WATER QUALITY TECHNICAL REPORT AND PRELIMINARY DRAINAGE STUDY FOR UNIVERSITY TOWN CENTER REVITALIZATION PROJECT
(Master Planned Development Permit)

Job Number 14166
December 31, 2002
Revised: February 14, 2003
Revised: May 19, 2003
Revised: August 5, 2004
Revised: March 24, 2005
Revised: March 27, 2007
Revised: July 20, 2007

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WATER QUALITY TECHNICAL REPORT

AND

PRELIMINARY DRAINAGE STUDY

FOR

UNIVERSITY TOWN CENTER REVITALIZATION PROJECT

(Master Planned Development Permit)

Job Number 14166

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WATER QUALITY TECHNICAL REPORT
AND
PRELIMINARY DRAINAGE STUDY
FOR
UNIVERSITY TOWN CENTER REVITALIZATION PROJECT
(Master Planned Development Plan)

REVISION PAGE

July 20, 2007

This Water Quality Technical Report (WQTR) and Preliminary Drainage Study provides a revision to the March 27, 2007 report titled "Water Quality Technical Report And Preliminary Drainage Study for University Town Center Renovation Project (Master Planned Development Permit)". This revision is prepared in order to address plan check comments received from the City of San Diego dated 05/22/2007.

Following is the plan check comment regarding drainage and water quality issues and responses for the comments.

24. Submit a detailed preliminary drainage study consistent with the city's drainage design manual. The report should demonstrate that no adverse impact would occur on downstream drainage systems as a result of project and if impacts are anticipated, state the measures that must be taken to mitigate the impacts.

The report has been revised to include preliminary existing condition and proposed condition runoff calculations. Refer to Appendix D for existing condition runoff calculations and refer to Appendix E for proposed condition runoff calculations for each outfall location. As stated throughout the report, there will be no increase in drainage area to each outfall as a result of the development. If an increase to impervious areas occurs within any of the eight (8) drainage basins, design tools such as pervious pavement, check dams, planter boxes, or other equally comparable methods may be used to help maintain post-project peak runoff and volumes equal to (or less than) pre-project conditions. Hence, there will be no adverse impacts to the downstream systems. Refer to Section 5.0 - Conditions of Concern (within this WQTR) for further discussion on no adverse impacts to downstream systems.

WATER QUALITY TECHNICAL REPORT

AND
PRELIMINARY DRAINAGE STUDY
FOR
UNIVERSITY TOWN CENTER REVITALIZATION PROJECT
(Master Planned Development Plan)

REVISION PAGE

March 27, 2007

This Water Quality Technical Report (WQTR) and Preliminary Drainage Study provides a revision to the March 24, 2005 report titled "Water Quality Technical Report for University Town Center Renovation Project (Master Planned Development Permit)". This revision is prepared in order to address plan check comments received from the City of San Diego on 01/30/07.

Following are the plan check comments regarding drainage and water quality issues and responses for the comments.

8. Submit a preliminary drainage study, which addresses the adequacy of the downstream system(s) demonstrating that no adverse impacts will occur to these systems as an increase in runoff from proposed development.

The proposed development will not increase the drainage area to each individual outfall. Also, the impervious area in the proposed condition will remain same or decrease compared to existing condition. Therefore, there will not be any increase in runoff from existing to proposed condition to adversely impact downstream existing systems. Refer to page 2 of this report for more details.

10. If the project requires BMPs, a WQTR consistent with City of San Diego's Storm Water Standards shall be submitted: The report shall include BMP maintenance schedules, maintenance costs and the party responsible for future maintenance and associated costs. The *report will also need to address water quality, by describing the type of pollutants which will be generated during post-construction, the pollutants to be captured and treated by the proposed BMPs and the quality of the resultant drainage.*

Please refer to this report for stormwater requirements applicable to the project. Sections 4.0 through 6.0 (pages 7-22) of this report addresses the water quality requirements of the projects by describing the type of pollutants, which will be generated during post-construction, the pollutants to be captured and treated by the proposed BMPs. Section 7 on pages 23 & 24 of this report provides information about BMP maintenance frequencies, maintenance costs and the party responsible for future maintenance and associated costs.

13. 18. Please submit a preliminary drainage study that is consistent with the city's drainage design manual.

Please refer to Section 5, pages 11 & 12, for discussion of pre-project and post-project drainage patterns. Also refer to map pocket 2 for pre- and post-project drainage study maps showing drainage areas to each of the outfall. During final engineering, more detailed hydrologic analyses will be prepared for both pre-project and post-project conditions.

16. Review and revise page iii of WQTR to reflect the City of San Diego. Helix Environmental Planning is not part of the City of San Diego.

Based on the discussion in revision page dated May 19, 2003 within the report, it was unclear that which reports were submitted to Helix Environmental Planning and/or the City of San Diego. Report dated December 31, 2002 and revised report dated February 14, 2003 were first submitted to Helix Environmental Planning, prior to the subsequent submittals to the City of San Diego.

18. WQTR need to be signed by registered civil engineer.

The report has been signed by the registered civil engineer.

A site visit to UTC revealed that there are eight existing outfalls from the UTC project. Previously, it appeared two outfall locations existed in the proximity of Outfall #7, however, the site visit showed the two systems combine prior to discharging off-site. Hence these two outfalls have been combined and named as outfall # 7 in this report. Water quality treatment calculations have been revised to reflect this change. The previous outfall # 9 is now renamed as outfall # 8 in this report.

Though this report addresses the overall UTC project, a separate WQTR was prepared to address the final engineering of UTC Retail Building V. A report titled "Water Quality Technical Report for Westfield UTC Retail Building V", dated January 22, 2007, prepared by Rick Engineering Company Job Number 14166A, (City of San Diego WO# 120208, DWG# 34395-D, PTS# 427276) addresses the water quality requirements and BMPs provided for this part of the overall UTC project. A drainage study report titled "Drainage Study Report for Westfield UTC Retail Building V", dated January 22, 2007, prepared by Rick Engineering Company Job Number 14166A, (City of San Diego WO# 120208, DWG# 34395-D, PTS# 427276) was also prepared to address the drainage for Retail Building V. The information about Retail Building V has been included briefly in this report for reference. However, for detailed information about drainage and BMPs for UTC Retail Building V, please refer to the above reports.

WATER QUALITY TECHNICAL REPORT

FOR

UNIVERSITY TOWN CENTER RENOVATION PROJECT

(Tentative Map)

REVISION PAGE

March 24, 2005

This Water Quality Technical Report (WQTR) provides a revision to the August 5, 2004 report titled "Water Quality Technical Report for University Town Center Renovation Project (Tentative Map)". This revision is to include an Appendix C titled "University Town Center Preliminary Treatment Flow Calculation Table". The additional appendix tabulates the required treatment flow for each of the nine outfalls located throughout the project, as well as the water quality treatment capacities provided for each proposed treatment control BMP.

In addition to adding Appendix C, minor revisions have been made throughout the text of this report to present some of the previously included information in tabular form. The map pockets have also been updated to reflect the most recent tentative map layout, to provide copies of the preliminary drainage study maps for both pre- and post-project condition, and to provide an updated site map.

Refer to the Table of Contents for updated page numbers, tables, appendices, and map pockets.

WATER QUALITY TECHNICAL REPORT
FOR
UNIVERSITY TOWN CENTER RENOVATION PROJECT
(Tentative Map)

REVISION PAGE

August 5, 2004

This Water Quality Technical Report (WQTR) presents a revision to the May 19, 2003 report with the title "Preliminary Water Quality Technical Report for University Town Center Expansion Project". In order to reflect that this WQTR is for the Tentative Map stage of engineering and planning, the title of the report has been changed to "Water Quality Technical Report for University Town Center Renovation Project (Tentative Map)." This report has been revised pursuant to overall site plan revisions that have occurred since the previous report was prepared and submitted. The format of this WQTR has been changed to match the general format currently used by Rick Engineering Company for WQTRs.

PRELIMINARY
WATER QUALITY TECHNICAL REPORT
FOR
UNIVERSITY TOWN CENTER EXPANSION PROJECT

REVISION PAGE

May 19, 2003

This report was originally submitted to Dennis Marcin at Helix Environmental Planning, Inc. on December 31, 2002 and a revised copy was submitted on February 14, 2003. Pursuant to comments received during a phone conversation with Dennis Marcin on February 20, 2003, minor changes have been included in this revised report. Additionally, the previous Storm Water Requirements Applicability Checklist has been replaced with the most up to date version, as provided by the City of San Diego.

1.0 INTRODUCTION

This water quality technical report (WQTR), prepared for the Master Planned Development Permit (MPDP), describes the permanent storm water Best Management Practices (BMPs) that will be incorporated in order to mitigate the impacts of urban runoff due to the development of the University Town Center (UTC) Revitalization Project. The project site is located in the City of San Diego east of Interstate 5 at the intersection of La Jolla Village Drive and Genesee Avenue. The project address is: 4545 La Jolla Village Drive, San Diego, CA 92122-1212. See the Vicinity Map, located in Section 2.0 of this report, for the approximate location of the project.

The project consists of an existing 75.9 acre open-air Regional/Community Retail Town Center featuring Department Stores, Specialty Retail Shops, Entertainment Venues, and Community Facilities. UTC has been the Town Center for the University City and Golden Triangle since its origination in the late 1970's.

Westfield at University Towne Centre (UTC) is in the community of La Jolla in the City of San Diego in the area of La Jolla Village Drive, Genesee Drive, Towne Centre Drive, and Nobel Drive. The Mater Plan Development Permit project proposes the development of a maximum of an additional 750,000 sq. ft. of commercial retail space, up to 35,000 of office use and up to 725 multi-family residential units with a possible 250 hotel rooms in addition to the development currently on site. The revitalization of UTC is to occur over multiple phases.

The project is subject to the National Pollutant Discharge Elimination System (NPDES) requirements during construction. NPDES requirements are contained in Section 402(p) of the federal Clean Water Act. These requirements are implemented through permits issued by the State Water Resources Control Board (SWRCB) or the local California Regional Water Quality Control Board (CRWQCB) in which the projects are located, and the governing municipality where the projects are located (City of San Diego). These requirements are discussed in further detail within Section 3.0 of this report.

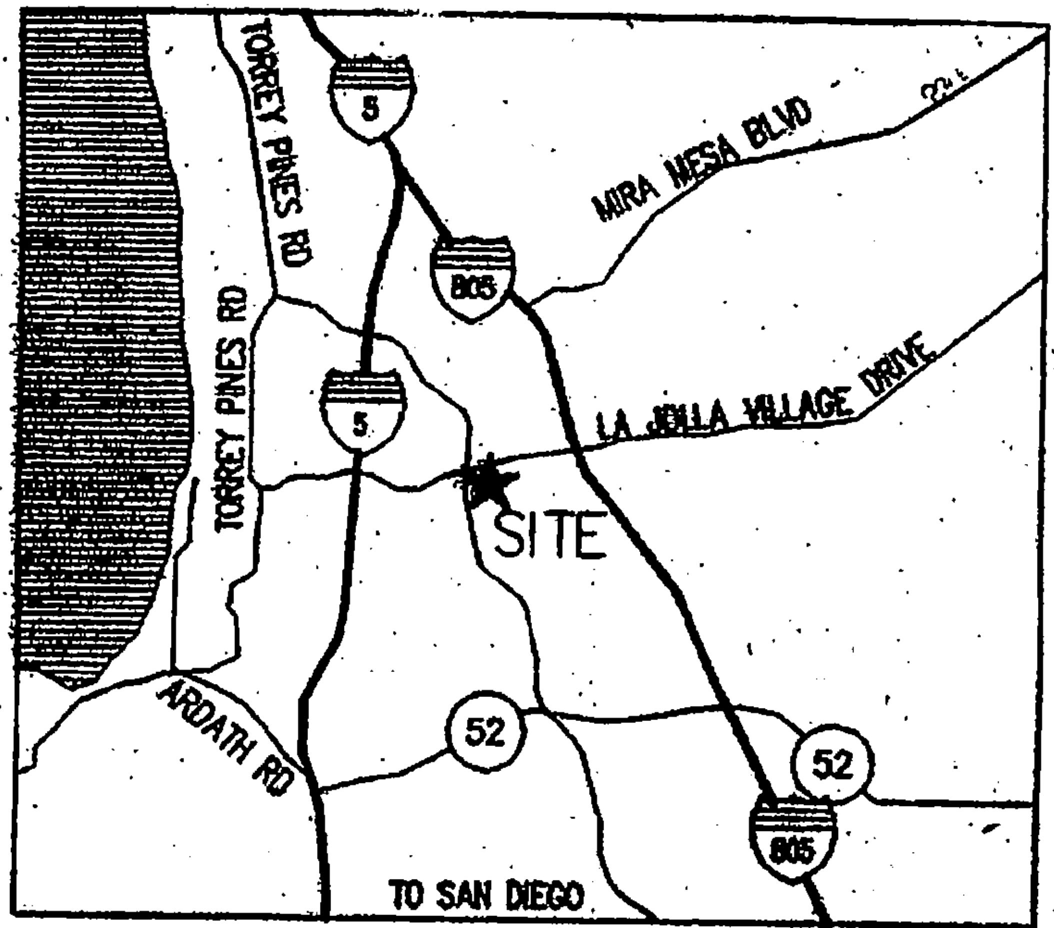
For the purposes of water quality and quantity management, the proposed redevelopment of UTC will follow the guidelines and requirements set forth in the "*San Diego Municipal Code Land Development Manual – Storm Water Standards: A Manual for Construction & Permanent Storm Water Best Management Practices Requirements*," revised May 30, 2003 (herein referred to as Storm Water Standards). A completed copy of the "Storm Water Requirements Applicability Checklist" that is provided within the Storm Water Standards manual has been included as Appendix A for the UTC revitalization project within this WQTR. The redevelopment of UTC will improve the water quality runoff situation by replacing the acres and acres of existing exposed asphalt surface parking areas with rooftops and parking decks. Replacing vehicular use impervious surface with rooftops will help improving water quality in proposed condition. Water quality requirements are discussed in further detail in Section 4.0 of this report.

For the purposes of water quantity management, the proposed re-development of UTC will not increase the overall amount of impervious surfaces for each basin draining to independent downstream outfalls. Additionally, the overall drainage area tributary to each independent downstream outfall and the outfall locations will remain the same as in the existing condition. During final engineering, this approach will be utilized in conjunction with analyzing both existing and proposed flow paths to ensure that the UTC revitalization project will not increase storm water runoff as compared to existing conditions. Further discussion of the hydrologic and environmental impacts of the UTC revitalization project are discussed in Section 5.0 of this report.

The development of the UTC revitalization project will provide permanent storm water BMPs to ensure that water quality treatment is provided prior to storm water runoff discharging downstream of the project site. Further discussion of permanent storm water BMPs are discussed in Section 6.0 of this report.

Maintenance conditions for the proposed permanent storm water BMPs are discussed in Section 7.0 of this WQTR. In the future, during the final engineering process for the UTC revitalization project, a maintenance agreement (currently referred to as a Storm Water Management and Discharge Control Maintenance Agreement (SWMDCMA)) will be prepared that will ensure the ongoing maintenance for the permanent storm water BMPs. As part of the SWMDCMA, an Operation and Maintenance (O&M) Plan will be prepared that describes the designated responsible party to manage the storm water BMPs. The party responsible for the O&M plan will retain records of inspection and servicing of all permanent treatment control BMPs for at least 5 years.

2.0 VICINITY MAP



VICINITY MAP

3.0 WATER QUALITY REQUIREMENTS DURING CONSTRUCTION

Based on the "Storm Water Requirements Applicability Checklist" provided in the "*San Diego Municipal Code Land Development Manual – Storm Water Standards: A Manual for Construction & Permanent Storm Water Best Management Practices Requirements*," revised May 30, 2003 (Storm Water Standards Manual), the project is subject to "Construction Storm Water BMP Performance Standards," established in the Storm Water Standards Manual. The "Storm Water Requirements Applicability Checklist" provided within the Storm Water Standards Manual has been completed and is located in Appendix A of this WQTR. Section IV of the Storm Water Standards Manual, "Construction Storm Water BMP Performance Standards," describes the construction site management requirements that contractors must comply with, in the City of San Diego. In addition, Section IV of the Storm Water Standards Manual lists the performance standards that construction sites must meet, and provides a list of erosion control, sediment control, and materials management BMPs for reference. The Storm Water Standards Manual requires that the construction BMPs be identified in the Storm Water Pollution Prevention Plan (SWPPP) for the project (see below).

During the construction phase, the project is also subject to the requirements of the "Waste Discharge Requirements (WDRS) for Discharges of Storm Water Runoff Associated with Construction Activity." For coverage by the General Construction Permit, the project owner is required to submit to the SWRCB a Notice of Intent (NOI) to comply with the General Construction Permit, and develop a Storm Water Pollution Prevention Plan (SWPPP) describing BMPs to be used during and after construction to prevent the discharge of sediment and other pollutants in storm water runoff from the project. As part of the SWPPP, a Storm Water Sampling and Analysis Strategy (SWSAS) must be developed for the construction site. The SWSAS is included in the project's SWPPP. The objectives of the SWSAS are to determine whether BMPs implemented on the construction site are: (1) preventing further impairment by sediment in storm waters discharged directly into waters listed as impaired for sediment or silt [i.e., listed on Attachment 3 of the General Construction Permit, which identifies waters listed as impaired for sediment, silt, or turbidity on the Clean Water Act Section 303(d) List]; and (2) preventing other pollutants, that are known or should be known by permittees to occur on construction sites and that are not visually detectable in storm water discharges, from causing or contributing to exceedances of water quality objectives. In order to terminate coverage under the General Construction Permit, the developer must submit a Notice of Termination (NOT) and a Post-Construction Storm Water Operation and Management Plan (PCSWOMP) according to Section A.10 of the General Construction Permit to the Regional Water Quality Control Board (RWQCB). The PCSWOMP requires permanent BMPs be established to prevent the discharge of sediment or other pollutants in storm water runoff from the completed project. (Permanent BMPs for the project are discussed in Sections 4.0, 5.0, and 6.0 of this WQTR).

As this project is only at the discretionary permitting stage of development, a SWPPP has not been prepared for the project. However, during the final engineering process, a SWPPP will be prepared that will also include a SWSAS for the construction site. The SWPPP/SWSAS for the project will provide a detailed discussion of the construction storm water BMPs that will be implemented.

The receiving waters for the project, the pollutants of concern, and the Hydrologic Unit classification are discussed in more detail within Section 5.0 of this Water Quality Technical Report.

4.0 WATER QUALITY REQUIREMENTS POST-CONSTRUCTION

The San Diego Final Model SUSMP (San Diego SUSMP) developed by the Copermittees and approved by the SDRWQCB on June 12, 2002 provides an implementation guide for compliance with the Municipal Permit. The City of San Diego later issued the *"San Diego Municipal Code Land Development Manual - Storm Water Standards,"* revised May 30, 2003, which states the new Storm Water Standards Manual "provides information on how to comply with all of the City's permanent and construction storm water BMP requirements, including the San Diego SUSMP, for new development projects in the City of San Diego," effective December 2, 2002.

For the purposes of meeting the City of San Diego SUSMP requirements, the guidelines as defined within the Storm Water Standards manual have been followed. Based on Table 1 of the Storm Water Standards Manual, "Standard Development Project & Priority Project Storm Water BMP Requirements Matrix," the UTC revitalization project applies to the following priority project categories: "Attached Residential Development," "Commercial Development greater than 100,000 ft^2," "Restaurants," "Parking Lots," and "Streets, Highways, and Freeways." The applicable sections of Table 1 of the Storm Water Standards Manual have been reproduced below in Table 4.1.

