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**DEVELOPMENT ENGINEERING
DESIGN BULLETIN**

CATEGORY: 3 Improvement Plans, Storm Drain

TITLE: 3.4.3 First Flush Storm

DATE: June 1, 2008

INTRODUCTION

The current regulatory environment requires that new projects provide water quality mitigation for the first flush storm. The first flush storm is generally defined as the storm that produces ½-inch of rain. It is generally accepted that ½-inch is needed to transport pollutants from the surface of a drainage basin to the storm drainage system. In California the idea of the first flush is that after the long, summer drought the first storm to produce ½-inch of precipitation would wash the pollutants that have accumulated over the summer into the storm drainage system.

Since the requirement for water quality mitigation has been driven primarily by State and Federal legislation, the Chico Municipal Code (C.M.C.) does not fully address the design aspects of the issue. The C.M.C. provides design requirements for the conveyance of storm water, but does not address the design of water quality facilities.

It is the purpose of this Design Bulletin to provide guidance for determining the flow rates that would be generated by the first flush storm. The discussion to follow is not a required method. It is a method used by some of the engineers at the City of Chico. Other similar methods, based on similar assumptions and data, and performed by competent professionals will be given due consideration during review.

DISCUSSION

The lowest rainfall intensity allowed by the C.M.C. for the design of storm drain systems is a 2-year storm of 20-minute duration. It is the fundamental assumption of this Design Bulletin that the storms required by the C.M.C. for storm drain conveyance are much larger than what the first flush storm is intended to be. The first flush storm is intended to be that first big storm that comes in during the fall, not a storm that occurs every other year.

The City of Chico procured the services of Metcalf and Eddy to produce the report, "FINAL DRAFT STORM WATER CHARACTERIZATIONSAMPLING PLAN FOR LOCUST STREET STORM DRAINIMPROVEMENTS PROJECT". As a portion of that report a prototypical, first flush storm was identified. Using the data for the Pacific Central Region from the National Oceanic and Atmospheric Administration Climate Data Center the following values were determined:

| | |
|-------------------------|------------------------------------|
| Mean Event Depth: | 0.580 inches |
| Mean Event Duration: | 13.70 hrs |
| Mean Event Depth Range: | (50% Variance) 0.29 to 0.87 inches |

Mean Event Duration Range: (50% Variance) 6.85 to 20.55 hours

It is reasonable and conservative to accept the mean event as the first flush storm. From this information an average intensity can be calculated:

$$0.58 \text{ inches} / 13.7 \text{ hours} = 0.042 \text{ inches per hour.}$$

Using this intensity, flow rates through the system can be calculated using conventional methods.

As stated earlier, other similar methods of determining the appropriate intensity of the first flush storm will be given due consideration during review. All methods must take into consideration the underlying intention of the first flush storm and be supported by appropriate data.