10.0 |
| FC-130 | FC-135 | Natural | OPEN CHANNEL | 419.4 | 19.2 | | |
| DR-3000 | FC-135 | Rectangle | BOX CULVERT | 162.2 | 19.3 | 6.0 | 7.0 |
| FC-135 | FC-136 | Natural | OPEN CHANNEL | 527.5 | 19.2 | | |
| FC-136 | FC-137 | Natural | OPEN CHANNEL | 527.6 | 19.1 | | |
| FC-137 | FC-140 | Natural | OPEN CHANNEL | 527.6 | 18.9 | | |
| FC-140 | FC-145 | Natural | OPEN CHANNEL | 537.6 | 18.9 | | |
| FC-145 | FC-146 | Natural | OPEN CHANNEL | 537.6 | 18.8 | | |
| FC-146 | FC-147 | Natural | OPEN CHANNEL | 537.7 | 18.7 | | |
| FC-147 | FC-148 | Natural | OPEN CHANNEL | 537.7 | 18.6 | | |
| FC-148 | FC-150 | Natural | OPEN CHANNEL | 537.7 | 18.4 | | |
| FC-150 | FC-151 | Natural | OPEN CHANNEL | 552.7 | 18.2 | | |
| FC-151 | FC-152 | Natural | OPEN CHANNEL | 552.8 | 18.0 | | |
| FC-152 | FC-153 | Natural | OPEN CHANNEL | 552.8 | 17.9 | | |
| FC-153 | FC-154 | Natural | OPEN CHANNEL | 552.9 | 17.7 | | |
| FC-154 | FC-155 | Natural | OPEN CHANNEL | 552.9 | 17.6 | | |

**Table 5-1. French Camp Outlet Canal - Flows cont'd…**

| Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|
| FC-155 | FC-156 | Natural | OPEN CHANNEL | 568.0 | 17.0 | | |
| FC-156 | FC-157 | Natural | OPEN CHANNEL | 568.0 | 17.0 | | |
| FC-157 | FC-160 | Natural | OPEN CHANNEL | 568.1 | 16.8 | | |
| FC-160 | FC-165 | Rectangle | BOX CULVERT | 284.1 | 16.6 | 10.0 | 10.0 |
| FC-160 | FC-165 | Rectangle | BOX CULVERT | 284.1 | 16.6 | 10.0 | 10.0 |
| FC-165 | FC-170 | Natural | OPEN CHANNEL | 568.1 | 16.5 | | |
| FC-170 | FC-175 | Rectangle | BOX CULVERT | 284.1 | 16.5 | 10.0 | 10.0 |
| FC-170 | FC-175 | Rectangle | BOX CULVERT | 284.1 | 16.5 | 10.0 | 10.0 |
| FC-175 | FC-176 | Natural | OPEN CHANNEL | 568.3 | 16.5 | | |
| FC-176 | FC-180 | Natural | OPEN CHANNEL | 568.5 | 16.2 | | |
| FC-180 | FC-181 | Natural | OPEN CHANNEL | 593.9 | 16.1 | | |
| FC-181 | FC-185 | Natural | OPEN CHANNEL | 595.0 | 15.6 | | |
| FC-185 | FC-186 | Natural | OPEN CHANNEL | 621.9 | 15.2 | | |
| FC-186 | FC-187 | Natural | OPEN CHANNEL | 626.2 | 14.3 | | |
| FC-187 | FC-190 | Natural | OPEN CHANNEL | 631.8 | 13.4 | | |
| FC-190 | FC-195 | Rectangle | BOX CULVERT | 317.0 | 13.2 | 10.0 | 10.0 |
| FC-190 | FC-195 | Rectangle | BOX CULVERT | 317.0 | 13.2 | 10.0 | 10.0 |
| FC-195 | FC-196 | Natural | OPEN CHANNEL | 729.9 | 13.2 | | |
| FC-196 | FC-200 | Natural | OPEN CHANNEL | 966.5 | 12.6 | | |
| FC-200 | FC-205 | Natural | OPEN CHANNEL | 644.0 | 12.6 | | |
| FC-205 | FC-210 | Trapezoid | BRIDGE CROSSING | 644.0 | 13.1 | | |
| FC-210 | FC-215 | Natural | OPEN CHANNEL | 644.0 | 12.2 | | |

## Table 5-2. French Camp Outlet Canal - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| FC-30 | 22.9 | 13.9 | 20.9 | 20.8 | 0.1 | PROBLEM |
| FC-35 | 22.9 | 13.15 | 20.9 | 20.8 | 0.1 | PROBLEM |
| FC-36 | 24.3 | 14.3 | 20.9 | 20.6 | 0.3 | PROBLEM |
| FC-37 | 24.8 | 14.4 | 20.7 | 20.3 | 0.4 | PROBLEM |
| FC-40 | 23.3 | 14.86 | 20.7 | 22.3 | -1.6 | OK |
| FC-45 | 24.8 | 13.86 | 20.7 | 22.3 | -1.6 | OK |
| FC-46 | 24.6 | 14 | 20.6 | 24.1 | -3.5 | OK |
| FC-47 | 25.8 | 13.6 | 20.4 | 25.2 | -4.8 | OK |
| FC-48 | 28.9 | 13.8 | 20.4 | 26.7 | -6.3 | OK |
| FC-50 | 26.6 | 12.77 | 20.4 | 26.7 | -6.3 | OK |
| FC-55 | 26.6 | 12.12 | 20.4 | 26.7 | -6.3 | OK |
| FC-60 | 28.9 | 11.47 | 20.4 | 26.7 | -6.3 | OK |
| FC-61 | 28.9 | 13.1 | 20.3 | 24.6 | -4.3 | OK |
| FC-62 | 24.5 | 14 | 20.3 | 22.3 | -2.0 | OK |
| FC-65 | 24.5 | 14 | 20.1 | 22.3 | -2.2 | OK |
| FC-66 | 24.7 | 11.7 | 20.1 | 19.8 | 0.3 | PROBLEM |
| FC-70 | 24.7 | 8.34 | 20.0 | 19.8 | 0.2 | PROBLEM |
| FC-75 | 24.7 | 12.1 | 19.8 | 19.8 | 0.0 | PROBLEM |
| FC-77 | 22.1 | 11.2 | 19.7 | 21.8 | -2.1 | OK |
| FC-78 | 21.9 | 10.2 | 19.7 | 21.8 | -2.1 | OK |
| FC-80 | 21.9 | 9.62 | 19.7 | 21.8 | -2.1 | OK |
| FC-85 | 21.9 | 9.53 | 19.7 | 21.8 | -2.1 | OK |
| FC-86 | 22.5 | 10.7 | 19.6 | 19.9 | -0.3 | OK |
| FC-90 | 22.5 | 10.7 | 19.5 | 19.9 | -0.4 | OK |
| FC-95 | 22.5 | 9.24 | 19.6 | 19.9 | -0.3 | OK |
| FC-96 | 22.5 | 11.6 | 19.6 | 22.0 | -2.4 | OK |
| FC-100 | 22.5 | 11.6 | 19.6 | 22.0 | -2.4 | OK |
| FC-105 | 22.5 | 11.2 | 19.6 | 22.0 | -2.4 | OK |
| FC-106 | 22.5 | 9.6 | 19.6 | 22.5 | -2.9 | OK |
| FC-107 | 23.4 | 10.4 | 19.5 | 22.7 | -3.2 | OK |
| FC-110 | 23.4 | 10.17 | 19.5 | 22.7 | -3.2 | OK |
| FC-115 | 23.4 | 9.5 | 19.5 | 22.7 | -3.2 | OK |
| FC-116 | 20.6 | 7.8 | 19.5 | 19.4 | 0.1 | PROBLEM |
| FC-120 | 20.6 | 7.8 | 19.5 | 19.4 | 0.1 | PROBLEM |
| FC-121 | 23.5 | 9.1 | 19.4 | 23.2 | -3.8 | OK |
| FC-125 | 23.5 | 11.7 | 19.3 | 19.6 | -0.3 | OK |
| FC-130 | 23.5 | 11.5 | 19.2 | 19.6 | -0.3 | OK |
| FC-135 | 18.17 | 10.01 | 19.2 | 18.2 | 1.1 | PROBLEM |
| FC-136 | 20.95 | 10.6 | 19.1 | 19.4 | -0.4 | OK |
| FC-137 | 21.65 | 10.53 | 18.9 | 18.1 | 0.8 | PROBLEM |
| FC-140 | 21.65 | 10.64 | 18.9 | 20.3 | -1.4 | OK |
| FC-145 | 22.1 | 10.49 | 18.8 | 20.1 | -1.3 | OK |
| FC-146 | 21.54 | 9.07 | 18.7 | 20.5 | -1.8 | OK |
| FC-147 | 23.8 | 9.39 | 18.6 | 23.6 | -5.0 | OK |
| FC-148 | 23.63 | 9.68 | 18.4 | 22.7 | -4.2 | OK |
| FC-150 | 23.24 | 10.57 | 18.2 | 22.2 | -4.0 | OK |
| FC-151 | 22.47 | 10.14 | 18.0 | 22.2 | -4.2 | OK |
| FC-152 | 22.31 | 10.41 | 17.9 | 20.7 | -2.9 | OK |
| FC-153 | 20.68 | 10.68 | 17.7 | 18.0 | -0.4 | OK |
| FC-154 | 19.56 | 9.44 | 17.6 | 19.6 | -2.0 | OK |

**Table 5-2. French Camp Outlet Canal - Water Surface Elevations, cont'd…**

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| FC-155 | 19.56 | 10.01 | 17.0 | 21.4 | -4.4 | OK |
| FC-156 | 20.98 | 8.51 | 17.0 | 20.5 | -3.5 | OK |
| FC-157 | 20.33 | 8.9 | 16.8 | 20.1 | -3.3 | OK |
| FC-160 | 23.85 | 9.84 | 16.6 | 23.1 | -6.5 | OK |
| FC-165 | 23.85 | 9.84 | 16.5 | 23.1 | -6.6 | OK |
| FC-170 | 21.92 | 7.1 | 16.5 | 21.6 | -5.1 | OK |
| FC-175 | 21.92 | 6.9 | 16.5 | 21.6 | -5.1 | OK |
| FC-176 | 24.5 | 6.2 | 16.2 | 22.9 | -6.7 | OK |
| FC-180 | 24.5 | 6.2 | 16.1 | 22.9 | -6.8 | OK |
| FC-181 | 24.3 | 6.1 | 15.6 | 20.3 | -4.7 | OK |
| FC-185 | 24.3 | 6.1 | 15.2 | 20.3 | -5.1 | OK |
| FC-186 | 24.3 | 6.1 | 14.3 | 21.3 | -7.0 | OK |
| FC-187 | 22.8 | 3.7 | 13.4 | 19.8 | -6.4 | OK |
| FC-190 | 23.7 | 2.2 | 13.2 | 18.7 | -5.5 | OK |
| FC-195 | 23 | 1.4 | 13.2 | 18.7 | -5.5 | OK |
| FC-196 | 22.8 | 3.7 | 12.6 | 18.8 | -6.2 | OK |
| FC-200 | 23 | 2.8 | 12.6 | 22.8 | -10.2 | OK |
| FC-205 | 22.8 | 0.5 | 13.1 | 22.8 | -9.7 | OK |
| FC-210 | 22.8 | 0.4 | 12.2 | 22.5 | -10.3 | OK |
| FC-215 | 23 | 0.3 | 12.2 | 22.8 | -10.6 | OK |

**Table 5-3. FCOC Crossing Culverts**

| Crossing Location | Existing Culverts | Master Plan Proposed Culverts |
|---|---|---|
| French Camp Road | 1 - 66-inch diameter pipe culvert | 2 - 10-foot by 10-foot box culvert |
| Roth Road | 1 - 42-inch & 1 - 48-inch diamter pipe | 2 - 10-foot by 10-foot box culvert |
| UP Intermodal | 2 - 10-foot by 10-foot box culverts | — |
| Lathrop Road | 2 - 42-inch diamter pipe culverts | — |
| Union Pacific Interconnect | 2 - 10-foot by 8-foot box culverts | — |
| Former SPRR | 1 - 36-inch & 1 - 42-inch pipe | 2 - 10-foot by 10-foot box culvert |
| Louise Road | 1 - 36-inch & 1 - 48-inch pipe | 2 - 10-foot by 10-foot box culvert |
| Yosemite Road | 2 - 6-foot by 8-foot box culverts | — |
| Farm Road | 1 - 96-inch pipe culvert | — |
| Farm Road | 2 - 36-inch diamter pipe culverts | 1 - 10-foot by 8-foot box culvert |

**Drain 3**

Drain 3 begins at a location halfway between Austin Road and Cottage Avenue east of Highway 99. The earth channel runs along the south side of Louise Avenue to a 36-inch culvert that crosses Louise Avenue and Cottage Avenue. The drain reverts to an earth channel and crosses Highway 99 in a 36-inch diameter culvert. On the west side of the highway, Drain 3 is a 48-inch diameter pipe through the Springtime Estates subdivision reverting again to an earth channel downstream. After North Main Street, the channel flows through a 48-inch pipe to the Tidewater Railroad and bike trail where it crosses the railroad in a 54-inch pipe. West of the railroad, the drain is a 60-inch diameter pipe to the Trailwood Channel where flow is carried in a 24- and 36-inch pipe. Along the channel, flow is both piped below ground and on the surface through the park in the Trailwood Channel to Union Road. West of Union Road the drain is a 60-inch pipe increasing to a 72-inch through Chadwick Square to where it crosses Lathrop Road in a 4-foot by 8-foot box culvert. North of Lathrop Road, the drain is contained in a trapezoidal earth channel to the FCOC. There is a 36-inch culvert at a small road crossing, a 36-inch culvert at Airport Way and a 7-foot by 6-foot box culvert at the FCOC.

The XP-SWMM model shows street flooding at several locations usually in the order of a few inches to a foot. The model was used to improve the operation of basins and pumps. By holding more water in each basin before turning on pumps, most of the street flooding could be averted.

The Monterey Place area has been a Drain 3 flooding problem for a long time. Flooding is caused because the drain inlets are lower than the hydraulic grade line in Drain 3. The grade at the Monterey Place drain inlet is below the top of the Drain 3 pipe. When Drain 3 is flowing full, water flows from the drain into Monterey Place from the manhole and drain inlets. There are options for protecting Monterey Place from flooding, but most would sacrifice full use of Drain 3 to protect this single area. Also, most are relatively expensive solutions.

As the City grows and Drain 3 is needed at its full capacity, it becomes more important to solve this problem without permanently reducing the drain's capacity. The best solution, although also costly, would be to disconnect the Monterey Place lateral from Drain 3, add underground storage and a pump to lift local runoff to the 60-inch drain.

Downstream of Monterey Place the Trailwood Channel winds through a small park setting. The system of a 24- and 36-inch pipe below ground and channel flow above ground appears to be working successfully with no known serious problems. Although a lower priority, the City may decide to replace this configuration with a 72-inch diameter pipe in the future.

In the open channel sections of Drain 3 downstream of Lathrop Road, there are culverts at two road crossings that are undersized and need to be replaced. The 36-inch diameter culvert at a small road crossing upstream of Airport Way and the 36-inch diameter culvert at Airport Way should both be replaced with 72-inch diameter RCP culverts. The existing 6-foot by 7-foot box culvert leading into the FCOC appears to be adequate.

**Drain 3A**

Drain 3A drains 287 acres east of Highway 99 crossing to the west under the highway and Main Street in a 30-inch diameter pipe. The drain continues west in a 36-inch pipe through Crestwood Park to the Tidewater Railroad where it turns north crossing Lathrop Road. The present drain flows north of Lathrop Road for approximately 1,500 feet to Pump Station 15 where flow is pumped into Lateral Rf.

Runoff in the Drain 3A shed from east of Highway 99 will be held in the two detention basins to be constructed until the water level in the 36-inch pipe at Main Street has lowered indicating that the downstream pipe can carry the additional flow. Operation of the pumps at the two proposed basins will be controlled remotely from the Main Street water surface elevation.

Flow in Drain 3A is controlled by its 36-inch diameter. The Master Plan analysis did not show flooding problems along the drain but no increase in capacity is possible without replacing the pipe with a pipe larger than 36 inches. It is proposed to connect Drain 3A to the proposed Drain 3N at Lathrop Road. Flow line and HGL elevations for the two pipes show that it may be possible for Drain 3A to flow into Drain 3N without the need for a pump. The planned invert of the Drain 3N pipe is 20.1 feet and the Drain 3A invert is at 22.3 feet.

**Drain 3N**

A proposed new drain, Drain 3N, is planned to serve new growth areas of the General Plan. The drain would serve the most northern area of the City, primarily the land between Lathrop Road and Northland Road. West of Union Road the new drain would join with Drain 3 and in the east, the drain would extend to between Cottage Avenue and Austin Road. Drain 3N would drain about 1,424 acres bringing a total flow of 55cfs to its confluence with Drain 3.

Lands to 2,640 feet north of Lathrop Road are planned for development during the next several years. General Plan lands further north are in urban reserve and are not included in the present Master Plan. The preliminary alignment for Drain 3N along Lathrop Road shown in previous Master Plan updates is maintained in the present plan because the location works well east of Highway 99 where land north and south of Lathrop Road will drain to Drain 3N. After crossing the highway, the new drain would continue along Lathrop Road until the Tidewater Railroad along the west boundary of the San Joaquin Delta College Farm Laboratory where the drain will turn north.

Drain 3A flow enters Drain 3N at the point where Drain 3N turns from Lathrop Road to the north. The combined Drain 3N/Drain 3A would flow north in a 54 inch diameter pipe for approximately 2,100 feet where the drain will turn to the west and continue for 2,100 feet in an open drainage channel to its confluence with Drain 3. Drain 3N will follow the Tidewater Bikeway alignment from Lathrop Road to its confluence with Drain 3, Figure 5-3.

**Results of Analysis**

Figure 5-4 shows the model schematic of Drains 3, 3A and 3N with model nodes labeled. Table 5-4, Drain 3 Flows, shows the peak flow rate and the maximum water surface elevation computed at each model node. Table 5-5, Drain 3 Water Surface Elevations, shows model output data and flooding depths at each model node with a problem designation when flooding is computed above ground level. A plan of Drain 3, Drain 3N and Drain 3A is shown on Figure 5-5.

Monterey Place is flood prone largely because the Monterey Place drain and drain inlets are below the hydraulic grade line in Drain 3. Several of the solutions considered by the City involved under utilizing the capacity of Drain 3 by limiting flow or installing larger drain pipes for hundreds of feet. Drain 3 should not be compromised by one small street drainage. The recommendation for Monterey Place is to divert the local drains to a constructed sump with a volume of 0.65 acre-feet and after detention pump to Drain 3 at a rate of 73 gpm.

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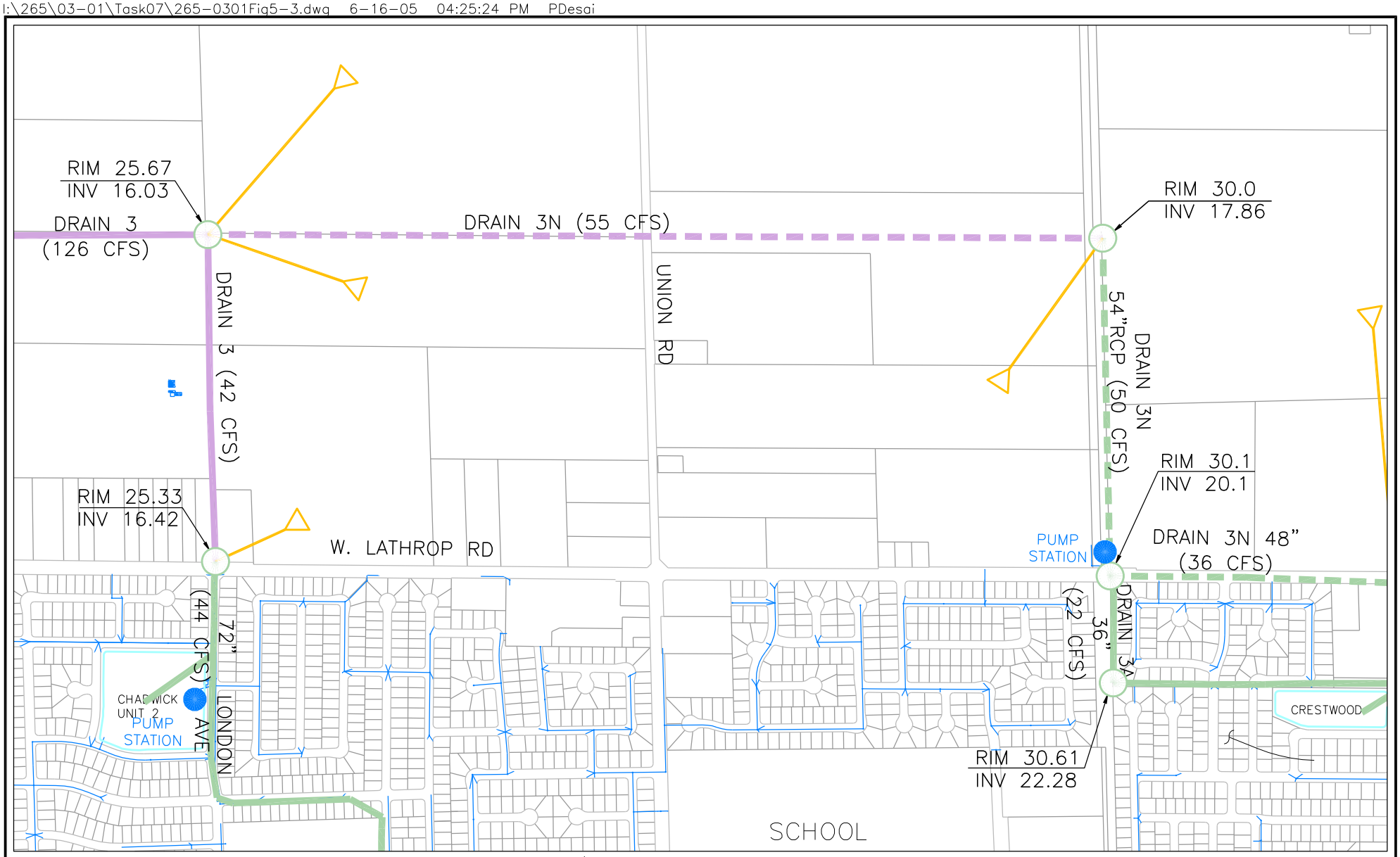