Table 4.1 – Standard Development Project & Priority Project Storm Water BMP Requirements Matrix

	Site Design BMPs [1]	Source Control BMPs[2]	BMPs Applicable to Individual Priority Project Categories[3]										Treatment Control BMPs[4]
			a. Private Roads	b. Residential Driveways & Guest	c. Dock Areas	d. Maintenance Bays	e. Vehicle Wash Areas	f. Equipment Wash Areas	g. Outdoor Processing Areas	h. Surface Parking	i. Fueling Areas	j. Hillside Landscaping	
Standard Projects	R	R	O	O	O	O	O	O	O	O	O	O	O
Priority Projects													
Attached Residential Development	R	R	R										S
Commercial Development greater than 100,000 ft²	R	R			R	R	R		R				S
Restaurants	R	R			R			R					S
Parking Lots	R	R								R[5]			
Streets, Highways & Freeways	R	R											S

R = Required: select one or more applicable and appropriate BMPs from the applicable steps in Section III.2.A-D, or equivalent as identified in Appendix C.

O = Optional/ or may be required by City staff. As appropriate, applicants are encouraged to incorporate treatment control BMPs and BMPs applicable to individual priority project categories into the project design. City staff may require one or more of these BMPs, where appropriate.

S = Select one or more applicable and appropriate treatment control BMPs from Appendix C.

(1) Refer to Section III.2.A.

(2) Refer to Section III.2.B.

(3) Priority project categories must apply specific storm water BMP requirements, where applicable. Priority projects are subject to the requirements of all priority project categories that apply.

(4) Refer to Section III.2.D.

(5) Applies if the paved area totals >5,000 square feet or with >15 parking spaces and is potentially exposed to urban runoff.

Source: Storm Water Standards Manual, 2003.

5.0 POLLUTANTS AND CONDITIONS OF CONCERN

Pollutants from the Project Area

Table 2 of the Storm Water Standards Manual, "Anticipated and Potential Pollutants Generated by Land Use Type," indicates General Pollutant Categories that are either anticipated or potential pollutants for specific project categories. The applicable sections of Table 2 of the Storm Water Standards Manual have been reproduced below in Table 5.1.

Table 5.1 – Anticipated and Potential Pollutants Generated By Land Use Type

	General Pollutant Categories								
General Project Categories	**Sediment**	**Nutrients**	**Heavy Metals**	**Organic Compounds**	**Trash & Debris**	**Oxygen Demanding Substances**	**Oil & Grease**	**Bacteria & Viruses**	**Pesticides**
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development >100,000 ft^2	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Restaurants					X	X	X	X	
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways, and Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Source: Storm Water Standards Manual, 2003.

Based on Table 2 of the Storm Water Standards Manual, the anticipated and potential pollutants for the project are as follows:

Anticipated Pollutants: Sediments, Nutrients, Heavy Metals, Organic Compounds (including petroleum hydrocarbons), Trash & Debris, Oxygen Demanding Substances, Oil & Grease, Bacteria & Viruses, and Pesticides

Potential Pollutants: There are no potential pollutants. See below for further information.

Based on the information above, each of the general pollutant categories listed in Table 2 of the Storm Water Standards manual are anticipated for at least one priority project category associated with the project. There are "potential pollutants" for the project under the different priority project categories, however, each "potential pollutant" is already considered an "anticipated pollutant" for the project because of another priority project category.

While the site is not expected to generate a large volume of sediment once buildout has been completed and landscaping has been established, some sediment will be tracked in by cars and a small amount may be generated on site. This sediment is defined as a pollutant, and may also contain attached pollutants such as heavy metals (anticipated for parking lots and streets/highways). The majority of anticipated and potential pollutants will be transported by low flows that typically occur during the initial stage of a storm event.

Pollutants of Concern in Receiving Waters

According to the SDRWQCB (Region 9) "Water Quality Control Plan for the San Diego Basin (9)", dated September 8, 1994, the proposed UTC revitalization project is within the Miramar

Hydrologic Area of the Penasquitos Hydrologic Unit. The corresponding number designation is 906.40 (Region '9', Hydrologic Unit '06', Hydrologic Area '4', Hydrologic Subarea '0').

In July 2003, the USEPA approved the 2002 CWA Section 303(d) List (that was adopted by the SWRCB on February 4, 2003) to update the previous 1998 Clean Water Act Section 303(d) List. Both the existing and proposed conditions for the project site indicate that storm water runoff will leave the project site through several storm drain connections to the public storm drain system, which ultimately outfall into two tributaries to Rose Canyon. The two tributaries drain towards Rose Canyon which then flows in a southwestwardly direction where it eventually discharges into Mission Bay. These tributaries to Rose Canyon and Rose Canyon itself are not listed for impaired water quality on the 2002 CWA 303(d) List. The only water body within Hydrologic Unit 906.40 listed for impairment on the 2002 CWA Section 303(d) List is Mission Bay, which is listed for the following impairments: "bacteria indicators," "eutrophic," and "lead".

Since the project site does not discharge directly (as defined within the Storm Water Standards manual) into any of the 303(d) listed water bodies, the treatment control BMPs will be designed to address the anticipated and potential project pollutants. For the UTC revitalization project, the most significant pollutants are expected to be sediments, trash and debris, and oil and grease.

Conditions of Concern

To study the impact of this redevelopment on the existing downstream storm drain systems waterways, peak flow rates at each of the outfall have been estimated for existing and proposed condition. The hydrologic methodology and criteria utilized for the project has been taken from the City of San Diego Drainage Design Manual. The Modified Rational Method computer program developed by Advanced Engineering Software (AES) was used for this study because it satisfies the City of San Diego's design criteria. The hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results.

Existing condition drainage: In the existing condition the site is close to fully paved with eight outfall locations along the perimeter of the site. All of the outfall locations consist of on-site storm drains discharging into existing storm drain systems. Existing condition rational method output has been provided in Appendix D of this report, along with backup calculations for the weighted runoff coefficient. Refer to exhibit titled "Pre-Condition Drainage Study Exhibit for University Town Center Revitalization Project (MPDP)" provided in the Map Pocket 2 of this report for existing drainage areas to each outfall and rational method node numbers.

Proposed condition drainage: In the proposed condition the UTC revitalization project will not increase drainage area to each existing outfall. For most of the drainage basins the impervious areas within the basins will remain the same in existing and proposed conditions. If an increase to impervious areas occurs within any of the eight (8) drainage basins, design tools such as pervious pavement, check dams, planter boxes, or other equally comparable methods may be used to help maintain post-project peak runoff rates and volumes equal to (or less than) pre-project conditions. Furthermore, the existing outfall locations will be utilized for the proposed storm drain system. It is expected that the proposed storm drain system will utilize a combination of existing and proposed "on-site" storm drain that will discharge from the project site at the existing outfall locations (8 existing outfalls are located along the perimeter of the site). Proposed condition rational method output has been provided in Appendix E of this report. Refer to exhibit titled "Post-Condition Drainage Study Exhibit for University Town Center Revitalization Project (MPDP)" provided in the Map Pocket 2 of this report for proposed drainage areas to each outfall location and node numbers.

The overall drainage boundary for the UTC project site will remain the same under both existing and proposed conditions. Based on the overall drainage boundary for both conditions, no significant "off-site" drainage enters the project site. Additionally, "on-site" drainage boundaries for proposed conditions are not expected to deviate significantly from existing drainage boundaries. Therefore, the drainage improvements associated with the proposed re-development of UTC will have no adverse affect on downstream drainage facilities.

Future upstream development will not provide run-on to the UTC revitalization project site and will be subject to their own water quantity and quality restrictions. The development of the UTC revitalization project site will provide permanent storm water BMPs to ensure that water quality treatment is provided prior to storm water runoff leaving the site and discharging into the existing public storm drain systems.

The following section of this WQTR, Section 6.0, will discuss the permanent storm water BMPs proposed for the UTC revitalization project.

6.0 PERMANENT STORM WATER BEST MANAGEMENT PRACTICES (BMPs)

In order to meet the requirements for termination of coverage under the General Construction Permit and the San Diego SUSMP requirements, the projects will incorporate a treatment train of non-structural and structural BMPs to the MEP. The Storm Water Standards manual indicates projects shall incorporate the following BMPs into the project design:

- Site Design BMPs
- Source Control BMPs
- BMPs for Individual Priority Project Categories (these are site design and source control)
- Treatment Control BMPs

In general, site design, source control, and category specific BMPs are non-structural and treatment control BMPs are structural. A more detailed description of each type of BMP is discussed below.

Site Design

Site design BMPs are designed to maintain or reduce pre-development erosion and protect stream habitat. The proposed development site will provide vegetation for all areas susceptible to erosion (minor areas of landscaping). It is currently anticipated that there will not be any storm drain outfalls into open channels (i.e. all on-site systems tie into existing off-site storm drain systems) provided as part of the proposed revitalization project. As a result, the project site will not require stabilization and/or energy dissipaters associated with these types of outfalls and/or open channels. Landscaping areas have been included in the design and an effort will be made to utilize these landscaping areas to treat runoff from rooftops and parking lots. Additionally, all proposed storm drain networks will be treated from structural treatment control facilities, which are discussed below, prior to discharging into existing public storm drain systems. Surface parking has been minimized through the use of several multi-level parking structures that are to be constructed throughout the site. The use of permeable surfaces such as pervious concrete, porous asphalt, unit pavers, and granular materials may be considered for the proposed pathways, sidewalks, pedestrian street and walkways. However, the remaining portions of the project site is comprised of high-traffic areas, and subsequently the use of permeable surfaces is not practical for these other areas of the UTC revitalization project.

Source Control

Source control BMPs are generally non-structural and are intended to reduce the quantity of pollutants entering the storm drain system. This can be accomplished by providing covered outdoor material and trash storage areas to prevent exposure to rainfall, employing integrated pest management (IPM) principles that includes minimizing the use of pesticides on site, utilizing efficient irrigation systems to prevent runoff from landscaping, through public education (e.g., storm water conveyance system stenciling and signage, and pollution prevention literature).

Outdoor material storage areas have the potential to introduce toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants into the storm water conveyance system if improperly designed. For projects that include these areas, they should be designed to preclude run-on, prevent runoff, and provide impervious secondary containment areas to prevent leaks, spills, and contact with direct precipitation. These design considerations will be incorporated if the during final engineering it is determined that the UTC revitalization project proposes the use of outdoor areas for storage of hazardous materials.

In accordance with page 16 of the Storm Water Standards manual, any trash storage areas for the UTC revitalization project site should be designed to meet the following requirements:

1. "paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; and
2. "contain attached lids on all trash containers that exclude rain; or
3. "contain a roof or awning to minimize direct precipitation."

IPM includes using pesticides only after monitoring indicates a need for them and then selecting pest control materials in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. These goals are realized by implementing the following: (a) eliminating and/or reducing the need for pesticide use; and (b) distributing IPM educational materials to future site residents/tenants. More information on IPM is located at the UC Davis website (http://www.ipm.ucdavis.edu/WATER/U/index.html).

Utilizing efficient irrigation systems can: help to prevent irrigation during and after precipitation events; limit irrigation to the specific requirements of the site; and control water loss in the event of malfunctioning sprinkler heads or lines. These benefits can be realized through the use of rain shutoff devices, site-specific irrigation systems, and using flow reducers or shutoff valves that are triggered by a pressure drop in the water line. These methods or some other equally comparable and effective method shall be utilized for the UTC revitalization project site in order to reduce irrigation water runoff.

Public education is a preventative measure to reduce potential storm water pollution at its source. Public education includes providing storm water conveyance system stenciling and signage. In accordance with page 17 of the Storm Water Standards manual, the project will incorporate the following:

1. Provide concrete stamping, or equivalent, of all storm water conveyance system inlets and catch basins within the project area with prohibitive language (e.g., "No

Dumping – I Live in <<name receiving water>>"), satisfactory to the City Engineer. Stamping may also be required in Spanish.

2. Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels, and creeks within the project area, trailheads, parks and building entrances.

BMPs Applicable to Individual Priority Project Categories

In addition to implementing site design and source control BMPs to address the pollutants of concern from the UTC revitalization project, site design and source control BMPs are required in specific areas of the project. Based on the previously discussed priority project categories that apply to the UTC revitalization project, Table 1 of the Storm Water Standards manual identifies the following project areas that specifically require additional BMPs to be considered:

- <u>Private Roads</u> – "The design of private roadway drainage shall use at least one of the following (for further guidance, see Start at the Source [1999]): (1) rural swale system – street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings; (2) urban curb/swale system – street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter; or (3) dual drainage system – first flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder."

- <u>Dock areas</u> – "Loading/unloading dock areas shall include the following: (1) cover loading dock areas, or design drainage to preclude urban run-on and runoff; and (2) An acceptable method of containment and pollutant removal, such as a shut-off valve and containment area. Direct connections to storm drains from depressed loading docks (truck wells) are prohibited."

- Maintenance Bays –
  a) "Maintenance Bays shall include at least one of the following: (1) repair / maintenance bays shall be indoors; or, (2) designed to preclude urban run-on and runoff."
  b) "Maintenance bays shall include a repair / maintenance bay drainage system to capture all wash water, leaks, and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm water conveyance system is prohibited."

- Vehicle & Equipment Wash Areas – "Areas for washing/steam cleaning of vehicles and areas for outdoor equipment/accessory washing and steam cleaning shall be: (1) self-contained to preclude run-on and run-off, covered with a roof or overhang, and equipped with a clarifier or other pretreatment facility; and (2) properly connected to a sanitary sewer."

- Outdoor Processing Areas –
  c) "Outdoor processing areas shall: (1) cover or enclose areas that would be the most significant source of pollutants; or, (2) slope the area toward a dead-end sump; or, (3) discharge to the sanitary sewer system."
  d) "Grade or berm processing area to prevent run-on from surrounding areas."
  e) "Installation of storm drains in areas of equipment repair is prohibited."

- Surface Parking Areas –
  a) "Where landscaping is proposed in surface parking areas (both covered and uncovered), incorporate landscaped areas into the drainage design."
  b) "Overflow parking (parking in excess of the project's minimum parking requirements) may be constructed with permeable paving.

In regards to the "private roads" listing, there is not enough contiguous vegetated area anticipated for the project to effectively treat roadway runoff through adjacent vegetated swales. Much of the site is already impervious, and as a result, other effective treatment control BMPs will be provided to treat the storm water runoff. Since this WQTR addresses the conceptual design for the project at a discretionary permitting level of detail, it is unknown as to the exact number of "docks areas" that will be provided as part of the proposed revitalization project for UTC. However, in order to comply with the above-mentioned requirements, each of the loading docks will be designed according to the guidelines listed above. It is not currently known if "maintenance bays," "vehicle & equipment wash areas," and/or "outdoor processing areas" will be constructed as part of the UTC project. The guidelines have been listed above (excerpted from the Storm Water Standards manual) in the possibility that these areas may be included, and will be incorporated into their design as needed. Similar to the constraints for treating the "private roads," site constraints limited the landscaping areas to locations outside of the parking structure areas and therefore "surface parking" will be treated through the proposed treatment control BMPs discussed below.

Treatment Control

Treatment control BMPs will treat, infiltrate, or filter a specified amount of runoff from the UTC project based on the numeric sizing criteria described in the Storm Water Standards (and the Municipal Permit Order No. 2001-01). The amount of runoff that must be treated may be calculated using either the volume-based criteria or flow-based criteria, depending on the type of BMP selected to meet this requirement. The Storm Water Standards manual provides several criteria for calculating treatment volume of runoff for volume-based BMPs or treatment flow for flow-based BMPs. The following discussion of structural BMPs will describe the treatment control BMPs that have been selected to address the pollutants of concern associated with the UTC revitalization project. Specific water quality treatment flow calculations for the potential treatment control BMPs will be provided during later stages of engineering.

Structural BMPs for Treatment Control

Structural BMPs have been preliminarily chosen pursuant to the preliminary drainage boundaries shown on the "Water Quality Technical Report Exhibit for University Town Center Revitalization Project (MPDP)," located in Map Pocket 1 of this report. Currently, it is anticipated that seven in-line storm water treatment units, two ClearWater BMP units and two Vegetated "Dry" swales with filtration will be used for the structural BMPs required on the project site. In-line storm water treatment units (with absorbent booms added) are mechanical separators that physically reduce sediment, trash, debris, and oil and grease from the flow, and pesticides that attach to sediment. In many cases, the treatment of oil and grease for in-line treatment facilities occurs through the placement of oil sorbent material that is placed within the treatment facility.

Depending on the specific in-line treatment facility, sorbent material can be added in the form of "mesh" material or "boom" configurations. If "boom" configurations are utilized, they are typically located within the treatment facility such that incoming flow passes through the booms, allowing the sorbent material to absorb oil and grease until fully saturated. Visual inspections can reveal the level of saturation and provides indication of when the sorbent material needs to be replaced ("sorbent material appears dark and becomes less buoyant when heavily saturated with oil, grease, and debris," according to CDS Technologies Storm Water Pollution Control Technical Manual, dated July 2002). Proper disposal of used sorbent material is required.

In-line storm water treatment units are installed after the last inlet to the storm water conveyance system and before the system connects to the existing off-site storm drain system. In-line storm water treatment units are flow-based BMPs. These BMPs will be incorporated to meet the requirements of the Storm Water Standards manual and will be sized using a flow-based numeric sizing criteria.

The required treatment flow for the in-line storm water treatment units are calculated using flow-based numeric sizing criteria from Table 4 of the Storm Water Standards (also located in the Municipal Permit). Calculations have been provided for treatment flow requirements for the UTC revitalization project based on the following numeric sizing criteria: "the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour for each hour of a storm event," and are pursuant to the project layout as shown on the exhibit located in Map Pocket 1. During the final engineering process, these calculations will be updated to reflect the ultimate post-project conditions of the site. The water quality treatment flow calculations have been provided in Appendix C of this WQTR.

It was mentioned in the introduction of this report that there are several locations where existing and proposed storm drains leave the proposed project site and tie-in to existing public storm drain systems. The installation of in-line treatment facilities will be located within the project boundary (property of Westfield Corporation, Inc.), and will treat the entire on-site drainage area contributing to each of the storm drain systems, and will follow the last catch basin / inlet contributing on-site runoff to the storm drain system. Each post-construction structural BMP will be privately maintained and shall be the responsibility of Westfield Corporation, Inc.

The complex size and nature of the project will yield numerous area drains, roof drains, and other forms of drainage collection that will tie-in to the proposed storm drain systems throughout the project site. For the purposes of this preliminary report, CDS Technologies in-line treatment units are recommended at the downstream ends of each proposed storm drain systems (or existing storm drain systems that are to remain following construction), prior to discharging into the existing storm drain system located off-site (public storm drain systems). The size, material, and alignment of the projects storm drain will be determined during final engineering. At that time, design calculations will be re-performed in order to size the proposed in-line treatment facilities for the required treatment capacities. Preliminary calculations and sizing has been done based on the conceptual (Tentative Map) layout, and have been provided in Appendix C of this WQTR.

Two ClearWater BMP units and two vegetated swales are the BMPs proposed for UTC retail building V located at northeast corner of the site (outfall 6). A separate drainage study report titled "Drainage Study Report for Westfield UTC Retail Building V", dated January 22, 2007, prepared by Rick Engineering Company Job Number 14166A and a water quality technical report titled "Water Quality Technical Report for Westfield UTC Retail Building V", dated January 22, 2007, prepared by Rick Engineering Company Job Number 14166A, (City of San Diego WO# 120208, DWG# 34395-D, PTS# 427276) have been prepared for UTC Retail Building V. These two reports discuss the drainage and water quality requirements for retail building V. Refer to these reports for further discussion on BMPs proposed for retail building V.

It is anticipated that approximately seven in-line treatment facilities along the perimeter of the UTC property boundary, two ClearWater BMP units and two vegetated swales will be necessary in order to provide water quality treatment for the entire UTC site. The proposed revitalization project may not affect storm water runoff to all eight outfall locations (e.g. – the project may not disturb any area within specific drainage basins, therefore, the outfall would not require BMPs), however, for the purposes of this report it has been assumed that seven outfalls (except outfall 6 which is addressed separately in another WQTR) will be provided with an in-line treatment facility. During final engineering, the exact location and specific number of in-line units will be verified. If additional outfall locations exist and/or are proposed, additional in-line treatment control facilities will be necessary. Additionally, other manufacturers of in-line units may also be considered during final engineering. Other manufacturers may include Vortechnics (Vortechs Stormwater Treatment System) or Suntree Technologies (Nutrient Separating Baffle Box). Refer to the "Water Quality Technical Report for University Town Center Revitalization Project (Tentative Map)" for the anticipated outfall locations and approximate locations of proposed BMPs.

