CITY OF ANAHEIM

Master Plan of Storm Drainage for Moody Creek Channel Tributary Area

SEPTEMBER 2010
VOLUME 1
MASTER PLAN OF STORM DRAINAGE FOR
MOODY CREEK CHANNEL TRIBUTARY AREA

SEPTEMBER 2010

Prepared for

City of Anaheim
Public Works Department
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Anaheim, CA 92805

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Director of Public Works

<table>
<thead>
<tr>
<th>Revisions</th>
</tr>
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<tbody>
<tr>
<td>No.</td>
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1. Executive Summary

1.1 General

The purpose of the City of Anaheim Master Plan of Storm Drainage for Moody Creek Channel Tributary Area (MCCTA) is to provide comprehensive long-range planning for the implementation and development of drainage facility improvements in the area, determine the cost of implementing the facilities, and discuss funding of the improvements. This Master Plan is based on the criteria outlined in the City’s Drainage Manual for Public and Private Drainage Facilities, dated August, 2005.

In 1973, the City published a Master Plan of Drainage for the City of Anaheim. That report divided the City into 42 Drainage Districts based generally on local storm drainage facilities and the City limits at that time. In 1983, two additional Drainage Districts were added for a total of 44 Drainage Districts. Since that time the City limits have changed to include more tributary area and the City has changed its drainage classification system to watersheds which relate to the County of Orange’s regional drainage facilities. The City of Anaheim is divided into seven major watershed tributary areas; Santa Ana River, Carbon Creek Channel, East Garden Grove-Wintersburg Channel, Anaheim Barber City Channel, Fullerton Creek Channel, Stanton Channel, and Moody Creek Channel. Each of these watersheds include several of the Districts from the 1973 Master Plan.

The MCCTA includes portions of Drainage District 2A from the 1973 Master Plan. The areas are identified as Drainage Basins instead of Districts for this Master Plan and are shown on Figure 1. The boundaries of some of the basins have been modified slightly from the 1973 Master Plan boundaries. Figure 1 shows the new boundaries, and all references to areas in this Master Plan are based on the new boundaries. Drainage Basins are further divided into one or more Drainage Areas as shown in Figure 2.

1.2 Drainage Basin 2A

Drainage Basin 2A drains approximately 144 acres and consists of two areas. The first area is generally bounded by the City Limits with Buena Park on the west, La Palma Avenue on the north, Magnolia Street on the east and Crescent Avenue on the south. The second area is also bounded by the Buena Park City limits to the north and west, Dale Avenue on the east and a few hundred feet north of Lincoln and Lincoln Avenue to the south. As shown in Figure 2, drainage basins are further divided into drainage areas depending on the existing flow patterns and storm drain outlets. There are 10 drainage areas within Basin 2A and no existing storm drain facilities. Generally, storm water flows from the southeast to the northwest via street flow and flows into the City of Buena Park at several locations.

In order to satisfy the City’s requirement of conveying the 10-year storm event in the storm drains, and also to satisfy the flooded width criteria improvements in Greenleaf Avenue, Lincoln Avenue, Western Avenue, Grand Avenue, and Coolidge Drive are recommended as shown on Figure 3. The estimated cost for constructing the improvements is $5,820,000 (2010 dollars).
1.3 Capital Improvement Plan

The goal of the Capital Improvement Plan is to identify an organized system for implementing the proposed improvements as financing becomes available. A total of 4 projects totaling $5.8 million dollars (2010 dollars) have been identified as part of this Master Plan. These projects consist of extensions of existing storm drain systems in residential streets and arterial highways.

A priority ranking was developed to identify the most important projects that should be constructed first. This ranking was based on the level to which the existing system meets the City’s flood protection goals. Three categories of improvements were identified as outlined below.

Priority 1 - Proposed new storm drain in arterial highway or local street to achieve 10, 25, and 100-year flood protection levels.

Priority 2 - Proposed parallel or replacement storm drain in arterial highway or local street to achieve 10, 25, and 100-year flood protection levels.

Priority 3 - Proposed new storm drain in a local street where 100-year protection levels are met without the storm drain, however, the storm drain is required to achieve flood protection levels for the 10-year storm.

Figure 3 shows the proposed improvements by priority. Table ES-1 below outlines those projects designated as Priority 1. There are a total of 2 projects totaling $2.7 million dollars (2010 dollars).