**Figure 5-3**

**City of Manteca**
**Storm Drain Master Plan**
**DRAIN 3 NORTH**

WEST YOST & ASSOCIATES

SHED BOUNDARY

Figure 5-4

City of Manteca
Storm Drain Master Plan
DRAIN 3 SCHEMATIC

N

0 1000 2000
SCALE IN FEET

WEST YOST & ASSOCIATES

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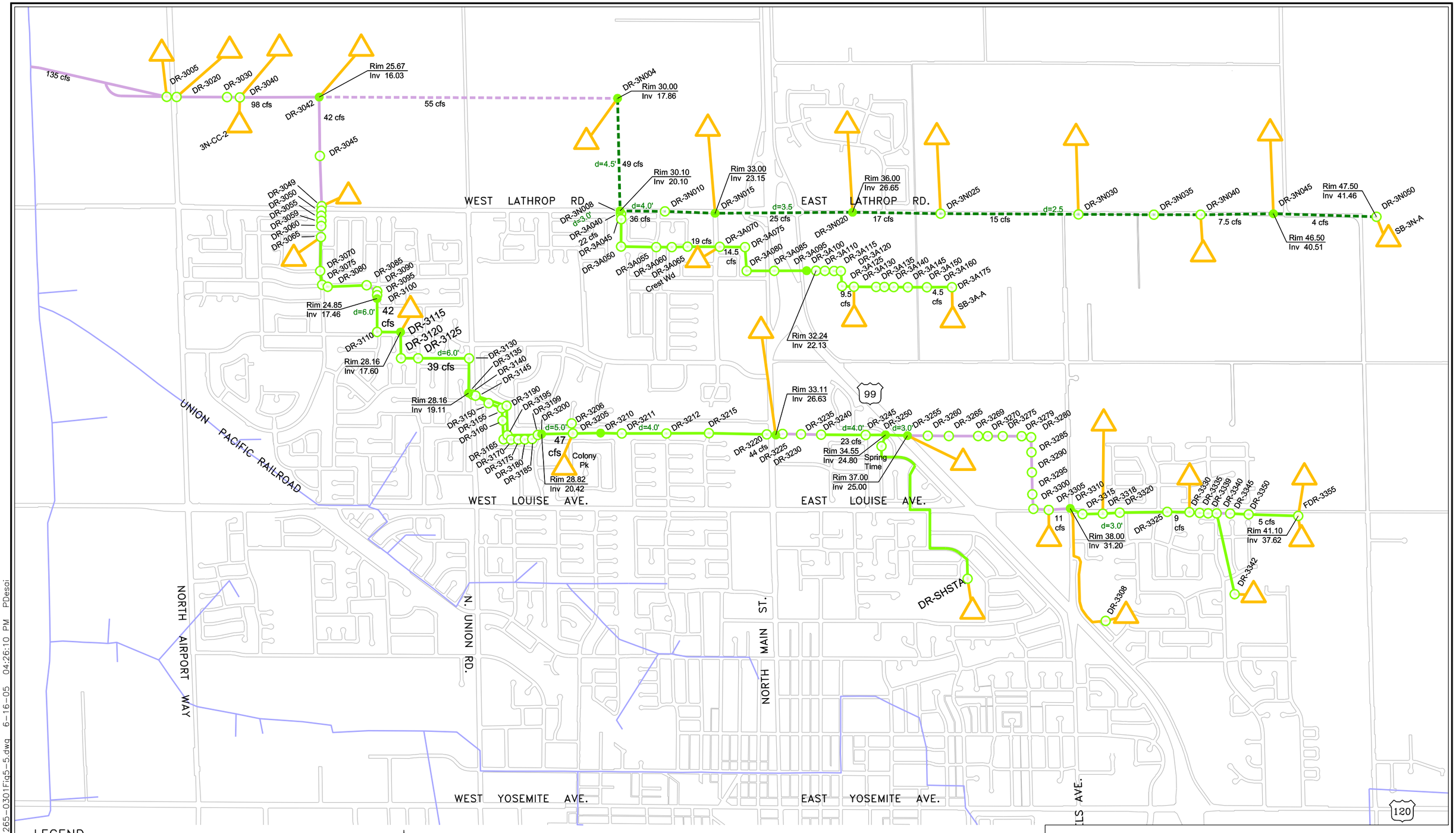


LEGEND

- EXISTING PIPE
- PROPOSED PIPE
- OPEN CHANNEL
- PROPOSED OPEN CHANNEL
- ASSUMED LOCATION OF INFLOW FROM ADJOINING PROPERTY
- ASSUMED DETENTION STORAGE
- OTHER CHANNELS/PIPES

N

0 800 1600

SCALE IN FEET

**Figure 5-5**

**City of Manteca**

**Storm Drain Master Plan**

**DRAIN 3 PLAN**

WEST YOST & ASSOCIATES

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**Table 5-4. Drain 3 Complex - Flows**

| Conduit Name | Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|---|
| FDRP3350 | FDR-3355 | DR-3350 | Circular | PIPE | 5.1 | 38.6 | 3.0 | |
| DRC3345 | DR-3350 | DR-3345 | Natural | OPEN CHANNEL | 5.3 | 36.2 | | |
| DRC3340 | DR-3345 | DR-3340 | Natural | OPEN CHANNEL | 5.3 | 35.0 | | |
| DRP3340A | DR-3342 | DR-3340 | Circular | PIPE | 6.1 | 37.0 | 2.0 | |
| DRP3339 | DR-3340 | DR-3339 | Circular | PIPE | 7.5 | 34.1 | 3.0 | |
| DRC3335 | DR-3339 | DR-3335 | Natural | OPEN CHANNEL | 7.1 | 34.1 | | |
| DRC3330 | DR-3335 | DR-3330 | Natural | OPEN CHANNEL | 6.9 | 34.0 | | |
| DRP3325 | DR-3330 | DR-3325 | Circular | PIPE | 9.0 | 34.0 | 3.0 | |
| DRP3320 | DR-3325 | DR-3320 | Circular | PIPE | 9.0 | 34.0 | 3.0 | |
| DRP3318 | DR-3320 | DR-3318 | Circular | PIPE | 9.0 | 33.8 | 3.0 | |
| DRP3315.1 | DR-3318 | DR-3315 | Circular | PIPE | 12.4 | 33.7 | 3.0 | |
| DRP3310 | DR-3315 | DR-3310 | Circular | PIPE | 12.4 | 33.6 | 3.0 | |
| DRP3310A | DR-3308 | DR-3310 | Circular | PIPE | 1.6 | 37.3 | 1.3 | |
| DRC3305 | DR-3310 | DR-3305 | Natural | OPEN CHANNEL | 13.8 | 32.6 | | |
| DRC3300 | DR-3305 | DR-3300 | Natural | OPEN CHANNEL | 14.5 | 32.6 | | |
| DRC3295 | DR-3300 | DR-3295 | Natural | OPEN CHANNEL | 14.1 | 32.4 | | |
| DRC3290 | DR-3295 | DR-3290 | Natural | OPEN CHANNEL | 13.7 | 32.3 | | |
| DRC3285 | DR-3290 | DR-3285 | Natural | OPEN CHANNEL | 13.4 | 32.2 | | |
| DRC3280 | DR-3285 | DR-3280 | Natural | OPEN CHANNEL | 13.1 | 32.1 | | |
| DRP3279 | DR-3280 | DR-3279 | Circular | PIPE | 13.1 | 32.1 | 3.0 | |
| DRC3275 | DR-3279 | DR-3275 | Natural | OPEN CHANNEL | 12.9 | 32.0 | | |
| DRC3270 | DR-3275 | DR-3270 | Natural | OPEN CHANNEL | 12.8 | 31.9 | | |
| DRP3269 | DR-3270 | DR-3269 | Circular | PIPE | 12.8 | 31.9 | 3.0 | |
| DRC3265 | DR-3269 | DR-3265 | Natural | OPEN CHANNEL | 12.7 | 31.8 | | |
| DRC3260 | DR-3265 | DR-3260 | Natural | OPEN CHANNEL | 12.7 | 31.6 | | |
| DRC3255 | DR-3260 | DR-3255 | Natural | OPEN CHANNEL | 12.7 | 31.3 | | |
| DRP3250 | DR-3255 | DR-3250 | Circular | PIPE | 12.6 | 31.3 | 3.0 | |
| DRPSPRTM | DR-SHSTA | SPRINGTIME | Circular | PIPE | 4.2 | 33.9 | 1.8 | |
| DRP3250A | SPRINGTIME | DR-3250 | Circular | PIPE | 19.5 | 31.3 | 2.0 | |
| DRP3245 | DR-3250 | DR-3245 | Circular | PIPE | 22.8 | 31.2 | 4.0 | |
| DRP3240 | DR-3245 | DR-3240 | Circular | PIPE | 24.6 | 31.2 | 4.0 | |
| DRC3235 | DR-3240 | DR-3235 | Natural | OPEN CHANNEL | 25.0 | 31.2 | | |
| DRC3230 | DR-3235 | DR-3230 | Natural | OPEN CHANNEL | 26.0 | 31.2 | | |
| DRC3225 | DR-3225 | DR-3230 | Natural | OPEN CHANNEL | 36.2 | 31.2 | | |
| DRP3225A | KMart | DR-3225 | Circular | PIPE | 3.9 | 38.2 | 1.3 | |
| DRP3220 | DR-3225 | DR-3220 | Circular | PIPE | 44.7 | 31.2 | 4.0 | |
| DRP3215 | DR-3220 | DR-3215 | Circular | PIPE | 44.6 | 31.0 | 4.0 | |
| DRP3212 | DR-3215 | DR-3212 | Circular | PIPE | 46.8 | 29.6 | 4.0 | |
| DRP3211 | DR-3212 | DR-3211 | Circular | PIPE | 49.7 | 28.6 | 4.0 | |
| DRP3210 | DR-3211 | DR-3210 | Circular | PIPE | 54.1 | 27.5 | 4.0 | |
| DRP3205 | DR-3210 | DR-3205 | Circular | PIPE | 59.1 | 26.8 | 5.0 | |
| DRP3205A | ColonyPk | DR-3205 | Circular | PIPE | 11.4 | 25.7 | 2.0 | |
| DRP3205B.1 | DR-3206 | DR-3205 | Circular | PIPE | 1.2 | 26.5 | 1.3 | |
| DRP3200 | DR-3205 | DR-3200 | Circular | PIPE | 48.6 | 26.4 | 5.0 | |
| DRP3199 | DR-3200 | DR-3199 | Circular | PIPE | 52.3 | 26.3 | 5.0 | |
| DRP3185 | DR-3199 | DR-3185 | Circular | PIPE | 22.7 | 26.2 | 2.0 | |
| DRP3195 | DR-3199 | DR-3195 | Circular | PIPE | 29.3 | 26.2 | 3.0 | |
| DRP3190 | DR-3195 | DR-3190 | Circular | PIPE | 29.3 | 25.0 | 3.0 | |
| DRP3145B | DR-3190 | DR-3145 | Circular | PIPE | 29.3 | 23.8 | 3.0 | |
| DRP3180 | DR-3185 | DR-3180 | Circular | PIPE | 22.7 | 25.6 | 2.0 | |
| DRP3175 | DR-3180 | DR-3175 | Circular | PIPE | 11.3 | 24.6 | 2.0 | |
| DRP3170 | DR-3175 | DR-3170 | Circular | PIPE | 9.8 | 24.3 | 2.0 | |
| DRP3165 | DR-3170 | DR-3165 | Circular | PIPE | 8.4 | 24.1 | 2.0 | |
| DRP3160 | DR-3165 | DR-3160 | Circular | PIPE | 8.4 | 23.8 | 2.0 | |
| DRP3155 | DR-3160 | DR-3155 | Circular | PIPE | 8.4 | 23.3 | 2.0 | |
| DRP3150 | DR-3155 | DR-3150 | Circular | PIPE | 8.4 | 22.9 | 2.0 | |
| DRP3145A | DR-3150 | DR-3145 | Circular | PIPE | 8.4 | 22.6 | 2.0 | |
| DRP3140 | DR-3145 | DR-3140 | Circular | PIPE | 36.0 | 22.2 | 5.0 | |
| DRP3135 | DR-3140 | DR-3135 | Circular | PIPE | 36.0 | 22.2 | 5.0 | |
| DRP3130 | DR-3135 | DR-3130 | Circular | PIPE | 43.0 | 22.2 | 5.0 | |

**Table 5-4. Drain 3 Complex - Flows, cont'd…**

| | Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|---|
| DRP3125 | DR-3130 | DR-3125 | Circular | PIPE | 42.7 | 21.9 | 5.0 | |
| DRP3120 | DR-3125 | DR-3120 | Circular | PIPE | 42.4 | 21.5 | 5.0 | |
| DRP3115 | DR-3120 | DR-3115 | Circular | PIPE | 42.3 | 21.3 | 5.0 | |
| DRP3110 | DR-3115 | DR-3110 | Circular | PIPE | 45.8 | 21.2 | 6.0 | |
| DRP3100 | DR-3110 | DR-3100 | Circular | PIPE | 45.6 | 21.2 | 6.0 | |
| DRP3095 | DR-3095 | DR-3100 | Circular | PIPE | 45.5 | 21.0 | 6.0 | |
| DRP3090 | DR-3095 | DR-3090 | Circular | PIPE | 45.4 | 21.0 | 6.0 | |
| DRP3085 | DR-3090 | DR-3085 | Circular | PIPE | 45.3 | 20.9 | 6.0 | |
| DRP3080 | DR-3085 | DR-3080 | Circular | PIPE | 45.2 | 20.8 | 6.0 | |
| DRP3075 | DR-3080 | DR-3075 | Circular | PIPE | 45.1 | 20.8 | 6.0 | |
| DRP3070 | DR-3075 | DR-3070 | Circular | PIPE | 45.0 | 20.7 | 6.0 | |
| DRP3065 | DR-3070 | DR-3065 | Circular | PIPE | 44.9 | 20.7 | 6.0 | |
| DRP3060 | DR-3065 | DR-3060 | Circular | PIPE | 44.8 | 20.5 | 6.0 | |
| DRP3059 | DR-3060 | DR-3059 | Circular | PIPE | 44.7 | 20.4 | 6.0 | |
| DRP3055 | DR-3059 | DR-3055 | Circular | PIPE | 44.6 | 20.4 | 6.0 | |
| DRP3050 | DR-3055 | DR-3050 | Circular | PIPE | 44.5 | 20.3 | 6.0 | |
| DRBX3049 | DR-3050 | DR-3049 | Rectangle | BOX CULVERT | 44.5 | 20.3 | 8.0 | 4.0 |
| DRC3040 | DR-3049 | DR-3045 | Natural | OPEN CHANNEL | 43.8 | 20.3 | | |
| DRC3042 | DR-3045 | DR-3042 | Natural | OPEN CHANNEL | 41.4 | 20.3 | | |
| DRC160/70 | DR-3A175 | DR-3A160 | Natural | OPEN CHANNEL | 4.7 | 34.3 | | |
| DRC3A150 | DR-3A160 | DR-3A150 | Natural | OPEN CHANNEL | 3.7 | 32.8 | | |
| DRP3A145 | DR-3A150 | DR-3A145 | Circular | PIPE | 3.7 | 32.7 | 2.5 | |
| DRC3A140 | DR-3A145 | DR-3A140 | Natural | OPEN CHANNEL | 3.7 | 32.3 | | |
| DRC3A135 | DR-3A140 | DR-3A135 | Natural | OPEN CHANNEL | 3.7 | 31.9 | | |
| DRC3A130 | DR-3A135 | DR-3A130 | Natural | OPEN CHANNEL | 3.7 | 31.4 | | |
| DRC3A125 | DR-3A130 | DR-3A125 | Natural | OPEN CHANNEL | 9.5 | 30.4 | | |
| DRC3A120 | DR-3A125 | DR-3A120 | Natural | OPEN CHANNEL | 9.5 | 29.9 | | |
| DRP3A115 | DR-3A120 | DR-3A115 | Circular | PIPE | 9.5 | 28.7 | 2.0 | |
| DRC3A110 | DR-3A115 | DR-3A110 | Natural | OPEN CHANNEL | 9.5 | 28.5 | | |
| DRC3A100/5 | DR-3A110 | DR-3A100 | Natural | OPEN CHANNEL | 9.5 | 28.5 | | |
| DRC3A095 | DR-3A100 | DR-3A095 | Natural | OPEN CHANNEL | 9.6 | 28.5 | | |
| DRP3A085 | DR-3A095 | DR-3A085 | Circular | PIPE | 9.5 | 28.5 | 3.0 | |
| DRP3A080 | DR-3A085 | DR-3A080 | Circular | PIPE | 16.1 | 28.4 | 3.0 | |
| DRP3A075 | DR-3A080 | DR-3A075 | Circular | PIPE | 14.5 | 28.1 | 3.0 | |
| DRP3A070 | DR-3A075 | DR-3A070 | Circular | PIPE | 14.5 | 27.9 | 3.0 | |
| DRP3A070A | Crest Wd | DR-3A070 | Circular | PIPE | 6.9 | 27.7 | 2.5 | |
| DRP3A065 | DR-3A070 | DR-3A065 | Circular | PIPE | 18.6 | 27.6 | 3.0 | |
| DRP3A060 | DR-3A065 | DR-3A060 | Circular | PIPE | 18.6 | 27.1 | 3.0 | |
| DRP3A055 | DR-3A060 | DR-3A055 | Circular | PIPE | 22.1 | 26.8 | 3.0 | |
| DRP3A050 | DR-3A055 | DR-3A050 | Circular | PIPE | 22.1 | 26.4 | 3.0 | |
| DRP3A045 | DR-3A050 | DR-3A045 | Circular | PIPE | 22.1 | 25.5 | 3.0 | |
| DRP3A040 | DR-3A045 | DR-3A040 | Circular | PIPE | 22.1 | 24.4 | 3.0 | |
| DRP3N045 | DR-3N050 | DR-3N045 | Circular | PIPE | 3.9 | 42.8 | 2.0 | |
| DRP3N040 | DR-3N045 | DR-3N040 | Circular | PIPE | 7.4 | 42.2 | 2.5 | |
| DRP3N035 | DR-3N040 | DR-3N035 | Circular | PIPE | 11.3 | 41.7 | 2.5 | |
| DRP3N030 | DR-3N035 | DR-3N030 | Circular | PIPE | 11.3 | 40.4 | 2.5 | |
| DRP3N025 | DR-3N030 | DR-3N025 | Circular | PIPE | 14.9 | 38.9 | 2.5 | |
| DRP3N020 | DR-3N025 | DR-3N020 | Circular | PIPE | 16.7 | 32.5 | 2.5 | |
| DRP3N015 | DR-3N020 | DR-3N015 | Circular | PIPE | 24.6 | 28.9 | 3.5 | |
| DRP3N010 | DR-3N015 | DR-3N010 | Circular | PIPE | 35.5 | 25.8 | 4.0 | |
| DRP3N008 | DR-3N010 | DR-3N008 | Circular | PIPE | 35.6 | 24.2 | 4.0 | |
| DRP3N008A | DR-3A040 | DR-3N008 | Circular | PIPE | 22.1 | 24.0 | 3.0 | |
| DRP3N004 | DR-3N008 | DR-3N004 | Circular | PIPE | 49.1 | 23.4 | 4.5 | |
| DRC3N042 | DR-3N004 | DR-3042 | Trapezoid | OPEN CHANNEL | 54.9 | 20.6 | | |
| DRC3040A | DR-3042 | DR-3040 | Natural | OPEN CHANNEL | 125.5 | 20.2 | | |
| DRP3030 | DR-3040 | DR-3030 | Rectangle | BOX CULVERT | 128.1 | 19.8 | 7.0 | 6.0 |
| DRC3020 | DR-3030 | DR-3020 | Natural | OPEN CHANNEL | 127.9 | 19.8 | | |
| DRBX3005 | DR-3020 | DR-3005 | Rectangle | BOX CULVERT | 127.8 | 19.7 | 7.0 | 6.0 |
| DRC3000 | DR-3005 | DR-3000 | Natural | OPEN CHANNEL | 163.2 | 19.7 | | |

## Table 5-5. Drain 3 Complex - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev | Notes |
|---|---|---|---|---|---|---|---|
| DR-3350 | 40.1 | 35.38 | 36.2 | 39.9 | -3.6 | OK | |
| DR-3345 | 39.9 | 34.5 | 35.0 | 39.6 | -4.6 | OK | |
| SprgMeadw | 42 | 19.2 | 35.8 | 41.7 | -5.9 | OK | |
| DR-3342 | 41.2 | 36.62 | 37.0 | 40.9 | -3.9 | OK | |
| DR-3340 | 39.43 | 32.07 | 34.1 | 39.1 | -5.0 | OK | |
| DR-3339 | 39.43 | 32 | 34.1 | 39.1 | -5.0 | OK | |
| DR-3335 | 38.9 | 33.15 | 34.0 | 38.9 | -4.9 | OK | |
| DiamdOaks | 40 | 26 | 35.9 | 39.7 | -3.8 | OK | |
| DR-3330 | 37.75 | 30.93 | 34.0 | 37.5 | -3.4 | OK | |
| DR-3325 | 38.52 | 30.57 | 34.0 | 38.2 | -4.2 | OK | |
| DR-3320 | 39.04 | 29.74 | 33.8 | 38.7 | -4.9 | OK | |
| SB-3-D | 39 | 29.096 | 31.2 | 38.7 | -7.5 | OK | |
| DR-3318 | 39 | 29.096 | 33.7 | 38.7 | -5.0 | OK | |
| DR-3315 | 38.95 | 28.65 | 33.6 | 38.7 | -5.0 | OK | |
| ButtonEst | 41.08 | 23.32 | 35.9 | 40.8 | -4.9 | OK | |
| DR-3308 | 41.6 | 37.09 | 37.3 | 41.3 | -4.0 | OK | |
| DR-3310 | 38 | 31.2 | 32.6 | 37.7 | -5.1 | OK | |
| DR-3305 | 37.2 | 30.8 | 32.6 | 37.2 | -4.6 | OK | |
| DR-3300 | 36.9 | 30.5 | 32.4 | 36.6 | -4.2 | OK | |
| DR-3295 | 38.45 | 29.7 | 32.3 | 36.9 | -4.6 | OK | |
| DR-3290 | 39.2 | 30.1 | 32.2 | 37.8 | -5.5 | OK | |
| DR-3285 | 38.05 | 30.2 | 32.1 | 37.5 | -5.3 | OK | |
| DR-3280 | 40 | 29.84 | 32.1 | 39.7 | -7.6 | OK | |
| DR-3279 | 40 | 29.76 | 32.0 | 39.7 | -7.7 | OK | |
| DR-3275 | 40.05 | 29.7 | 31.9 | 39.2 | -7.2 | OK | |
| DR-3270 | 39.5 | 30.1 | 31.9 | 39.2 | -7.3 | OK | |
| DR-3269 | 39.5 | 30.03 | 31.8 | 39.2 | -7.4 | OK | |
| DR-3265 | 40.55 | 30.15 | 31.6 | 40.1 | -8.5 | OK | |
| DR-3260 | 40.3 | 29.45 | 31.3 | 40.1 | -8.8 | OK | |
| DR-3255 | 37 | 25 | 31.3 | 36.7 | -5.4 | OK | |
| SHASTAPRK | 39 | 21 | 35.9 | 38.7 | -2.8 | OK | |
| DR-SHSTA | 38 | 30.41 | 33.9 | 37.7 | -3.8 | OK | |
| SPRINGTIME | 33 | 26 | 31.3 | 32.7 | -1.4 | OK | |
| DR-3250 | 34.55 | 24.8 | 31.2 | 34.3 | -3.0 | OK | |
| DR-3245 | 33.27 | 24.62 | 31.2 | 33.0 | -1.8 | OK | |
| DR-3240 | 34.5 | 24.98 | 31.2 | 34.2 | -3.0 | OK | |
| DR-3235 | 35.9 | 25.6 | 31.2 | 33.7 | -2.5 | OK | |
| DR-3230 | 35.6 | 25.5 | 31.2 | 33.4 | -2.1 | OK | |
| KMart | 40.31 | 36.23 | 38.2 | 40.0 | -1.8 | OK | |
| DR-3225 | 33.11 | 26.63 | 31.2 | 32.8 | -1.6 | OK | |
| DR-3220 | 32.81 | 24.92 | 31.0 | 32.5 | -1.5 | OK | |
| DR-3215 | 30.72 | 24.67 | 29.6 | 30.4 | -0.9 | OK | |
| DR-3212 | 30.22 | 24.32 | 28.6 | 29.9 | -1.3 | OK | |
| DR-3211 | 29.7 | 23.96 | 27.5 | 29.4 | -1.9 | OK | |
| DR-3210 | 29.49 | 23.8 | 26.8 | 29.2 | -2.4 | OK | |
| ColonyPk | 30 | 23.048 | 25.7 | 29.7 | -4.0 | OK | |
| DR-3206 | 30 | 24 | 26.5 | 29.7 | -3.2 | OK | |
| DR-3205 | 29.5 | 22.06 | 26.5 | 29.2 | -2.8 | OK | |
| DR-3200 | 28.82 | 20.42 | 26.3 | 28.5 | -2.3 | OK | |
| DR-3199 | 28.42 | 20.5 | 26.2 | 28.1 | -1.9 | OK | |