For budgetary purposes, preliminary costs (for the material cost of the unit and installation) associated with CDS Technologies in-line units are provided in the table located in the first part of Appendix B – "Storm Water CDS Capacities and Costs", last updated by CDS Technologies on January 9, 2002. A summary of the approximate costs for material, installation, and annual maintenance of the proposed CDS units is provided in Appendix B of this WQTR. If another manufacturer of in-line storm water treatment units is selected, calculations will need to be performed to determine size, costs, maintenance costs, and frequency of maintenance. This WQTR provides general information pursuant to the CDS Technologies in-line units only.

A variety of manufacturers provide in-line treatment control facilities, however, CDS Technologies in-line units are used as a basis for this preliminary report. Recommendations specific to the size and required treatment capacities for each of the proposed CDS Technologies in-line treatment units are summarized in Appendix C of this report. As stated previously, these recommendations will be updated and provided during later stages of engineering.

Depending on the overall design capacity of the storm drain system, the CDS Technologies in-line units may require diversion boxes in order to provide for the design storm event (e.g. the 100-year peak discharge storm event). The size and slope of pipe and amount of discharge passing through the unit are the parameters that determine if a diversion box is required. During final design, the design storm discharge will be calculated and the size and slope for the proposed storm drain systems will be designed accordingly, which will then allow calculations to determine if a diversion box will be required for any or all of the CDS Technologies in-line units. If it is determined that a diversion box is required for any or all of the CDS Technologies in-line units currently proposed, the typical cost is an additional $4,000 to $8,000 per CDS Technologies in-line unit.

7.0 ANTICIPATED MAINTENANCE CONDITION(S)

Typical Maintenance Procedures for Treatment Control BMPs

The maintenance procedure for servicing in-line treatment units typically includes contracting the maintenance cleaning/waste removal through a provider of those services. In-line treatment facility manufacturers often offer servicing for their own facilities, however, maintenance services are also offered through a variety of other manufacturers and cleaners as well. Specific to the CDS Technologies units, "a unit can be cleaned using a vacuum truck or a small clamshell bucket, or a basket can be provided to fit a standard sump," as specified in the "CDS Technologies Storm Water Pollution Control Technical Manual," dated July 2002. If a basket is desired, CDS Technologies should be advised so that the material and installation costs can be adjusted accordingly.

The frequency of maintenance required is site and drainage area specific. The unit should be inspected periodically to assure its condition to handle anticipated runoff. Initially following the installation of new CDS Units, it is important to check that the unit is functioning properly and measure the amount deposition occurring from specific storm events. Based on these inspections, it may be necessary to adjust the frequency of scheduled inspections and maintenance cleanings.

The designated responsible party (see below) shall maintain records of inspections, maintenance cleanings, and servicing of all permanent storm water BMPs for at least 5 years (as specified on the attached Storm Water Management and Discharge Control Maintenance Agreement).

Anticipated Maintenance Cost of Post-Construction Structural BMPs

Specific material and installation costs pursuant to CDS Technologies units require information related to storm drain design not yet completed. However, for budgetary purposes, preliminary maintenance costs can be provided, as they typically do not vary significantly based on size. Outlined within the table summary of approximate materials, installation and maintenance costs (Appendix B), the preliminary total maintenance cost for seven CDS Technologies units is $24,020.00 per year. This total cost includes a cost per hour for labor (most units require approximately 2 hours per-unit) and a waste disposal fee per maintenance service (this waste disposal fee is based on the total volume of pollutants removed from the units). These maintenance costs assume the CDS Technologies units will be serviced two times a year. However, the required frequency of servicing may need to be adjusted based on periodic inspections following the installation of the CDS Technologies units. These are preliminary costs as of July 2002 and apply to the CDS Technologies manufacturer only.

The equipment, installation and maintenance costs associated with BMPs of UTC Retail Building V are included in the Table in Appendix B of this report. However, for detailed description and backup information for these BMPs, refer to WQTR for Retail Building V.

Responsible Party for Maintenance and Funding of Permanent Storm Water BMPs

The owner of the UTC revitalization project will be responsible for compliance with the NPDES Construction permit and the San Diego Municipal Code Land Development Manual – Storm Water Standards (which covers compliance for the San Diego SUSMP requirements for these projects). Specifically, the owner will be responsible for during construction and post-construction BMPs until the UTC project is fully constructed. Furthermore, the owner of the UTC revitalization project, Westfield Corporation Incorporated, will assume all responsibility for ensuring the ongoing effectiveness and maintenance of all permanent storm water BMPs (including all necessary funding for repair, replacement, and servicing).

8.0 SUMMARY

The UTC revitalization project will conform to applicable NPDES requirements during and after construction. During the construction phase, the project will be subject to the requirements of the General Construction Permit. The project will meet the requirements of the General Construction Permit by implementing a site-specific SWPPP and incorporating temporary BMPs for control of sediment and non-visible pollutants. The site inspection requirements and site-specific storm water sampling and analysis strategy (SWSAS) required in the SWPPP will provide an evaluation of the effectiveness of the BMPs. Adjustments to the BMPs will be made as necessary to maintain or improve effectiveness. The completed project will incorporate a PCSWOMP as a requirement for termination of coverage under the General Construction Permit. The completed project will also require an amount of runoff to be treated, infiltrated, or filtered based on numeric sizing criteria established in the San Diego SUSMP and the San Diego Municipal Code Land Development Manual – Storm Water Standards.

The completed project will incorporate a treatment train of non-structural and structural BMPs that will include stenciled inlets, prohibitive signage, landscaping, in-line treatment facilities, and others in order to meet the applicable requirements of the General Construction Permit and the Storm Water Standards manual. The in-line storm water treatment units are flow-based BMPs and have been sized for the project using flow-based numeric sizing criteria to meet the requirements of the Storm Water Standards manual (which covers the San Diego SUSMP requirements).

The UTC revitalization project will not increase drainage area to each existing outfall in the proposed condition. For most of the drainage basins the impervious areas within the basins will remain the same in existing and proposed conditions. If an increase to impervious areas occurs within any of the eight (8) drainage basins, design tools such as pervious pavement, check dams, planter boxes, or other equally comparable methods may be used to help maintain post-project peak runoff and volumes equal to (or less than) pre-project conditions. As a result, there will be no adverse impacts to downstream storm drain systems or waterways.

APPENDIX A

Storm Water Requirements Applicability Checklist

University Town Center J-14166 05/19/03

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000 for information
THE CITY OF SAN DIEGO

Storm Water Requirements Applicability Checklist

Project Address: 4545 La Jolla Village Dr., San Diego, CA 92122-1212	Assessor Parcel Number(s):	Project Number (for City Use Only)

Complete Sections 1 and 2 of the following checklist to determine your project's permanent and construction storm water best management practices requirements. This form must be completed and submitted with your permit application.

Section 1 - Permanent Storm Water BMP Requirements:

If any answers to Part A are answered "Yes," your project is subject to the "Priority Project Permanent Storm Water BMP Requirements," and "Standard Permanent Storm Water BMP Requirements" of the Storm Water Standards Manual, Section III, "Permanent Storm Water BMP Selection Procedure." If all answers to Part A are "No," and any answers to Part B are "Yes," your project is only subject to the Standard Permanent Storm Water BMP Requirements. If every question in Part A and B is answered "No," your project is exempt from permanent storm water requirements.

Part A: Determine Priority Project Permanent Storm Water BMP Requirements.

Does the project meet the definition of one or more of the priority project categories?*

1. Detached residential development of 10 or more units .... Yes **No** (circled)
2. Attached residential development of 10 or more units .... **Yes** (circled) No
3. Commercial development greater than 100,000 square feet .... **Yes** (circled) No
4. Automotive repair shop .... Yes **No** (circled)
5. Restaurant .... **Yes** (circled) No
6. Steep hillside development greater than 5,000 square feet .... Yes **No** (circled)
7. Project discharging to receiving waters within Environmentally Sensitive Areas .... Yes **No** (circled)
8. Parking lots greater than or equal to 5,000 square feet or with at least 15 parking spaces, and potentially exposed to urban runoff .... **Yes** (circled) No
9. Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater .... **Yes** (circled) No
10. Significant redevelopment over 5,000 square feet .... **Yes** (circled) No

* *Refer to the definitions section in the* Storm Water Standards *for expanded definitions of the priority project categories.*

Limited Exclusion: *Trenching and resurfacing work associated with utility projects are not considered priority projects. Parking lots, buildings and other structures associated with utility projects are priority projects if one or more of the criteria in Part A is met. If all answers to Part A are "No", continue to Part B.*

Part B: Determine Standard Permanent Storm Water Requirements.

Does the project propose:

1. New impervious areas, such as rooftops, roads, parking lots, driveways, paths and sidewalks? .... **Yes** (circled) No
2. New pervious landscape areas and irrigation systems? .... **Yes** (circled) No
3. Permanent structures within 100 feet of any natural water body? .... Yes **No** (circled)
4. Trash storage areas? .... **Yes** (circled) No
5. Liquid or solid material loading and unloading areas? .... **Yes** (circled) No
6. Vehicle or equipment fueling, washing, or maintenance areas? .... Yes **No** (circled)
7. Require a General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except construction)?* .... Yes **No** (circled)
8. Commercial or industrial waste handling or storage, excluding typical office or household waste? .... **Yes** (circled) No
9. Any grading or ground disturbance during construction? .... **Yes** (circled) No
10. Any new storm drains, or alteration to existing storm drains? .... **Yes** (circled) No

*To find out if your project is required to obtain an individual General NPDES Permit for Storm Water Discharges Associated with Industrial Activities, visit the State Water Resources Control Board web site at, www.swrcb.ca.gov/stormwtr/industrial.html

OVER

Section 2. Construction Storm Water BMP Requirements:

If the answer to question 1 of Part C is answered "Yes," your project is subject to Section IV of the Storm Water Standards Manual, "Construction Storm Water BMP Performance Standards," and must prepare a Storm Water Pollution Prevention Plan (SWPPP). If the answer to question 1of Part C is "No," but the answer to any of the remaining questions is "Yes," your project is subject to Section IV of the Storm Water Standards Manual, "Construction Storm Water BMP Performance Standards," and must prepare a Water Pollution Control Plan (WPCP). If every question in Part C is answered "No," your project is exempt from any construction storm water BMP requirements. If any of the answers to the questions in Part C are "Yes," complete the construction site prioritization in Part D below.

Part C: Determine Construction Phase Storm Water Requirements.

Would the project meet any of these criteria during construction?

1. Is the project subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities? .... Yes No
2. Does the project propose grading or soil disturbance? .... Yes No
3. Would storm water or urban runoff have the potential to contact any portion of the construction area, including washing and staging areas? .... Yes No
4. Would the project use any construction materials that could negatively affect water quality if discharged from the site (such as, paints, solvents, concrete, and stucco)? .... Yes No

Part D: Determine Construction Site Priority

In accordance with the Municipal Permit, each construction site with construction storm water BMP requirements must be designated with a priority: high, medium or low. This prioritization must be completed with this form, noted on the plans, and included in the SWPPP or WPCP. Indicate the project's priority in one of the check boxes using the criteria below, and existing and surrounding conditions of the project, the type of activities necessary to complete the construction and any other extenuating circumstances that may pose a threat to water quality. The City reserves the right to adjust the priority of the projects both before and during construction. [Note: The construction priority does NOT change construction BMP requirements that apply to projects; all construction BMP requirements must be identified on a case-by-case basis. The construction priority does affect the frequency of inspections that will be conducted by City staff. See Section IV.1 for more details on construction BMP requirements.]

☒ 1) High Priority

a) Projects where the site is 50 acres or more and grading will occur during the wet season

b) Projects 5 acres or more and tributary to an impaired water body for sediment (e.g., Peñasquitos watershed)

c) Projects 5 acres or more within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area

d) Projects, active or inactive, adjacent or tributary to sensitive water bodies

☐ 2) Medium Priority

a) Capital Improvement Projects where grading occurs, however a Storm Water Pollution Prevention Plan (SWPPP) is not required under the State General Construction Permit (i.e., water and sewer replacement projects, intersection and street re-alignments, widening, comfort stations, etc.)

b) Permit projects in the public right-of-way where grading occurs, however SWPPPs are not required, such as installation of sidewalk, substantial retaining walls, curb and gutter for an entire street frontage, etc.

c) Permit projects on private property where grading permits are required (i.e., cuts over 5 feet, fills over 3 feet), however, Notice Of Intents (NOIs) and SWPPPs are not required.

☐ 3) Low Priority

a) Capital Projects where minimal to no grading occurs, such as signal light and loop installations, street light installations, etc.

b) Permit projects in the public right-of-way where minimal to no grading occurs, such as pedestrian ramps, driveway additions, small retaining walls, etc.

c) Permit projects on private property where grading permits are not required, such as small retaining walls, single-family homes, small tenant improvements, etc.

Name of Owner or Agent *(Please Print)*:	Title:
Signature:	Date:

APPENDIX B

CDS Technologies: Summary of Approximate Material, Installation, and Maintenance Costs for Treatment Control BMPs and Backup Information

Summary of Approximate Material, Installation, and Maintenance Costs

For

Treatment Control BMPs

Outfall Number	Type of BMP	Material Costs [1]	Installation Costs [1]	Approximate Total Cost (Material and Installation) [1]	Approximate Maintenance Cost per year[2]
1	CDS Unit Model PMSU20_15	$4600	$2,400	$7,000	$1,500
2	CDS Unit Model PMSU20_25	$14,700	$3,800	$18,500	$2,000
3	CDS Unit Model PMSU20_25	$14,700	$3,800	$18,500	$2,000
4	CDS Unit Model PMSU 30_30	$2,500	$4,500	$29,000	$2,500
5	CDS Unit Model PMSU 20_15	$4600	$2,400	$7,000	$1,500
6[3]	(3)ClearWater BMP Units	$9,885	$1,200	$11,085	$4,075.5
	(2)Vegetated "Dry" swales	-	-	-	$5944.0
7	CDS Unit Model PMSU20_20	$10,500	$3,800	$14,300	$2,000
8	CDS Unit Model PSWC 40_40	$28,000	$25,500	$53,500	$2,500

1 - Costs for CDS Units: Material, Installation, and Total Costs were provided by CDS Technologies, Inc., dated 01/09/02. See the following pages for back-up information.

2 - Maintenance Costs for CDS Units: Costs were provided by CDS Technologies, Inc. by phone on 6/25/04, for most of the above units. Costs were provided based on a per-maintenance cleaning, and annual costs shown above reflect 2 maintenance cleanings per year. Costs are typically based on the volume of pollutants that each unit can handle, therefor, some approximations were used to determine the maintenance costs of units not previously provided by CDS Technologies, Inc.

3- These costs are included for reference only. For detailed description and backup for these costs, refer to report titled, "Water Quality Technical Report for Westfield UTC Retail Building V", dated January 22, 2007, prepared by Rick Engineering Company Job Number 14166A, (City of San Diego WO# 120208, DWG# 34395-D, PTS# 427276).

STORM WATER CDS

CAPACITIES AND COSTS*

MODEL	CAPACITY (CFS)	**CDS UNIT F.O.B COST	ESTIMATED IN PLACE COST
PMIU20_15	0.7	$4,600	$7,000
PMSU20_15_4	0.7	$6,900	$9,300
PMSU20_15	0.7	$8,200	$11,600
PMSU20_20	1.1	$10,500	$14,300
PMSU20_25	1.6	$14,700	$18,500
PMSU30_20	2.0	$19,200	$23,000
PSW30_30	3.0	$19,700	$29,000
PMSU30_30	3.0	$24,500	$29,000
PSWC30_30	3.0	$19,900	$29,000
PMSU40_30	4.5	$28,000	$34,000
PMSU40_40	6.0	$32,700	$39,700
PSWC40_40	6.0	$28,000	$53,500
PSW50_42	9.0	$35,500	$72,800
PSWC56_40	9.0	$35,500	$72,800
PSW50_50	11	$36,200	$72,800
PSWC56_53	14	$42,000	$81,900
PSWC56_68	19	$51,600	$94,500
PSWC56_78	25	$63,000	$112,400
PSW70_70	26	$64,900	$120,800
PSW100_60	30	$115,300	$236,600
PSW100_80	50	$121,600	$236,600
PSW100_100	64	$127,900	$236,600

CDS cast-in-place reinforced concrete units can be designed to treat flows up to 300 cfs. Call for prices.

* COST ESTIMATES ARE FOR NEW CONSTRUCTION INSTALLATIONS FOB @ JOBSITE

APPROXIMATE CDS MAINTENANCE COSTS

(SEE NOTE)

MODEL	Q_{TREAT} (CFS)	AREA (ACRES)	SUMP VOLUME (CU YDS)	SUMP MATERIAL WT. (TONS)	DISPOSAL COSTS $40/TON	VACTOR TIME (HRS)	VACTOR CHARGE $175/HR	TOTAL COST
PMIU 20_15	0.7	4	1	1	$35	4	$700	$735
PMSU 20_15_4	0.7	4	1	1	$35	4	$700	$735
PMSU 20_15	0.7	4	1	1	$50	4	$700	$750
PMSU 20_20	1.1	6	1	1	$50	4	$700	$750
PMSU 20_25	1.6	8	1	1	$50	4	$700	$750
PMSU 30_20	2.0	10	2	2	$100	4	$700	$800
PMSU 30_30	3.0	20	2	2	$100	4	$700	$800
PSW 30_30	3.0	20	1	2	$65	4	$700	$765
PMSU 40_30	4.5	25	6	6	$250	4	$700	$950
PMSU 40_40	6.0	30	6	6	$250	4	$700	$950
PSWC 40_30	4.5	80	6	6	$250	4	$700	$950
PSWC 40_40	6.0	80	6	6	$250	4	$700	$950
PSW 50-42	9.0	50	2	2	$85	4	$700	$785
PSW 50_50	11	60	2	2	$85	4	$700	$785
PSWC 56_53	14	110	6	6	$250	5	$875	$1,125
PSWC 56_68	19	110	6	6	$250	5	$875	$1,125
PSW 70_70	26	150	4	4	$180	6	$1,050	$1,230
PSW 100_60	30	210	14	16	$635	7	$1,225	$1,860
PSW 100_80	50	280	14	16	$635	7	$1,225	$1,860
PSW 100_100	64	350	14	16	$635	7	$1,225	$1,860

Assumptions:

1. Sump material weighs 85 lbs per cubic foot
2. Cleanout intervals are based on the amount and types of floatables and sediment captured by each CDS unit. CDS installations in Southern California typically require 1-2 cleanouts per year.
3. This estimate does not include hazardous waste disposal fees, if required.
4. Liquids may be decanted back into the CDS unit or discharged into the sanitay sewer without fees.
5. Minimum vactor charge of 4 hours applies. Actual maintenance time is less. Therefore, cleaning multiple CDS units in one day is recommended to reduce cost.

NOTE: Actual maintenance costs for seven CDS units may be less than the total costs suggested above, since costs above assume minimum vactor times.