<table>
<thead>
<tr>
<th>Area</th>
<th>Storm Drain ID</th>
<th>Street</th>
<th>Type of Facility</th>
<th>Length (feet)</th>
<th>Estimated Cost (2010 Dollars)</th>
<th>Area Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>SD 2-3_01 (P)</td>
<td>Lincoln Ave</td>
<td>New 24-inch RCP/</td>
<td>2,200</td>
<td>$1,829,000</td>
<td>$1,829,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New 30-inch RCP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>SD 2-4_01 (P)</td>
<td>Western Ave</td>
<td>New 30-inch RCP/</td>
<td>870</td>
<td>$ 831,000</td>
<td>$ 831,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New 36-inch RCP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2,660,000</td>
<td>$2,660,000</td>
</tr>
</tbody>
</table>

There are no projects designated as Priority 2. Table ES-2 below outlines those projects designated as Priority 3. There are a total of 2 projects totaling $3.2 million dollars (2010 dollars).

<table>
<thead>
<tr>
<th>Area</th>
<th>Storm Drain ID</th>
<th>Street</th>
<th>Type of Facility</th>
<th>Length (feet)</th>
<th>Estimated Cost (2010 Dollars)</th>
<th>Area Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2</td>
<td>SD 2-2_01 (P)</td>
<td>Greenleaf Ave</td>
<td>New 30-inch RCP</td>
<td>2,310</td>
<td>$2,137,000</td>
<td>$2,137,000</td>
</tr>
<tr>
<td>2-5</td>
<td>SD 2-5_01 (P)</td>
<td>Coolidge Ave/Grand</td>
<td>New 30-inch RCP/</td>
<td>1,070</td>
<td>$1,023,000</td>
<td>$1,023,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ave/Grand Ave</td>
<td>New 36-inch RCP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3,160,000</td>
<td>$3,160,000</td>
</tr>
</tbody>
</table>
1.4 Storm Drain Impact and Improvement Fee

To finance storm drain improvements and to mitigate the flooding and storm drainage impacts caused by new development and/or by additions and expansions to existing development the City of Anaheim City Council previously adopted an ordinance and storm drain impact fees for certain areas with the City. None of these fees are applicable to the Moody Creek Channel Tributary Area. A future study will be conducted to identify financing mechanisms for constructing the improvements. These could include such options as Impact Fees, Assessment Districts or other financing mechanisms.

1.5 Potential Locations for Detention/Infiltration Basins in City Parks

An analysis of potential locations for detention and infiltration basins in City parks was made. These detention/infiltration basins could potentially reduce the size or need for downstream storm drain facilities. The analysis was made by looking at the location of each park within the study area and determining if an existing or proposed storm drain facility was located nearby. If a storm drain facility was located nearby, then the potential to reduce downstream storm drain facilities was made. If the basin could reduce downstream facilities, then the location was identified as a potential location for a detention or infiltration basin. There are no City parks within the Moody Creek Channel Tributary Area.
Figure 1
Study Area
Master Plan of Storm Drainage for Moody Creek Channel Tributary Area
Figure 2
Drainage Areas
Master Plan of Storm Drainage for
Moody Creek Channel Tributary Area
2. Introduction

2.1 Purpose

The purpose of the City of Anaheim Master Plan of Storm Drainage for Moody Creek Channel Tributary Area (MCCTA) is to provide comprehensive long-range planning for the implementation and development of drainage facility improvements in the area, determine the cost of implementing the facilities, and discuss funding of the improvements. This Master Plan is based on the criteria outlined in the City’s Drainage Manual for Public and Private Drainage Facilities, dated August, 2005.

2.2 Background

In 1973, the City published a Master Plan of Drainage for the City of Anaheim. That report divided the City into 42 Drainage Districts based generally on local storm drainage facilities and the City limits at that time. In 1983, two additional Drainage Districts were added for a total of 44 Drainage Districts. Since that time the City limits have changed to include more tributary area and the City has changed its drainage classification system to watersheds which relate to the County of Orange’s regional drainage facilities. The City of Anaheim is divided into seven major watershed tributary areas; Santa Ana River, Carbon Creek Channel, East Garden Grove-Wintersburg Channel, Anaheim Barber City Channel, Fullerton Creek Channel, Stanton Channel, and Moody Creek Channel. Each of these watersheds include several of the Districts from the 1973 Master Plan.