**Table 5-5. Drain 3 Complex - Water Surface Elevations cont'd…**

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-3195 | 25.67 | 20.67 | 25.0 | 25.4 | -0.4 | OK |
| DR-3190 | 25.98 | 20.08 | 23.8 | 25.7 | -1.8 | OK |
| DR-3185 | 28.02 | 21.2 | 25.6 | 27.7 | -2.1 | OK |
| DR-3180 | 24.03 | 21.13 | 24.6 | 23.7 | 0.8 | PROBLEM |
| DR-3175 | 23.95 | 21.05 | 24.3 | 23.7 | 0.6 | PROBLEM |
| DR-3170 | 23.63 | 20.93 | 24.1 | 23.3 | 0.7 | PROBLEM |
| DR-3165 | 23.85 | 20.85 | 23.8 | 23.6 | 0.2 | PROBLEM |
| DR-3160 | 23.51 | 20.46 | 23.3 | 23.2 | 0.1 | PROBLEM |
| DR-3155 | 23.34 | 20.24 | 22.9 | 23.0 | -0.1 | PROBLEM |
| DR-3150 | 27.18 | 20 | 22.6 | 26.9 | -4.3 | OK |
| DR-3145 | 26.56 | 19.66 | 22.2 | 26.3 | -4.0 | OK |
| DR-3140 | 28.16 | 19.11 | 22.2 | 27.9 | -5.6 | OK |
| DR-3135 | 27 | 18.9 | 22.2 | 26.7 | -4.5 | OK |
| DR-3130 | 27 | 18.5 | 21.9 | 26.7 | -4.8 | OK |
| DR-3125 | 26.8 | 17.9 | 21.5 | 26.5 | -5.0 | OK |
| DR-3120 | 28.15 | 17.68 | 21.3 | 27.9 | -6.5 | OK |
| Doxey | 26 | 8.5 | 23.5 | 25.7 | -2.2 | OK |
| DR-3115 | 27.28 | 17.6 | 21.2 | 27.0 | -5.7 | OK |
| DR-3110 | 25.62 | 17.79 | 21.2 | 25.3 | -4.2 | OK |
| DR-3100 | 24.85 | 17.46 | 21.0 | 24.6 | -3.5 | OK |
| DR-3095 | 27 | 17.33 | 21.0 | 25.3 | -4.2 | OK |
| DR-3090 | 26.8 | 17.23 | 20.9 | 26.6 | -5.6 | OK |
| DR-3085 | 26.65 | 17.08 | 20.8 | 26.7 | -5.8 | OK |
| DR-3080 | 27.2 | 17.07 | 20.8 | 26.4 | -5.6 | OK |
| DR-3075 | 26.7 | 16.99 | 20.7 | 26.3 | -5.5 | OK |
| DR-3070 | 26.2 | 16.94 | 20.7 | 25.9 | -5.2 | OK |
| Chdwk | 23.5 | 7.04 | 19.1 | 23.2 | -4.1 | OK |
| DR-3065 | 25.9 | 16.92 | 20.5 | 25.7 | -5.2 | OK |
| DR-3060 | 26.4 | 16.83 | 20.4 | 25.7 | -5.3 | OK |
| DR-3059 | 26 | 16.8 | 20.4 | 25.7 | -5.3 | OK |
| DR-3055 | 26.85 | 16.77 | 20.3 | 26.3 | -5.9 | OK |
| SB-3N-H | 30 | 20 | 23.0 | 29.7 | -6.7 | OK |
| SB-3N-A | 47.5 | 40 | 41.0 | 47.2 | -6.2 | OK |
| DR-3N050 | 47.5 | 41.46 | 42.8 | 47.2 | -4.4 | OK |
| SB-3N-B | 46.5 | 39 | 40.0 | 46.2 | -6.2 | OK |
| DR-3N045 | 46.5 | 40.51 | 42.2 | 46.2 | -4.0 | OK |
| SB-3N-C | 46 | 38.5 | 39.5 | 45.7 | -6.2 | OK |
| DR-3N040 | 46 | 39.95 | 41.7 | 45.7 | -4.0 | OK |
| DR-3N035 | 45 | 38.6 | 40.4 | 44.7 | -4.3 | OK |
| SB-3N-D | 46 | 38 | 39.0 | 45.7 | -6.7 | OK |
| DR-3N030 | 46 | 37.21 | 38.9 | 45.7 | -6.8 | OK |
| SB-3N-E | 40 | 31.5 | 32.5 | 39.7 | -7.2 | OK |
| DR-3N025 | 40 | 30.71 | 32.5 | 39.7 | -7.2 | OK |
| SB-3N-F | 36 | 27.5 | 29.5 | 35.7 | -6.2 | OK |
| DR-3N020 | 36 | 26.65 | 28.9 | 35.7 | -6.8 | OK |
| SB-3N-G | 33 | 24 | 26.4 | 32.7 | -6.3 | OK |
| DR-3N015 | 33 | 23.15 | 25.8 | 32.7 | -6.9 | OK |
| DR-3N010 | 30.2 | 20.94 | 24.2 | 29.9 | -5.7 | OK |
| SB-3A-A | 40.8 | 33.61 | 34.9 | 40.5 | -5.6 | OK |
| DR-3A175 | 40.8 | 33.61 | 34.3 | 37.6 | -3.3 | OK |
| DR-3A160 | 39.4 | 29.94 | 32.8 | 39.1 | -6.3 | OK |

**Table 5-5. Drain 3 Complex - Water Surface Elevations cont'd…**

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev | |
|---|---|---|---|---|---|---|---|
| DR-3A150 | 38.94 | 31.91 | 32.7 | 38.6 | -5.9 | OK | |
| DR-3A145 | 38.94 | 31.89 | 32.3 | 38.6 | -6.3 | OK | |
| DR-3A140 | 39.15 | 31.73 | 31.9 | 37.3 | -5.4 | OK | |
| DR-3A135 | 37.48 | 30.8 | 31.4 | 36.5 | -5.0 | OK | |
| SB-3A-B | 36.65 | 29.52 | 31.3 | 36.4 | -5.1 | OK | |
| DR-3A130 | 36.65 | 29.52 | 30.4 | 36.3 | -5.9 | OK | |
| DR-3A125 | 36.57 | 29.35 | 29.9 | 35.9 | -6.0 | OK | |
| DR-3A120 | 36 | 26.65 | 28.7 | 35.7 | -7.0 | OK | |
| DR-3A115 | 36 | 26.85 | 28.5 | 35.7 | -7.2 | OK | |
| DR-3A110 | 35.29 | 27.79 | 28.5 | 35.2 | -6.7 | OK | |
| DR-3A100 | 34.01 | 26.51 | 28.5 | 33.6 | -5.1 | OK | |
| DR-3A095 | 32.24 | 22.13 | 28.5 | 31.9 | -3.5 | OK | |
| DR-3A085 | 32.15 | 26.16 | 28.4 | 31.9 | -3.5 | OK | |
| DR-3A080 | 32.36 | 24.63 | 28.1 | 32.1 | -3.9 | OK | |
| DR-3A075 | 33.34 | 24.55 | 27.9 | 33.0 | -5.1 | OK | |
| Crest Wd | 32.13 | 26.96 | 27.7 | 31.8 | -4.1 | OK | |
| DR-3A070 | 32.42 | 20.95 | 27.6 | 32.1 | -4.5 | OK | |
| DR-3A065 | 31 | 22.31 | 27.1 | 30.7 | -3.6 | OK | |
| DR-3A060 | 31.04 | 22.26 | 26.8 | 30.7 | -3.9 | OK | |
| DR-3A055 | 30.67 | 21.99 | 26.4 | 30.4 | -4.0 | OK | |
| DR-3A050 | 32.04 | 21.67 | 25.5 | 31.7 | -6.3 | OK | |
| DR-3A045 | 32.05 | 22.31 | 24.4 | 31.8 | -7.4 | OK | |
| DR-3A040 | 30.61 | 22.28 | 24.0 | 30.3 | -6.4 | OK | |
| DR-3N008 | 30.1 | 20.1 | 23.4 | 29.8 | -6.4 | OK | |
| DR-3N004 | 30 | 17.86 | 20.6 | 29.7 | -9.1 | OK | |
| DR-3050 | 25.33 | 16.74 | 20.3 | 25.0 | -4.7 | OK | |
| DR-3049 | 25.33 | 16.72 | 20.3 | 25.0 | -4.7 | OK | |
| DR-3045 | 25.33 | 16.27 | 20.3 | 25.0 | -4.7 | OK | |
| SB-F-LDRES | 25.67 | 16.03 | 17.6 | 25.4 | -7.8 | OK | |
| 3N-CC-1 | 25.33 | 16.42 | 18.3 | 25.0 | -6.7 | OK | |
| 3N-CC-2 | 26 | 15.79 | 17.9 | 25.7 | -7.8 | OK | |
| DR-3042 | 25.67 | 16.03 | 20.2 | 25.4 | -5.1 | OK | |
| DR-3040 | 26 | 15.79 | 19.8 | 25.7 | -5.9 | OK | |
| X-DR3-B | 26 | 15.54 | 17.5 | 25.7 | -8.2 | OK | |
| DR-3030 | 26 | 15.54 | 19.8 | 25.7 | -5.9 | OK | |
| DR-3020 | 26 | 13.5 | 19.7 | 25.7 | -6.0 | OK | |
| X-DR3-A | 23 | 13.42 | 16.8 | 22.7 | -5.9 | OK | |
| DR-3005 | 23 | 13.42 | 19.7 | 22.7 | -3.1 | OK | |
| DR-3000 | 20 | 10.5 | 19.3 | 19.7 | -0.4 | OK | |
| SB-3-A | 40.1 | 37.62 | 38.2 | 39.8 | -1.6 | OK | |
| SB-3-B | 40.1 | 37.62 | 38.2 | 39.8 | -1.6 | OK | |
| SB-3-D | 39 | 29.096 | 31.2 | 38.7 | -7.5 | OK | |
| SB-3-E | 37.2 | 30.8 | 36.5 | 36.9 | -0.4 | OK | |

A detailed feasibility study is required to compare alternatives and select a preferred solution for Monterey Place flooding. Each potential solution has positives and negatives that require more detailed analysis than is possible within this master plan.

Six locations in Table 5-5 show some flooding from 0.3 to 0.9 foot deep. The flooding area is actually the Trailhead Channel and there is no flood problem because the area was designed to carry overland releases.

**Master Plan Projects**

| | |
|---|---|
| • Drain 3N,Tidewater RR to Drain 3 | 5,300 feet of Drain 3N Channel |
| • Drain 3N, Lathrop Road north | 2,100 ft of Drain 3N 54-inch pipe |
| • Drain 3A, Lathrop Road | Connect 3A to 3N |
| • Drain 3, Monterey Place | Pipe modifications, sump and pump connection to Drain 3 |
| • Drain 3, Airport Way | 6-foot by 8-foot box culvert |
| • Drain 3, road crossing upstream of Airport Way | 6-foot by 8-foot box culvert |

**DRAIN 4**

Drain 4 drains 885 acres of central Manteca to the French Camp Outlet Canal. The drain begins west of Main Street and flows in a 36 inch diameter pipe generally west to Graystone Park where it increases to a 48-inch pipe. The drain flows northwest along the Union Pacific Railroad past Mayors Park to Louise Avenue where the pipe in increased to 54 inches in diameter. The 54-inch pipe continues west to the railroad tracks and turns northwest and flows through a 60-inch culvert at Airport Way. An earth channel carries flow from Airport Way to the French Camp Outlet Canal.

Analysis in previous Master Plans and for this Master Plan show that Drain 4 is close to capacity. Minor street flooding is evident at several locations. Although not meeting City standards, most of the flooding seen in the model is more of a nuisance and probably not worth large expenditures to replace existing pipes with larger pipes. Each of the drains benefits from the road crossing improvements along the FCOC. Master Plan analysis includes completion of the FCOC improvements.

West of Airport Way, Drain 4 is an earth channel through land primarily designated for both light and heavy industrial uses. On the north side of the drain 102 acre feet of storage will be required and on the south side 21 acre feet is required. As lands west of Airport Way develop, the City may elect to use an open drainage corridor or drain 4 may be converted to a 54-inch diameter pipe.

**Results of Analysis**

Figure 5-6 shows a schematic of Drain 4 with model nodes labeled. Figure 5-7 is a plan view of Drain 4. Table 5-6, Drain 4 Flows, show the peak flow rate computed at each model node. Table 5-7, Drain 4 Water Surface Elevations, shows model output data and flooding depths at each model node with a problem designation when flooding is computed above ground level.

Figure 5-6

City of Manteca
Storm Drain Master Plan
DRAIN 4 SCHEMATIC

N

0 1300 2600
SCALE IN FEET

WEST YOST & ASSOCIATES

SHED BOUNDARY

DR-4000
DR-4005
DR-4010
DR-4015
DR-4020
DR-4025
DR-4030
DR-4035
DR-4040
DR-4045
DR-4050
DR-4053
Prnvra
DR-4055
DR-4060
DR-4065
DR-4070
DR-4075
St Francis
DR-4080
DR-4085
DR-4090
DR-4095
DR-4100
MyrsPk A
Myrs B
DR-4105
DR-4110
DR-4115
DR-4120
DR-4125
DR-4130
DR-4135
DR-4140
Grey Stn
DR-4145
DR-4146
DR-4149
DR-4150
DR-4155
DR-4160
DR-4165
DR-4180
DR-4185
DR-4190
DR-4195
DR-4200
DR-4203
WalnutPl
DR-4205
Boy Mdws
DR-4210
DR-4215
DR-4220
DR-4225
DR-4230

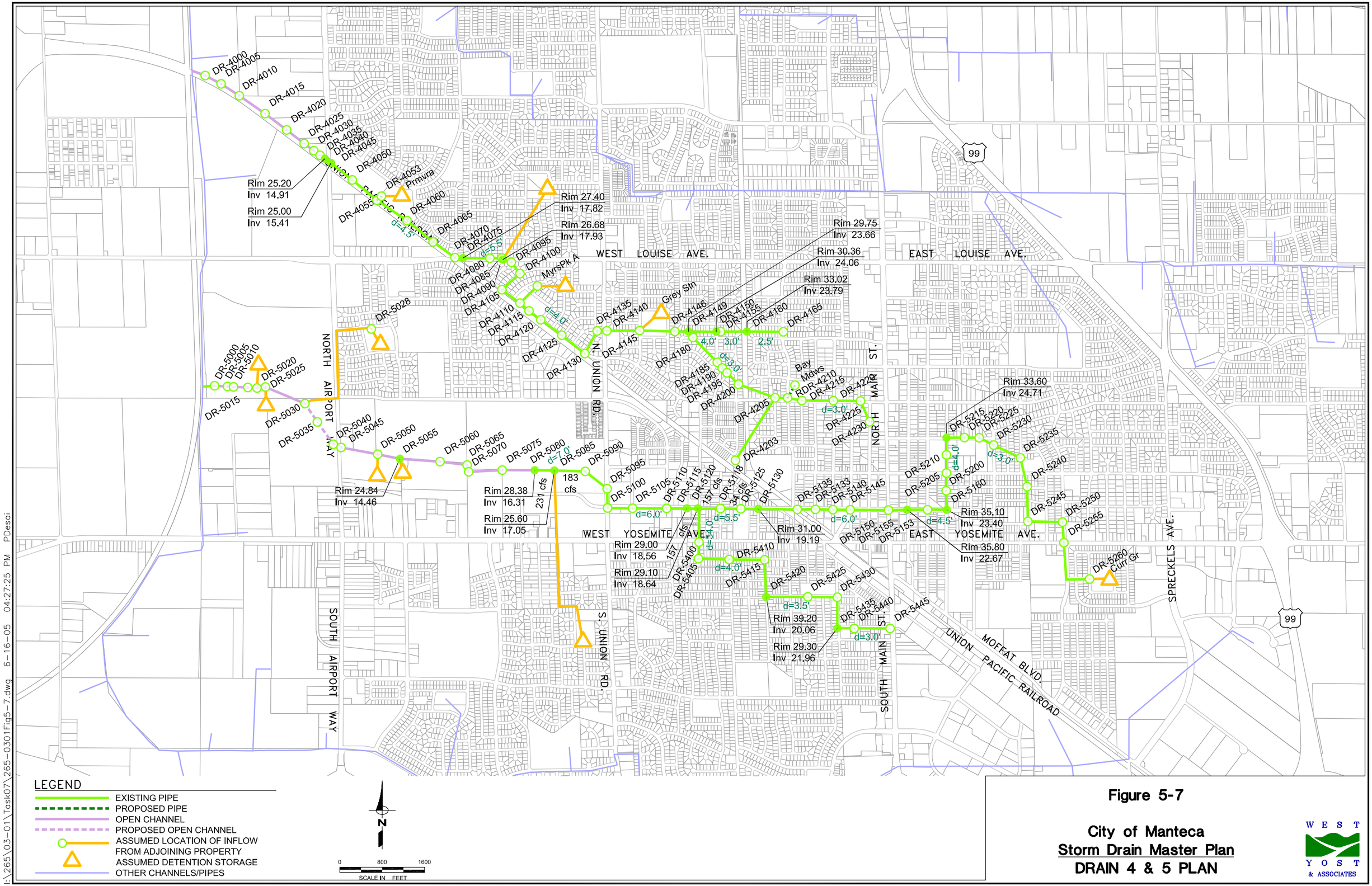


**Figure 5-7**

**City of Manteca**
**Storm Drain Master Plan**
**DRAIN 4 & 5 PLAN**

WEST YOST & ASSOCIATES

| Conduit Name | Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|---|
| DRP4160 | DR-4165 | DR-4160 | Circular | PIPE | 5.1 | 27.7 | 2.5 | |
| DRP4155 | DR-4160 | DR-4155 | Circular | PIPE | 6.2 | 27.7 | 3.0 | |
| DRP4150 | DR-4155 | DR-4150 | Circular | PIPE | 6.2 | 27.6 | 3.0 | |
| DRP4149 | DR-4150 | DR-4149 | Circular | PIPE | 10.6 | 27.6 | 4.0 | |
| DRP4225 | DR-4230 | DR-4225 | Circular | PIPE | 2.7 | 31.2 | 3.0 | |
| DRP4220 | DR-4225 | DR-4220 | Circular | PIPE | 4.7 | 30.8 | 3.0 | |
| DRP4215 | DR-4220 | DR-4215 | Circular | PIPE | 16.7 | 30.8 | 3.0 | |
| DRP4210 | DR-4215 | RDR-4210 | Circular | PIPE | 20.2 | 30.3 | 3.0 | |
| DRP4210A | BayMdws | RDR-4210 | Circular | PIPE | 2.5 | 30.1 | 1.0 | |
| DRP4205 | RDR-4210 | DR-4205 | Circular | PIPE | 19.3 | 30.1 | 3.0 | |
| DRP4205A | DR-4203 | DR-4205 | Circular | PIPE | 2.7 | 30.8 | 1.3 | |
| DRP4200 | DR-4205 | DR-4200 | Circular | PIPE | 27.6 | 30.0 | 3.0 | |
| DRC4195 | DR-4200 | DR-4195 | Natural | OPEN CHANNEL | 20.4 | 29.3 | | |
| DRC4190 | DR-4195 | DR-4190 | Natural | OPEN CHANNEL | 21.3 | 29.3 | | |
| DRP4185 | DR-4190 | DR-4185 | Circular | PIPE | 25.6 | 29.3 | 3.0 | |
| DRP4180 | DR-4185 | DR-4180 | Circular | PIPE | 25.6 | 28.9 | 3.0 | |
| DRP4149A | DR-4180 | DR-4149 | Circular | PIPE | 25.6 | 27.7 | 3.5 | |
| DRP4146 | DR-4149 | DR-4146 | Circular | PIPE | 35.8 | 27.6 | 4.0 | |
| DRP4145 | DR-4146 | DR-4145 | Circular | PIPE | 35.9 | 27.4 | 4.0 | |
| DRP4140 | DR-4145 | DR-4140 | Circular | PIPE | 41.8 | 26.9 | 4.0 | |
| DRP4135 | DR-4140 | DR-4135 | Circular | PIPE | 41.9 | 26.9 | 4.0 | |
| DRP4130 | DR-4135 | DR-4130 | Circular | PIPE | 41.8 | 26.7 | 4.0 | |
| DRP4125 | DR-4130 | DR-4125 | Circular | PIPE | 41.7 | 26.2 | 4.0 | |
| DRP4120 | DR-4125 | DR-4120 | Circular | PIPE | 41.7 | 25.7 | 4.0 | |
| DRP4115 | DR-4120 | DR-4115 | Circular | PIPE | 41.6 | 25.1 | 4.0 | |
| DRP4110 | DR-4115 | DR-4110 | Circular | PIPE | 41.5 | 24.5 | 4.0 | |
| DRP4105 | DR-4110 | DR-4105 | Circular | PIPE | 41.4 | 23.7 | 4.0 | |
| DRP4100 | DR-4105 | DR-4100 | Circular | PIPE | 41.5 | 23.8 | 4.0 | |
| DRP4095 | DR-4100 | DR-4095 | Circular | PIPE | 41.6 | 23.3 | 4.0 | |
| DRP4090 | DR-4095 | DR-4090 | Circular | PIPE | 41.7 | 23.1 | 4.0 | |
| DRP4090A | StFrancs | DR-4090 | Circular | PIPE | 2.6 | 22.1 | 1.5 | |
| DRP4085 | DR-4090 | DR-4085 | Circular | PIPE | 53.4 | 23.0 | 4.0 | |
| DRP4080 | DR-4085 | DR-4080 | Circular | PIPE | 53.3 | 23.0 | 5.5 | |
| DRP4075 | DR-4080 | DR-4075 | Circular | PIPE | 53.1 | 22.9 | 5.5 | |
| DRP4070 | DR-4075 | DR-4070 | Circular | PIPE | 53.0 | 22.8 | 4.5 | |
| DRP4065 | DR-4070 | DR-4065 | Circular | PIPE | 53.0 | 22.7 | 4.5 | |
| DRP4060 | DR-4065 | DR-4060 | Circular | PIPE | 53.0 | 22.3 | 4.5 | |
| DRP4055 | DR-4060 | DR-4055 | Circular | PIPE | 53.0 | 21.6 | 4.5 | |
| DRP4055A | DR-4053 | DR-4055 | Circular | PIPE | 7.2 | 21.2 | 2.0 | |
| DRP4050 | DR-4055 | DR-4050 | Circular | PIPE | 55.0 | 20.6 | 4.5 | |
| DRP4045 | DR-4050 | DR-4045 | Circular | PIPE | 55.0 | 19.7 | 4.5 | |
| DRP435 | DR-4045 | DR-4040 | Circular | PIPE | 54.9 | 19.6 | 5.0 | |
| DRC4035 | DR-4040 | DR-4035 | Natural | OPEN CHANNEL | 54.9 | 19.6 | | |
| DRC4030 | DR-4035 | DR-4030 | Natural | OPEN CHANNEL | 54.9 | 19.6 | | |
| DRC4025 | DR-4030 | DR-4025 | Natural | OPEN CHANNEL | 54.4 | 19.6 | | |
| DRC4020 | DR-4025 | DR-4020 | Natural | OPEN CHANNEL | 53.4 | 19.6 | | |
| DRC4015 | DR-4020 | DR-4015 | Natural | OPEN CHANNEL | 52.8 | 19.6 | | |
| DRC4010 | DR-4015 | DR-4010 | Natural | OPEN CHANNEL | 52.0 | 19.6 | | |
| DRC4005 | DR-4010 | DR-4005 | Natural | OPEN CHANNEL | 51.2 | 19.6 | | |
| DRC4000 | DR-4005 | DR-4000 | Natural | OPEN CHANNEL | 50.2 | 19.6 | | |