APPENDIX C

University Town Center

Preliminary Treatment Flow Calculation Table

UNIVERSITY TOWN CENTER
RICK ENGINEERING COMPANY (JOB # 14166A)

Post-Project Condition Preliminary Treatment Flow Calculations

Outfall Number	**Run-off Coefficient*	*Intensity (in/hr)*	*Area (acres)*	*Water Quality Treatment, Qt required*	*Water Quality Treatment Provided*	*Type of BMP*
1	0.88	0.2	2.2	0.4	0.7	CDS Unit Model PMIU20_15
2	0.83	0.2	7.9	1.3	1.6	CDS Unit Model PMSU20_25
3	0.92	0.2	7.2	1.3	1.6	CDS Unit Model PMSU20_25
4	0.89	0.2	11.3	2.0	3.0	CDS Unit Model PMSU30_30
5	0.83	0.2	2.4	0.4	0.7	CDS Unit Model PMIU20_15
6	Refer to Water Quality Technical Report for UTC Retail Building V (J-14166A), City of San Diego WO# 120208, DWG# 34395-D, PTS# 427276					
7	0.90	0.2	5.7	1.0	1.1	CDS Unit Model PMSU20_20
8	0.83	0.2	33.2	5.5	6.0	CDS Unit Model PSWC40_40

* Area Weighted Coefficient

APPENDIX D

Existing Condition Drainage Calculations

```
****************************************************************************

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          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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                        Analysis prepared by:

                       RICK ENGINEERING COMPANY
                           5620 Friars Road
                      San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * J-14166; UTC WESTFIELD                                                 *
 * 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                               *
 * BASIN 100 TO OUTFALL 1                                                 *
 **************************************************************************

  FILE NAME: UTC100EX.DAT
  TIME/DATE OF STUDY: 17:23 07/16/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =    0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =     375.50
  DOWNSTREAM ELEVATION(FEET) =     374.20
  ELEVATION DIFFERENCE(FEET) =       1.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     3.299
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =        1.14
  TOTAL AREA(ACRES) =       0.30   TOTAL RUNOFF(CFS) =        1.14

*******************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
-------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
===============================================================================
  UPSTREAM ELEVATION(FEET) =  374.20  DOWNSTREAM ELEVATION(FEET) =  350.50
  STREET LENGTH(FEET) =   660.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        4.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    10.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     1.13
  STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =    9.06
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.628
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     6.20
  TOTAL AREA(ACRES) =       2.20        PEAK FLOW RATE(CFS) =        7.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.06
  FLOW VELOCITY(FEET/SEC.) =  4.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   760.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       2.20  TC(MIN.) =      9.06
  PEAK FLOW RATE(CFS)    =       7.34
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                   *
* 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                                 *
* BASIN 200 TO OUTFALL 2                                                   *
 **************************************************************************

  FILE NAME: UTC200EX.DAT
  TIME/DATE OF STUDY: 08:32 07/13/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.000;  4.400
   2)   10.000;  3.450
   3)   15.000;  2.900
   4)   20.000;  2.500
   5)   25.000;  2.200
   6)   30.000;  2.000
   7)   40.000;  1.700
   8)   50.000;  1.500
   9)   60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP    HIKE  FACTOR
NO.   (FT)    (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
  1   30.0      20.0    0.018/0.018/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   20.0      15.0    0.020/0.020/0.020  0.50   1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =     376.00
  DOWNSTREAM ELEVATION(FEET) =     373.00
  ELEVATION DIFFERENCE(FEET) =       3.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.871
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =        2.56
  TOTAL AREA(ACRES) =       0.70   TOTAL RUNOFF(CFS) =        2.56

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     373.00  DOWNSTREAM(FEET) =     336.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    580.00   CHANNEL SLOPE =  0.0638
  CHANNEL BASE(FEET) =   10.00    "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.962
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    7.42
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =    1.30
  Tc(MIN.) =    7.30
  SUBAREA AREA(ACRES) =       7.20      SUBAREA RUNOFF(CFS) =   24.82
  TOTAL AREA(ACRES) =       7.90          PEAK FLOW RATE(CFS) =       27.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   9.16
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =   680.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       7.90  TC(MIN.) =       7.30
  PEAK FLOW RATE(CFS)     =      27.38
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                          San Diego, California 92110
                       619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * J-14166; UTC WESTFIELD                                                   *
 * 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                                 *
 * BASIN 300 TO OUTFALL 3                                                   *
 ****************************************************************************

  FILE NAME: UTC300EX.DAT
  TIME/DATE OF STUDY: 08:34 07/13/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0      20.0   0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0      15.0   0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE     300.00 TO NODE     301.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    380.10
  DOWNSTREAM ELEVATION(FEET) =    379.60
  ELEVATION DIFFERENCE(FEET) =      0.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.216
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       1.10
  TOTAL AREA(ACRES) =       0.30   TOTAL RUNOFF(CFS) =       1.10

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    373.60  DOWNSTREAM(FEET) =   372.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1:10
  PIPE TRAVEL TIME(MIN.) =   3.55    Tc(MIN.) =   9.55
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =   620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.536
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      3.30   SUBAREA RUNOFF(CFS) =   10.15
  TOTAL AREA(ACRES) =       3.60   TOTAL RUNOFF(CFS) =   11.25
  TC(MIN.) =    9.55

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =   360.00
  FLOW LENGTH(FEET) =   530.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       11.25
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =  10.49
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =  1150.00 FEET.

****************************************************************************
```

```
FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.396
*USER SPECIFIED(SUBAREA):
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8700
S.C.S. CURVE NUMBER (AMC II) =   0
SUBAREA AREA(ACRES) =     3.60   SUBAREA RUNOFF(CFS) =   10.64
TOTAL AREA(ACRES) =       7.20   TOTAL RUNOFF(CFS) =   21.89
TC(MIN.) =  10.49

****************************************************************************
FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   360.00  DOWNSTREAM(FEET) =   350.00
FLOW LENGTH(FEET) =    36.80   MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  28.16
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      21.89
PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  10.52
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =  1186.80 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =       7.20  TC(MIN.) =      10.52
PEAK FLOW RATE(CFS)    =      21.89
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
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                          Analysis prepared by:

                         RICK ENGINEERING COMPANY
                             5620 Friars Road
                        San Diego, California 92110
                      619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                    *
* 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                                  *
* BASIN 400 TO OUTFALL 4                                                    *
 **************************************************************************

  FILE NAME: UTC400EX.DAT
  TIME/DATE OF STUDY: 08:35 07/13/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO  STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL IN- / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE   FACTOR
NO.  (FT)     (FT)    SIDE / SIDE/ WAY   (FT)   (FT)  (FT)   (FT)    (n)
===  =====  ========= ================= ====== ===== ====== ===== =======
  1   30.0     20.0   0.018/0.018/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   20.0     15.0   0.020/0.020/0.020  0.50   1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   413.40
  DOWNSTREAM ELEVATION(FEET) =   403.40
  ELEVATION DIFFERENCE(FEET) =    10.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.253
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       0.80
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   361.00  DOWNSTREAM(FEET) =   353.50
  FLOW LENGTH(FEET) =   610.77   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.80
  PIPE TRAVEL TIME(MIN.) =   2.80    Tc(MIN.) =   8.80
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =   710.77 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.677
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      8.20   SUBAREA RUNOFF(CFS) =    26.84
  TOTAL AREA(ACRES) =      8.40   TOTAL RUNOFF(CFS) =    27.64
  TC(MIN.) =    8.80

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.677
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      2.90   SUBAREA RUNOFF(CFS) =     9.49
  TOTAL AREA(ACRES) =     11.30   TOTAL RUNOFF(CFS) =    37.13
  TC(MIN.) =    8.80

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   353.50  DOWNSTREAM(FEET) =   351.50
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.13
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =    9.41
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =  1000.77 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      11.30  TC(MIN.) =       9.41
 PEAK FLOW RATE(CFS)    =      37.13
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                         RICK ENGINEERING COMPANY
                             5620 Friars Road
                        San Diego, California 92110
                      619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * J-14166; UTC WESTFIELD                                                 *
 * 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                               *
 * BASIN 500 TO OUTFALL 5                                                 *
 **************************************************************************

  FILE NAME: UTC500EX.DAT
  TIME/DATE OF STUDY: 16:25 07/18/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)  (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ====== ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50   1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
```

```
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =    473.50
  DOWNSTREAM ELEVATION(FEET) =    371.00
  ELEVATION DIFFERENCE(FEET) =    102.50
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.923
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =       0.25

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE = .62
-----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
=============================================================================
  UPSTREAM ELEVATION(FEET) =  371.00  DOWNSTREAM ELEVATION(FEET) =  364.00
  STREET LENGTH(FEET) =   370.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   8.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.753
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =    5.18
  TOTAL AREA(ACRES) =       2.40        PEAK FLOW RATE(CFS) =        5.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.17
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =   470.00 FEET.
=============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)        =       2.40  TC(MIN.) =       8.41
  PEAK FLOW RATE(CFS)      =       5.43
=============================================================================
=============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
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                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707   Fax 619-291-4165

************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                 *
* 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                               *
* BASIN 700 TO OUTFALL 7                                                 *
**************************************************************************

  FILE NAME: UTC700EX.DAT
  TIME/DATE OF STUDY: 13:21 07/13/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1  30.0     20.0     0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2  20.0     15.0     0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =   6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    406.50
  DOWNSTREAM ELEVATION(FEET) =    405.18
  ELEVATION DIFFERENCE(FEET) =      1.32
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.282
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       2.65
  TOTAL AREA(ACRES) =       0.70   TOTAL RUNOFF(CFS) =       2.65

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   900.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.65
  PIPE TRAVEL TIME(MIN.) =    2.92    Tc(MIN.) =    8.92
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =  1000.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.655
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   16.45
  TOTAL AREA(ACRES) =       5.70   TOTAL RUNOFF(CFS) =   19.10
  TC(MIN.) =    8.92
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       5.70  TC(MIN.) =       8.92
  PEAK FLOW RATE(CFS)    =      19.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                 *
* 100-YR, 6-HR PRE-PROJECT RATIONAL METHOD                               *
* BASIN 800 TO OUTFALL 8                                                 *
**************************************************************************

  FILE NAME: UTC800EX.DAT
  TIME/DATE OF STUDY: 17:01 07/16/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ====== ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50   1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE     800.00 TO NODE     801.00 IS CODE =  21
```

```
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    384.00
  DOWNSTREAM ELEVATION(FEET) =    383.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.915
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       1.50
  TOTAL AREA(ACRES) =       0.40   TOTAL RUNOFF(CFS) =       1.50

**************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  383.10  DOWNSTREAM ELEVATION(FEET) =  374.00
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        6.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
  STREET FLOW TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =   7.85
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.858
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =     3.00      SUBAREA RUNOFF(CFS) =   10.30
  TOTAL AREA(ACRES) =       3.40        PEAK FLOW RATE(CFS) =      11.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.04
  FLOW VELOCITY(FEET/SEC.) =  3.95   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    802.00 =   480.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   366.00  DOWNSTREAM(FEET) =   362.60
```

```
  FLOW LENGTH(FEET) =    680.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =    5.34
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
  PIPE TRAVEL TIME(MIN.) =   2.12    Tc(MIN.) =   9.97
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    803.00 =  1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.455
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =      6.40    SUBAREA RUNOFF(CFS) =   19.68
  TOTAL AREA(ACRES) =        9.80    TOTAL RUNOFF(CFS) =    31.48
  TC(MIN.) =    9.97

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.455
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =      5.30    SUBAREA RUNOFF(CFS) =   16.30
  TOTAL AREA(ACRES) =       15.10    TOTAL RUNOFF(CFS) =    47.78
  TC(MIN.) =    9.97

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.60  DOWNSTREAM(FEET) =    362.20
  FLOW LENGTH(FEET) =     75.00    MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =    7.73
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.78
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  10.14
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    804.00 =  1235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    804.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.435
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =      1.20    SUBAREA RUNOFF(CFS) =     3.67
  TOTAL AREA(ACRES) =       16.30    TOTAL RUNOFF(CFS) =    51.44
  TC(MIN.) =  10.14
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    805.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.20  DOWNSTREAM(FEET) =    331.00
  FLOW LENGTH(FEET) =   660.00   MANNING'S N = 0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) = 17.89
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     51.44
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  10.75
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    805.00 =  1895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    805.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.367
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =    10.70   SUBAREA RUNOFF(CFS) =    32.07
  TOTAL AREA(ACRES) =      27.00   TOTAL RUNOFF(CFS) =    83.51
  TC(MIN.) =  10.75

****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    806.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     331.00  DOWNSTREAM(FEET) =    269.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1170.00   CHANNEL SLOPE =  0.0530
  CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.143
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     88.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.54
  AVERAGE FLOW DEPTH(FEET) =   2.15   TRAVEL TIME(MIN.) =   2.04
  Tc(MIN.) =  12.79
  SUBAREA AREA(ACRES) =     6.20        SUBAREA RUNOFF(CFS) =     9.16
  TOTAL AREA(ACRES) =     33.20          PEAK FLOW RATE(CFS) =       92.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.19   FLOW VELOCITY(FEET/SEC.) =    9.64
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    806.00 =  3065.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =      33.20  TC(MIN.) =      12.79
  PEAK FLOW RATE(CFS)     =      92.67
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Date 07/05/07
Job No. 14166
Page 1
Done By
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Weighted Runoff Coefficient Calculations

EXISTING CONDITION

* **Basin 100**

$$C_w = \frac{0.2 \times 0.45 + 2.0 \times 0.95}{2.2}$$

$C_w = 0.90$

* **Basin 200**

$$C_w = \frac{1.3 \times 0.45 + 6.6 \times 0.95}{7.9}$$

$C_w = 0.87$

* **Basin 300**

$$C_w = \frac{1.1 \times 0.45 + 6.1 \times 0.95}{7.2}$$

$C_w = 0.87$

* **Basin 400 (Node 401 - 403)**

$$C_w = \frac{1.3 \times 0.45 + 9.8 \times 0.95}{11.1}$$

$C_w = 0.89$

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* Basin 500

$$C_w = \frac{1.7 \times 0.45 + 0.7 \times 0.95}{2.4}$$

$$C_w = 0.60$$

* Basin 700

$$C_w = \frac{0.4 \times 0.45 + 5.3 \times 0.95}{5.7}$$

$$C_w = 0.90$$

* Basin 800 (Node 800 - 805)

$$C_w = \frac{3.4 \times 0.45 + 23.6 \times 0.95}{27.0}$$

$$C_w = 0.89$$

* Basin 800 (Node 805 - 806)

$$C_w = \frac{5.9 \times 0.45 + 0.3 \times 0.95}{6.2}$$

$$C_w = 0.47$$

BASN 800 (Total) $C_w = 0.81$

APPENDIX E

Proposed Condition Drainage Calculations

```
****************************************************************************
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          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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           Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                          Analysis prepared by:

                         RICK ENGINEERING COMPANY
                             5620 Friars Road
                        San Diego, California 92110
                      619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * J-14166; UTC WESTFIELD                                                   *
 * 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                                *
 * BASIN 100 TO OUTFALL 1                                                   *
 **************************************************************************

  FILE NAME: UTC100PP.DAT
  TIME/DATE OF STUDY: 09:37 07/17/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)   (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020  0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
```

```
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =    377.00
  DOWNSTREAM ELEVATION(FEET) =    375.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.143
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      1.11
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      1.11

*******************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
-------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
===============================================================================
  UPSTREAM ELEVATION(FEET) =  375.00  DOWNSTREAM ELEVATION(FEET) =  350.50
  STREET LENGTH(FEET) =   690.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =  0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.36
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =    9.23
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.596
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =    6.01
  TOTAL AREA(ACRES) =      2.20       PEAK FLOW RATE(CFS) =       7.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.94
  FLOW VELOCITY(FEET/SEC.) =  4.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   790.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =     2.20  TC(MIN.) =      9.23
  PEAK FLOW RATE(CFS)     =     7.12
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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                       Analysis prepared by:

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                         5620 Friars Road
                    San Diego, California 92110
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 ************************* DESCRIPTION OF STUDY *************************
 * J-14166; UTC WESTFIELD                                                  *
 * 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                               *
 * BASIN 200 TO OUTFALL 2                                                  *
 **************************************************************************

  FILE NAME: UTC200PP.DAT
  TIME/DATE OF STUDY: 15:17 07/17/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO  STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL IN- / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE   FACTOR
NO.  (FT)     (FT)    SIDE / SIDE/ WAY  (FT)   (FT)  (FT)   (FT)    (n)
===  =====  ========= ================  ====== ===== ====== ===== =======
  1   30.0     20.0   0.018/0.018/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   20.0     15.0   0.020/0.020/0.020  0.50   1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =     375.00
  DOWNSTREAM ELEVATION(FEET) =     374.00
  ELEVATION DIFFERENCE(FEET) =       1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     4.860
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =        2.10
  TOTAL AREA(ACRES) =        0.60   TOTAL RUNOFF(CFS) =      2.10

****************************************************************************
  FLOW PROCESS FROM NODE     201.00 TO NODE     202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    341.50  DOWNSTREAM(FEET) =   329.00
  FLOW LENGTH(FEET) =  1250.00    MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS    5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =    4.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        2.10
  PIPE TRAVEL TIME(MIN.) =    4.66     Tc(MIN.) =   10.66
  LONGEST FLOWPATH FROM NODE     200.00 TO NODE     202.00 =   1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     202.00 TO NODE     202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.378
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      7.30   SUBAREA RUNOFF(CFS) =     20.47
  TOTAL AREA(ACRES) =        7.90   TOTAL RUNOFF(CFS) =     22.56
  TC(MIN.) =   10.66
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =        7.90  TC(MIN.) =       10.66
  PEAK FLOW RATE(CFS)     =       22.56
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                      San Diego, California 92110
                    619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * J-14166; UTC WESTFIELD                                                 *
 * 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                              *
 * BASIN 300 TO OUTFALL 3                                                 *
 **************************************************************************

  FILE NAME: UTC300PP.DAT
  TIME/DATE OF STUDY: 09:11 07/17/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50   1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    394.00
  DOWNSTREAM ELEVATION(FEET) =    393.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.240
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       1.16
  TOTAL AREA(ACRES) =       0.30   TOTAL RUNOFF(CFS) =       1.16

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    303.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   360.00
  FLOW LENGTH(FEET) =  1600.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.16
  PIPE TRAVEL TIME(MIN.) =   7.82    Tc(MIN.) =  13.82
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =  1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.030
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =       6.90   SUBAREA RUNOFF(CFS) =   19.23
  TOTAL AREA(ACRES) =       7.20   TOTAL RUNOFF(CFS) =   20.40
  TC(MIN.) =  13.82

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   360.00  DOWNSTREAM(FEET) =   350.00
  FLOW LENGTH(FEET) =    36.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.40
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =  13.84
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =  1736.80 FEET.
============================================================================
```

```
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       7.20  TC(MIN.) =       13.84
  PEAK FLOW RATE(CFS)    =      20.40
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

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           Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                     619-291-0707    Fax 619-291-4165

************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                  *
* 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                               *
* BASIN 400 TO OUTFALL 4                                                  *
**************************************************************************

  FILE NAME: UTC400PP.DAT
  TIME/DATE OF STUDY: 13:31 07/17/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.000;  4.400
   2)   10.000;  3.450
   3)   15.000;  2.900
   4)   20.000;  2.500
   5)   25.000;  2.200
   6)   30.000;  2.000
   7)   40.000;  1.700
   8)   50.000;  1.500
   9)   60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020  0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =    0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =     383.00
  DOWNSTREAM ELEVATION(FEET) =     382.00
  ELEVATION DIFFERENCE(FEET) =       1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =     2.700
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =        1.20
  TOTAL AREA(ACRES) =        0.30   TOTAL RUNOFF(CFS) =        1.20

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   364.00  DOWNSTREAM(FEET) =   356.00
  FLOW LENGTH(FEET) =   700.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.98
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.20
  PIPE TRAVEL TIME(MIN.) =   2.93    Tc(MIN.) =    8.93
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =   800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.654
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =      3.20   SUBAREA RUNOFF(CFS) =    10.41
  TOTAL AREA(ACRES) =        3.50   TOTAL RUNOFF(CFS) =    11.61
  TC(MIN.) =     8.93

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.654
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =      3.60   SUBAREA RUNOFF(CFS) =    11.71
  TOTAL AREA(ACRES) =        7.10   TOTAL RUNOFF(CFS) =    23.31
  TC(MIN.) =     8.93

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   356.00  DOWNSTREAM(FEET) =   351.50
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.54
 ESTIMATED PIPE DIAMETER(INCH) =  27.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.31
 PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =  10.14
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =  1350.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    403.00 TO NODE    403.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.434
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8900
 S.C.S. CURVE NUMBER (AMC II) =    0
 SUBAREA AREA(ACRES) =    4.20   SUBAREA RUNOFF(CFS) =   12.84
 TOTAL AREA(ACRES) =     11.30   TOTAL RUNOFF(CFS) =   36.15
 TC(MIN.) =  10.14
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      11.30  TC(MIN.) =      10.14
 PEAK FLOW RATE(CFS)    =      36.15
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
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                            Analysis prepared by:

                            RICK ENGINEERING COMPANY
                               5620 Friars Road
                          San Diego, California 92110
                        619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
 * J-14166; UTC WESTFIELD                                                 *
 * 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                              *
 * BASIN 500 TO OUTFALL 5                                                 *
 **************************************************************************

  FILE NAME: UTC500PP.DAT
  TIME/DATE OF STUDY: 16:57 07/18/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.000;  4.400
   2)   10.000;  3.450
   3)   15.000;  2.900
   4)   20.000;  2.500
   5)   25.000;  2.200
   6)   30.000;  2.000
   7)   40.000;  1.700
   8)   50.000;  1.500
   9)   60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
    WIDTH  CROSSFALL  IN- / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)    (FT)     SIDE / SIDE/ WAY   (FT)   (FT)  (FT)  (FT)    (n)
=== =====  =========  ================  ======  ===== ====== ===== =======
  1  30.0     20.0    0.018/0.018/0.020  0.67    2.00 0.0313 0.167 0.0150
  2  20.0     15.0    0.020/0.020/0.020  0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
```

```
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
  UPSTREAM ELEVATION(FEET) =     381.00
  DOWNSTREAM ELEVATION(FEET) =     380.00
  ELEVATION DIFFERENCE(FEET) =       1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.860
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       1.05
  TOTAL AREA(ACRES) =       0.30   TOTAL RUNOFF(CFS) =       1.05

***************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    367.50  DOWNSTREAM(FEET) =    365.25
  CHANNEL LENGTH THRU SUBAREA(FEET) =    350.00   CHANNEL SLOPE =  0.0064
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =    1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.528
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.63
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   3.59
  Tc(MIN.) =    9.59
  SUBAREA AREA(ACRES) =      1.10        SUBAREA RUNOFF(CFS) =    3.22
  TOTAL AREA(ACRES) =      1.40          PEAK FLOW RATE(CFS) =       4.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   1.84
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =   450.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.528
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      1.00   SUBAREA RUNOFF(CFS) =      2.93
  TOTAL AREA(ACRES) =      2.40   TOTAL RUNOFF(CFS) =     7.20
  TC(MIN.) =    9.59

***************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  31
---------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    357.00
```

```
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.15
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.20
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    9.86
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    503.00 =   550.00 FEET.
===========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       2.40  TC(MIN.) =       9.86
 PEAK FLOW RATE(CFS)   =       7.20
===========================================================================
===========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
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                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                            5620 Friars Road
                       San Diego, California 92110
                      619-291-0707    Fax 619-291-4165

************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                  *
* 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                               *
* BASIN 700 TO OUTFALL 7                                                  *
**************************************************************************

  FILE NAME: UTC700PP.DAT
  TIME/DATE OF STUDY: 13:20 07/13/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)  (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = -0.10 FEET
      as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
```

```
-----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =  0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    406.50
  DOWNSTREAM ELEVATION(FEET) =    405.18
  ELEVATION DIFFERENCE(FEET) =      1.32
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.282
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      2.65
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      2.65

*****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  31
-----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   377.00  DOWNSTREAM(FEET) =   366.00
  FLOW LENGTH(FEET) =   900.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.65
  PIPE TRAVEL TIME(MIN.) =   2.92    Tc(MIN.) =    8.92
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =  1000.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.655
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      5.00   SUBAREA RUNOFF(CFS) =   16.45
  TOTAL AREA(ACRES) =      5.70   TOTAL RUNOFF(CFS) =   19.10
  TC(MIN.) =    8.92
=============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      5.70  TC(MIN.) =      8.92
  PEAK FLOW RATE(CFS)    =     19.10
=============================================================================
=============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
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                         Analysis prepared by:

                        RICK ENGINEERING COMPANY
                           5620 Friars Road
                      San Diego, California 92110
                    619-291-0707    Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* J-14166; UTC WESTFIELD                                                  *
* 100-YR, 6-HR POST-PROJECT RATIONAL METHOD                               *
* BASIN 800 TO OUTFALL 8                                                  *
 **************************************************************************

  FILE NAME: UTC800PP.DAT
  TIME/DATE OF STUDY: 15:13 07/17/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:  CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN- / OUT-/PARK-  HEIGHT WIDTH LIP    HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY   (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  ================= ======  ===== ====== ===== =======
  1  30.0     20.0     0.018/0.018/0.020  0.67    2.00 0.0313 0.167 0.0150
  2  20.0     15.0     0.020/0.020/0.020  0.50    1.50 0.0100 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    801.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    381.00
  DOWNSTREAM ELEVATION(FEET) =    380.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.420
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =       1.53
  TOTAL AREA(ACRES) =       0.40   TOTAL RUNOFF(CFS) =        1.53

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   378.00  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =  1800.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.53
  PIPE TRAVEL TIME(MIN.) =   7.64    Tc(MIN.) =  13.64
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    802.00 =  1900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.049
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9100
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      9.40   SUBAREA RUNOFF(CFS) =    26.08
  TOTAL AREA(ACRES) =        9.80   TOTAL RUNOFF(CFS) =    27.61
  TC(MIN.) =  13.64

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.049
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9100
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =      5.40   SUBAREA RUNOFF(CFS) =    14.98
  TOTAL AREA(ACRES) =       15.20   TOTAL RUNOFF(CFS) =    42.60
  TC(MIN.) =  13.64

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.00  DOWNSTREAM(FEET) =    331.00
  FLOW LENGTH(FEET) =   600.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.52
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     42.60
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  14.22
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    803.00 =  2500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.986
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9100
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =     6.00   SUBAREA RUNOFF(CFS) =   16.31
  TOTAL AREA(ACRES) =     21.20   TOTAL RUNOFF(CFS) =    58.90
  TC(MIN.) =  14.22

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.986
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9100
  S.C.S. CURVE NUMBER (AMC II) =    0
  SUBAREA AREA(ACRES) =     5.80   SUBAREA RUNOFF(CFS) =   15.76
  TOTAL AREA(ACRES) =     27.00   TOTAL RUNOFF(CFS) =    74.67
  TC(MIN.) =  14.22

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    806.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    331.00  DOWNSTREAM(FEET) =    269.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1170.00   CHANNEL SLOPE =  0.0530
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.794
  *USER SPECIFIED(SUBAREA):
  MULTI-UNITS DEVELOPMENT RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =    0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     78.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    9.25
  AVERAGE FLOW DEPTH(FEET) =   2.06   TRAVEL TIME(MIN.) =   2.11
  Tc(MIN.) =  16.32
  SUBAREA AREA(ACRES) =     6.20      SUBAREA RUNOFF(CFS) =    8.14
  TOTAL AREA(ACRES) =     33.20       PEAK FLOW RATE(CFS) =      82.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.10   FLOW VELOCITY(FEET/SEC.) =   9.38
```

```
LONGEST FLOWPATH FROM NODE    800.00 TO NODE    806.00 =  3670.00 FEET.
==========================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =      33.20  TC(MIN.) =      16.32
PEAK FLOW RATE(CFS)    =      82.81
==========================================================================
==========================================================================
END OF RATIONAL METHOD ANALYSIS
```

RICK™
ENGINEERING COMPANY
5620 Friars Road
San Diego, CA 92110-2596
Tel: (619) 291-0707
Fax: (619) 291-4165

Date	07/16/07
Job No.	14166
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Done By	
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Weighted Runoff Coefficient Calculations

PROPOSED CONDITION

* Basin 100

$$C_w = \frac{0.3 \times 0.45 + 1.9 \times 0.95}{2.2}$$

$$C_w = 0.88$$

* Basin 200

$$C_w = \frac{1.9 \times 0.45 + 6.0 \times 0.95}{7.9}$$

$$C_w = 0.83$$

* Basin 300

$$C_w = \frac{0.5 \times 0.45 + 6.7 \times 0.95}{7.2}$$

$$C_w = 0.92$$

NOTE: Due to longer T_c in post-project condition, $Q_{post} < Q_{pre}$, despite slight increase to C_w.
To ensure $Vol_{post} \leq Vol_{pre}$, project shall store. $\Delta C_w \cdot P_{6HR,10YR} \cdot A$

$$= (.05)(1.52 \text{ in})(7.2 \text{ Ac}) = 0.05 \text{ Ac-ft}$$

* Basin 400 (Node 401-403)

$$C_w = \frac{1.3 \times 0.45 + 9.7 \times 0.95}{11.0}$$

$$C_w = 0.89$$

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* Basin 500

$$C_W = \frac{0.6 \times 0.45 + 1.8 \times 0.95}{2.4}$$

$C_W = 0.83$

NOTE: To ensure $Q_{100,post} \leq Q_{100,pre}$, project shall detain volume $= 0.044$ Ac-ft (See Calculation, Next Pg)

To ensure $Vol_{post} \leq Vol_{pre}$, project shall store $\Delta C_W \cdot P_{6HR,100YR} \cdot A$

$= (0.23)(1.52 \text{ inches})(2.4 \text{ Ac})$

$= 0.07$ Ac-ft

* Basin 700

$$C_W = \frac{0.4 \times 0.45 + 5.3 \times 0.95}{5.7}$$

$C_W = 0.9$

* Basin 800 (Node 800-805)

$$C_W = \frac{2.0 \times 0.45 + 25.0 \times 0.95}{27.0}$$

$C_W = 0.91$

BASIN 800 (Total) $C_W = 0.83$

NOTE: Due to longer T_c in post-project condition, $Q_{post} < Q_{pre}$, despite slight increase to C_W.

To ensure $Vol_{post} \leq Vol_{pre}$, project shall store $\Delta C_W \cdot P_{6HR,100YR} \cdot A$

$= (0.02)(1.52 \text{ inches})(33.2 \text{ Ac})$

$= 0.08$ Ac-ft

* Basin 800 (Node 805-806)

$$C_W = \frac{5.9 \times 0.45 + 0.3 \times 0.95}{6.2}$$

$C_W = 0.47$

BASIN 500 - Detention volume Calculations for Q100

(Preliminary)

```
*DIAGRAM
*FREE
ID UNIVERSITY TOWN CENTRE J-14166
ID JULY18, 2007 FN:B5H_100.HC1
ID 100 YEAR DETENTION FOR BASIN 500
IT 2 01JAN90 1200 200
IO 3,2
KK B5H_100.hc1
KM RUN DATE   7/19/2007
KM RATIONAL METHOD HYDROGRAPH PROGRAM
KM COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
KM 6HR RAINFALL IS 2.3 INCHES
KM RATIONAL METHOD RUNOFF COEFFICIENT IS 0.83
KM RATIONAL METHOD TIME OF CONCENTRATION IS 10 MIN.
KM FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
KM IT 2 01JAN90 1200 200
BA 0.0038
IN 10 01JAN90  1155
QI 0  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.4
QI 0.4  0.4  0.4  0.4  0.4  0.5  0.5  0.6  0.6  0.7
QI 0.7  0.9  1  1.5  2.7  7.2  1.2  0.8  0.6  0.5
QI 0.5  0.4  0.4  0.3  0.3  0.3  0.3  0  0  0
QI 0  0  0  0  0  0  0  0
KK DETAIN
KO 0,0,0,0,21
RS 1 STOR -1
SV 0 0.044 — Detention vol. required
SQ 0 5.4
SE 100 101
ZZ
```

```
*****************************************                    **************************************
*                                       *                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS
*              JUN   1998               *                    *   HYDROLOGIC ENGINEERING CENTER
*           VERSION 4.1                 *                    *        609 SECOND STREET
*                                       *                    *     DAVIS, CALIFORNIA 95616
*  RUN DATE   19JUL07  TIME  10:34:15   *                    *        (916) 756-1104
*                                       *                    *
*****************************************                    **************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X         X     X       XX
                    X     X  X         X              X
                    XXXXXXX  XXXX      X       XXXXX  X
                    X     X  X         X              X
                    X     X  X         X     X        X
                    X     X  XXXXXXX   XXXXX         XXX


THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

              *DIAGRAM
*** FREE ***
              ID   UNIVERSITY TOWN CENTRE J-14166
              ID   JULY18, 2007 FN:B5H_100.HC1
              ID   100 YEAR DETENTION FOR BASIN 500
              IT       2 01JAN90    1200     200
              IO       3       2

              KKB5H_100.hc1
              KM   RUN DATE   7/19/2007
              KM   RATIONAL METHOD HYDROGRAPH PROGRAM
              KM   COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
              KM   6HR RAINFALL IS  2.3  INCHES
              KM   RATIONAL METHOD RUNOFF COEFFICIENT IS  0.83
              KM   RATIONAL METHOD TIME OF CONCENTRATION IS  10  MIN.
              KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
              KM   IT 2 01JAN90 1200 200
              BA  0.0038
              IN      10 01JAN90    1155
              QI       0     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.4
              QI     0.4     0.4     0.4     0.4     0.4     0.5     0.5     0.6     0.6     0.7
              QI     0.7     0.9       1     1.5     2.7     7.2     1.2     0.8     0.6     0.5
              QI     0.5     0.4     0.4     0.3     0.3     0.3     0.3       0       0       0
              QI       0       0       0       0       0       0       0       0

              KK  DETAIN
              KO       0       0       0       0      21
              RS       1    STOR      -1
              SV       0   0.044
              SQ       0     5.4
              SE     100     101
              ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   6     B5H_100.
               V
               V
  22       DETAIN

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
*****************************************                        *************************************
*                                       *                        *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                        *   U.S. ARMY CORPS OF ENGINEERS
*              JUN   1998               *                        *   HYDROLOGIC ENGINEERING CENTER
*             VERSION 4.1               *                        *        609 SECOND STREET
*                                       *                        *     DAVIS, CALIFORNIA 95616
* RUN DATE   19JUL07  TIME  10:34:15    *                        *        (916) 756-1104
*                                       *                        *
*****************************************                        *************************************
```

```
                      UNIVERSITY TOWN CENTRE J-14166
                      JULY18, 2007 FN:B5H_100.HC1
                      100 YEAR DETENTION FOR BASIN 500

 5 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          2  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          2  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1JAN90  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ        200  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     1JAN90  ENDING DATE
                    NDTIME       1838  ENDING TIME
                     ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE    6.63 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** **

            **************
            *            *
 6 KK       * B5H_100.   *      hcl
            *            *
            **************
                      RUN DATE   7/19/2007
                      RATIONAL METHOD HYDROGRAPH PROGRAM
                      COPYRIGHT 1992, 2001, RICK ENGINEERING COMPANY
                      6HR RAINFALL IS   2.3  INCHES
                      RATIONAL METHOD RUNOFF COEFFICIENT IS  0.83
                      RATIONAL METHOD TIME OF CONCENTRATION IS  10  MIN.
```

```
          FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
          IT 2 01JAN90 1200 200

16 IN        TIME DATA FOR INPUT TIME SERIES
                JXMIN          10  TIME INTERVAL IN MINUTES
                JXDATE     1JAN90  STARTING DATE
                JXTIME       1155  STARTING TIME

          SUBBASIN RUNOFF DATA

15 BA        SUBBASIN CHARACTERISTICS
                TAREA         .00  SUBBASIN AREA

                                                  ***

    ***            ***            ***            ***            ***

              HYDROGRAPH AT STATION B5H_100.

PEAK FLOW    TIME                   MAXIMUM AVERAGE FLOW
  (CFS)      (HR)              6-HR        24-HR       72-HR      6.63-HR
     7.      4.07    (CFS)       1.          1.          1.          1.
                   (INCHES)   1.850       1.853       1.853       1.853
                    (AC-FT)      0.          0.          0.          0.

              CUMULATIVE AREA =     .00 SQ MI
```

STATION B5H_100.