The MCCTA includes portions of Drainage District 2A from the 1973 Master Plan. The areas are identified as Drainage Basins instead of Districts for this Master Plan and are shown on Figure 1. The boundaries of some of the basins have been modified slightly from the 1973 Master Plan boundaries. Figure 1 shows the new boundaries, and all references to areas in this Master Plan are based on the new boundaries.

Drainage Basin 2A covers two areas ultimately tributary to Orange County Flood Control District (OCFCD) regional facility Moody Creek Channel (MCC). Each of these areas drain via street flow to the City limits where the flow enters the City of Buena Park. These flows eventually enter BO2P03 storm drain in Crescent Avenue which drains to MCC. The first area is generally bounded by the City Limits with Buena Park on the west, La Palma Avenue on the north, Magnolia Street on the east and Crescent Avenue on the south. The second area is also bounded by the Buena Park City limits to the north and west, Dale Avenue on the east and a few hundred feet north of Lincoln and Lincoln Avenue to the south.
3. Technical Criteria

3.1 Hydrologic Analysis

The hydrologic analysis for the City of Anaheim Master Plan of Storm Drainage for MCCTA was performed in accordance with the City of Anaheim Department of Public Works Storm Drainage Manual for Public and Private Storm Drainage Facilities, dated August of 2005. The City of Anaheim has adopted the 1986 Orange County Hydrology Manual (and the subsequent Addendum No. 1 to the Hydrology Manual, issued in 1995), except for the modifications outlined in Division 1 of the City’s Manual. The modification affecting hydrology includes the requirement that the analysis of all storm events be based on the “high confidence level” storm frequency event. This criterion was used for the Master Plan. The methods, data, and criteria integrated and incorporated are consistent with accepted methods of analyzing storm water runoff throughout Orange County as outlined in the Orange County Hydrology Manual.

GIS Facility Maps and AutoCad drawings were obtained from the City, which contained streets and existing facilities for the MCCTA. Drainage Basins were delineated based on the 1973 drainage maps. A field review was then conducted, and the drainage patterns were further refined. Land use data was obtained from the City of Anaheim’s October 2008 General Plan and soils information was obtained from the 1986 Orange County Hydrology Manual. Land use, soils information and subarea information was input into the Advanced Engineering Software Computer Program RATOC which is based on the 1986 Orange County Hydrology Manual.

3.2 Hydraulics Analysis

Storm drains and street flooded width analyses were performed in accordance with the City of Anaheim Department of Public Works Storm Drainage manual, dated August of 2005. The existing drainage systems were analyzed using computer analysis techniques that consisted of the storm drain analysis program, Water Surface and Pressure Gradient Hydraulic Analysis System (WSPG), originally written for use by the Los Angeles County Flood Control District. WSPG is a hydraulics program that can be used to determine the capacity of a storm drain system. The computational procedure is based on solving Bernoulli’s equation for the total energy at each section and Manning’s formula for friction loss between the sections in a reach. Confluences are analyzed using pressure and momentum theory. The program uses basic mathematical and hydraulic principles to calculate such data as cross sectional area, wetted perimeter, normal depth, critical depth, pressure, and momentum.

The proposed storm drains were sized using the WSPG program and FlowMaster. Relevant storm drain information such as pipe sizes and invert elevations were obtained from storm drain improvement as-built drawings.
The hydraulic analysis performed assumed that the streets would be free and clear of any major obstructions and that the storm drains would be adequately maintained so that blockage would not occur. Street capacity analyses assumed that all streets conformed to the City of Anaheim’s typical street sections. Street widths were determined from street plans and as-built drawings.

Based on the technical criteria outlined in this chapter, preliminary sizes of the Master Plan facilities were determined. The hydraulic control for calculations typically assumed that the water surface elevation was one foot below the ground surface. For lateral storm drains, the hydraulic control was taken from the water surface elevation of the major storm drain at the point of confluence between the drains.