## Table 5-7. Drain 4 - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-4160 | 33.02 | 23.79 | 27.7 | 32.7 | -5.1 | OK |
| DR-4155 | 30.2 | 23.01 | 27.6 | 29.9 | -2.3 | OK |
| DR-4150 | 30.36 | 24.06 | 27.6 | 30.1 | -2.5 | OK |
| DR-4230 | 35 | 30.542 | 31.2 | 34.7 | -3.5 | OK |
| DR-4225 | 35 | 29.118 | 30.8 | 34.7 | -3.9 | OK |
| DR-4220 | 35 | 28.638 | 30.8 | 34.7 | -3.9 | OK |
| DR-4215 | 35 | 26.902 | 30.3 | 34.7 | -4.4 | OK |
| BayMdws | 33.5 | 29 | 30.1 | 33.2 | -3.1 | OK |
| RDR-4210 | 30 | 26.39 | 30.1 | 29.7 | 0.4 | PROBLEM |
| WalnutPl | 31.32 | 18.35 | 28.2 | 31.0 | -2.8 | OK |
| DR-4203 | 31.4 | 26.9 | 30.8 | 31.1 | -0.3 | OK |
| DR-4205 | 30 | 25.866 | 30.0 | 29.7 | 0.3 | PROBLEM |
| DR-4200 | 31.82 | 24.39 | 29.3 | 30.5 | -1.2 | OK |
| DR-4195 | 32.54 | 25 | 29.3 | 29.5 | -0.2 | OK |
| DR-4190 | 31.16 | 24.28 | 29.3 | 30.9 | -1.6 | OK |
| DR-4185 | 30.2 | 24.01 | 28.9 | 29.9 | -1.0 | OK |
| DR-4180 | 30.05 | 22.57 | 27.7 | 29.8 | -2.0 | OK |
| DR-4149 | 29.75 | 23.66 | 27.6 | 29.5 | -1.9 | OK |
| DR-4146 | 29.45 | 23.454 | 27.4 | 29.2 | -1.8 | OK |
| GreyStn | 29 | 14 | 25.7 | 28.7 | -3.0 | OK |
| DR-4145 | 29.14 | 23.05 | 26.9 | 28.8 | -1.9 | OK |
| DR-4140 | 29.57 | 22.57 | 26.9 | 29.3 | -2.3 | OK |
| DR-4135 | 28.2 | 22.6 | 26.7 | 27.9 | -1.2 | OK |
| DR-4130 | 29.3 | 22.54 | 26.2 | 29.0 | -2.8 | OK |
| DR-4125 | 29.57 | 22.17 | 25.7 | 29.3 | -3.6 | OK |
| DR-4120 | 27.86 | 22.05 | 25.1 | 27.6 | -2.5 | OK |
| DR-4115 | 29.42 | 21.69 | 24.5 | 29.1 | -4.7 | OK |
| MyrsPk A | 26 | 9 | 26.6 | 25.7 | 0.9 | PROBLEM |
| DR-4110 | 29.24 | 21.66 | 23.7 | 28.9 | -5.2 | OK |
| DR-4105 | 29.24 | 21.44 | 23.8 | 28.9 | -5.1 | OK |
| DR-4100 | 26.31 | 19.41 | 23.3 | 26.0 | -2.7 | OK |
| DR-4095 | 27.82 | 19.02 | 23.1 | 27.5 | -4.4 | OK |
| StFrancs | 26 | 20 | 22.2 | 25.7 | -3.6 | OK |
| DR-4090 | 27.24 | 19.06 | 23.0 | 26.9 | -4.0 | OK |
| DR-4085 | 26.68 | 17.93 | 23.0 | 26.4 | -3.4 | OK |
| DR-4080 | 26.1 | 18.12 | 22.9 | 25.8 | -2.9 | OK |
| DR-4075 | 27.4 | 17.82 | 22.8 | 27.1 | -4.3 | OK |
| DR-4070 | 27 | 17.75 | 22.7 | 26.7 | -4.0 | OK |
| DR-4065 | 25.8 | 17.37 | 22.3 | 25.5 | -3.2 | OK |
| DR-4060 | 25 | 16.82 | 21.6 | 24.7 | -3.1 | OK |
| Prmvra | 22.61 | 7.38 | 18.4 | 22.3 | -3.9 | OK |
| DR-4053 | 24 | 20.25 | 21.2 | 23.7 | -2.5 | OK |
| DR-4055 | 25 | 18.34 | 20.6 | 24.7 | -4.1 | OK |
| DR-4050 | 23.4 | 15.86 | 19.7 | 23.1 | -3.4 | OK |
| DR-4045 | 25 | 15.41 | 19.6 | 24.7 | -5.1 | OK |
| DR-4040 | 25.2 | 14.91 | 19.6 | 24.9 | -5.3 | OK |
| DR-4035 | 24.16 | 14.4 | 19.6 | 23.7 | -4.0 | OK |
| DR-4030 | 24.16 | 14.1 | 19.6 | 23.7 | -4.0 | OK |
| DR-4025 | 22.83 | 12.9 | 19.6 | 22.7 | -3.1 | OK |
| DR-4020 | 22.8 | 13.23 | 19.6 | 21.1 | -1.4 | OK |
| DR-4015 | 23.59 | 13.31 | 19.6 | 23.1 | -3.4 | OK |
| DR-4010 | 22.67 | 12.62 | 19.6 | 22.0 | -2.3 | OK |
| DR-4005 | 21.63 | 12.06 | 19.6 | 21.6 | -2.0 | OK |
| DR-4000 | 19.27 | 10.69 | 19.6 | 19.2 | 0.4 | PROBLEM |

The Mayor's Park area shows flooding up to two feet. This area is a good candidate for pump optimization analyses with two pump stations and the park basin. Unrestricted flows from upstream trigger the control system and shut down Mayors Park pumps causing minor flooding. The Drain 4 central City area does not have the detention basins that exist in much of the City.

Table 5-7 shows three locations where there is brief flooding up to two inches and four locations where the City's design criteria is not met by a couple of inches. These limited locations are likely not serious enough to warrant Master Plan solutions. The City can live with this minor short term nuisance. They do, however, demonstrate that Drain 4 is near capacity and does not have capacity for additional development or additional inflows.

## DRAIN 5

Drain 5 begins as a 36-inch diameter pipe along South Street and increases to 42 inches as it turns into Park Avenue. The drain turns west on Oregon Street and increases to 48 inches turning north on South Veach Street. It then follows west along Nevada Street and north on Walnut Street to Center Street where it connects with the Drain 5 Interceptor.

### Drain 5 Interceptor

The Drain 5 Interceptor begins at Curran Grove as a 36-inch pipe, proceeds north on Powers, north on Washington and west along North turning south in a 48 inch pipe to Center Street. The Interceptor flows west along Center Street to Sycamore as a 54-inch increasing to 60 inches to South Veach Street and 66 inches to Walnut. After the confluence with Drain 5 at Walnut and Center Parkway, the Interceptor continues west in a 72-inch diameter pipe connecting to a 60-inch pipe along the golf course. From the golf course the Interceptor flows west in an open drainage channel crossing under Airport Way in a 6-foot by 3-foot box culvert, that appears to be inadequate, then passes through two parallel 48-inch pipes for 1,000 feet and continues in an open channel to its outfall to the FCOC in a 84-inch corrugated metal pipe. The low area upstream of the FCOC functions as storage for Drain 5.

### Results of Analysis

Figure 5-8 shows a schematic of Drain 5 with model nodes labeled. Table 5-8, Drain 5 Flows, shows the peak flow rate and the maximum water surface elevation computed at each model node. Table 5-9, Drain 5 Water Surface Elevations, shows model output data and flooding depths at each model node with a problem designation when flooding is computed above ground level. Figure 5-7 shows a plan view of Drain 5.

The model output also shows some areas of minor short term ponding that may not warrant the construction of extensive improvement projects. The model output, Table 5-9, also shows long stretches of the lower half of Drain 5 where City standards are violated. These are areas where the hydraulic grade line is not 0.5 foot below rim elevation.

SHED BOUNDARY

DR-5000
DR-5005
DR-5010
SB-5-JJ
DR-5020
DR-5025
DR-5015
SB-5-II
DR-5028
Vil Tcno
DR-5030
DR-5035
DR-5040
DR-5045
DR-5050
DR-5055
DR-5060
DR-5065
DR-5070
DR-5075
DR-5080
DR-5085
DR-5090
DR-5095
DR-5100
DR-5105
SB-5-GG
St Dommc
DR-5110
DR-5115
DR-5120
DR-5118
DR-5125
DR-5130
DR-5135
DR-5133
DR-5140
DR-5145
DR-5210
DR-5205
DR-5200
DR-5160
DR-5215
DR-5220
DR-5225
DR-5230
DR-5235
DR-5240
DR-5245
DR-5250
DR-5255
DR-5260
Curtis Cr
DR-5400
DR-5405
DR-5410
DR-5415
DR-5130
DR-5155
DR-5153
DR-5420
DR-5425
DR-5430
DR-5435
DR-5440
DR-5445
Union Wst

Figure 5-8

City of Manteca
Storm Drain Master Plan
DRAIN 5 SCHEMATIC

N

0 400 800
SCALE IN FEET

WEST YOST & ASSOCIATES

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**Table 5-8. Drain 5 - Flows**

| Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|
| DR-5445 | DR-5440 | Circular | PIPE | 34.2 | 31.4 | 3.0 | |
| DR-5440 | DR-5435 | Circular | PIPE | 22.4 | 28.8 | 3.0 | |
| DR-5435 | DR-5430 | Circular | PIPE | 24.4 | 28.8 | 3.5 | |
| DR-5430 | DR-5425 | Circular | PIPE | 24.7 | 28.8 | 3.5 | |
| DR-5425 | DR-5420 | Circular | PIPE | 25.9 | 28.8 | 3.5 | |
| DR-5420 | DR-5415 | Circular | PIPE | 26.8 | 28.9 | 4.0 | |
| DR-5415 | DR-5410 | Circular | PIPE | 28.0 | 28.9 | 4.0 | |
| DR-5410 | DR-5405 | Circular | PIPE | 28.0 | 28.8 | 4.0 | |
| DR-5405 | DR-5400 | Circular | PIPE | 33.8 | 29.1 | 4.0 | |
| DR-5400 | DR-5120 | Circular | PIPE | 33.8 | 28.9 | 4.0 | |
| DR-5260 | DR-5255 | Circular | PIPE | 3.3 | 36.9 | 3.0 | |
| DR-5255 | DR-5250 | Circular | PIPE | 11.9 | 36.6 | 3.0 | |
| DR-5250 | DR-5245 | Circular | PIPE | 17.5 | 36.5 | 3.0 | |
| DR-5245 | DR-5240 | Circular | PIPE | 24.9 | 36.1 | 3.0 | |
| DR-5240 | DR-5235 | Circular | PIPE | 23.9 | 35.0 | 3.0 | |
| DR-5235 | DR-5230 | Circular | PIPE | 24.6 | 34.5 | 3.0 | |
| DR-5230 | DR-5225 | Circular | PIPE | 37.2 | 33.5 | 3.0 | |
| DR-5225 | DR-5220 | Circular | PIPE | 38.7 | 33.5 | 3.0 | |
| DR-5220 | DR-5215 | Circular | PIPE | 38.8 | 33.5 | 3.0 | |
| DR-5215 | DR-5210 | Circular | PIPE | 54.3 | 33.5 | 4.0 | |
| DR-5210 | DR-5205 | Circular | PIPE | 53.5 | 33.5 | 4.0 | |
| DR-5205 | DR-5200 | Circular | PIPE | 56.3 | 33.4 | 4.0 | |
| DR-5200 | DR-5160 | Circular | PIPE | 56.3 | 33.4 | 4.0 | |
| DR-5160 | DR-5153 | Circular | PIPE | 61.6 | 33.8 | 4.5 | |
| DR-5153 | DR-5155 | Circular | PIPE | 66.8 | 33.8 | 4.5 | |
| DR-5155 | DR-5150 | Circular | PIPE | 83.8 | 33.6 | 5.0 | |
| DR-5150 | DR-5145 | Circular | PIPE | 77.6 | 33.5 | 5.0 | |
| DR-5145 | DR-5140 | Circular | PIPE | 78.9 | 33.6 | 5.0 | |
| DR-5140 | DR-5133 | Circular | PIPE | 89.6 | 32.6 | 5.0 | |
| DR-5133 | DR-5135 | Circular | PIPE | 93.8 | 32.3 | 5.0 | |
| DR-5135 | DR-5130 | Circular | PIPE | 95.0 | 31.5 | 5.0 | |
| DR-5130 | DR-5125 | Circular | PIPE | 121.5 | 30.3 | 5.5 | |
| DR-5125 | DR-5118 | Circular | PIPE | 121.1 | 29.4 | 5.5 | |
| DR-5118 | DR-5120 | Circular | PIPE | 130.9 | 28.9 | 5.5 | |
| DR-5120 | DR-5115 | Circular | PIPE | 157.8 | 28.3 | 5.5 | |
| DR-5115 | DR-5110 | Circular | PIPE | 156.8 | 27.9 | 6.0 | |
| DR-5110 | DR-5105 | Circular | PIPE | 145.1 | 27.1 | 6.0 | |
| DR-5105 | DR-5100 | Circular | PIPE | 167.6 | 26.4 | 6.0 | |
| DR-5100 | DR-5095 | Circular | PIPE | 168.2 | 25.3 | 6.0 | |
| DR-5095 | DR-5090 | Circular | PIPE | 177.6 | 24.7 | 6.0 | |
| DR-5090 | DR-5085 | Circular | PIPE | 175.8 | 23.5 | 6.0 | |
| UnionWst | DR-5085 | Circular | PIPE | 8.2 | 24.4 | 3.0 | |
| DR-5085 | DR-5080 | Circular | PIPE | 221.1 | 22.2 | 7.0 | |
| DR-5080 | DR-5075 | Natural | OPEN CHANNEL | 215.9 | 20.8 | | |
| DR-5075 | DR-5070 | Natural | OPEN CHANNEL | 212.4 | 20.7 | | |
| DR-5070 | DR-5065 | Natural | OPEN CHANNEL | 211.0 | 20.7 | | |
| DR-5065 | DR-5060 | Natural | OPEN CHANNEL | 209.9 | 20.7 | | |
| DR-5060 | DR-5055 | Natural | OPEN CHANNEL | 208.8 | 20.7 | | |
| St Domnc | DR-5055 | Circular | PIPE | 0.6 | 20.7 | 1.0 | |
| DR-5055 | DR-5050 | Natural | OPEN CHANNEL | 207.9 | 20.7 | | |
| DR-5050 | DR-5045 | Natural | OPEN CHANNEL | 207.2 | 20.7 | | |
| DR-5045 | DR-5040 | Rectangle | BOX CULVERT | 103.5 | 20.7 | 6.0 | 3.0 |
| DR-5045 | DR-5040 | Rectangle | BOX CULVERT | 103.5 | 20.7 | 6.0 | 3.0 |
| DR-5040 | DR-5035 | Trapezoid | OPEN CHANNEL | 206.3 | 20.7 | | |
| DR-5035 | DR-5030 | Trapezoid | OPEN CHANNEL | 204.7 | 20.7 | | |
| DR-5028 | DR-5030 | Circular | PIPE | 0.0 | 20.3 | 2.5 | |
| DR-5030 | DR-5025 | Natural | OPEN CHANNEL | 77.0 | 20.0 | | |
| DR-5025 | DR-5020 | Natural | OPEN CHANNEL | 75.9 | 20.0 | | |
| DR-5020 | DR-5015 | Natural | OPEN CHANNEL | 75.3 | 20.0 | | |
| DR-5015 | DR-5010 | Natural | OPEN CHANNEL | 74.6 | 20.0 | | |
| DR-5010 | DR-5005 | Natural | OPEN CHANNEL | 73.2 | 20.0 | | |
| DR-5005 | DR-5000 | Natural | OPEN CHANNEL | 74.2 | 20.0 | | |
| DR-5000 | FC-70 | Circular | PIPE | 72.0 | 20.0 | 7.0 | |

## Table 5-9. Drain 5 - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-5440 | 28.5 | 22.16 | 28.8 | 28.2 | 0.6 | PROBLEM |
| DR-5435 | 29.3 | 21.96 | 28.8 | 29.0 | -0.2 | PROBLEM |
| DR-5430 | 31.5 | 21.1 | 28.8 | 31.2 | -2.4 | OK |
| DR-5425 | 29.5 | 20.67 | 28.8 | 29.2 | -0.4 | OK |
| DR-5420 | 30.2 | 20.06 | 28.9 | 29.9 | -1.0 | OK |
| DR-5415 | 30.7 | 19.76 | 28.9 | 30.4 | -1.5 | OK |
| DR-5410 | 29.24 | 19.46 | 28.8 | 28.9 | -0.2 | PROBLEM |
| DR-5405 | 30.1 | 19.21 | 29.1 | 29.8 | -0.7 | OK |
| DR-5400 | 30 | 18.86 | 28.9 | 29.7 | -0.8 | OK |
| Curr Gr | 36.5 | 14 | 31.2 | 36.2 | -5.0 | OK |
| DR-5260 | 40 | 36.68 | 36.9 | 39.7 | -2.8 | OK |
| DR-5255 | 40 | 33.486 | 36.6 | 39.7 | -3.1 | OK |
| DR-5250 | 40 | 32.349 | 36.5 | 39.7 | -3.2 | OK |
| DR-5245 | 40 | 30.564 | 36.1 | 39.7 | -3.6 | OK |
| DR-5240 | 35 | 28.666 | 35.0 | 34.7 | 0.3 | PROBLEM |
| DR-5235 | 34.8 | 27 | 34.5 | 34.5 | 0.0 | PROBLEM |
| DR-5230 | 33.2 | 26.7 | 33.5 | 32.9 | 0.6 | PROBLEM |
| DR-5225 | 34.3 | 27.1 | 33.5 | 34.0 | -0.5 | OK |
| DR-5220 | 34.4 | 25.66 | 33.5 | 34.1 | -0.6 | OK |
| DR-5215 | 33.6 | 24.71 | 33.5 | 33.3 | 0.2 | PROBLEM |
| DR-5210 | 33.6 | 24.44 | 33.5 | 33.3 | 0.2 | PROBLEM |
| DR-5205 | 34.6 | 24.06 | 33.4 | 34.3 | -0.9 | OK |
| DR-5200 | 33.8 | 23.82 | 33.4 | 33.5 | -0.1 | PROBLEM |
| DR-5160 | 35.1 | 23.4 | 33.8 | 34.8 | -1.0 | OK |
| DR-5153 | 35.45 | 23.04 | 33.8 | 35.2 | -1.3 | OK |
| DR-5155 | 35.8 | 22.67 | 33.6 | 35.5 | -1.9 | OK |
| DR-5150 | 34.9 | 22.32 | 33.5 | 34.6 | -1.1 | OK |
| DR-5145 | 34.1 | 21.56 | 33.6 | 33.8 | -0.2 | OK |
| DR-5140 | 33.1 | 21.24 | 32.6 | 32.8 | -0.2 | PROBLEM |
| DR-5133 | 33.1 | 20.94 | 32.3 | 32.8 | -0.5 | OK |
| DR-5135 | 33.1 | 20.63 | 31.5 | 32.8 | -1.3 | OK |
| DR-5130 | 31 | 19.19 | 30.3 | 30.7 | -0.4 | OK |
| DR-5125 | 30 | 18.96 | 29.4 | 29.7 | -0.3 | OK |
| DR-5118 | 29.55 | 18.8 | 28.9 | 29.3 | -0.4 | OK |
| DR-5120 | 29.1 | 18.64 | 28.3 | 28.8 | -0.5 | OK |
| DR-5115 | 29 | 18.56 | 27.9 | 28.7 | -0.8 | OK |
| DR-5110 | 27.1 | 18.32 | 27.1 | 26.8 | 0.3 | PROBLEM |
| DR-5105 | 26.9 | 18 | 26.4 | 26.6 | -0.2 | PROBLEM |
| DR-5100 | 26.3 | 15 | 25.3 | 26.0 | -0.7 | OK |
| DR-5095 | 26.1 | 17.63 | 24.7 | 25.8 | -1.1 | OK |
| DR-5090 | 26.5 | 17.32 | 23.5 | 26.2 | -2.7 | OK |
| UnionWst | 29 | 23.09 | 24.4 | 28.7 | -4.3 | OK |
| DR-5085 | 25.6 | 17.05 | 22.2 | 25.3 | -3.1 | OK |
| DR-5080 | 28.38 | 16.31 | 20.8 | 24.6 | -3.8 | OK |
| DR-5075 | 26.88 | 16.04 | 20.7 | 24.6 | -3.9 | OK |
| DR-5070 | 25.76 | 15.98 | 20.7 | 24.4 | -3.7 | OK |
| DR-5065 | 25.27 | 16.01 | 20.7 | 22.6 | -1.9 | OK |
| DR-5060 | 25.03 | 14.79 | 20.7 | 24.1 | -3.4 | OK |
| St Domnc | 23 | 14.74 | 20.7 | 22.7 | -2.0 | OK |
| DR-5055 | 24.84 | 14.46 | 20.7 | 24.5 | -3.8 | OK |

**Table 5-9. Drain 5 - Water Surface Elevations, cont'd…**

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-5050 | 24.84 | 14.35 | 20.7 | 24.2 | -3.5 | OK |
| DR-5045 | 23.96 | 14.3 | 20.7 | 23.7 | -3.0 | OK |
| DR-5040 | 25 | 14.24 | 20.7 | 21.7 | -1.0 | OK |
| DR-5035 | 25 | 13.66 | 20.7 | 21.7 | -1.0 | OK |
| Vil Tcno | 23.7 | 7 | 20.6 | 23.4 | -2.8 | OK |
| DR-5028 | 24.3 | 20.3 | 20.3 | 24.0 | -3.7 | OK |
| DR-5030 | 25 | 13.1 | 20.0 | 21.7 | -1.7 | OK |
| DR-5025 | 21.87 | 13.06 | 20.0 | 21.9 | -1.8 | OK |
| DR-5020 | 20.85 | 12.87 | 20.0 | 20.3 | -0.2 | OK |
| DR-5015 | 20.85 | 12.789 | 20.0 | 20.3 | -0.2 | OK |
| DR-5010 | 21.84 | 12.78 | 20.0 | 21.5 | -1.5 | OK |
| DR-5005 | 21.84 | 8.88 | 20.0 | 20.3 | -0.2 | OK |
| DR-5000 | 20.95 | 8.78 | 20.0 | 21.0 | -0.9 | OK |

The Airport Way culvert is undersized. The recommendation is to matching the existing 6-foot by 3-foot box culvert with a second box. An analysis with a second Airport Way culvert and replacement of the two 48-inch parallel CMP drains with an open drainage channel shows that flooding problems are alleviated. This solution is similar to previous Master Plan updates and is strongly recommended.