```
                        (O) OUTFLOW
          0.        1.        2.        3.        4.        5.        6.        7.        0.        0.        0.        0.        0
DAHRMN PER
 11200   1.-O-------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------
 11202   2. O       .         .         .         .         .         .         .         .         .         .         .
 11204   3.  O      .         .         .         .         .         .         .         .         .         .         .
 11206   4.  O      .         .         .         .         .         .         .         .         .         .         .
 11208   5.  O      .         .         .         .         .         .         .         .         .         .         .
 11210   6.  O      .         .         .         .         .         .         .         .         .         .         .
 11212   7.  O      .         .         .         .         .         .         .         .         .         .         .
 11214   8.  O      .         .         .         .         .         .         .         .         .         .         .
 11216   9.  O      .         .         .         .         .         .         .         .         .         .         .
 11218  10.  O      .         .         .         .         .         .         .         .         .         .         .
 11220  11. .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11222  12.  O      .         .         .         .         .         .         .         .         .         .         .
 11224  13.  O      .         .         .         .         .         .         .         .         .         .         .
 11226  14.  O      .         .         .         .         .         .         .         .         .         .         .
 11228  15.  O      .         .         .         .         .         .         .         .         .         .         .
 11230  16.  O      .         .         .         .         .         .         .         .         .         .         .
 11232  17.  O      .         .         .         .         .         .         .         .         .         .         .
 11234  18.  O      .         .         .         .         .         .         .         .         .         .         .
 11236  19.  O      .         .         .         .         .         .         .         .         .         .         .
 11238  20.  O      .         .         .         .         .         .         .         .         .         .         .
 11240  21. .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11242  22.  O      .         .         .         .         .         .         .         .         .         .         .
 11244  23.  O      .         .         .         .         .         .         .         .         .         .         .
 11246  24.  O      .         .         .         .         .         .         .         .         .         .         .
 11248  25.  O      .         .         .         .         .         .         .         .         .         .         .
 11250  26.  O      .         .         .         .         .         .         .         .         .         .         .
 11252  27.  O      .         .         .         .         .         .         .         .         .         .         .
 11254  28.  O      .         .         .         .         .         .         .         .         .         .         .
 11256  29.  O      .         .         .         .         .         .         .         .         .         .         .
 11258  30.  O      .         .         .         .         .         .         .         .         .         .         .
 11300  31. .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11302  32.  O      .         .         .         .         .         .         .         .         .         .         .
 11304  33.  O      .         .         .         .         .         .         .         .         .         .         .
 11306  34.  O      .         .         .         .         .         .         .         .         .         .         .
 11308  35.  O      .         .         .         .         .         .         .         .         .         .         .
 11310  36.  O      .         .         .         .         .         .         .         .         .         .         .
 11312  37.  O      .         .         .         .         .         .         .         .         .         .         .
 11314  38.  O      .         .         .         .         .         .         .         .         .         .         .
 11316  39.  O      .         .         .         .         .         .         .         .         .         .         .
 11318  40.  O      .         .         .         .         .         .         .         .         .         .         .
 11320  41. . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11322  42.   O     .         .         .         .         .         .         .         .         .         .         .
 11324  43.   O     .         .         .         .         .         .         .         .         .         .         .
 11326  44.   O     .         .         .         .         .         .         .         .         .         .         .
 11328  45.   O     .         .         .         .         .         .         .         .         .         .         .
 11330  46.   O     .         .         .         .         .         .         .         .         .         .         .
 11332  47.   O     .         .         .         .         .         .         .         .         .         .         .
 11334  48.   O     .         .         .         .         .         .         .         .         .         .         .
 11336  49.   O     .         .         .         .         .         .         .         .         .         .         .
 11338  50.   O     .         .         .         .         .         .         .         .         .         .         .
 11340  51. . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11342  52.   O     .         .         .         .         .         .         .         .         .         .         .
 11344  53.   O     .         .         .         .         .         .         .         .         .         .         .
 11346  54.   O     .         .         .         .         .         .         .         .         .         .         .
 11348  55.   O     .         .         .         .         .         .         .         .         .         .         .
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```
11350  56.    O     .         .         .         .         .         .         .         .         .         .         .
11352  57.    O     .         .         .         .         .         .         .         .         .         .         .
11354  58.    O     .         .         .         .         .         .         .         .         .         .         .
11356  59.    O     .         .         .         .         .         .         .         .         .         .         .
11358  60.    O     .         .         .         .         .         .         .         .         .         .         .
11400  61. . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11402  62.    O     .         .         .         .         .         .         .         .         .         .         .
11404  63.    O     .         .         .         .         .         .         .         .         .         .         .
11406  64.    O     .         .         .         .         .         .         .         .         .         .         .
11408  65.    O     .         .         .         .         .         .         .         .         .         .         .
11410  66.    O     .         .         .         .         .         .         .         .         .         .         .
11412  67.    O     .         .         .         .         .         .         .         .         .         .         .
11414  68.    O     .         .         .         .         .         .         .         .         .         .         .
11416  69.    O     .         .         .         .         .         .         .         .         .         .         .
11418  70.    O     .         .         .         .         .         .         .         .         .         .         .
11420  71. . .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11422  72.     O    .         .         .         .         .         .         .         .         .         .         .
11424  73.     O    .         .         .         .         .         .         .         .         .         .         .
11426  74.     O    .         .         .         .         .         .         .         .         .         .         .
11428  75.     O    .         .         .         .         .         .         .         .         .         .         .
11430  76.     O    .         .         .         .         .         .         .         .         .         .         .
11432  77.     O    .         .         .         .         .         .         .         .         .         .         .
11434  78.     O    .         .         .         .         .         .         .         .         .         .         .
11436  79.     O    .         .         .         .         .         .         .         .         .         .         .
11438  80.     O    .         .         .         .         .         .         .         .         .         .         .
11440  81. . . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11442  82.      O   .         .         .         .         .         .         .         .         .         .         .
11444  83.      O   .         .         .         .         .         .         .         .         .         .         .
11446  84.      O   .         .         .         .         .         .         .         .         .         .         .
11448  85.      O   .         .         .         .         .         .         .         .         .         .         .
11450  86.      O   .         .         .         .         .         .         .         .         .         .         .
11452  87.      O   .         .         .         .         .         .         .         .         .         .         .
11454  88.      O   .         .         .         .         .         .         .         .         .         .         .
11456  89.      O   .         .         .         .         .         .         .         .         .         .         .
11458  90.      O   .         .         .         .         .         .         .         .         .         .         .
11500  91. . . .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11502  92.       O  .         .         .         .         .         .         .         .         .         .         .
11504  93.       O  .         .         .         .         .         .         .         .         .         .         .
11506  94.       O  .         .         .         .         .         .         .         .         .         .         .
11508  95.       O  .         .         .         .         .         .         .         .         .         .         .
11510  96.       O  .         .         .         .         .         .         .         .         .         .         .
11512  97.       O  .         .         .         .         .         .         .         .         .         .         .
11514  98.       O  .         .         .         .         .         .         .         .         .         .         .
11516  99.       O  .         .         .         .         .         .         .         .         .         .         .
11518 100.        O .         .         .         .         .         .         .         .         .         .         .
11520 101. . . . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11522 102.        O .         .         .         .         .         .         .         .         .         .         .
11524 103.         O.         .         .         .         .         .         .         .         .         .         .
11526 104.         O.         .         .         .         .         .         .         .         .         .         .
11528 105.         O.         .         .         .         .         .         .         .         .         .         .
11530 106.         O.         .         .         .         .         .         .         .         .         .         .
11532 107.          O         .         .         .         .         .         .         .         .         .         .
11534 108.          O         .         .         .         .         .         .         .         .         .         .
11536 109.          O         .         .         .         .         .         .         .         .         .         .
11538 110.          .O        .         .         .         .         .         .         .         .         .         .
11540 111. . . . . . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11542 112.          .   O     .         .         .         .         .         .         .         .         .         .
11544 113.          .    O    .         .         .         .         .         .         .         .         .         .
11546 114.          .     O   .         .         .         .         .         .         .         .         .         .
11548 115.          .        O.         .         .         .         .         .         .         .         .         .
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11550 116.          .         .O        .         .         .         .         .         .         .         .         .
11552 117.          .         .  O      .         .         .         .         .         .         .         .         .
11554 118.          .         .     O   .         .         .         .         .         .         .         .         .
11556 119.          .         .         . O       .         .         .         .         .         .         .         .
11558 120.          .         .         .         .O        .         .         .         .         .         .         .
11600 121.  . . . . . . . . . . . . . . . . . . . . . . . .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11602 122.          .         .         .         .         .       O .         .         .         .         .         .
11604 123.          .         .         .         .         .         .      O  .         .         .         .         .
11606 124.          .         .         .         .         .         .     O   .         .         .         .         .
11608 125.          .         .         .         .         .   O     .         .         .         .         .         .
11610 126.          .         .         .         . O       .         .         .         .         .         .         .
11612 127.          .         .         O         .         .         .         .         .         .         .         .
11614 128.          .       O .         .         .         .         .         .         .         .         .         .
11616 129.          . O       .         .         .         .         .         .         .         .         .         .
11618 130.          .O        .         .         .         .         .         .         .         .         .         .
11620 131.  . . . . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11622 132.         O.         .         .         .         .         .         .         .         .         .         .
11624 133.        O .         .         .         .         .         .         .         .         .         .         .
11626 134.        O .         .         .         .         .         .         .         .         .         .         .
11628 135.       O  .         .         .         .         .         .         .         .         .         .         .
11630 136.       O  .         .         .         .         .         .         .         .         .         .         .
11632 137.       O  .         .         .         .         .         .         .         .         .         .         .
11634 138.      O   .         .         .         .         .         .         .         .         .         .         .
11636 139.      O   .         .         .         .         .         .         .         .         .         .         .
11638 140.      O   .         .         .         .         .         .         .         .         .         .         .
11640 141.  . . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11642 142.     O    .         .         .         .         .         .         .         .         .         .         .
11644 143.     O    .         .         .         .         .         .         .         .         .         .         .
11646 144.     O    .         .         .         .         .         .         .         .         .         .         .
11648 145.     O    .         .         .         .         .         .         .         .         .         .         .
11650 146.     O    .         .         .         .         .         .         .         .         .         .         .
11652 147.     O    .         .         .         .         .         .         .         .         .         .         .
11654 148.     O    .         .         .         .         .         .         .         .         .         .         .
11656 149.     O    .         .         .         .         .         .         .         .         .         .         .
11658 150.     O    .         .         .         .         .         .         .         .         .         .         .
11700 151.  . O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11702 152.    O     .         .         .         .         .         .         .         .         .         .         .
11704 153.    O     .         .         .         .         .         .         .         .         .         .         .
11706 154.    O     .         .         .         .         .         .         .         .         .         .         .
11708 155.    O     .         .         .         .         .         .         .         .         .         .         .
11710 156.    O     .         .         .         .         .         .         .         .         .         .         .
11712 157.    O     .         .         .         .         .         .         .         .         .         .         .
11714 158.    O     .         .         .         .         .         .         .         .         .         .         .
11716 159.    O     .         .         .         .         .         .         .         .         .         .         .
11718 160.    O     .         .         .         .         .         .         .         .         .         .         .
11720 161.  .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11722 162.   O      .         .         .         .         .         .         .         .         .         .         .
11724 163.   O      .         .         .         .         .         .         .         .         .         .         .
11726 164.   O      .         .         .         .         .         .         .         .         .         .         .
11728 165.   O      .         .         .         .         .         .         .         .         .         .         .
11730 166.   O      .         .         .         .         .         .         .         .         .         .         .
11732 167.   O      .         .         .         .         .         .         .         .         .         .         .
11734 168.   O      .         .         .         .         .         .         .         .         .         .         .
11736 169.   O      .         .         .         .         .         .         .         .         .         .         .
11738 170.   O      .         .         .         .         .         .         .         .         .         .         .
11740 171.  .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11742 172.   O      .         .         .         .         .         .         .         .         .         .         .
11744 173.   O      .         .         .         .         .         .         .         .         .         .         .
11746 174.   O      .         .         .         .         .         .         .         .         .         .         .
11748 175.   O      .         .         .         .         .         .         .         .         .         .         .
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11750 176.  O      .         .         .         .         .         .         .         .         .         .         .
11752 177.  O      .         .         .         .         .         .         .         .         .         .         .
11754 178.  O      .         .         .         .         .         .         .         .         .         .         .
11756 179.  O      .         .         .         .         .         .         .         .         .         .         .
11758 180. O       .         .         .         .         .         .         .         .         .         .         .
11800 181. O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11802 182.O        .         .         .         .         .         .         .         .         .         .         .
11804 1830         .         .         .         .         .         .         .         .         .         .         .
11806 1840         .         .         .         .         .         .         .         .         .         .         .
11808 1850         .         .         .         .         .         .         .         .         .         .         .
11810 1860         .         .         .         .         .         .         .         .         .         .         .
11812 1870         .         .         .         .         .         .         .         .         .         .         .
11814 1880         .         .         .         .         .         .         .         .         .         .         .
11816 1890         .         .         .         .         .         .         .         .         .         .         .
11818 1900         .         .         .         .         .         .         .         .         .         .         .
11820 1910 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11822 1920         .         .         .         .         .         .         .         .         .         .         .
11824 1930         .         .         .         .         .         .         .         .         .         .         .
11826 1940         .         .         .         .         .         .         .         .         .         .         .
11828 1950         .         .         .         .         .         .         .         .         .         .         .
11830 1960         .         .         .         .         .         .         .         .         .         .         .
11832 1970         .         .         .         .         .         .         .         .         .         .         .
11834 1980         .         .         .         .         .         .         .         .         .         .         .
11836 1990         .         .         .         .         .         .         .         .         .         .         .
11838 2000---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------
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             *            *
 22 KK       *   DETAIN   *
             *            *
             **************

 23 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           2  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         200  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


                HYDROGRAPH ROUTING DATA

 24 RS            STORAGE ROUTING
                        NSTPS           1  NUMBER OF SUBREACHES
                         ITYP        STOR  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                            X         .00 WORKING R AND D COEFFICIENT

 25 SV              STORAGE         .0         .0

 26 SQ            DISCHARGE         0.         5.

 27 SE            ELEVATION     100.00     101.00

                                                                   ***

      ***             ***             ***             ***             ***

                               HYDROGRAPH AT STATION   DETAIN

 PEAK FLOW      TIME                                    MAXIMUM AVERAGE FLOW
   (CFS)        (HR)                        6-HR          24-HR          72-HR        6.63-HR
       5.       4.13           (CFS)          1.             1.             1.             1.
                            (INCHES)       1.847          1.859          1.859          1.859
                             (AC-FT)          0.             0.             0.             0.

 PEAK STORAGE   TIME                                   MAXIMUM AVERAGE STORAGE
   (AC-FT)      (HR)                        6-HR          24-HR          72-HR        6.63-HR
       0.       4.13                          0.             0.             0.             0.

 PEAK STAGE     TIME                                    MAXIMUM AVERAGE STAGE
   (FEET)       (HR)                        6-HR          24-HR          72-HR        6.63-HR
   101.00       4.13                      100.14         100.13         100.13         100.13

                              CUMULATIVE AREA =       .00 SQ MI
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                                            STATION    DETAIN

                      (I) INFLOW,   (O) OUTFLOW
            0.        1.        2.        3.        4.        5.        6.        7.        0.        0.        0.        0.        0
                                                                                     (S) STORAGE
           .00       .00       .00       .00       .00       .00       .00       .02       .04       .06       .00       .00       .0
DAHRMN PER
 11200   1.-I--------.---------.---------.---------.---------.---------.S--------.---------.---------.---------.---------.---------
 11202   2. I        .         .         .         .         .         .S        .         .         .         .         .
 11204   3. OI       .         .         .         .         .         .S        .         .         .         .         .
 11206   4. OI       .         .         .         .         .         .S        .         .         .         .         .
 11208   5. OI       .         .         .         .         .         .S        .         .         .         .         .
 11210   6.  I       .         .         .         .         .         .S        .         .         .         .         .
 11212   7.  I       .         .         .         .         .         .S        .         .         .         .         .
 11214   8.  I       .         .         .         .         .         .S        .         .         .         .         .
 11216   9.  I       .         .         .         .         .         .S        .         .         .         .         .
 11218  10.  I       .         .         .         .         .         .S        .         .         .         .         .
 11220  11. .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11222  12.  I       .         .         .         .         .         .S        .         .         .         .         .
 11224  13.  I       .         .         .         .         .         .S        .         .         .         .         .
 11226  14.  I       .         .         .         .         .         .S        .         .         .         .         .
 11228  15.  I       .         .         .         .         .         .S        .         .         .         .         .
 11230  16.  I       .         .         .         .         .         .S        .         .         .         .         .
 11232  17.  I       .         .         .         .         .         .S        .         .         .         .         .
 11234  18.  I       .         .         .         .         .         .S        .         .         .         .         .
 11236  19.  I       .         .         .         .         .         .S        .         .         .         .         .
 11238  20.  I       .         .         .         .         .         .S        .         .         .         .         .
 11240  21. .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11242  22.  I       .         .         .         .         .         .S        .         .         .         .         .
 11244  23.  I       .         .         .         .         .         .S        .         .         .         .         .
 11246  24.  I       .         .         .         .         .         .S        .         .         .         .         .
 11248  25.  I       .         .         .         .         .         .S        .         .         .         .         .
 11250  26.  I       .         .         .         .         .         .S        .         .         .         .         .
 11252  27.  I       .         .         .         .         .         .S        .         .         .         .         .
 11254  28.  I       .         .         .         .         .         .S        .         .         .         .         .
 11256  29.  I       .         .         .         .         .         .S        .         .         .         .         .
 11258  30.  I       .         .         .         .         .         .S        .         .         .         .         .
 11300  31. .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11302  32.  I       .         .         .         .         .         .S        .         .         .         .         .
 11304  33.  I       .         .         .         .         .         .S        .         .         .         .         .
 11306  34.  I       .         .         .         .         .         .S        .         .         .         .         .
 11308  35.  I       .         .         .         .         .         .S        .         .         .         .         .
 11310  36.  I       .         .         .         .         .         .S        .         .         .         .         .
 11312  37.  I       .         .         .         .         .         .S        .         .         .         .         .
 11314  38.  I       .         .         .         .         .         .S        .         .         .         .         .
 11316  39.  I       .         .         .         .         .         .S        .         .         .         .         .
 11318  40.  I       .         .         .         .         .         .S        .         .         .         .         .
 11320  41. .OI . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11322  42.  OI      .         .         .         .         .         .S        .         .         .         .         .
 11324  43.  OI      .         .         .         .         .         .S        .         .         .         .         .
 11326  44.   I      .         .         .         .         .         .S        .         .         .         .         .
 11328  45.   I      .         .         .         .         .         . S       .         .         .         .         .
 11330  46.   I      .         .         .         .         .         . S       .         .         .         .         .
 11332  47.   I      .         .         .         .         .         . S       .         .         .         .         .
 11334  48.   I      .         .         .         .         .         . S       .         .         .         .         .
 11336  49.   I      .         .         .         .         .         . S       .         .         .         .         .
 11338  50.   I      .         .         .         .         .         . S       .         .         .         .         .
 11340  51. . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 11342  52.   I      .         .         .         .         .         . S       .         .         .         .         .
 11344  53.   I      .         .         .         .         .         . S       .         .         .         .         .
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11346  54.   I     .         .         .         .         .         . S       .         .         .         .         .
11348  55.   I     .         .         .         .         .         . S       .         .         .         .         .
11350  56.   I     .         .         .         .         .         . S       .         .         .         .         .
11352  57.   I     .         .         .         .         .         . S       .         .         .         .         .
11354  58.   I     .         .         .         .         .         . S       .         .         .         .         .
11356  59.   I     .         .         .         .         .         . S       .         .         .         .         .
11358  60.   I     .         .         .         .         .         . S       .         .         .         .         .
11400  61. . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11402  62.   I     .         .         .         .         .         . S       .         .         .         .         .
11404  63.   I     .         .         .         .         .         . S       .         .         .         .         .
11406  64.   I     .         .         .         .         .         . S       .         .         .         .         .
11408  65.   I     .         .         .         .         .         . S       .         .         .         .         .
11410  66.   I     .         .         .         .         .         . S       .         .         .         .         .
11412  67.   I     .         .         .         .         .         . S       .         .         .         .         .
11414  68.   I     .         .         .         .         .         . S       .         .         .         .         .
11416  69.   I     .         .         .         .         .         . S       .         .         .         .         .
11418  70.   I     .         .         .         .         .         . S       .         .         .         .         .
11420  71. . OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11422  72.   OI    .         .         .         .         .         . S       .         .         .         .         .
11424  73.   OI    .         .         .         .         .         . S       .         .         .         .         .
11426  74.    I    .         .         .         .         .         . S       .         .         .         .         .
11428  75.    I    .         .         .         .         .         . S       .         .         .         .         .
11430  76.    I    .         .         .         .         .         . S       .         .         .         .         .
11432  77.    I    .         .         .         .         .         . S       .         .         .         .         .
11434  78.    I    .         .         .         .         .         . S       .         .         .         .         .
11436  79.    I    .         .         .         .         .         . S       .         .         .         .         .
11438  80.    I    .         .         .         .         .         . S       .         .         .         .         .
11440  81. . .OI. . . . . . . . . . . . . . . . . . . . . . . . . . .S . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11442  82.    OI   .         .         .         .         .         . S       .         .         .         .         .
11444  83.    OI   .         .         .         .         .         . S       .         .         .         .         .
11446  84.     I   .         .         .         .         .         . S       .         .         .         .         .
11448  85.     I   .         .         .         .         .         . S       .         .         .         .         .
11450  86.     I   .         .         .         .         .         . S       .         .         .         .         .
11452  87.     I   .         .         .         .         .         . S       .         .         .         .         .
11454  88.     I   .         .         .         .         .         . S       .         .         .         .         .
11456  89.     I   .         .         .         .         .         . S       .         .         .         .         .
11458  90.     I   .         .         .         .         .         . S       .         .         .         .         .
11500  91. . . OI. . . . . . . . . . . . . . . . . . . . . . . . . . .S . . . . . . . . . . . . . . . . . . . . . . . . . . . .
11502  92.     OI  .         .         .         .         .         .  S      .         .         .         .         .
11504  93.     OI  .         .         .         .         .         .  S      .         .         .         .         .
11506  94.      I  .         .         .         .         .         .  S      .         .         .         .         .
11508  95.      I  .         .         .         .         .         .  S      .         .         .         .         .
11510  96.      I  .         .         .         .         .         .  S      .         .         .         .         .
11512  97.      I  .         .         .         .         .         .  S      .         .         .         .         .
11514  98.      I  .         .         .         .         .         .  S      .         .         .         .         .
11516  99.      I  .         .         .         .         .         .  S      .         .         .         .         .
11518 100.      OI .         .         .         .         .         .  S      .         .         .         .         .
11520 101. . . .OI. . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . . .
11522 102.       I .         .         .         .         .         .  S      .         .         .         .         .
11524 103.       OI.         .         .         .         .         .  S      .         .         .         .         .
11526 104.       OI.         .         .         .         .         .  S      .         .         .         .         .
11528 105.       OI.         .         .         .         .         .  S      .         .         .         .         .
11530 106.        I.         .         .         .         .         .   S     .         .         .         .         .
11532 107.        OI         .         .         .         .         .   S     .         .         .         .         .
11534 108.        OI         .         .         .         .         .   S     .         .         .         .         .
11536 109.         I         .         .         .         .         .   S     .         .         .         .         .
11538 110.         OI        .         .         .         .         .   S     .         .         .         .         .
11540 111. . . . . .OI . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . .
11542 112.         .O  I     .         .         .         .         .    S    .         .         .         .         .
11544 113.         . O  I    .         .         .         .         .    S    .         .         .         .         .
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11546 114.          . O   I   .         .         .         .         .    S    .         .         .         .         .
11548 115.          .  O     I.         .         .         .         .     S   .         .         .         .         .
11550 116.          .     O   .I        .         .         .         .     S   .         .         .         .         .
11552 117.          .       O .  I      .         .         .         .      S  .         .         .         .         .
11554 118.          .         O     I   .         .         .         .       S .         .         .         .         .
11556 119.          .         . O       . I       .         .         .        S.         .         .         .         .
11558 120.          .         .     O   .         .I        .         .         .S        .         .         .         .
11600 121.  . . . . . . . . . . . . . . .O. . . . . . . . .I. . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . .
11602 122.          .         .         .       O .         .       I .         .     S   .         .         .         .
11604 123.          .         .         .         .    O    .         .      I  .       S .         .         .         .
11606 124.          .         .         .         .         . O       .     I   .         .S        .         .         .
11608 125.          .         .         .         .         .   I     .         .         . S       .         .         .
11610 126.          .         .         .         . I       . O       .         .         .S        .         .         .
11612 127.          .         .         I         .       O .         .         .        S.         .         .         .
11614 128.          .       I .         .         .O        .         .         .      S  .         .         .         .
11616 129.          . I       .         .  O      .         .         .         .   S     .         .         .         .
11618 130.          .I        .      O  .         .         .         .         .S        .         .         .         .
11620 131.  . . . . I . . . . . O . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . .
11622 132.         I.      .O .         .         .         .         .       S .         .         .         .         .
11624 133.        I .     O   .         .         .         .         .     S   .         .         .         .         .
11626 134.        I .  O      .         .         .         .         .    S    .         .         .         .         .
11628 135.       I  . O       .         .         .         .         .    S    .         .         .         .         .
11630 136.       I  O         .         .         .         .         .   S     .         .         .         .         .
11632 137.       I O.         .         .         .         .         .   S     .         .         .         .         .
11634 138.      I  O.         .         .         .         .         .  S      .         .         .         .         .
11636 139.      I O .         .         .         .         .         .  S      .         .         .         .         .
11638 140.      IO  .         .         .         .         .         .  S      .         .         .         .         .
11640 141.  . . IO. . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . .
11642 142.     IO   .         .         .         .         .         . S       .         .         .         .         .
11644 143.     IO   .         .         .         .         .         . S       .         .         .         .         .
11646 144.     IO   .         .         .         .         .         . S       .         .         .         .         .
11648 145.     IO   .         .         .         .         .         . S       .         .         .         .         .
11650 146.     I    .         .         .         .         .         . S       .         .         .         .         .
11652 147.     I    .         .         .         .         .         . S       .         .         .         .         .
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11658 150.     I    .         .         .         .         .         . S       .         .         .         .         .
11700 151.  . IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . .
11702 152.    IO    .         .         .         .         .         . S       .         .         .         .         .
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11714 158.    I     .         .         .         .         .         . S       .         .         .         .         .
11716 159.    I     .         .         .         .         .         . S       .         .         .         .         .
11718 160.    I     .         .         .         .         .         . S       .         .         .         .         .
11720 161.  .IO . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . .
11722 162.   IO     .         .         .         .         .         . S       .         .         .         .         .
11724 163.   IO     .         .         .         .         .         .S        .         .         .         .         .
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11728 165.   I      .         .         .         .         .         .S        .         .         .         .         .
11730 166.   I      .         .         .         .         .         .S        .         .         .         .         .
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11734 168.   I      .         .         .         .         .         .S        .         .         .         .         .
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11742 172.   I      .         .         .         .         .         .S        .         .         .         .         .
11744 173.   I      .         .         .         .         .         .S        .         .         .         .         .
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11746 174.  I       .         .         .         .         .        .S         .         .         .         .         .
11748 175.  I       .         .         .         .         .        .S         .         .         .         .         .
11750 176.  I       .         .         .         .         .        .S         .         .         .         .         .
11752 177.  I       .         .         .         .         .        .S         .         .         .         .         .
11754 178.  I       .         .         .         .         .        .S         .         .         .         .         .
11756 179.  I       .         .         .         .         .        .S         .         .         .         .         .
11758 180. IO       .         .         .         .         .        .S         .         .         .         .         .
11800 181. IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . .
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11804 183I O        .         .         .         .         .        .S         .         .         .         .         .
11806 184IO         .         .         .         .         .        .S         .         .         .         .         .
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11812 187I          .         .         .         .         .        S          .         .         .         .         .
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11816 189I          .         .         .         .         .        S          .         .         .         .         .
11818 190I          .         .         .         .         .        S          .         .         .         .         .
11820 191I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S . . . . . . . . . . . . . . . . . . . . . . . . . .
11822 192I          .         .         .         .         .        S          .         .         .         .         .
11824 193I          .         .         .         .         .        S          .         .         .         .         .
11826 194I          .         .         .         .         .        S          .         .         .         .         .
11828 195I          .         .         .         .         .        S          .         .         .         .         .
11830 196I          .         .         .         .         .        S          .         .         .         .         .
11832 197I          .         .         .         .         .        S          .         .         .         .         .
11834 198I          .         .         .         .         .        S          .         .         .         .         .
11836 199I          .         .         .         .         .        S          .         .         .         .         .
11838 200I---------.---------.---------.---------.---------.---------S---------.---------.---------.---------.---------.---------
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	B5H_100.	7.	4.07	1.	1.	1.	.00		
ROUTED TO	DETAIN	5.	4.13	1.	1.	1.	.00	101.00	4.13