### 3.3 Downstream Boundaries

This study evaluates the capacity of facilities in Drainage Basin 2A at the City’s boundary with Buena Park. The approach for the proposed hydraulics at the City limit is to recognize the adjacent agency’s downstream capacities. In this study, when existing downstream facilities are determined to be unable to convey the flow from the City of Anaheim’s master plan storm drain at the City limits, excess flow at the City boundary is proposed to be resurfaced onto the street through equalizers.
4. **Drainage Basin 2A**

Drainage Basin 2A drains approximately 144 acres and consists of two areas. The first area is generally bounded by the City Limits with Buena Park on the west, La Palma Avenue on the north, Magnolia Street on the east and Crescent Avenue on the south. The second area is also bounded by the Buena Park City limits to the north and west, Dale Avenue on the east and a few hundred feet north of Lincoln and Lincoln Avenue to the south. As shown in Figure 4, drainage basins are further divided into drainage areas depending on the existing flow patterns and storm drain outlets. There are 10 drainage areas within Basin 2A and no existing storm drain facilities. Generally, storm water flows from the southeast to the northwest via street flow and flows into the City of Buena Park at several locations.

### 4.1 Hydrologic Analysis

The hydrologic analysis for Drainage Basin 2A was performed in accordance with the hydrologic criteria outlined in Chapter 3 and is included in Appendix C. The hydrology map for Basin 2A is included in Appendix B. The following table highlights the flow rates at the key drainage nodes for Basin 2A. The table shows associated drainage areas and flows for 10-, 25-, and 100-year storm events.

<table>
<thead>
<tr>
<th>Drainage Area</th>
<th>Node</th>
<th>Location</th>
<th>Drainage Area (ac)</th>
<th>10-Year Flow (cfs)</th>
<th>25-Year Flow (cfs)</th>
<th>100-Year Flow (cfs)</th>
</tr>
</thead>
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<tr>
<td>2-1</td>
<td>202</td>
<td>La Palma Ave</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>2-2</td>
<td>212</td>
<td>Greenleaf Ave and Felicidad St</td>
<td>19</td>
<td>25</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>2-2</td>
<td>213</td>
<td>Greenleaf Ave and Nancita St</td>
<td>34</td>
<td>35</td>
<td>45</td>
<td>60</td>
</tr>
<tr>
<td>2-2</td>
<td>214</td>
<td>Greenleaf Ave at the City Limits</td>
<td>63</td>
<td>60</td>
<td>80</td>
<td>105</td>
</tr>
<tr>
<td>2-3</td>
<td>223</td>
<td>Lincoln Ave</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>2-4</td>
<td>232</td>
<td>Western Ave</td>
<td>9</td>
<td>11</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>2-4</td>
<td>233</td>
<td>Western Ave</td>
<td>26</td>
<td>25</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>2-4</td>
<td>234</td>
<td>Western Ave</td>
<td>35</td>
<td>35</td>
<td>40</td>
<td>55</td>
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<td>2-5</td>
<td>242</td>
<td>Coolidge Ave</td>
<td>7</td>
<td>14</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>2-5</td>
<td>243</td>
<td>Grand Ave</td>
<td>17</td>
<td>25</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>2-6</td>
<td>252</td>
<td>Grant Cir</td>
<td>5</td>
<td>10</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>2-7</td>
<td>262</td>
<td>Beach Blvd</td>
<td>21</td>
<td>30</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>2-8</td>
<td>272</td>
<td>Bel Air St</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>14</td>
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<td>2-9</td>
<td>282</td>
<td>Kendor Dr</td>
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<td>10</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>2-10</td>
<td>292</td>
<td>Johnson Cir</td>
<td>4</td>
<td>7</td>
<td>9</td>
<td>12</td>
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</table>
4.2 Analysis of Existing Improvements

There are no existing facilities within Drainage Basin 2A. Storm water in Basin 2A is conveyed via street flow to the City Limits. The flooded width calculations in Greenleaf Avenue, Lincoln Avenue, Western Avenue, Coolidge Drive and Grand Avenue do not meet City criteria. The street flow flooded width calculations are contained in Appendix D.

4.3 Proposed Improvements

In order to satisfy the City’s requirement of conveying the 10-year storm event in the storm drains, and also to satisfy the flooded width criteria, the following improvements are recommended for Areas 2-2, 2-3, 2-4 and 2-5. In Area 2-2, 2,310 feet of 30-inch RCP is recommended in Greenleaf Avenue of which 1,280 feet of this storm drain is proposed in the City of Buena Park to tie into the existing storm drain. Alternately, equalizers and a low flow pipe could be constructed. The pipe size was limited to 30-inches to match the size of the City of Buena Park’s existing storm drain. Flow at the City limits does not meet the City of Anaheim’s flooded width criteria due to this limitation.