**Master Plan Project**

- Airport Way — Construct 6-foot by 3-foot box culvert to match existing culvert
- Downstream of Airport Way — Convert 1000 feet of two 48-inch pipes to open drainage channel

**DRAIN 7**

Drain 7 begins on the east side of Spreckels Avenue where runoff flows into the first of two Sprekels detention basins. Runoff is pumped out of the first basin into the second basin. A 24-inch diameter force main will soon convey flow pumped from the second basin west to Main Street. Two new inflows to Drain 7 will serve an 84 acre mixed use land area to the north and a 221 acre industrial area along Industrial Park Drive and pump into the force main. Runoff now going to Pump Stations 8 and 9 will be diverted to one of the new detention basins north of Industrial Park Drive. Outflow from the basin will be pumped into the Drain 7 force main. All four Spreckels / Industrial basins and pumps will have monitored discharges to maintain flow limits downstream.

The force main ends at Main Street and Drain 7 continues west in a 36-inch pipe. The drain follows a little to the north of Highway 120 with an increase to 42 inches opposite Stonum Lane. The 42-inch pipe continues to Airport Way where a 3-foot by 10-foot box culvert is under constructed to carry Drain 7 under Daniels Street by the Big League Dreams complex. The box culvert ends at the confluence with Drain 8 at the beginning of the French Camp Outlet Canal.

Drain 7 is well controlled with 10 detention basins along its length. More detailed system operation studies may help to make the system of basins and pumps work more effectively and reduce some of the flooding along Drain 7.

Drain 7 flows through the center of the City's Big League Dreams (BLD) project and the channel is being moved to a 12-foot by 10-foot box culvert that runs under Daniels Street from Airport Way to the west boundary of BLD, 1,300 feet to the west.

**Results of Analysis**

Figure 5-9 shows a schematic of Drain 7 with model nodes labeled. Table 5-10, Drain 7 Flows, shows the peak flow rate computed at each model node. Table 5-11, Drain 7 Water Surface Elevations, shows model output data and flooding depths at each model node with a problem designation when flooding is computed above ground level. Figure 5-10 is a plan view of Drain 7.

DR-7016
DR-7017
DR-7035
DR-7030
DR-7020
DR-7015
DR-7040
DR-7025
DR-7045
DR-7000
DR7-BLD
DR-7005
DR-7010
HTL&GS
DR-7050
DR-7055
DR-7060
DR-7065
Roberts
DR-7074
DR-7075
DR-7080
DR-7085
DR-7090
DR-7095
DR-7100
El Brock
DR-7070
DR-7069
Dutra
Pk
MOHR
WEST
DR-7105
DR-7110
DR-7115
DR-7119
DR-7120
DR-7125
DR-7130
DR-7135
DR-7140
DR-7145
DR-7150
DR-7155
DR-7160
COTTA PARK
DR-7165
DR-7170
DR-7175
DR-7180
DR-7185
DR-7190
DR-7195
DRP7205
SprklsUpr
SB 7-C
Sprecklrs
DR-7198
DR-7200
Ind Pk
SHED BOUNDARY

Figure 5-9

City of Manteca
Storm Drain Master Plan
DRAIN 7 SCHEMATIC

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0 750 1500
SCALE IN FEET

WEST YOST & ASSOCIATES

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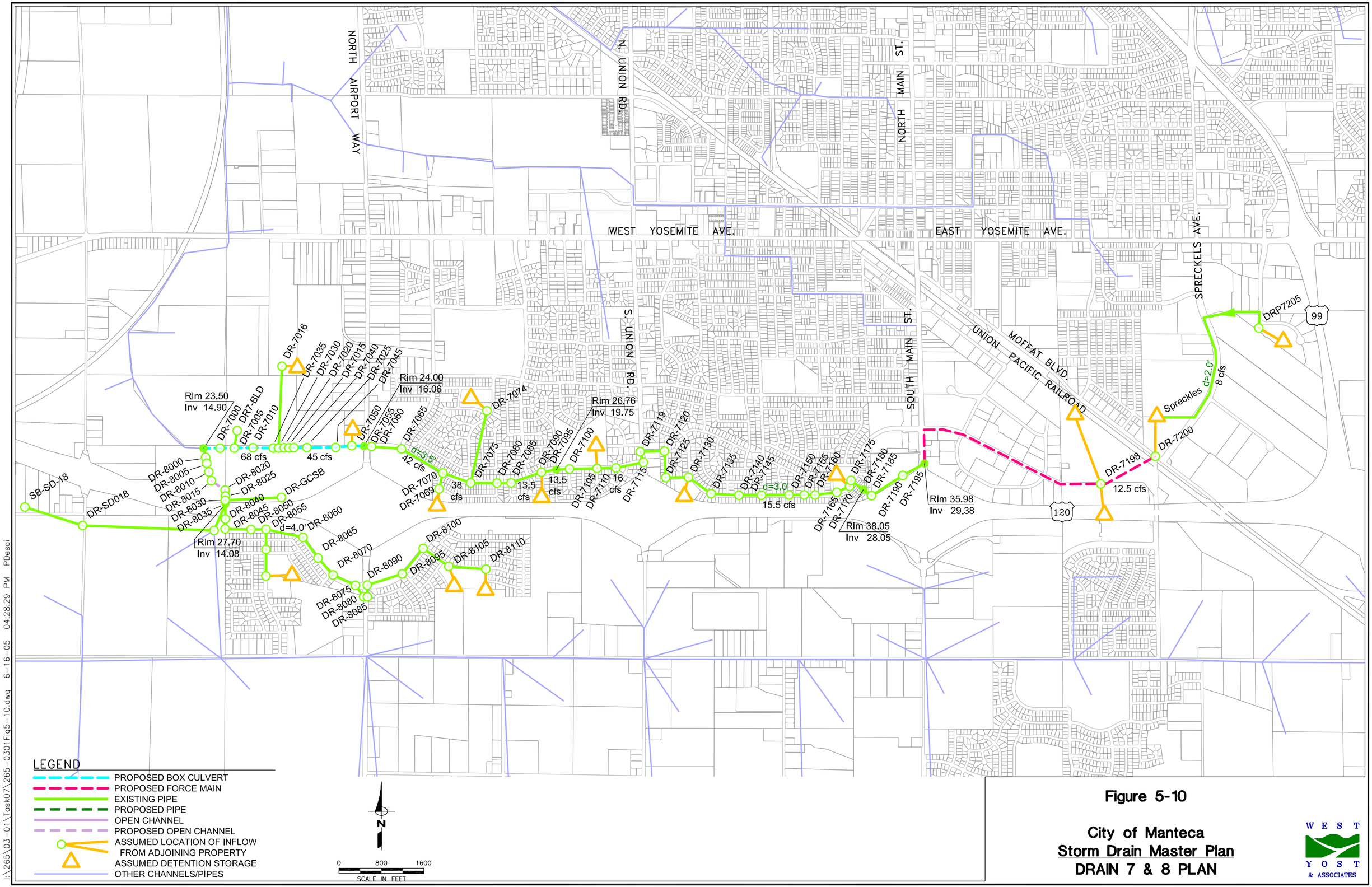


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**Figure 5-10**

**City of Manteca**
**Storm Drain Master Plan**
**DRAIN 7 & 8 PLAN**

WEST YOST & ASSOCIATES

**Table 5-10. Drain 7 - Flows**

| Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|
| DRP7205 | Spreckles | Circular | PIPE | 7.8 | 41.3 | 2.0 | |
| DR-7200 | DR-7198 | Circular | FORCEMAIN | 12.5 | 34.5 | 2.0 | |
| DR-7198 | DR-7195 | Circular | FORCEMAIN | 12.1 | 34.0 | 2.0 | |
| DR-7195 | DR-7190 | Circular | PIPE | 12.0 | 31.2 | 3.5 | |
| DR-7190 | DR-7185 | Circular | PIPE | 12.0 | 30.9 | 3.5 | |
| DR-7185 | DR-7180 | Circular | PIPE | 12.0 | 30.2 | 3.5 | |
| DR-7180 | DR-7175 | Circular | PIPE | 12.1 | 30.1 | 3.0 | |
| DR-7175 | DR-7170 | Circular | PIPE | 12.3 | 29.7 | 3.0 | |
| DR-7170 | DR-7165 | Circular | PIPE | 12.5 | 29.5 | 3.0 | |
| DR-7165 | DR-7160 | Circular | PIPE | 13.0 | 29.4 | 3.0 | |
| DR-7160 | DR-7155 | Circular | PIPE | 13.3 | 29.2 | 3.0 | |
| DR-7155 | DR-7150 | Circular | PIPE | 13.7 | 29.1 | 3.0 | |
| DR-7150 | DR-7145 | Circular | PIPE | 14.0 | 29.0 | 3.0 | |
| DR-7145 | DR-7140 | Circular | PIPE | 14.3 | 28.8 | 3.0 | |
| DR-7140 | DR-7135 | Circular | PIPE | 14.7 | 28.6 | 3.0 | |
| DR-7135 | DR-7130 | Circular | PIPE | 15.7 | 28.4 | 3.0 | |
| DR-7130 | DR-7125 | Circular | PIPE | 16.1 | 28.2 | 3.0 | |
| DR-7125 | DR-7120 | Circular | PIPE | 16.1 | 27.8 | 3.0 | |
| DR-7120 | DR-7119 | Circular | PIPE | 16.1 | 27.4 | 3.0 | |
| DR-7119 | DR-7115 | Circular | PIPE | 16.1 | 27.1 | 3.0 | |
| DR-7115 | DR-7110 | Circular | PIPE | 16.1 | 26.9 | 3.0 | |
| DR-7110 | DR-7105 | Circular | PIPE | 16.1 | 26.5 | 3.0 | |
| Brock El | DR-7105 | Circular | PIPE | 5.0 | 24.2 | 1.5 | |
| DR-7105 | DR-7100 | Circular | PIPE | 11.2 | 26.3 | 3.0 | |
| DR-7100 | DR-7095 | Circular | PIPE | 11.2 | 26.1 | 3.0 | |
| DR-7095 | DR-7090 | Circular | PIPE | 11.2 | 26.0 | 3.5 | |
| MOHR WEST | DR-7090 | Circular | PIPE | 2.1 | 26.5 | 1.0 | |
| DR-7090 | DR-7085 | Circular | PIPE | 11.2 | 25.9 | 3.5 | |
| DR-7085 | DR-7080 | Circular | PIPE | 36.2 | 25.8 | 3.5 | |
| DR-7080 | DR-7075 | Circular | PIPE | 36.2 | 25.6 | 3.5 | |
| DR-7074 | DR-7075 | Circular | PIPE | 2.8 | 25.8 | 1.5 | |
| DR-7075 | DR-7070 | Circular | PIPE | 38.0 | 24.5 | 3.5 | |
| DR-7069 | DR-7070 | Circular | PIPE | 2.8 | 23.9 | 1.5 | |
| DR-7070 | DR-7065 | Circular | PIPE | 40.0 | 23.8 | 3.5 | |
| DR-7065 | DR-7060 | Circular | PIPE | 40.0 | 22.7 | 3.5 | |
| DR-7060 | DR-7055 | Circular | PIPE | 40.1 | 21.7 | 3.5 | |
| DR-7055 | DR-7050 | Rectangle | BOX CULVERT | 40.1 | 21.5 | 8.0 | 3.0 |
| DR-7050 | DR-7045 | Rectangle | BOX CULVERT | 40.1 | 21.4 | 8.0 | 3.0 |
| DR-7045 | DR-7040 | Rectangle | BOX CULVERT | 40.0 | 21.4 | 8.0 | 3.0 |
| DR-7040 | DR-7020 | #N/A | BOX CULVERT | 40.1 | 21.3 | 8.0 | 3.0 |
| DR-7020 | DR-7010 | #N/A | BOX CULVERT | 65.1 | 21.2 | 12.0 | 3.0 |
| DR-7010 | DR-7005 | Rectangle | BOX CULVERT | 65.1 | 21.1 | 12.0 | 3.0 |
| DR-7005 | DR-7000 | Rectangle | BOX CULVERT | 65.6 | 21.0 | 12.0 | 3.0 |
| DR-7000 | FC-25 | Natural | OPEN CHANNEL | 69.2 | 21.0 | | |

## Table 5-11. Drain 7 - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev | Notes |
|---|---|---|---|---|---|---|---|
| SprklsUpr | 40.6 | 21 | 37.2 | 40.3 | -3.1 | OK | |
| DRP7205 | 41 | 35.91 | 41.3 | 40.7 | 0.6 | PROBLEM | |
| Spreckles | 38.18 | 13.79 | 36.7 | 37.9 | -1.2 | OK | |
| DR-7200 | 40 | 29.38 | 34.5 | 39.7 | -5.2 | OK | |
| SB 7-C | 40 | 29.6 | 35.1 | 39.7 | -4.6 | OK | |
| DR-7198 | 40 | 29.26 | 34.0 | 39.7 | -5.7 | OK | |
| DR-7195 | 35.98 | 29.38 | 31.2 | 35.7 | -4.5 | OK | |
| DR-7190 | 33.61 | 29.23 | 30.9 | 33.3 | -2.4 | OK | Low Spot |
| DR-7185 | 39.25 | 28.69 | 30.2 | 39.0 | -8.7 | OK | |
| DR-7180 | 38.05 | 28.05 | 30.1 | 37.8 | -7.7 | OK | |
| DR-7175 | 33.51 | 28.19 | 29.7 | 33.2 | -3.6 | OK | Low Spot |
| COTTA PARK | 33 | 12.5 | 28.4 | 32.7 | -4.3 | OK | |
| DR-7170 | 33.26 | 27.36 | 29.5 | 33.0 | -3.4 | OK | Low Spot |
| DR-7165 | 34.13 | 27.23 | 29.4 | 33.8 | -4.4 | OK | |
| DR-7160 | 32.66 | 26.45 | 29.2 | 32.4 | -3.2 | OK | Low Spot |
| DR-7155 | 33.45 | 26.45 | 29.1 | 33.2 | -4.0 | OK | |
| DR-7150 | 32.29 | 26.04 | 29.0 | 32.0 | -3.0 | OK | Low Spot |
| DR-7145 | 32.87 | 25.77 | 28.8 | 32.6 | -3.8 | OK | |
| DR-7140 | 31.64 | 25.44 | 28.6 | 31.3 | -2.7 | OK | |
| DR-7135 | 30.47 | 24.87 | 28.4 | 30.2 | -1.8 | OK | |
| Quail | 29 | 12.16 | 27.5 | 28.7 | -1.2 | OK | |
| DR-7130 | 30.47 | 24.21 | 28.2 | 30.2 | -2.0 | OK | |
| DR-7125 | 29.73 | 23.63 | 27.8 | 29.4 | -1.6 | OK | |
| DR-7120 | 29.34 | 23.04 | 27.4 | 29.0 | -1.6 | OK | |
| DR-7119 | 35.35 | 22.36 | 27.1 | 35.1 | -7.9 | OK | |
| DR-7115 | 33 | 22.2 | 26.9 | 32.7 | -5.8 | OK | |
| DR-7110 | 29.8 | 21.67 | 26.5 | 29.5 | -3.0 | OK | |
| Brock El | 27.57 | 24.17 | 24.2 | 27.3 | -3.1 | OK | |
| DR-7105 | 27.8 | 21.31 | 26.3 | 27.5 | -1.2 | OK | |
| DR-7100 | 26.55 | 21.23 | 26.1 | 26.3 | -0.2 | PROBLEM | Low Spot |
| DR-7095 | 27.1 | 21 | 26.0 | 26.8 | -0.8 | OK | |
| MOHR WEST | 26.76 | 21.653 | 26.5 | 26.5 | 0.1 | PROBLEM | |
| DR-7090 | 26.76 | 19.75 | 25.9 | 26.5 | -0.5 | OK | |
| DR-7085 | 26 | 19.12 | 25.8 | 25.7 | 0.1 | PROBLEM | |
| DR-7080 | 26 | 18.99 | 25.6 | 25.7 | -0.1 | PROBLEM | |
| Roberts | 24.5 | 10.37 | 22.0 | 24.2 | -2.2 | OK | |
| DR-7074 | 25.2 | 20.99 | 25.8 | 24.9 | 0.9 | PROBLEM | |
| DR-7075 | 24.2 | 18.43 | 24.5 | 23.9 | 0.6 | PROBLEM | |
| DutraPk | 24.5 | 8.63 | 19.1 | 24.2 | -5.1 | OK | |
| DR-7069 | 24.5 | 17.5 | 23.9 | 24.2 | -0.3 | OK | |
| DR-7070 | 23 | 17.84 | 23.8 | 22.7 | 1.1 | PROBLEM | Low Spot |
| DR-7065 | 25.2 | 17.09 | 22.7 | 24.9 | -2.2 | OK | |
| DR-7060 | 23.6 | 16.46 | 21.7 | 23.3 | -1.6 | OK | |
| DR-7055 | 23.48 | 16.06 | 21.5 | 24.0 | -2.5 | OK | |
| DR-7050 | 24 | 15.97 | 21.4 | 24.0 | -2.6 | OK | |
| DR-7045 | 24 | 15.85 | 21.4 | 24.0 | -2.6 | OK | |
| DR-7040 | 24 | 15.61 | 21.3 | 24.0 | -2.7 | OK | |
| DR-7020 | 24 | 15.46 | 21.2 | 24.0 | -2.8 | OK | |
| DR-7010 | 24 | 15.23 | 21.1 | 24.0 | -2.9 | OK | |
| DR-7005 | 24 | 15.04 | 21.0 | 24.0 | -3.0 | OK | |
| DR-7000 | 24 | 14.99 | 21.0 | 24.0 | -3.0 | OK | |
| DR7-BLD | 23.36 | 15.25 | 18.7 | 23.1 | -4.3 | OK | |
| FC-25 | 23.5 | 14.9 | 21.0 | 21.5 | -0.6 | OK | |

As the industrial zoned land along Industrial Park Drive is developed, the City's plan is to construct a force main from the west Spreckels basin to South Main Street. There are two basins with a total pumping capacity to the drain of 16 cfs. Two more basins will serve the land between Spreckels and Main Street. All four of these basins will provide extended storage and runoff will be held in the basin for a longer time to avoid flooding at and downstream of South Main Street.

**Master Plan Projects**

A force main required from the industrial area to Main Street and the improvements associated with the Daniels Street Improvements west of Airport Way are key projects along Drain 7.

- Industrial Park Drive — Force main, 24-inch, from Spreckels pump to Main Street
- Daniels Street — Box Culvert

## DRAIN 8

Most south area lands within the Drain 8 drainage area will drain to the South Drain after that facility is constructed and land is developed. Under the Master Plan, about 236 acres of residential land immediately south of Highway 120 will continue to drain to Drain 8 and flow north to its confluence with Drain 7 at the beginning of the FCOC. A 4.5 acre wetland along the east side of Drain 8 will be protected as important wetland habitat.

Drain 8 will also receive some South Drain flow pumped into the channel on the north side of Highway 120. The combined flow in Drain 8 from the South Drain pump station and from gravity flow in Drain 8 from south of Highway 120 will be 125 cfs. The Drain 8 channel will have to be widened by 10 feet along its west side to avoid the wetlands east of the channel.

A small road crossing north of the highway would have to be reconstructed and a 4-foot by 8-foot box culvert constructed.

**Results of Analysis**

Figure 5-11 shows a schematic of Drain 8 with model nodes labeled. Table 5-12, Drain 8 Flows, shows the peak flow rate and the maximum water surface elevation computed at each model node. Table 5-13, Drain 8 Water Surface Elevations, shows model output data and flooding depths at each model node with a problem designation when flooding is computed above ground level. A plan of Drain 8 is shown in Figure 5-10.