*** NORMAL END OF HEC-1 ***

TAPE 21

```
    DETAIN    21200  1JAN90 0 1 1 200       .004
           .150      .159      .182      .212      .237      .256      .268      .278
 .284         .289
           .292      .294      .296      .297      .298      .299      .299      .299
 .299         .300
           .300      .300      .300      .300      .300      .300      .300      .300
 .300         .300
           .300      .300      .300      .300      .300      .300      .300      .300
 .301         .307
           .316      .329      .344      .359      .371      .379      .385      .389
 .392         .395
           .396      .397      .398      .399      .399      .399      .400      .400
 .400         .400
           .400      .400      .400      .400      .400      .400      .400      .400
 .401         .407
           .416      .429      .444      .459      .471      .479      .485      .489
 .494         .501
           .513      .526      .542      .557      .570      .578      .585      .589
 .594         .601
           .612      .626      .642      .657      .670      .678      .685      .689
 .695         .708
           .729      .755      .786      .817      .847      .874      .899      .922
 .951         .994
          1.053     1.125     1.204     1.300     1.427     1.587     1.770     1.970
2.229        2.625
          3.167     3.813     4.532     5.152     5.397 Qout 5.225   4.755     4.074
3.324        2.686
          2.210     1.849     1.569     1.349     1.179     1.046      .940      .853
 .782         .723
           .676      .637      .603      .575      .553      .538      .527      .519
 .512         .503
           .490      .476      .460      .444      .431      .422      .416      .411
 .407         .399
           .388      .374      .358      .343      .330      .322      .315      .311
 .308         .306
           .304      .303      .302      .301      .301      .301      .301      .300
 .296         .280
           .251      .213      .169      .124      .088      .063      .045      .032
 .023         .016
           .011      .008      .006      .004      .003      .002      .001      .001
 .001         .001
```

APPENDIX F

Comparison of Existing and Proposed Condition

7/19/2007
J-14166

Comparison of Peak Runoff Rates and Drainage Areas

Basin #	Pre-project			Post-project		
	Area (ac)	Q100 (cfs)	Tc (min)	Area (ac)	Q100 (cfs)	Tc (min)
100	2.2	7.3	9.1	2.2	7.1	9.2
200	7.9	27.4	7.3	7.9	22.6	10.7
300	7.2	21.9	10.5	7.2	20.4	13.8
400	11.3	37.1	9.4	11.3	36.2	10.1
500*	2.4	5.4	8.4	2.4	7.2	9.9
700	5.7	19.1	8.9	5.7	19.1	8.9
800	33.2	92.7	12.8	33.2	82.8	16.3
Total	69.9			69.9		

* For Basin 500 post-project runoff will be reduced to pre-project runoff by detaining the excess post-project runoff. Please refer to Appendix E for calculation of volume required to detain excess runoff.

Comparison of Runoff Volume

Basin #	P6 (inches)	Pre-project			Post-project		
	10-YR	A (ac)	Cw	Vol (ac-ft)	A (ac)	Cw[1]	Vol (ac-ft)
100	1.52	2.2	0.90	0.25	2.2	0.88	0.25
200	1.52	7.9	0.87	0.87	7.9	0.83	0.83
300	1.52	7.2	0.87	0.79	7.2	0.92	0.84
400	1.52	11.3	0.89	1.27	11.3	0.89	1.27
500	1.52	2.4	0.60	0.18	2.4	0.83	0.25
700	1.52	5.7	0.90	0.65	5.7	0.90	0.65
800	1.52	33.2	0.81	3.41	33.2	0.83	3.49

NOTES:

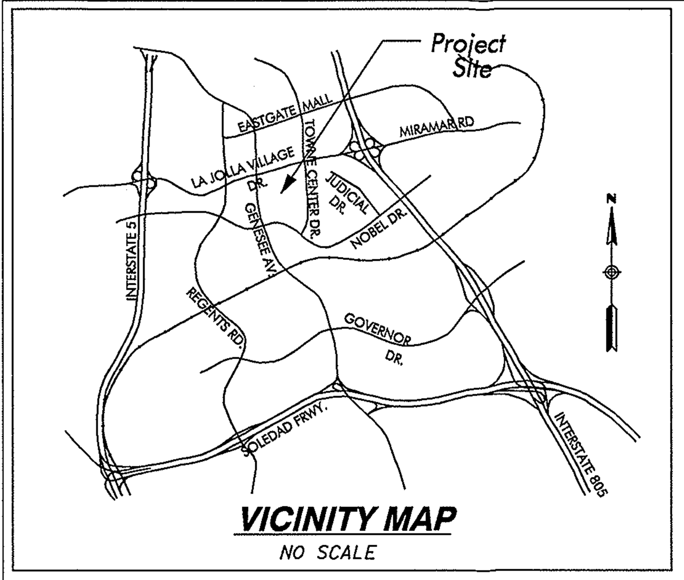
1. Post-project Runoff Coefficients for Basins 300,500,800 are reduced to match pre-project values by storing otherwise excess volumes, as computed by Vol,excess = C* $P_{6,10\text{-}yr} \cdot A$ (see backup calcs in Appendix D). Excess volume within within these three basins will be stored by utilizing design tools such as pervious pavement, checkdams, planter boxes, or other equally comparable methods. Use of pervious pavement may offset the need for storing excess volume if it is enough to reduce the runoff coefficient on its own (to pre-project levels).

MAP POCKET 1

Water Quality Technical Report Exhibit for University Town Center Revitalization Project (MPDP)

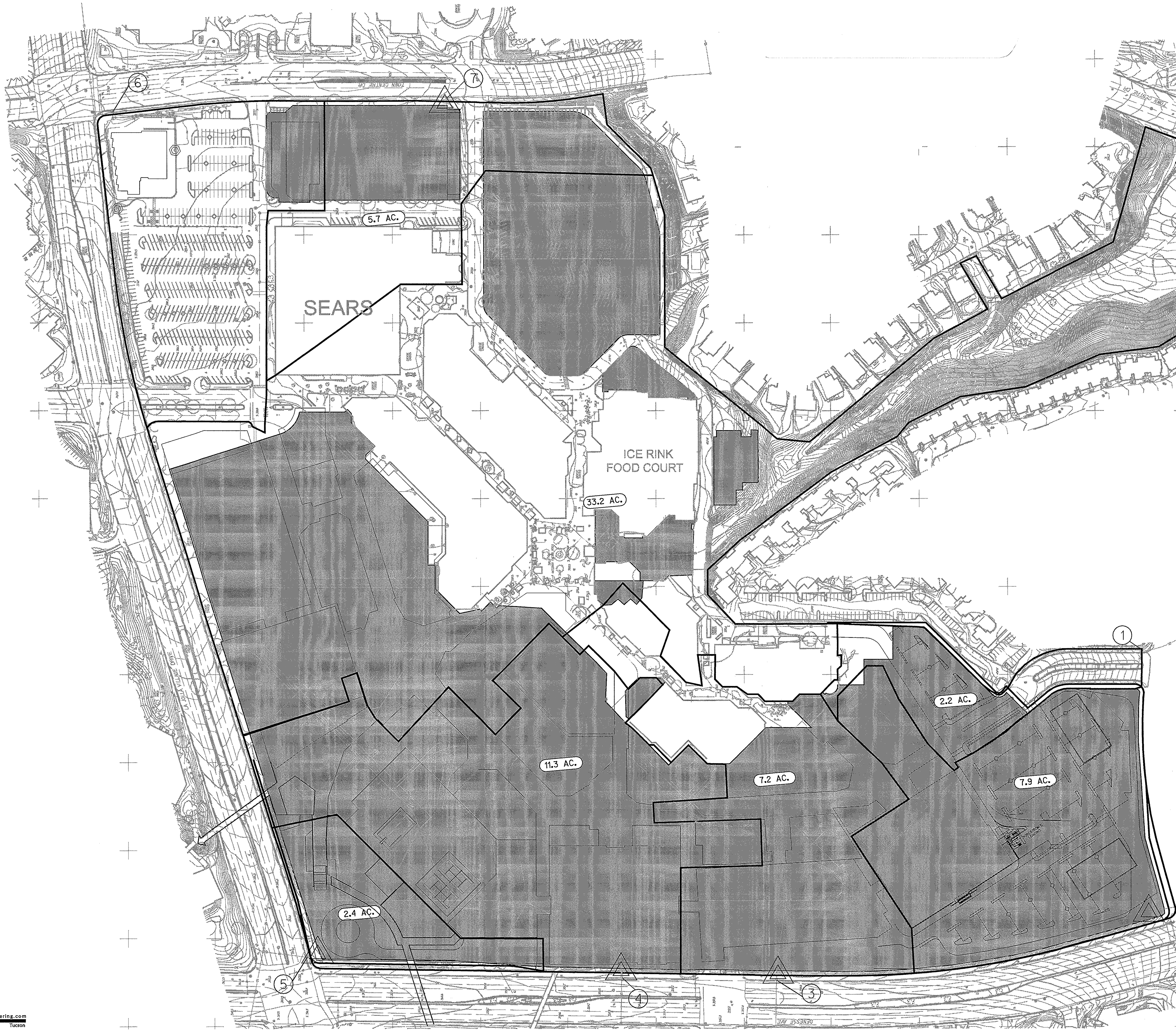
Prepared By:
Rick Engineering Company – Water Resources Division

JJT:RS:ns/Report/14166.006
12-31-02
Revised: 2-14-03
Revised: 5-19-03
Revised: 8-5-04
Revised: 3-24-05
Revised: 3-27-07
Revised: 7-20-07



WATER QUALITY TECHNICAL REPORT EXHIBIT FOR UNIVERSITY TOWN CENTER RENOVATION PROJECT (MPDP)

DATE: 08/24/04
REVISED: 03/24/05
REVISED: 03/19/07
REVISED: 07/20/07



NOTES: THESE POST-CONSTRUCTION BMPs ARE DISCUSSED IN MORE DETAIL WITHIN THIS WATER QUALITY TECHNICAL REPORT.

REFER TO EXHIBIT TITLED "POST-CONDITION DRAINAGE STUDY EXHIBIT FOR UNIVERSITY TOWN CENTRE REVITALIZATION PROJECT(MPDP)" IN MAP POCKET #2 OF THIS WATER QUALITY TECHNICAL REPORT FOR DRAINAGE AREAS, NODE NUMBERS AND ADDITIONAL SITE INFORMATION.

LEGEND

LOCATION OF PROPOSED CDS TECHNOLOGIES IN-LINE TREATMENT FACILITY

LOCATION OF PROPOSED CLEARWATER BMP UNIT (PER SEPARATE WQTR)

X.X AC. TOTAL DRAINAGE AREA TO OUTFALL

1 OUTFALL LOCATION

PROPOSED DISTURBED AREA

100 50 0 100 200 300

GRAPHIC SCALE 1"= 100'

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX)619.291.4165
rickengineering.com
San Diego Riverside Sacramento Orange Phoenix Tucson

W:\14166\Hydro\14166tmwqtr01.dgn
\\srv_photo1\RickStandards\Bentley_2006\workspace\projects\CorpStds_2005_SD\iplot\CorpStds_2005_SD.pen
19-JUL-2007 16:18

NOT FOR CONSTRUCTION - EXHIBIT FOR WATER QUALITY TECHNICAL REPORT ONLY

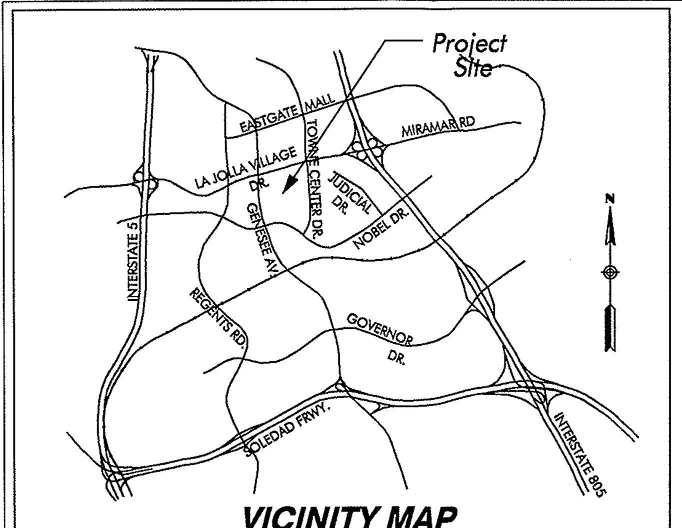
MAP POCKET 2

Drainage Study Maps: (Two Sheets)

Pre-Condition Drainage Study Exhibit for
University Town Center Revitalization Project (MPDP)

Post-Condition Drainage Study Exhibit for
University Town Center Revitalization Project (MPDP)

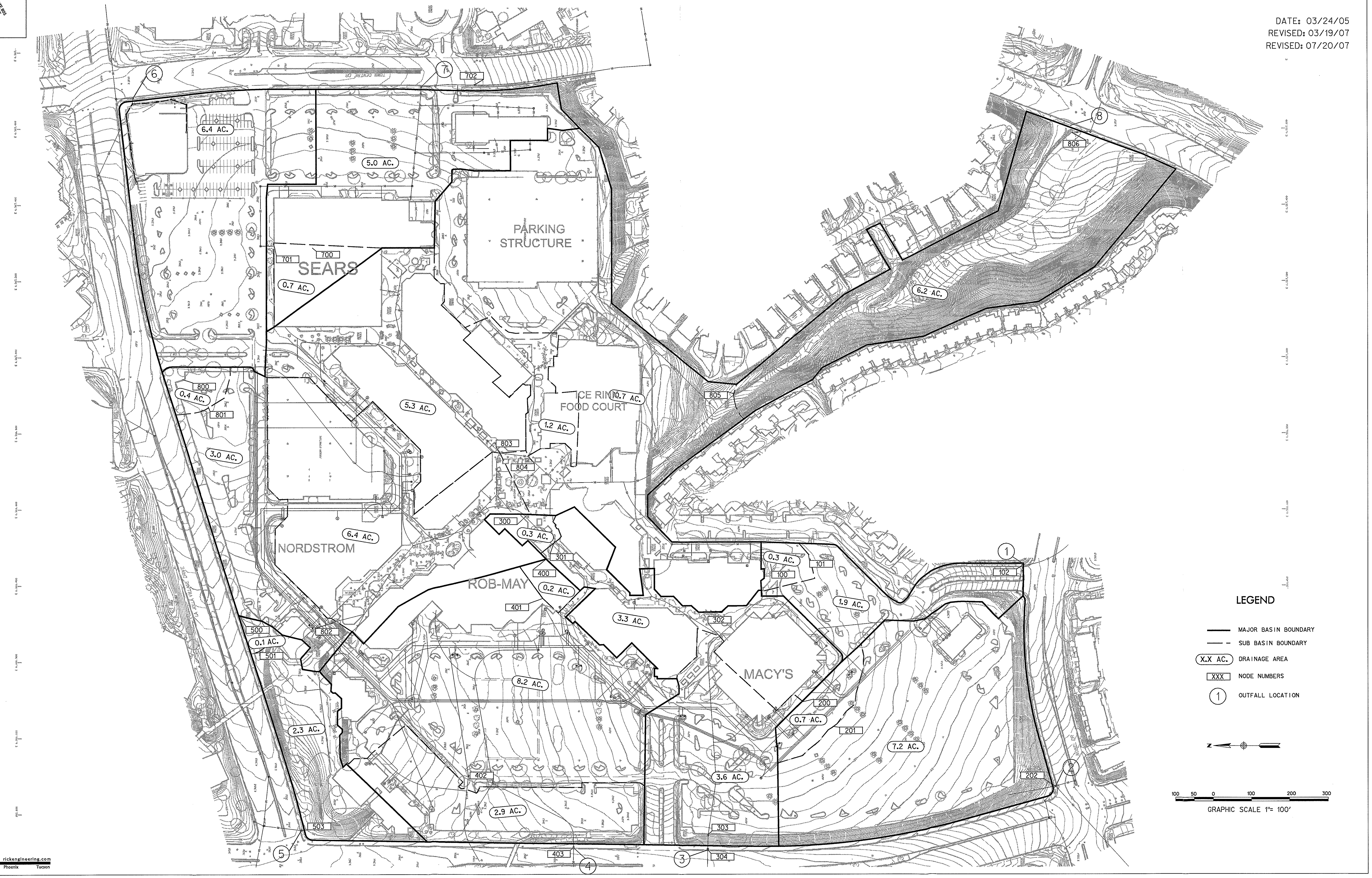
PRE-CONDITION DRAINAGE STUDY EXHIBIT
FOR
UNIVERSITY TOWN CENTER RENOVATION PROJECT
(MPDP)