In Area 2-3, 2,200 feet of new storm drain facilities varying in size from 24-inch to 30-inch RCP are recommended in Lincoln Avenue. This storm drain would tie into a City of Buena Park storm drain at the intersection of Lincoln Avenue and Knott Avenue. In Area 2-4, 870 feet of new storm drain facilities varying in size from 30-inch to 36-inch RCP are recommended in Western Avenue. This storm drain would tie into a City of Buena Park storm drain just outside the City limits north of Coolidge Avenue. The pipe size was limited to 36-inches to match the size of the City of Buena Park’s existing storm drain. As such, the flow in the pipe does not convey the entire 10-year storm. However, the City’s flooded width criteria is met. In Area 2-5, 1,070 feet of new storm drain facilities varying in size from 30-inch to 36-inch RCP are recommended in Coolidge Drive and Grand Avenue. This storm drain would tie into a City of Buena Park storm drain 150 feet north of the City limits at the intersection of Grand Avenue and Jackson Way. The proposed improvements for Basin 2A are shown in Figure 4, the hydraulic calculations are included in Appendix E and the street flow calculations in Appendix F.

An alternative to building a storm drain in Greenleaf Avenue was investigated. This alternative would be to extend the storm drain in Magnolia Avenue and divert the flow to that storm drain. However, the Magnolia Avenue storm drain is under capacity and therefore can not accept additional flow.

4.4 Cost Estimates

The estimated costs summarized in Table 2 include costs for construction, engineering, design, surveying, and construction management. Pipe costs are per linear foot of pipe and have been increased to include excavation, shoring, bedding, backfill, compaction, removal of excess material, and trench resurfacing. The detailed cost estimates for Basin 2A are included in Appendix A.

Since the construction of the recommended facilities will be spread out over a number of years, the total cost of master plan implementation will be subject to future construction cost increases. Therefore, it is recommended that the funding programs established for
implementation of the Master Plan of Storm Drainage make provisions for the increased
cost of deferred construction. Inflation factors should be applied to reflect a specific year’s
total cost over the 2010 total costs. Summarized in Table 2 are the construction cost
estimates by project location for Areas, 2-2, 2-3, 2-4, and 2-5 in Basin 2A.

<table>
<thead>
<tr>
<th>Area</th>
<th>Storm Drain ID</th>
<th>Street</th>
<th>Type of Facility</th>
<th>Length (feet)</th>
<th>Estimated Cost (2010 Dollars)</th>
<th>Area Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2</td>
<td>SD 2-2_01 (P)</td>
<td>Greenleaf Avenue</td>
<td>New 30-inch RCP</td>
<td>2,310</td>
<td>$2,137,000</td>
<td>$2,137,000</td>
</tr>
<tr>
<td>2-3</td>
<td>SD 2-3_01 (P)</td>
<td>Lincoln Avenue</td>
<td>New 24-inch RCP/New 30-inch RCP</td>
<td>2,200</td>
<td>$1,829,000</td>
<td>$1,829,000</td>
</tr>
<tr>
<td>2-4</td>
<td>SD 2-4_01 (P)</td>
<td>Western Avenue</td>
<td>New 30-inch RCP/New 36-inch RCP</td>
<td>870</td>
<td>$ 831,000</td>
<td>$ 831,000</td>
</tr>
<tr>
<td>2-5</td>
<td>SD 2-5_01 (P)</td>
<td>Coolidge Ave/Grand Avenue</td>
<td>New 30-inch RCP/New 36-inch RCP</td>
<td>1,070</td>
<td>$1,023,000</td>
<td>$1,023,000</td>
</tr>
<tr>
<td></td>
<td>TOTAL FOR Basin 2A</td>
<td></td>
<td></td>
<td></td>
<td>$5,820,000</td>
<td>$5,820,000</td>
</tr>
</tbody>
</table>
Figure 4
Drainage Basin 2A
Master Plan of Storm Drainage for Moody Creek Channel Tributary Area
5. Capital Improvement Plan

The goal of the Capital Improvement Plan is to identify an organized system for implementing the proposed improvements as financing becomes available. A total of 4 projects totaling $5.8 million dollars (2010 dollars) have been identified as part of this Master Plan. These projects consist of extensions of existing storm drains systems in residential streets and arterial highways.