**Master Plan Projects**

These recommended improvements for Drain 8 include the following facilities:

| Location | Recommended Improvement |
|---|---|
| • Road crossing, 250 ft north of Hwy 120 with a 4-foot by 8-foot box culvert | Replace existing crossing and culvert |
| • Drain 8, Hwy 120 to FCOC | Widen channel 10 feet along west side |

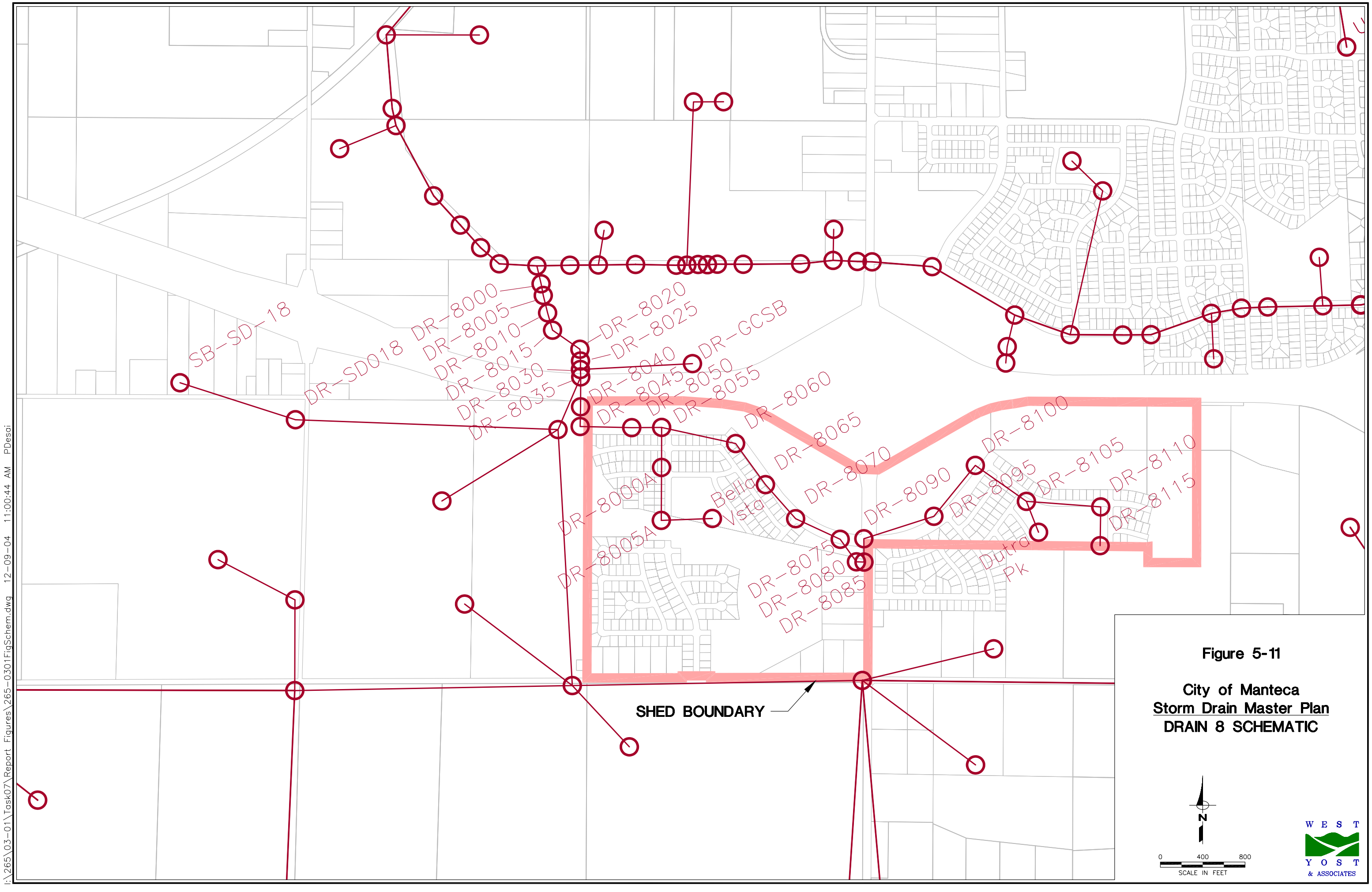


Figure 5-11

City of Manteca
Storm Drain Master Plan
DRAIN 8 SCHEMATIC

**Table 5-12. Drain 8 - Flows**

| Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$ | Upstream Max Water Elevation, feet | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|
| DR-8115 | DR-8110 | Circular | PIPE | 1.3 | 21.3 | 4.0 | |
| DR-8110 | DR-8105 | Circular | PIPE | 2.9 | 21.3 | 4.0 | |
| DR-8105 | DR-8100 | Circular | PIPE | 5.5 | 21.3 | 4.0 | |
| DR-8100 | DR-8095 | Circular | PIPE | 5.8 | 21.3 | 4.0 | |
| DR-8095 | DR-8090 | Circular | PIPE | 6.2 | 21.2 | 4.0 | |
| DR-8090 | DR-8085 | Circular | PIPE | 6.3 | 21.2 | 4.0 | |
| DR-8085 | DR-8080 | Rectangle | BOX CULVERT | 6.4 | 21.2 | 6.0 | 2.5 |
| DR-8080 | DR-8075 | Circular | PIPE | 6.5 | 21.2 | 4.0 | |
| DR-8075 | DR-8070 | Circular | PIPE | 6.6 | 21.2 | 4.0 | |
| DR-8070 | DR-8065 | Circular | PIPE | 6.7 | 21.2 | 4.0 | |
| DR-8065 | DR-8060 | Circular | PIPE | 7.0 | 21.2 | 4.0 | |
| DR-8060 | DR-8055 | Circular | PIPE | 7.3 | 21.2 | 4.0 | |
| DR-8005A | DR-8000A | Circular | PIPE | 14.4 | 21.2 | 4.0 | |
| DR-8000A | DR-8055 | Circular | PIPE | 15.5 | 21.2 | 4.0 | |
| DR-8055 | DR-8050 | Circular | PIPE | 16.9 | 21.2 | 5.5 | |
| DR-8050 | DR-8045 | Circular | PIPE | 10.7 | 21.2 | 5.5 | |
| DR-8045 | DR-8040 | Circular | PIPE | 12.0 | 21.2 | 4.0 | |
| DR-8040 | DR-8035 | Circular | PIPE | 47.2 | 21.2 | 4.0 | |
| DR-8035 | DR-8030 | Natural | OPEN CHANNEL | 124.2 | 21.1 | | |
| DR-8030 | DR-8025 | Natural | OPEN CHANNEL | 130.7 | 21.1 | | |
| DR-8025 | DR-8020 | Natural | OPEN CHANNEL | 133.6 | 21.1 | | |
| DR-8015 | DR-8020 | Rectangle | BOX CULVERT | 134.9 | 21.1 | 8.0 | |
| DR-8015 | DR-8010 | Natural | OPEN CHANNEL | 134.5 | 21.0 | | |
| DR-8010 | DR-8005 | Natural | OPEN CHANNEL | 140.0 | 21.0 | | |
| DR-8005 | DR-8000 | Natural | OPEN CHANNEL | 135.8 | 21.0 | | |
| DR-8000 | FC-25 | Natural | OPEN CHANNEL | 134.1 | 21.0 | | |

## Table 5-13. Drain 8 - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-8115 | 25.2 | 17.31 | 21.3 | 24.9 | -3.6 | OK |
| DR-8110 | 23.5 | 17.15 | 21.3 | 23.2 | -1.9 | OK |
| Dutra Pk | 20.88 | 4 | 14.2 | 20.6 | -6.4 | OK |
| DR-8105 | 24.5 | 16.87 | 21.3 | 24.2 | -2.9 | OK |
| DR-8100 | 23.5 | 16.61 | 21.3 | 23.2 | -1.9 | OK |
| DR-8095 | 23 | 16.36 | 21.2 | 22.7 | -1.5 | OK |
| DR-8090 | 23 | 16.08 | 21.2 | 21.6 | -0.4 | OK |
| DR-8085 | 23 | 16.03 | 21.2 | 21.5 | -0.2 | OK |
| DR-8080 | 23 | 15.14 | 21.2 | 21.1 | 0.1 | PROBLEM |
| DR-8075 | 23 | 15.07 | 21.2 | 21.1 | 0.1 | PROBLEM |
| DR-8070 | 23 | 14.92 | 21.2 | 22.5 | -1.3 | OK |
| DR-8065 | 22.8 | 14.74 | 21.2 | 20.9 | 0.3 | PROBLEM |
| DR-8060 | 22.8 | 14.56 | 21.2 | 20.7 | 0.5 | PROBLEM |
| BellaVsta | 18 | 1.96 | 12.7 | 17.7 | -5.0 | OK |
| DR-8005A | 23.5 | 13.62 | 21.2 | 20.3 | 0.9 | PROBLEM |
| DR-8000A | 23.5 | 13.46 | 21.2 | 20.7 | 0.5 | PROBLEM |
| DR-8055 | 22.8 | 13.29 | 21.2 | 21.7 | -0.5 | OK |
| DR-8050 | 22 | 13.18 | 21.2 | 21.7 | -0.5 | OK |
| DR-8045 | 23.2 | 13.06 | 21.2 | 22.9 | -1.7 | OK |
| DR-8040 | 27.7 | 13.63 | 21.2 | 27.4 | -6.2 | OK |
| DR-8035 | 27.7 | 14.08 | 21.1 | 27.4 | -6.3 | OK |
| DR-GCSB | 22 | 12 | 16.0 | 21.7 | -5.7 | OK |
| DR-8030 | 22.71 | 14.1 | 21.1 | 21.1 | 0.0 | PROBLEM |
| DR-8025 | 22.71 | 14.09 | 21.1 | 21.1 | 0.0 | PROBLEM |
| DR-8020 | 22.76 | 14.72 | 21.1 | 22.5 | -1.4 | OK |
| DR-8015 | 22.71 | 14.87 | 21.0 | 21.1 | -0.1 | PROBLEM |
| DR-8010 | 22.2 | 14.67 | 21.0 | 21.6 | -0.6 | OK |
| DR-8005 | 22.2 | 15.32 | 21.0 | 19.7 | 1.3 | PROBLEM |
| DR-8000 | 21.76 | 15.08 | 21.0 | 19.7 | 1.3 | PROBLEM |

## SOUTH DRAIN

The Manteca General Plan designates a large area in south Manteca for development. The South Manteca plan area extends from the western city limits east past Highway 99 and is bounded on the north by Highway 120 and on the south by the city limits (see Figure 5-12). The area also includes land to the east to Austin Road between Highway 99 and one half mile north of Yosemite Avenue.

The South Drain was planned to serve these 7,680 acres of developing land. The land has historically been in agricultural land uses but is rapidly developing into primarily residential housing, commercial and industrial uses. The South Drain begins north of Yosemite Avenue and runs south to Highway 99. The South Drain turns west crossing under the highway and the Union Pacific Railroad tracks and continues along Woodward Road to Airport Way. The South Drain splits at Airport Way with early stages of development conveyed west along Woodward Avenue and north to Highway 120 and pumped into Drain 8. Drainage from later stages of development will be conveyed south along Airport Way and pumped into Drain 10. Drainage flows will be carried in Drain 10 and connect to Drain 11 and outfall to the San Joaquin River.

The Manteca south area is designated Drainage Financing Zone 36. The South Drain is planned to be the primary drainage facility for Zone 36. The City adopted a policy for development of the South Area Master Plan that at all stages of development, 10-year storm drainage protection will be provided by diverting all storm runoff to detention basins before being discharged to a terminal drainage facility. Detention basins are to provide attenuation of peak runoff and water quality treatment consistent with the City's NPDES permit. Basins and pump stations for the South Drain area will be sized in accordance with City standards as presented in Chapter 3, Policies and Design Criteria.

The South Drain was sized using the City XP-SWMM model prepared for the Master Plan. Figure 5-12 shows a schematic of the XP-SWMM model for South Drain. Lands draining to the South Drain and their land uses as designated by the General Plan and shown in Figure 5-13 and tabulated in Tables 5-14 and 5-15. The phasing of South Drain construction continues to follow the 1993 plan.

The map of Figure 5-14 shows the five major components of the South Drain system:

- The primary South Drain begins north of Yosemite Avenue, follows Austin Avenue south to Woodward Avenue and turns west along Woodward Avenue to Airport Way. The north-south leg begins with a 30 inch diameter pipe and increases to 42 inches as it crosses under Highway 99, Moffat Boulevard and the Union Pacific Railroad tracks.
- A southern tributary, 60 inches in diameter, beginning in the proposed industrial area, traversing west along a future road designated in the General Plan and north along South Main Street connecting with the South Drain.
- The north diversion of 66 inches in diameter that would bring a portion of South Drain flow from Airport Way west along Woodward Avenue and north along the alignment of the proposed road designated in the General Plan to Highway 120. A pump station would pump flow through a force main to Drain 8 and to the FCOC.
- A 36 inch increasing to 48 inch pipe tributary that would convey flows from the west near Oakwood Lake east to the north diversion.

Figure 5-12

City of Manteca
Storm Drain Master Plan
SOUTH DRAIN SCHEMATIC

N

0 1200 2400
SCALE IN FEET

WEST YOST & ASSOCIATES

SHED BOUNDARY

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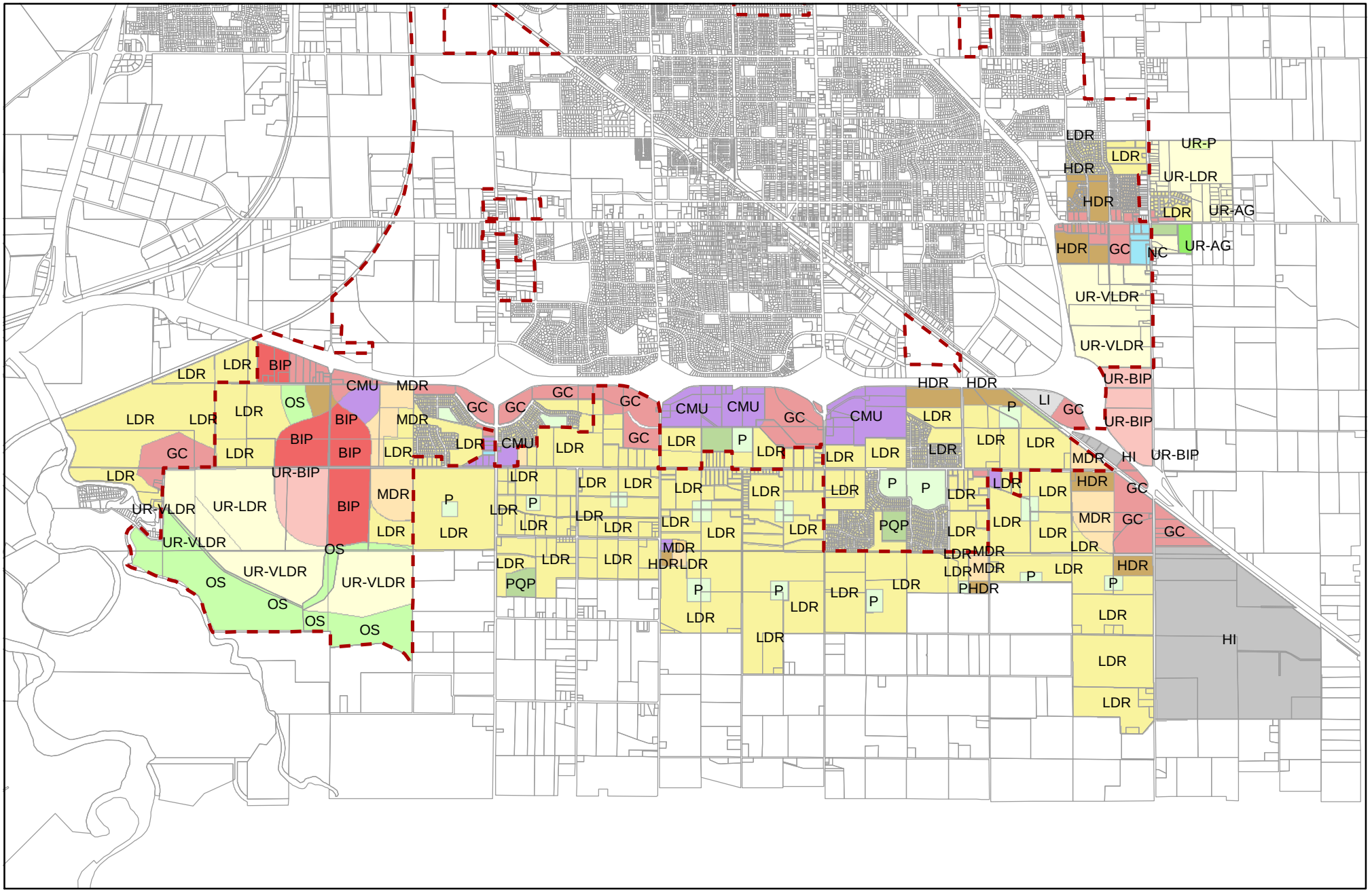


**Figure 5-13**

**City of Manteca**
**Storm Drain Master Plan**
**LAND USE - SOUTH DRAIN SUBSHED**

WEST YOST & ASSOCIATES

SOUTH DRAIN PUMP STATION

SOUTH DRAIN FORCEMAIN

Rim 17.00
Inv -1.06
SDPS

80 cfs

DR-SD018

d=2.0'

DR-SD010

Rim 14.00
Inv 6.04

d=3.0'

DR-SD015

d=4.0'

19 cfs

Rim 16.00
Inv 4.82

DR-SD016

d=5.5'

DR-SD019

Rim 7.00
Inv 2.69

d=2.0'

DR-SD019

DR-SD020

d=5.0'

50 cfs

Rim 24.00
Inv 7.51

DR-SD025

d=6.0'

133 cfs

Rim 27.00
Inv 11.15

DR-SD030

d=6.0'

DR-SD035

d=6.0'

Rim 33.00
Inv 14.86

DR-SD038

DR-SD040

d=5.5'

DR-SD045

d=5.5'

118 cfs

Rim 37.00
Inv 24.10

DR-SD048

DR-SD050

d=4.5'

59 cfs

DR-SD055

d=4.5'

Rim 41.00
Inv 31.20

DR-SD060

d=4.5'

DR-SD065

d=4.0'

37 cfs

DR-SD070

d=3.5'

15 cfs

Rim 43.00
Inv 33.50

DR-SD075

d=3.5'

Rim 48.00
Inv 35.80

DR-SD080

d=3.0'

DR-SD085

d=3.0'

Rim 48.00
Inv 38.53

DR-SD090

d=2.5'

Rim 50.00
Inv 39.48

DR-SD095

d=2.5'

Rim 46.00
Inv 40.96

DR-SD100

d=2.0'

d=2.0'

DR-XSD-10

d=2.0'

DR-XSD-9

d=2.0'

DR-XSD-8

d=2.0'

DR-XSD-7

d=5.0'

50 cfs

d=5.0'

DR-XSD-1

d=5.0'

DR11-OF PS

DRAIN 10

DRAIN 10/11

PUMP STATION TO DRAIN 10

LEGEND

- EXISTING PIPE
- PROPOSED PIPE
- OPEN CHANNEL
- PROPOSED OPEN CHANNEL
- ASSUMED LOCATION OF INFLOW FROM ADJOINING PROPERTY
- ASSUMED DETENTION STORAGE
- OTHER CHANNELS/PIPES

N

0 1100 2200

SCALE IN FEET

**Figure 5-14**
**City of Manteca**
**Storm Drain Master Plan**
**SOUTH DRAIN PLAN**

W E S T
Y O S T
& ASSOCIATES

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**Table 5-14. Proposed South Drain Land Use Data, acres**

| Subshed Number | VLDR | LDR | MDR | HDR | BIP | CMU | GC | LI | HI | PQP | NC | P | OS | RDS | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79 | 9.90 | 52.67 | 0.00 | 0.00 | 0.00 | 0.00 | 3.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.74 | 73.61 |
| 78 | 0.01 | 25.48 | 22.51 | 38.01 | 0.00 | 0.00 | 26.36 | 0.00 | 0.00 | 0.03 | 4.78 | 0.00 | 0.00 | 22.02 | 139.20 |
| 65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.00 | 0.00 | 0.00 | 0.00 | 2.30 | 9.30 |
| 61 | 0.00 | 0.00 | 0.00 | 32.96 | 0.00 | 0.00 | 19.79 | 0.00 | 0.00 | 0.00 | 14.21 | 0.00 | 0.00 | 3.43 | 70.39 |
| 59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 14.74 | 14.74 |
| 60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.70 | 7.70 |
| 91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.64 | 16.36 | 0.00 | 4.53 | 0.00 | 0.00 | 0.00 | 3.29 | 40.81 |
| 912 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.10 | 0.00 | 10.47 | 0.00 | 0.00 | 0.00 | 0.00 | 1.51 | 20.08 |
| 53 | 0.00 | 152.15 | 0.00 | 0.00 | 0.00 | 5.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.24 | 0.00 | 0.19 | 167.59 |
| 62 | 0.00 | 61.09 | 14.75 | 13.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 5.40 | 0.00 | 4.28 | 99.57 |
| 63 | 0.00 | 71.27 | 0.00 | 6.94 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.10 | 0.00 | 2.31 | 85.62 |
| 64 | 0.00 | 21.98 | 0.00 | 25.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.81 | 49.55 |
| 48 | 0.00 | 131.01 | 0.00 | 0.00 | 0.00 | 0.01 | 2.33 | 0.00 | 0.00 | 0.00 | 0.00 | 50.62 | 0.00 | 25.13 | 209.10 |
| 52 | 0.00 | 45.44 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.62 | 62.08 |
| 87 | 0.00 | 0.02 | 0.00 | 0.01 | 0.00 | 95.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.89 | 96.80 |
| 88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.94 | 71.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.25 | 76.48 |
| 43 | 0.00 | 127.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.64 | 0.00 | 0.00 | 0.00 | 9.49 | 155.05 |
| 49 | 0.00 | 49.38 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.00 | 54.38 |
| 50 | 0.00 | 48.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.07 | 0.00 | 5.08 | 66.05 |
| 89 | 0.00 | 22.44 | 0.00 | 0.00 | 0.00 | 91.22 | 0.00 | 0.00 | 0.00 | 36.10 | 0.00 | 0.08 | 0.00 | 2.80 | 152.63 |
| 90 | 0.00 | 22.57 | 0.00 | 0.00 | 0.00 | 0.00 | 61.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.44 | 86.35 |
| 41 | 0.00 | 147.75 | 3.68 | 0.06 | 0.00 | 3.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.24 | 0.00 | 2.48 | 166.55 |
| 51 | 0.00 | 27.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 3.98 | 31.17 |
| 83 | 0.00 | 17.07 | 0.01 | 0.00 | 0.00 | 0.03 | 27.77 | 0.00 | 0.00 | 0.00 | 0.00 | 5.02 | 0.00 | 10.73 | 60.61 |
| 86 | 0.00 | 34.59 | 0.00 | 0.00 | 0.00 | 0.00 | 36.31 | 0.00 | 0.00 | 0.00 | 0.00 | 6.95 | 0.00 | 11.67 | 89.51 |
| 34 | 0.00 | 79.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.75 | 0.00 | 2.66 | 87.10 |
| 35 | 0.00 | 92.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.74 | 0.00 | 2.21 | 99.97 |
| 38 | 0.00 | 75.59 | 5.09 | 0.00 | 0.00 | 9.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.93 | 102.00 |
| 28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.76 | 0.21 | 16.97 |
| 30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 81.04 | 0.29 | 81.32 |
| 33 | 0.00 | 152.06 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.66 | 0.00 | 3.20 | 161.16 |
| 18 | 0.00 | 36.10 | 0.00 | 0.00 | 27.34 | 0.00 | 21.43 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 84.86 |
| 25 | 0.00 | 88.80 | 0.00 | 15.21 | 21.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 21.85 | 3.10 | 150.73 |
| 84 | 0.00 | 11.81 | 36.77 | 2.02 | 24.35 | 24.74 | 18.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 118.97 |
| 27 | 0.00 | 0.06 | 0.00 | 0.00 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 4.90 | 5.13 |
| 85 | 0.00 | 19.97 | 8.42 | 0.00 | 28.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 56.63 |
| 26 | 0.00 | 40.22 | 0.00 | 0.00 | 35.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 75.71 |
| 24 | 0.00 | 232.56 | 0.00 | 0.00 | 0.00 | 0.00 | 49.64 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 282.35 |
| 29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 193.15 | 7.26 | 200.41 |
| 42 | 0.00 | 155.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.69 | 0.00 | 5.84 | 170.49 |
| 39 | 0.00 | 65.50 | 0.00 | 0.00 | 0.00 | 9.96 | 1.89 | 0.00 | 0.00 | 0.00 | 2.72 | 0.00 | 0.00 | 7.41 | 87.49 |
| 40 | 0.00 | 25.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.62 | 28.45 |
| 31 | 0.00 | 28.30 | 48.96 | 0.13 | 73.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 14.57 | 3.34 | 169.06 |
| 23 | 0.00 | 35.14 | 0.00 | 0.00 | 0.00 | 0.00 | 9.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.57 | 48.23 |
| Total | 9.92 | 2198.52 | 140.47 | 134.48 | 211.07 | 241.52 | 374.57 | 16.36 | 10.47 | 65.98 | 21.72 | 129.53 | 327.36 | 229.97 | |