VICINITY MAP

NO SCALE

DATE: 03/24/05
REVISED: 03/19/07
REVISED: 07/20/07



LEGEND

———	MAJOR BASIN BOUNDARY
— - —	SUB BASIN BOUNDARY
(X.X AC.)	DRAINAGE AREA
[XXX]	NODE NUMBERS
(1)	OUTFALL LOCATION

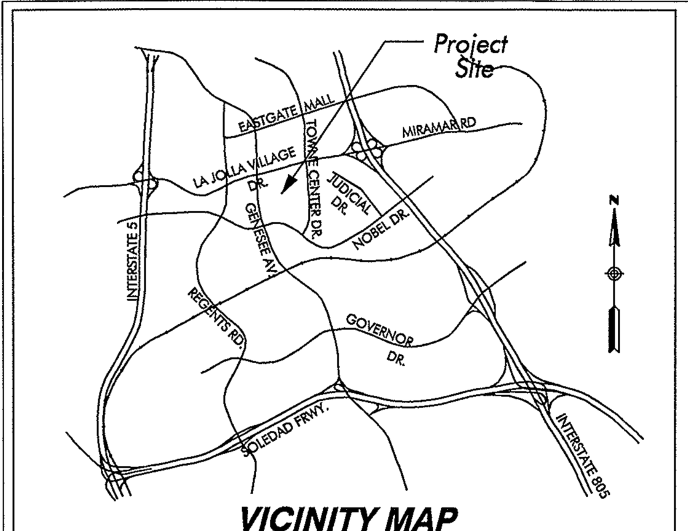
100 50 0 100 200 300

GRAPHIC SCALE 1"= 100'

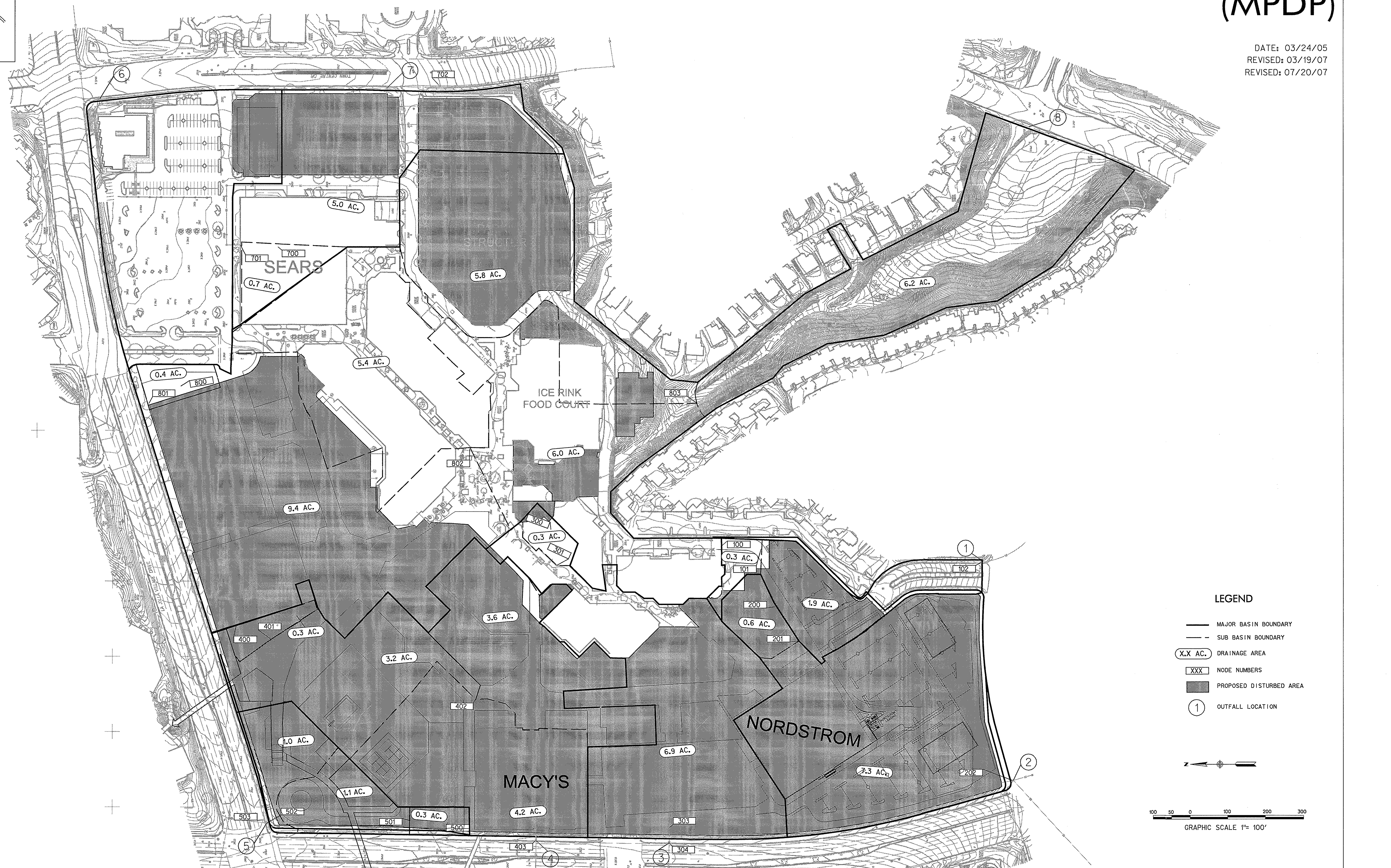
RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX)619.291.4165
rickengineering.com
San Diego Riverside Sacramento Orange Phoenix Tucson

POST-CONDITION DRAINAGE STUDY EXHIBIT FOR UNIVERSITY TOWN CENTER RENOVATION PROJECT (MPDP)

DATE: 03/24/05
REVISED: 03/19/07
REVISED: 07/20/07



VICINITY MAP
NO SCALE



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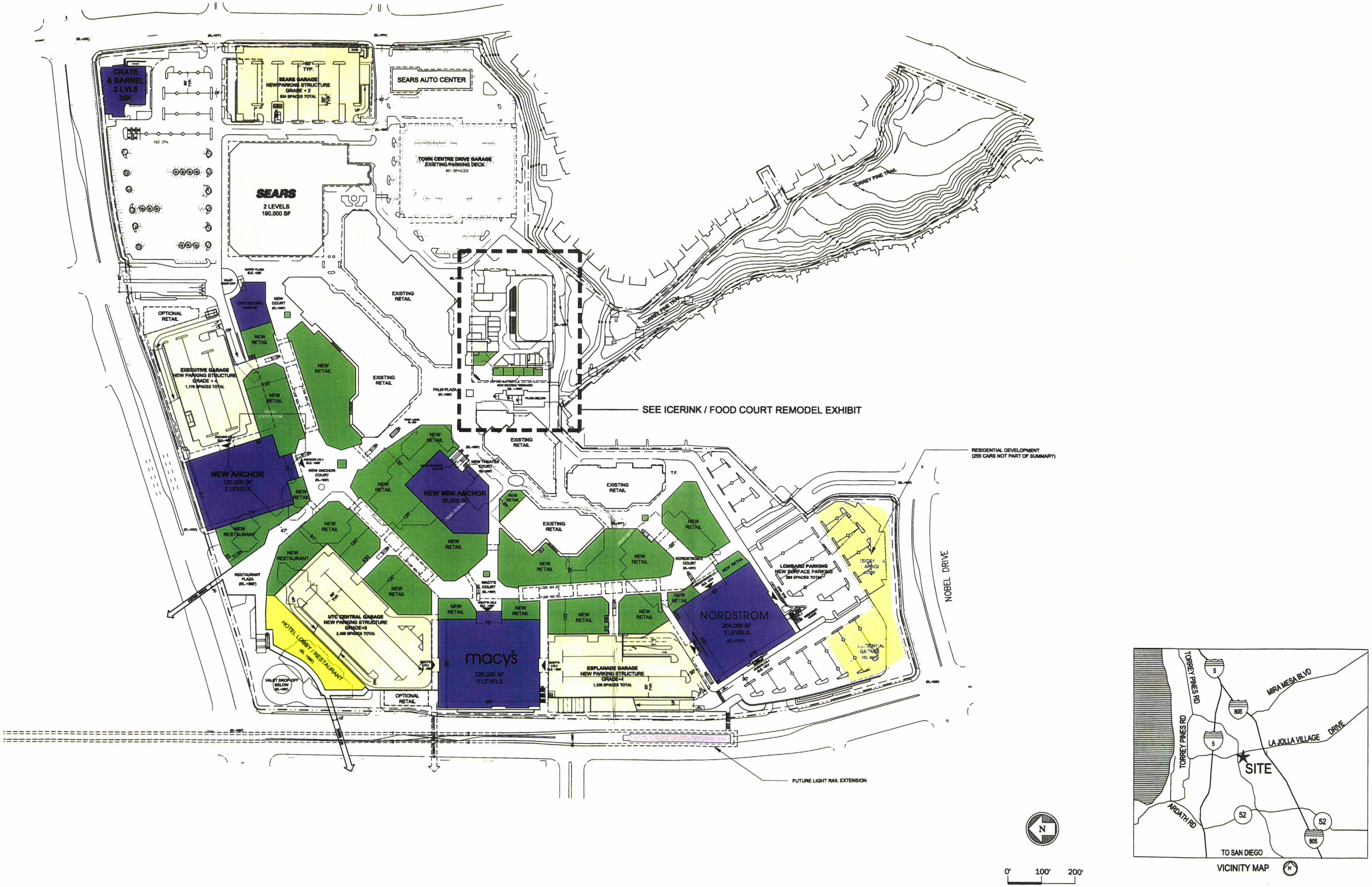
San Diego Riverside Sacramento Orange Phoenix Tucson

MAP POCKET 3

Project Overview



Westfield Design
11601 Wilshire Blvd. 11th Floor
Los Angeles, CA 90025

UTC - REDEVELOPMENT PLAN

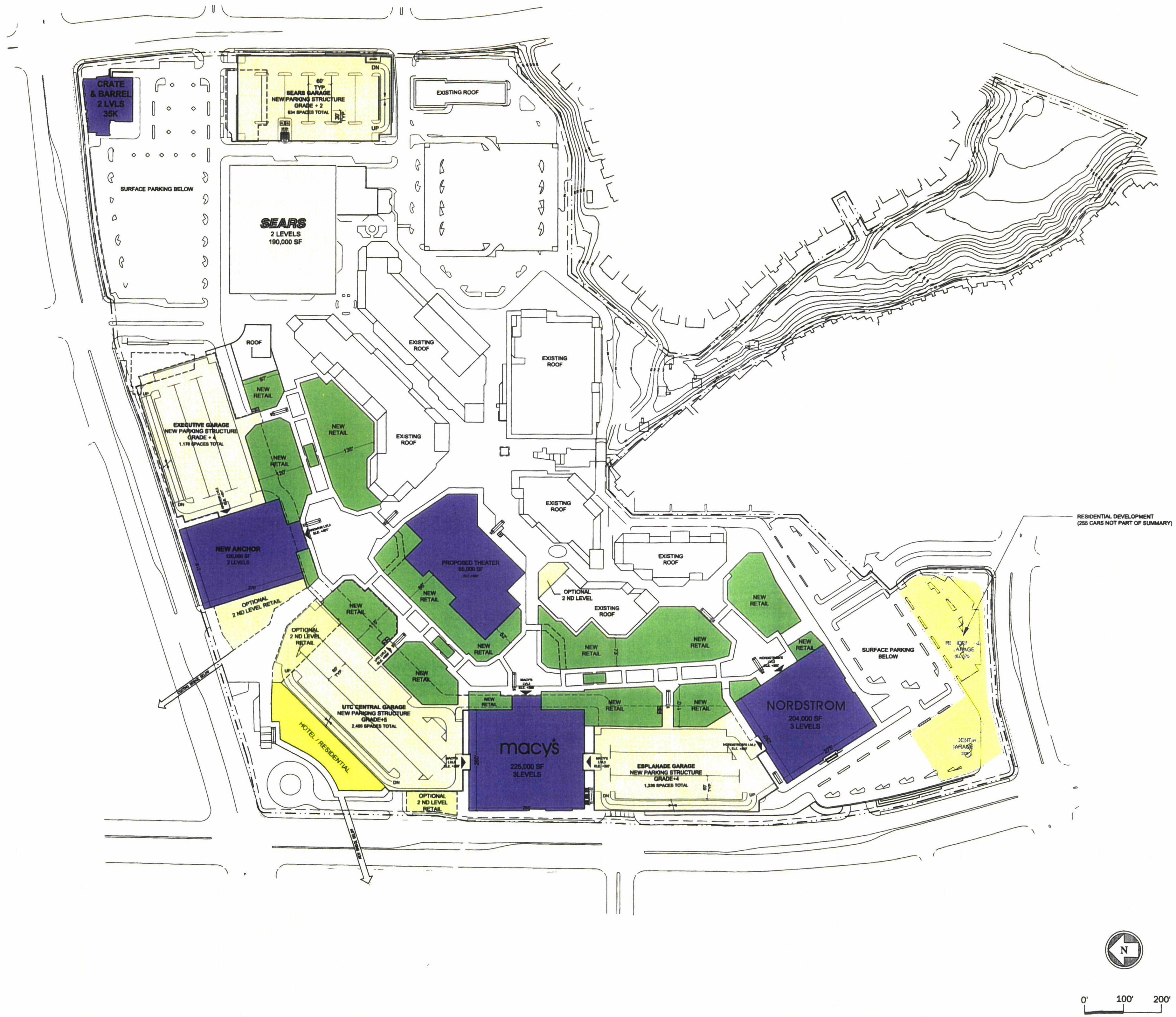
LEVEL 1

SCALE: AS NOTED

DATE: MAY 23, 2007

Westfield
UTC - San Diego

1
SHEET



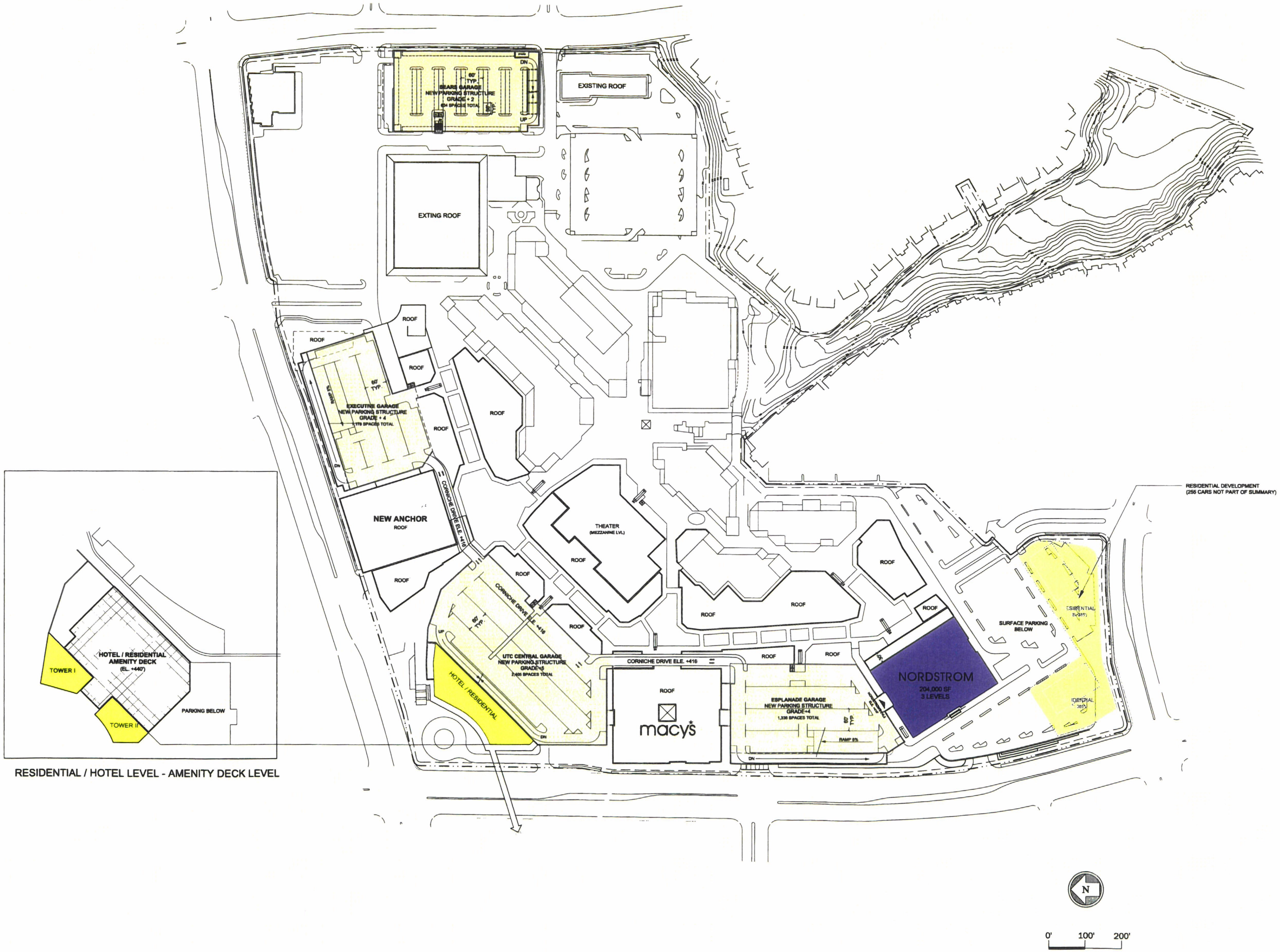
Westfield Design
11601 Wilshire Blvd. 11th Floor
Los Angeles, CA 90025

UTC - REDEVELOPMENT PLAN

LEVEL 2

SCALE: AS NOTED

Westfield



RESIDENTIAL / HOTEL LEVEL - AMENITY DECK LEVEL

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11601 Wilshire Blvd. 11th Floor
Los Angeles, CA 90025

UTC - REDEVELOPMENT PLAN

LEVEL 3

SCALE: AS NOTED

DATE: MAY 23, 2007

Westfield
UTC - San Diego

3
SHEET

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Los Angeles, CA 90025

UTC - REDEVELOPMENT PLAN

LOWER LEVELS

SCALE: AS NOTED

DATE: MAY 23, 2007

UTC - San Diego

4

SHEET

ICE RINK / FOODCOURT
REMODEL EXHIBIT
(WITH NEW CHILD TIME BLDG)