A priority ranking was developed to identify the most important projects that should be constructed first. This ranking was based on the level to which the existing system meets the City’s flood protection goals. Three categories of improvements were identified as outlined below.

Priority 1 - Proposed new storm drain in arterial highway or local street to achieve 10, 25, and 100-year flood protection levels.

Priority 2 - Proposed parallel or replacement storm drain in arterial highway or local street to achieve 10, 25, and 100-year flood protection levels.

Priority 3 - Proposed new storm drain in a local street where 100-year protection levels are met without the storm drain, however, the storm drain is required to achieve flood protection levels for the 10-year storm.

Table 3 below outlines those projects designated as Priority 1. There are a total of 2 projects totaling $2.7 million dollars (2010 dollars).

<table>
<thead>
<tr>
<th>Area</th>
<th>Storm Drain ID</th>
<th>Street</th>
<th>Type of Facility</th>
<th>Length (feet)</th>
<th>Estimated Cost (2010 Dollars)</th>
<th>Area Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>SD 2-3_01 (P)</td>
<td>Lincoln Avenue</td>
<td>New 24-inch RCP/ New 30-inch RCP</td>
<td>2,200</td>
<td>$1,829,000</td>
<td>$1,829,000</td>
</tr>
<tr>
<td>2-4</td>
<td>SD 2-4_01 (P)</td>
<td>Western Avenue</td>
<td>New 30-inch RCP/ New 36-inch RCP</td>
<td>870</td>
<td>$831,000</td>
<td>$831,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2,660,000</td>
<td>$2,660,000</td>
</tr>
</tbody>
</table>
There are no projects designated as Priority 2. Table 4 below outlines those projects designated as Priority 3. There are a total of 2 projects totaling $3.2 million dollars (2010 dollars).

<table>
<thead>
<tr>
<th>Area</th>
<th>Storm Drain ID</th>
<th>Street</th>
<th>Type of Facility</th>
<th>Length (feet)</th>
<th>Estimated Cost (2010 Dollars)</th>
<th>Area Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2</td>
<td>SD 2-2_01 (P)</td>
<td>Greenleaf Avenue</td>
<td>New 30-inch RCP</td>
<td>2,310</td>
<td>$2,137,000</td>
<td>$2,137,000</td>
</tr>
<tr>
<td>2-5</td>
<td>SD 2-5_01 (P)</td>
<td>Coolidge Ave/</td>
<td>New 30-inch RCP/New</td>
<td>1,070</td>
<td>$1,023,000</td>
<td>$1,023,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grand Avenue</td>
<td>36-inch RCP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3,160,000</td>
<td>$3,160,000</td>
</tr>
</tbody>
</table>
6. Storm Drain Impact and Improvement Fee

To finance storm drain improvements and to mitigate the flooding and storm drainage impacts caused by new development and/or by additions and expansions to existing development the City of Anaheim City Council previously adopted an ordinance and storm drain impact fees for certain areas with the City. None of these fees are applicable to the Moody Creek Channel Tributary Area. A future study will be conducted to identify financing mechanisms for constructing the improvements. These could include such options as Impact Fees, Assessment Districts or other financing mechanisms.
7. Potential Locations for Detention/Infiltration Basins in City Parks

An analysis of potential locations for detention and infiltration basins in City parks was made. These detention/infiltration basins could potentially reduce the size or need for downstream storm drain facilities. The analysis was made by looking at the location of each park within the study area and determining if an existing or proposed storm drain facility was located nearby. If a storm drain facility was located nearby, then the potential to reduce downstream storm drain facilities was made. If the basin could reduce downstream facilities, then the location was identified as a potential location for a detention or infiltration basin. There are no City parks within the Moody Creek Channel Tributary Area.
Appendix A
Cost Estimates
Appendix B
Hydrology Maps
Appendix C
Hydrology Calculations
Appendix D
Existing Street Flow Calculations
Appendix E

Proposed Hydraulic Calculations
Appendix F

Proposed Street Flow Calculation