**Table 5-15. South Drain**

| Link Name | u/s Node | d/s Node | GS Elev u/s | GS Elev d/s | US Invert | DS Invert | Length, feet | Slope | Diameter | Max Flow, cfs | Qfull 0.015 | Cover | HGL u/s | HGL d/s | Location/Reach |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |
| DRPSD095.1 | DR-SD100 | DR-SD095 | 46 | 50 | 40.96 | 39.98 | 750 | 0.00130 | 2.0 | 2.1 | 7.1 | 3.0 | 41.7 | 41.3 | Along Austin Road |
| DRPSD090.1 | DR-SD095 | DR-SD090 | 50 | 48 | 39.48 | 39.03 | 700 | 0.00065 | 2.5 | 8.9 | 9.1 | 8.0 | 41.3 | 40.5 | Along Austin Road |
| DRPSDO85 | DR-SD090 | DR-SD085 | 48 | 45 | 38.53 | 37.40 | 2250 | 0.00050 | 3.0 | 9.5 | 13.0 | 6.5 | 40.5 | 39.8 | Along Austin Road |
| DRPSR080 | DR-SD085 | DR-SD080 | 45 | 48 | 37.40 | 36.30 | 2000 | 0.00055 | 3.0 | 13.5 | 13.6 | 4.6 | 39.8 | 38.1 | Along Austin Road |
| DRPSD075.1 | DR-SD080 | DR-SD075 | 48 | 45 | 35.80 | 34.43 | 2750 | 0.00050 | 3.5 | 14.5 | 19.6 | 8.7 | 38.1 | 37.0 | Along Austin Road |
| DRPSD070 | DR-SD075 | DR-SD070 | 45 | 43 | 34.43 | 34.00 | 850 | 0.00050 | 3.5 | 15.0 | 19.6 | 7.1 | 37.0 | 36.7 | Along Austin Road |
| DRPSD065 | DR-SD070 | DR-SD065 | 43 | 41 | 33.50 | 31.70 | 3000 | 0.00060 | 4.0 | 29.9 | 30.6 | 5.5 | 36.7 | 34.6 | Rail Rd to Main Street |
| DRPSD060 | DR-SD065 | DR-SD060 | 41 | 42 | 31.20 | 30.30 | 1800 | 0.00050 | 4.5 | 36.6 | 38.3 | 5.3 | 34.6 | 33.5 | Rail Rd to Main Street |
| DRPSD055 | DR-SD060 | DR-SD055 | 42 | 40 | 30.30 | 29.15 | 1750 | 0.00066 | 4.5 | 38.7 | 43.9 | 7.2 | 33.5 | 32.2 | Rail Rd to Main Street |
| DRPSD050 | DR-SD055 | DR-SD050 | 40 | 37 | 29.15 | 25.10 | 2700 | 0.00150 | 4.5 | 48.1 | 66.3 | 6.4 | 32.2 | 28.6 | Rail Rd to Main Street |
| DRPSD045 | DR-SD050 | DR-SD045 | 37 | 30 | 24.10 | 19.73 | 2650 | 0.00165 | 5.5 | 117.6 | 118.9 | 7.4 | 28.6 | 24.2 | Main Street to Union Rd |
| DRPSD040 | DR-SD045 | DR-SD040 | 30 | 33 | 19.73 | 15.36 | 2650 | 0.00165 | 5.5 | 117.6 | 118.9 | 4.8 | 24.2 | 19.6 | Main Street to Union Rd |
| DRPSD035 | DR-SD040 | DR-SD035 | 33 | 27 | 14.86 | 12.41 | 1750 | 0.00140 | 6.0 | 131.5 | 138.1 | 12.1 | 19.6 | 17.2 | Union Rd to Airport Way |
| DRPSD030 | DR-SD035 | DR-SD030 | 27 | 27 | 12.41 | 11.15 | 900 | 0.00140 | 6.0 | 132.2 | 138.1 | 8.6 | 17.2 | 16.1 | Union Rd to Airport Way |
| DRPSD025 | DR-SD030 | DR-SD025 | 27 | 24 | 11.15 | 7.51 | 2600 | 0.00140 | 6.0 | 132.1 | 138.1 | 9.9 | 16.1 | 11.2 | Union Rd to Airport Way |
| DRPSD020 | DR-SD025 | DR-SD020 | 24 | 17 | 8.51 | 4.59 | 2800 | 0.00140 | 5.0 | 48.1 | 84.9 | 10.5 | 11.2 | 8.1 | West of Airport Way |
| DRPSD018 | DR-SD020 | DR-SD019 | 17 | 17 | 4.09 | 2.69 | 1400 | 0.00100 | 5.5 | 48.1 | 92.5 | 7.4 | 8.1 | 7.2 | West of Airport Way |
| DRPSDPS | DR-SD019 | DR-SDPS | 17 | 17 | 2.69 | -1.06 | 3740 | 0.00100 | 5.5 | 50.8 | 92.5 | 8.8 | 7.2 | 3.6 | Airport Way to Drain 8 |
| | | | | | | | | | | | | | | | |
| DPSD015W.1 | DR-SD010 | DR-SD015 | 14 | 16 | 6.04 | 5.32 | 1600 | 0.00045 | 3.5 | 11.6 | 18.6 | 4.5 | 10.1 | 9.3 | |
| DRPSD015.1 | DR-SD015 | DR-SD019 | 16 | 17 | 4.82 | 4.19 | 1400 | 0.00045 | 4.0 | 16.7 | 26.5 | 7.2 | 9.3 | 8.1 | |
| | | | | | | | | | | | | | | | |
| DRPSD017 | DR-SD018 | DR-SDPS | 15 | 17 | 8.39 | 5.59 | 2800 | 0.00100 | 2.0 | 4.1 | 6.2 | 4.6 | 9.9 | 3.6 | |

- A 60 inch diameter south diversion that would convey the remaining portion of South Drain flow south along Airport Way to a pump station that will lift flow into Drain 10 and downstream into Drain 11.

The present South Drain plan includes two drains serving the area east of South Main Street, a Woodward Avenue drain from Austin Road to South Main Street and an industrial lateral from the planned industrial area south of Woodward Avenue then west to South Main Street and north to Woodward Avenue (see Figure 5-14). From Main Street, the South Drain continues west to Airport Way and the pump stations.

As was discussed above, the present General Plan includes changes in land uses and adds new land areas to the South Drain service area; areas that were not included in the 1990 General Plan used for the 1993 study. In the 1993 study, the previous basis for South Drain planning, the South Area produced a peak 10-year outflow after detention of 138 cfs; the present analysis results in an equivalent flow of approximately 166 cfs.

South Drain flows are shown on Table 5-16. Table 5-17, South Drain Water Elevations, shows model output data at each model node.

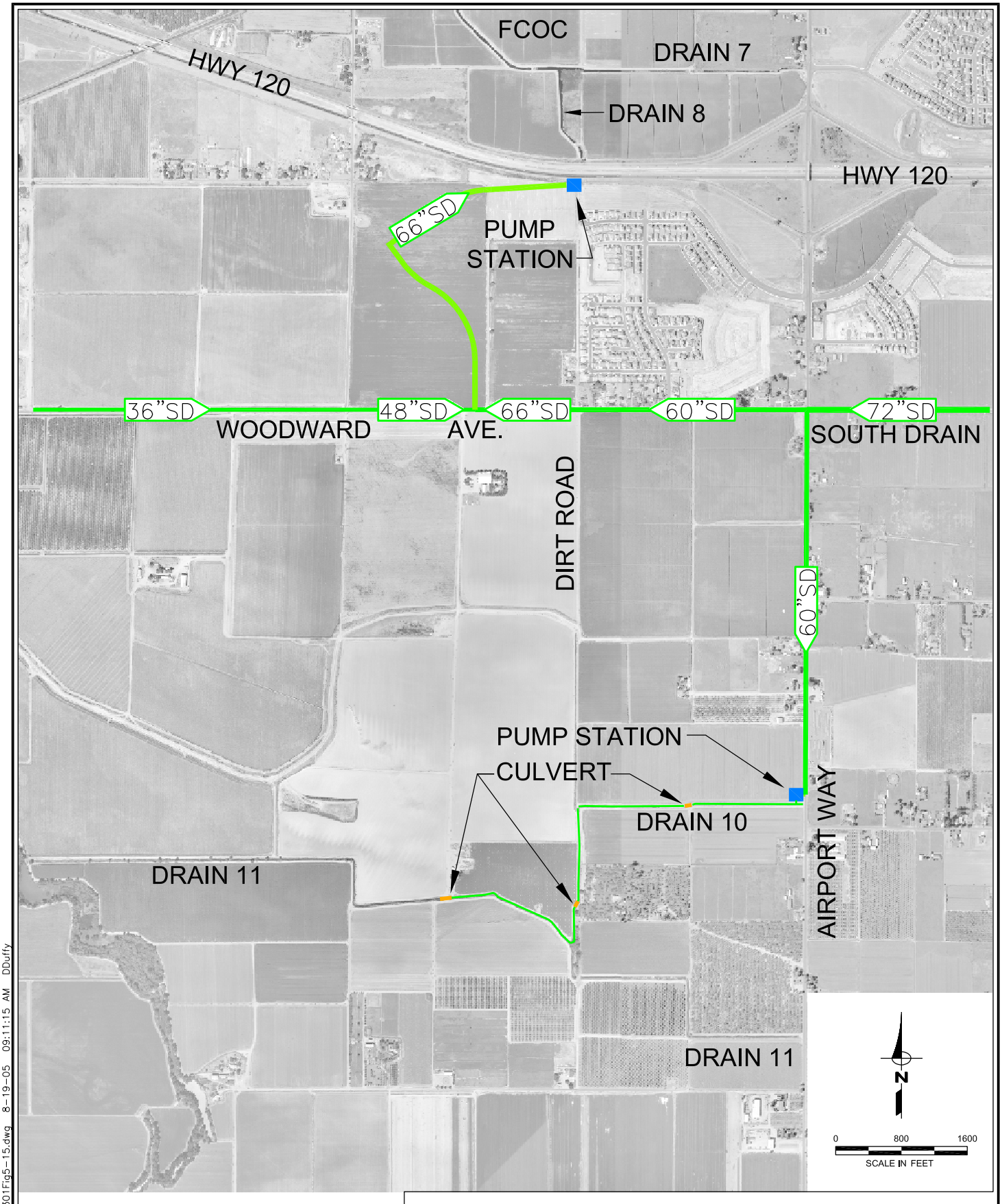
**Western Terminus of South Drain**

Several potential locations for the western terminus of the South Drain were investigated. These included alternative alignments, pumping facilities and the location of the ultimate receiving waters. A technical memorandum submitted and discussed during the preparation of the Master Plan identified Drain 11 and the FCOC as the optimum South Drain receiving waters. The Drain 11 alignment has some potential problems and a risk of unknowns that may delay construction of the needed facilities. The FCOC is expected to have fewer problems and can be on-line in a shorter time.

A hybrid plan for the ultimate discharge of the South Drain was adopted for the Master Plan. The plan is to use the FCOC alternative for the first several years of the South Area buildout. A second phase would divert additional flows to Drain 11. This hybrid alternative will provide time for the City to pursue the approvals and permits necessary to utilize Drain 11.

An earlier discussion presented the results of the Master Plan analysis of the FCOC and recommended improvements to assure that the facility will meet the needs of the Master Plan buildout period. With completion of the recommended improvements, the Master Plan analysis shows that the FCOC will have capacity to receive about 80 cfs of South Drain flow. Analysis shows that if more than 80 cfs is added from the South Drain, the FCOC will have to be widened at several locations.

The Master Plan provides for two South Drain outfall locations, Figure 5-15. The first 80 cfs will be pumped to Drain 8 and the FCOC and subsequent flows will be directed to and pumped into Drains 10 and 11. The first phase is expected to meet the drainage needs for ten years of South Area development. This estimate is based on present planning and may change with changing conditions and development plans. Planning should begin immediately to assure that the second phase, South Drain outfall to Drain 11, will be in place when South Area development requires.




LEGEND:

- STORM DRAIN
- NEW CULVERT
- 60"SD CHANNEL IMPROVEMENTS
- PUMP STATION SITE

**Figure 5-15**

**City of Manteca**
**Storm Drain Master Plan**
**SOUTH DRAIN**

WEST YOST & ASSOCIATES

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**Table 5-16. South Drain - Flows**

| Upstream Node | Downstream Node | Conduit Class | Conduit Type | Max Flow, $ft^3/s$, $m^3/s$ | Upstream Max Water Elevation, feet, meters | Pipe Diameter/ Box Culvert Width, feet | Box Culvert Height, feet |
|---|---|---|---|---|---|---|---|
| DR-SD018 | SDPS | Circular | PIPE | 4.1 | 9.9 | 2.0 | |
| DR-SD100 | DR-SD095 | Circular | PIPE | 2.1 | 41.7 | 2.0 | |
| DR-SD095 | DR-SD090 | Circular | PIPE | 8.9 | 41.3 | 2.5 | |
| DR-SD090 | DR-SD085 | Circular | PIPE | 9.5 | 40.5 | 3.0 | |
| DR-SD085 | DR-SD080 | Circular | PIPE | 13.5 | 39.8 | 3.0 | |
| DR-SD080 | DR-SD075 | Circular | PIPE | 14.5 | 38.1 | 3.5 | |
| DR-SD075 | DR-SD070 | Circular | PIPE | 15.0 | 37.0 | 3.5 | |
| DR-SD070 | DR-SD065 | Circular | PIPE | 29.9 | 36.7 | 4.0 | |
| DR-SD065 | DR-SD060 | Circular | PIPE | 36.6 | 34.6 | 4.5 | |
| DR-SD060 | DR-SD055 | Circular | PIPE | 38.7 | 33.5 | 4.5 | |
| DR-SD052 | DR-SD055 | Circular | PIPE | 1.8 | 36.3 | 2.0 | |
| DR-SD055 | DR-SD050 | Circular | PIPE | 48.2 | 32.2 | 4.5 | |
| DR-SD048 | DR-SD050 | Circular | PIPE | 11.6 | 32.1 | 2.5 | |
| DR-XSD-6 | DR-SD050 | Circular | PIPE | 52.5 | 31.5 | 5.0 | |
| DR-SD050 | DR-SD045 | Circular | PIPE | 117.6 | 28.6 | 5.5 | |
| DR-XSD-7 | DR-SD045 | Circular | PIPE | 4.4 | 26.0 | 2.0 | |
| DR-SD045 | DR-SD040 | Circular | PIPE | 117.6 | 24.2 | 5.5 | |
| DR-SD038 | DR-SD040 | Circular | PIPE | 14.0 | 27.1 | 2.5 | |
| DR-XSD-8 | DR-SD040 | Circular | PIPE | 3.5 | 23.3 | 2.0 | |
| DR-SD040 | DR-SD035 | Circular | PIPE | 131.5 | 19.6 | 6.0 | |
| DR-SD035 | DR-SD030 | Circular | PIPE | 132.2 | 17.2 | 6.0 | |
| DR-XSD-9 | DR-SD030 | Circular | PIPE | 2.6 | 16.7 | 2.0 | |
| DR-SD030 | DR-SD025 | Circular | PIPE | 132.1 | 16.1 | 6.0 | |
| DR-XSD-10 | DR-SD025 | Circular | PIPE | 3.3 | 15.2 | 2.0 | |
| DR-SD025 | DR-SD020 | Circular | PIPE | 48.1 | 11.2 | 5.0 | |
| DR-SD016 | DR-SD015 | Circular | PIPE | 4.9 | 9.5 | 3.5 | |
| DR-SD019 | DR-SD015 | Circular | PIPE | 0.4 | 11.9 | 2.0 | |
| DR-SD010 | DR-SD015 | Circular | PIPE | 11.6 | 10.1 | 3.0 | |
| DR-SD015 | DR-SD020 | Circular | PIPE | 16.7 | 9.3 | 4.0 | |
| DR-SD020 | SDPS | Circular | PIPE | 70.1 | 8.1 | 5.5 | |

## Table 5-17. South Drain - Water Surface Elevations

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-SD100 | 46 | 40.96 | 41.7 | 45.7 | -4.0 | OK |
| SB-SD-78 | 50 | 40.4 | 43.7 | 49.7 | -6.0 | OK |
| DR-SD095 | 50 | 39.48 | 41.3 | 49.7 | -8.4 | OK |
| SB-SD-65 | 48 | 40.03 | 43.0 | 47.7 | -4.7 | OK |
| DR-SD090 | 48 | 38.53 | 40.5 | 47.7 | -7.2 | OK |
| SB-SD-61 | 45 | 37.66 | 40.7 | 44.7 | -4.0 | OK |
| DR-SD085 | 45 | 37.4 | 39.8 | 44.7 | -4.9 | OK |
| SB-SD-59 | 48 | 36.75 | 40.6 | 47.7 | -7.1 | OK |
| DR-SD080 | 48 | 35.8 | 38.1 | 47.7 | -9.6 | OK |
| SB-SD-60 | 45 | 34.08 | 37.8 | 44.7 | -6.9 | OK |
| DR-SD075 | 45 | 34.43 | 37.0 | 44.7 | -7.7 | OK |
| SB-SD-91 | 43 | 33.63 | 36.9 | 42.7 | -5.8 | OK |
| SB-XSD-1 | 43 | 33.63 | 38.6 | 42.7 | -4.1 | OK |
| DR-XSD-1 | 44 | 34.2 | 37.5 | 43.7 | -6.2 | OK |
| SB-XSD-2 | 43 | 33.63 | 36.9 | 42.7 | -5.8 | OK |
| SB-XSD-3 | 43 | 33.63 | 35.8 | 42.7 | -6.9 | OK |
| DR-XSD-3 | 43 | 33.39 | 36.8 | 42.7 | -5.9 | OK |
| DR-SD070 | 43 | 33.5 | 36.7 | 42.7 | -6.0 | OK |
| SB-SD-53 | 41 | 31.28 | 33.8 | 40.7 | -6.9 | OK |
| SB-SD-62 | 41 | 31.28 | 34.3 | 40.7 | -6.4 | OK |
| SB-XSD--4 | 41 | 31.28 | 33.5 | 40.7 | -7.2 | OK |
| DR-XSD-4 | 41 | 31.59 | 35.1 | 40.7 | -5.6 | OK |
| DR-SD065 | 41 | 31.2 | 34.6 | 40.7 | -6.1 | OK |
| SB-SD-63 | 42 | 30.3 | 33.3 | 41.7 | -8.4 | OK |
| DR-SD060 | 42 | 30.3 | 33.5 | 41.7 | -8.2 | OK |
| SB-SD-64 | 40 | 35.33 | 36.6 | 39.7 | -3.1 | OK |
| DR-SD052 | 40 | 35.33 | 36.3 | 39.7 | -3.4 | OK |
| SB-SD-52 | 40 | 29.15 | 32.2 | 39.7 | -7.5 | OK |
| SB-SD-48 | 40 | 29.15 | 32.2 | 39.7 | -7.5 | OK |
| SB-XSD--5 | 40 | 29.15 | 32.2 | 39.7 | -7.5 | OK |
| DR-XSD-5 | 40 | 29.46 | 33.2 | 39.7 | -6.5 | OK |
| DR-SD055 | 40 | 29.15 | 32.2 | 39.7 | -7.5 | OK |
| SB-SD-87 | 35 | 29.79 | 31.3 | 34.7 | -3.4 | OK |
| SB-SD-88 | 35 | 29.79 | 31.3 | 34.7 | -3.4 | OK |
| DR-SD048 | 35 | 29.79 | 32.1 | 34.7 | -2.6 | OK |
| SB-SD-43 | 37 | 25.84 | 28.8 | 36.7 | -7.9 | OK |
| SB-SD-49 | 37 | 25.84 | 28.8 | 36.7 | -7.9 | OK |
| SB-SD-50 | 37 | 25.84 | 28.8 | 36.7 | -7.9 | OK |
| SB-XSD-6 | 37 | 25.84 | 28.8 | 36.7 | -7.9 | OK |
| DR-XSD-6 | 37 | 27.6 | 31.5 | 36.7 | -5.2 | OK |
| DR-SD050 | 37 | 24.1 | 28.6 | 36.7 | -8.1 | OK |
| SB-SD-42 | 30 | 21.58 | 23.2 | 29.7 | -6.5 | OK |
| SB-XSD-7 | 30 | 21.58 | 23.4 | 29.7 | -6.3 | OK |
| DR-XSD-7 | 30 | 21.78 | 26.0 | 29.7 | -3.7 | OK |
| DR-SD045 | 30 | 19.73 | 24.2 | 29.7 | -5.5 | OK |
| SB-SD-89 | 30 | 24.79 | 26.3 | 29.7 | -3.4 | OK |
| SB-SD-90 | 30 | 24.79 | 26.2 | 29.7 | -3.5 | OK |

**Table 5-17. South Drain - Water Surface Elevations, cont'd…**

| Node Name | Model Gr Elev, feet | Inv Elev, feet | 10-yr Max WSEL | Flood Elev, feet | Flood Depth, feet | HGL criteria - 0.5 feet below Rim Elev |
|---|---|---|---|---|---|---|
| DR-SD038 | 30 | 24.79 | 27.1 | 29.7 | -2.6 | OK |
| SB-SD-41 | 33 | 18.6 | 21.6 | 32.7 | -11.1 | OK |
| SB-SD-51 | 33 | 18.6 | 21.8 | 32.7 | -10.9 | OK |
| SB-XSD-8 | 33 | 18.6 | 21.6 | 32.7 | -11.1 | OK |
| DR-XSD-8 | 33 | 18.8 | 23.3 | 32.7 | -9.5 | OK |
| DR-SD040 | 33 | 14.86 | 19.6 | 32.7 | -13.1 | OK |
| SB-SD-40 | 27 | 15.72 | 18.7 | 26.7 | -8.0 | OK |
| DR-SD035 | 27 | 12.41 | 17.2 | 26.7 | -9.5 | OK |
| SB-SD-35 | 27 | 13.72 | 16.7 | 26.7 | -10.0 | OK |
| SB-XSD-9 | 27 | 13.72 | 16.7 | 26.7 | -10.0 | OK |
| DR-XSD-9 | 27 | 13.92 | 16.7 | 26.7 | -10.0 | OK |
| DR-SD030 | 27 | 11.15 | 16.1 | 26.7 | -10.6 | OK |
| SB-SD-34 | 24 | 10.96 | 14.0 | 23.7 | -9.7 | OK |
| SB-SD-38 | 24 | 10.96 | 14.2 | 23.7 | -9.5 | OK |
| SB-XSD-10 | 24 | 10.96 | 14.0 | 23.7 | -9.7 | OK |
| DR-XSD-10 | 24 | 11.16 | 15.2 | 23.7 | -8.5 | OK |
| DR-SD025 | 24 | 7.51 | 11.2 | 23.7 | -12.5 | OK |
| SB-SD-33 | 17 | 7.28 | 9.8 | 16.7 | -6.9 | OK |
| DR-SD020 | 17 | 4.09 | 8.1 | 16.7 | -8.6 | OK |
| SB-SD-28 | 25 | 19.79 | 20.8 | 24.7 | -3.9 | OK |
| DR-SD019 | 25 | 11.55 | 11.9 | 24.7 | -12.8 | OK |
| SB-SD-85 | 16 | 3.06 | 6.9 | 15.7 | -8.8 | OK |
| DR-SD015 | 16 | 6.85 | 9.3 | 15.7 | -6.4 | OK |
| SB-SD-25 | 15 | 8.01 | 10.3 | 14.7 | -4.4 | OK |
| SB-SD-84 | 15 | 8.01 | 11.0 | 14.7 | -3.7 | OK |
| DR-SD016 | 15 | 8.2 | 9.5 | 14.7 | -5.2 | OK |
| SB-SD-18 | 15 | 10.33 | 11.5 | 14.7 | -3.2 | OK |
| SB-SD-26 | 14 | 0.98 | 4.7 | 13.7 | -9.0 | OK |
| SB-SD-27 | 14 | 0.98 | 5.4 | 13.7 | -8.3 | OK |
| SB-SD-31 | 14 | 0.98 | 4.9 | 13.7 | -8.8 | OK |

**South Drain Flows - First Phase - FCOC**

The FCOC is a SSJID facility that conveys agricultural and urban drainage flows north from the vicinity of Highway 120 to French Camp Road and its outfall to French Camp Slough. The SSJID allows the City to discharge stormwater into the FCOC. Restrictions on the drainage flows that the District will accept in the FCOC and a growing Manteca have prompted the City to consider the need to expand the FCOC.

The Master Plan analysis using the City's XP-SWMM model demonstrates that 80 cfs of South Drain flow can be pumped into Drain 8 at Highway 120. This 80 cfs is about 48 percent of the ultimate South Area flow of 166 cfs and should provide capacity until about 2015. This South Drain flow will combine with Drain 8 flow and then combine with Drain 7 at the beginning of the FCOC.

Directing first phase South Drain flows to the FCOC requires that Master Plan improvements to Drain 8 and the FCOC be completed including construction of the following facilities:

1. Construction of FCOC Master Plan improvements
2. Construction of Drain 8 Master Plan improvements
3. Continuation of the South Drain from Woodward Avenue north to Highway 120
4. Construction of a pumping plant at Highway 120 to lift South Drain flows into Drain 8

South Drain from Airport Way to Highway 120

The first phase extension of the South Drain from Airport Way west on Woodward Avenue and north to the pump station (see Figure 5-15) to the pumping plant at Highway 120 will be a 60-inch diameter pipe, 5,200 feet in length. For flexibility and reliability, the pump station will have four 27 cfs units, one of which will be a standby unit. The pump discharge lines will manifold to a 30-inch pressure pipe jacked under the highway to Drain 8.

**South Drain Flows Second Phase - Drain 11**

The second phase South Drain outfall proposes to use SSJID Drains 10 and 11 to carry a portion of South Drain flow to an existing outfall at the San Joaquin River, Figures 5-15. The South Drain would be extended south along Airport Boulevard. A 60-inch diameter pipe would carry 90 cfs from Woodward Avenue south for 4,800 feet to Drain 10. A pump station constructed at the levee would lift drainage flows to the Drain 10 channel and conveyed 4,480 feet west to its confluence with Drain 11.

Drain 10 would be enlarged from Airport Way to its confluence with Drain 11. Drain 11 would be enlarged to convey the South Drain flow 7,150 feet west to an existing outfall at Walthall Slough. Four culvert structures would be re-constructed under access roads. A Drain 11 culvert at the Walthall Slough levee and an upgraded outfall structure at the slough would also be required.

The Airport Way / Drain 10 pump station would have 4 units totaling 90 cfs including a standby pump and motor unit. Pumps will lift South Drain flow about 11 feet from the South Drain pipe in Airport Way to the new channel.

The SSJID's Drains 10 and 11 will be widened from channel widths of 27 and 47 feet to 32 and 50 feet respectively. Adequate right of way will be obtained to provide for maintenance activities and access.

If Drains 10 and 11 are to be part of the south area drainage plan, agreements will have to be worked out between the SSJID and the City. There will have to be assurances that operations of the District are not compromised by conveying the City's drainage and that pumps discharging into the South Drain will be cycled or shut down to maintain desired water surface elevations in Drain 11. Use of the District facilities would be governed by the same restrictions that regulate the City's use of other SSJID drains. These requirements will necessitate the construction of adequately sized detention basins and similar telemetry controlled discharges that are in place for other SSJID drains used by the City.

Environmental issues include concerns over the widening of existing channels, re-constructing culverts at road crossings, excavating through the Walthall Slough levee to construct a new culvert and constructing of a larger outfall structure in Walthall Slough. The wider channels will provide opportunities for additional wetland habitat, and there will be opportunities for new habitat restoration along Drain 11. Widening the drains to carry higher flows will require mitigation to alleviate potential concerns of landowners along the channels. The impact of using the existing outfall location on Walthall Slough is somewhat lessened due to its historical use for discharge of runoff from the tributary area.

**Master Plan Projects**

The recommended improvements for the proposed South Drain are summarized below

| Location | Recommended Improvements |
|---|---|
| • South Drain | Construct South Drain to Airport Way |
| • From Airport Way along Woodward Avenue and north to Highway 120 | Construct 60-inch pipe, 5,200 feet |
| • Pump Station at Hwy 120 | |
| • Airport Way to Drain 10 | Construct 60-inch pipe, 4,800 feet |
| • Pump Station at Drain 10 | |
| • Drain 10 and 11 | Widen channels |

**SSJID LATERALS**

Some of the SSJID irrigation supply laterals are used by the City to convey drainage. The Master Plan provides for the continued use of the lateral where they are providing a service. Since they are an integral part of the City drainage system the laterals used for drainage are described below.

The SSJID laterals are the delivery pipes and channels distributing irrigation water to fields throughout the District. Manteca pumps drainage runoff to six SSJID laterals. Each of these laterals discharge to a drain or directly to the FCOC. Laterals are designed to be higher to allow gravity delivery of water to fields. Because their function is delivery and not drainage, it is

necessary to limit City drainage flows into laterals. SSJID limits flow in its laterals from City drains to 25 cfs.

Laterals Rf, Y and Z are affected by Master Plan projects. Drain 3A, which is now pumped into Lateral Rf at Pump Station 15 will be directed into Drain 3N. This was the only City drainage pumped into the lateral. Pump Station 8 used to pump to Lateral Y and Pump Station 9 used to pump to Lateral Z. Now both pump to Drain 7. Pump Station 17 continues to pump drainage to Lateral Z and Pump Station 7 continues to pump drainage to Lateral Y.

Lateral Re - receives about 7.7 cfs from Pump Stations 3 and 4 and discharges into Drain 3.

Lateral T - receives drainage from Pump Stations 1, 2, 10, 14, A, B, C, D and E. With a total drainage flow of 30 cfs, Lateral T is above the 25 cfs limit. Lateral T flows directly into the FCOC.

Lateral Tb - receives inflow from Pump Station 13. Lateral Tb terminates in Drain 5.

Lateral Z - receives inflow from Pump Stations 17 and 24 and discharges into Lateral Y.

Lateral Y - receives inflow from Pump Station 7 and from Lateral Z. Lateral Y is being relocated along Stadium Drive and discharges into Drain 7.

**DETENTION BASINS**

The Manteca Storm Drain Master Plan requires that all runoff collected in storm drains flow to a detention basin before being pumped into one of the drains that will convey flow to the FCOC and the Delta. Basins have traditionally been used to attenuate peak flows prior to entering drains to meet restrictions of the SSJID. In the future, most new basins will have a duel purpose to also provide stormwater treatment and reduce the pollutants in stormwater entering the drains.

Basins are sized in accordance with City design criteria, Chapter 3. The basic criterion is that basins are sized for the watershed runoff with 3.56 inches of rainfall. This storage volume was used in the XP-SWMM analysis for existing, proposed and future Master Plan basins. The modeling showed that even with some basins holding their water for a longer time, the storage volume appeared to be adequate. The City's model should be a valuable tool to evaluate future proposals.

Water quality treatment options are included in the design criteria of Chapter 3 and in Chapter 6, Water Quality. Water quality complicates multi-use of basins, at least for part of the basin area, but each situation should be analyzed in detail to obtain the maximum benefits of a joint use facility. Preliminary designs should also be reviewed by Parks and Recreation for their assistance and approval.

Table 5-18 shows existing basins including those under construction. In the coming years, a significant number of new basins will be required as shown in Table 5-19. Any efforts that landowners and developers may make to combine proposed developments and construct regional facilities would lead to operational difficulties. There is no land use policy in place that allows the City to direct the construction of regional detention basins. For the new developing land areas, sub-sheds were delineated and basins were sized and modeled.

**Table 5-18. Existing Detention Basins**

| Name | Location | Storm Drainage Volume, ac-ft | Basin Outlet | Controlled Outlet |
|---|---|---|---|---|
| Shasta Park | Place Ave and Snowshoe Way | 15.9 | Drain 3 | Pump Station #19 |
| Colony Park | Trailwood Avenue and Cedar Way | 6.4 | Drain 3 | None |
| Springtime Park | April Way and Springtime Avenue | 4.7 | Drain 3 | None |
| Doxey Park | Northgate Drive and Doxey Drive | 6.1 | Drain 3 | Pump Station #12 |
| Crestwood Park | Cottonwood Drive and Crestwood Avenue | 3.6 | Drain 3A | None |
| Spring Meadows | Pestina Avenue and Orange Blossum Drive | 6.3 | Drain 3 | Proposed Pump Station |
| Button Estates/Discovery Creek | Discovery Creek | 6.8 | Drain 3 | Pump Station #21 |
| K-Mart | Northgate and Main | 2.5 | Drain 3 | Electric Gate |
| Cardoza West | Louise and Main | 2.0 | Drain 3 | Electric Gate |
| Chadwick Square Park | London Avenue and Exeter Drive | 17.3 | Drain 3 | Pump Station #23 |
| Diamond Oaks Park | Pestana Avenue, and Diamond Oaks Way | 7.2 | Drain 3 | Pump Station #22 |
| Cheeks Creek | Along Drain 3 between Trailwood Avenue and Union Road | 6.5 | Drain 3 | None |
| Bay Meadows Park | Elm Avenue and Alameda Street | 5.1 | Drain 4 | None |
| Greystone Park | Agate Avenue and Turqoise Way | 4.3 | Drain 4 | Pump Station #11 |
| Mayor's Park | Stoker Way and Phillips Drive | 6.0 | Drain 4 | Pump Station #16 |
| Walnut Place Park | Union Pacific RR and Pioneer Avenue | 3.21 | Drain 4 | Pump Station #25 |
| Primavera Park | Primavera Avenue and Giuciano Way | 16.7 | Drain 4 | Proposed Pump Station |
| Curran Grove Park | Schadeck Street and Bernt Avenue | 12.7 | Drain 5 | Pump Station #26 |

**Table 5-18. Existing Detention Basins, cont'd…**

| Name | Location | Storm Drainage Volume, ac-ft | Basin Outlet | Controlled Outlet |
|---|---|---|---|---|
| Union West Park | Mercedes Avenue and Parkview Street | 4.2 | Drain 5 | None |
| Villa Tocino | Zurcih Drive and Solothum Eway | 13.1 | Drain 5 | Pump Station #28 |
| San Dominic | St. Dominic's Drive | 29.3 | Drain 5 | None |
| Quail Ridge Park | Mission Ridge Drive | 2.2 | Drain 7 | Pump Station #5 |
| Vintage Estates/Cotta Park | Mission Ridge Drive | 5.5 | Drain 7 | Pump Station #20 |
| Brock Elliott School | Daniel Street | 13.2 | Drain 7 | None |
| Roberts Estates Park Basin | Hidden Brook Drive and Junction Drive | 13.8 | Drain 7 | Pump Station #27 |
| Spreckels Baseball Park Basin | Moffat Blvd. And Spreckels Avenue | 47.5 | Drain 7 | |
| Sequoia Park | Wawona and Ebbetts | 2.0 | Lateral y | Pump Station #7 |
| Gonsalves Park/Fishback Basin | Fishback Road | 6.0 | Lateral Z | Pump Station #24 |
| Bella Vista (Proposed) | Proposed Streets | 16.64 | Drain 8 | Proposed Pump Station |
| Woodward Park | Woodward Avenue and Birdwell Avenue | 62.3 | Future South Drain | Proposed Pump Station |
| St. Francis Park | Devonshire Avenue and Pheasant Hallow Way | | | None |

## Table 5-19: Proposed Storm Water Pump Stations

| Basin ID | Pump Outflow Rate, cfs | Pumping Capacity, gpm | Discharge To | Drainage Area, acres | Detention Basin, acre-feet |
|---|---|---|---|---|---|
| SB 7-C | 6.99 | 3,140 | Drain 7 | 110.00 | 27.74 |
| Industr Pk | 15.89 | 7,135 | Drain 7 | 250.00 | 63.04 |
| DR7-BLD | 4.34 | 1,947 | Drain 7 | 40.28 | 10.75 |
| DR-GCSB | 2.71 | 1,217 | Drain 7 | 61.21 | 17.20 |
| HTL & GS | 0.39 | 174 | Drain 7 | 5.84 | 1.56 |
| DR-7017 | 2.30 | 1,033 | Drain 7 | 34.00 | 9.10 |
| SB-SD-79 | 2.15 | 964 | South Drain | 73.60 | 8.52 |
| SB-SD-78 | 6.70 | 3,008 | South Drain | 139.20 | 26.57 |
| SB-SD-65 | 0.63 | 281 | South Drain | 9.30 | 2.48 |
| SB-SD-61 | 4.00 | 1,795 | South Drain | 70.40 | 15.86 |
| SB-SD-59 | 0.99 | 446 | South Drain | 14.70 | 3.94 |
| SB-SD-60 | 0.52 | 233 | South Drain | 7.70 | 2.05 |
| SB-SD-91 | 4.10 | 1,841 | South Drain | 60.90 | 16.26 |
| SB-SD-53 | 3.92 | 1,759 | South Drain | 167.60 | 15.54 |
| SB-SD-62 | 2.94 | 1,318 | South Drain | 99.60 | 11.65 |
| SB-SD-63 | 2.14 | 962 | South Drain | 85.60 | 8.50 |
| SB-SD-64 | 1.77 | 795 | South Drain | 49.50 | 7.02 |
| SB-SD-48 | 5.55 | 2,490 | South Drain | 209.10 | 22.00 |
| SB-SD-52 | 2.14 | 960 | South Drain | 62.10 | 8.48 |
| SB-SD-87 | 6.51 | 2,925 | South Drain | 96.80 | 25.84 |
| SB-SD-88 | 5.15 | 2,311 | South Drain | 76.50 | 20.42 |
| SB-SD-43 | 4.70 | 2,109 | South Drain | 155.00 | 18.63 |
| SB-SD-49 | 1.44 | 649 | South Drain | 54.40 | 5.73 |
| SB-SD-50 | 1.62 | 727 | South Drain | 66.10 | 6.42 |
| SB-SD-42 | 4.02 | 1,806 | South Drain | 170.50 | 15.95 |
| SB-SD-89 | 9.26 | 4,159 | South Drain | 152.60 | 36.74 |
| SB-SD-90 | 4.80 | 2,155 | South Drain | 86.30 | 19.04 |
| SB-SD-41 | 3.99 | 1,790 | South Drain | 166.60 | 15.81 |
| SB-SD-51 | 0.88 | 395 | South Drain | 31.20 | 3.49 |
| SB-SD-83 | 3.05 | 1,370 | Drain 8 | 60.60 | 12.10 |
| SB-SD-86 | 4.11 | 1,845 | Drain 8 | 89.50 | 16.30 |
| SB-SD-34 | 2.04 | 915 | South Drain | 87.10 | 8.09 |
| SB-SD-35 | 2.30 | 1,032 | South Drain | 100.00 | 9.12 |
| SB-SD-38 | 3.32 | 1,491 | South Drain | 102.00 | 13.17 |
| SB-SD-28 | 0.26 | 119 | South Drain | 17.00 | 1.05 |
| SB-SD-30 | 1.23 | 553 | Drain 10/11 | 81.30 | 4.88 |
| SB-SD-33 | 3.72 | 1,671 | South Drain | 161.20 | 14.76 |
| SB-SD-18 | 4.09 | 1,837 | South Drain | 84.90 | 16.23 |
| SB-SD-25 | 4.68 | 2,099 | South Drain | 150.70 | 18.55 |
| SB-SD-84 | 6.33 | 2,843 | South Drain | 119.00 | 25.12 |
| SB-SD-27 | 0.34 | 154 | South Drain | 5.10 | 1.36 |
| SB-SD-85 | 2.66 | 1,196 | South Drain | 56.60 | 10.57 |
| SB-SD-26 | 3.29 | 1,478 | South Drain | 75.70 | 13.05 |
| SB-SD-24 | 8.57 | 3,848 | Drain 10/11 | 282.40 | 33.99 |
| SB-SD-29 | 3.38 | 1,517 | Drain 10/11 | 200.40 | 13.40 |
| SB-SD-39 | 2.95 | 1,324 | Drain 8 | 87.50 | 11.70 |
| SB-SD-40 | 0.76 | 339 | South Drain | 28.50 | 3.00 |
| SB-SD-31 | 7.88 | 3,537 | South Drain | 169.10 | 31.25 |
| SB-SD-23 | 1.67 | 750 | Drain 10/11 | 48.20 | 6.62 |
| SB-XSD-1 | 38.05 | 17,087 | South Drain | 565.40 | 150.96 |
| SB-XSD-2 | 10.76 | 4,830 | South Drain | 198.40 | 42.67 |
| SB-XSD-3 | 7.14 | 3,205 | South Drain | 318.20 | 28.32 |
| SB-XSD--4 | 1.27 | 569 | South Drain | 56.50 | 5.03 |
| SB-XSD--5 | 2.37 | 1,064 | South Drain | 79.60 | 9.40 |
| SB-XSD-6 | 4.37 | 1,961 | South Drain | 154.50 | 17.33 |

**Table 5-19: Proposed Storm Water Pump Stations cont'd…**

| Basin ID | Pump Outflow Rate, cfs | Pumping Capacity, gpm | Discharge To | Drainage Area, acres | Detention Basin, acre-feet |
|---|---|---|---|---|---|
| SB-XSD-7 | 4.42 | 1,983 | South Drain | 196.90 | 17.52 |
| SB-XSD-8 | 3.50 | 1,573 | South Drain | 156.20 | 13.90 |
| SB-XSD-9 | 2.54 | 1,138 | South Drain | 113.00 | 10.06 |
| SB-XSD-10 | 3.34 | 1,501 | South Drain | 149.00 | 13.26 |
| SB-5-GG | 9.97 | 4,474 | Drain 5 | 281.90 | 39.53 |
| SB-5-II | 3.80 | 1,707 | Drain 5 | 119.77 | 15.08 |
| SB-5-JJ | 4.73 | 2,124 | Drain 5 | 148.92 | 18.76 |
| XDR3-A | 24.30 | 10,910 | Drain 3 | 361.00 | 96.39 |
| XDR3-B | 11.86 | 5,325 | Drain 3 | 529.00 | 47.08 |
| XDR3-C | 1.40 | 630 | Drain 3 | 62.50 | 5.56 |
| SB-F-LDRES | 4.37 | 1,962 | Drain 3 | 194.30 | 16.94 |
| SB-3-A | 2.89 | 1,299 | Drain 3 | 118.77 | 11.47 |
| SB-3-B | 2.12 | 951 | Drain 3 | 81.60 | 8.40 |
| SB-3-D | 3.38 | 1,517 | Drain 3 | 86.87 | 13.40 |
| SB-3-E | 0.91 | 409 | Drain 3 | 31.84 | 3.63 |
| SB-3-F | 4.48 | 2,012 | Drain 3 | 170.57 | 17.77 |
| SB-3N-H | 6.53 | 2,932 | Drain 3 | 197.35 | 25.91 |
| SB-3N-A | 3.81 | 1,710 | Drain 3 | 161.74 | 15.10 |
| SB-3N-B | 3.63 | 1,628 | Drain 3 | 159.35 | 14.38 |
| SB-3N-C | 3.85 | 1,729 | Drain 3 | 160.17 | 15.27 |
| SB-3N-D | 3.68 | 1,652 | Drain 3 | 160.74 | 14.60 |
| SB-3N-E | 1.85 | 829 | Drain 3 | 80.53 | 7.33 |
| SB-3N-F | 7.82 | 3,510 | Drain 3 | 166.12 | 31.01 |
| SB-3N-G | 10.96 | 4,922 | Drain 3 | 164.20 | 43.48 |
| SB-3A-A | 3.66 | 1,642 | Drain 3 | 139.69 | 14.50 |
| SB-3A-B | 5.87 | 2,637 | Drain 3 | 147.04 | 23.30 |
| 3N-CC-1 | 4.09 | 1,836 | Drain 3 | 118.00 | 16.23 |
| 3N-CC-2 | 2.73 | 1,226 | Drain 3 | 80.00 | 10.82 |
| DR-Un Ranch | 2.25 | 1,010 | Drain 3 | 78.00 | 7.60 |
| F-FC-LI | 25.61 | 11,498 | FCOC | 380.48 | 101.59 |
| F-FC-COMM | 5.29 | 2,377 | FCOC | 78.66 | 21.00 |
| Shed -Z | 12.54 | 5,632 | FCOC | 261.50 | 49.76 |
| F-HWYPQP | 16.78 | 7,534 | FCOC | 249.32 | 66.57 |
| F-HWYCOMM | 3.36 | 1,506 | FCOC | 49.85 | 13.31 |
| South Drain PS | 80.00 | 35,900 | Drain 8 | — | — |
| Drain 10 PS | 90.00 | 40,400 | Drain 10 | — | — |

## PUMPS

The Manteca drainage system depends on pumping to convey water from storage basins to drains and laterals. Existing pumps were modeled as part of the Master Plan XP-SWMM model from data derived from as-built drawings and site inspections. Table 5-18 lists the existing pump stations.

For each of the future basins identified in Table 5-19, it was assumed that two pumps would be installed, one of which would be standby. Pumps were sized according to City design criteria, Chapter 3. Landowners and the City should make an effort to develop fewer and regional basins. The number of future pump stations in Table 5-19 shows a situation that can only be improved with larger regional basins.