STORMWATER UTILITY UPDATES

May 11, 2010

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Department of Public Works
Town of Oro Valley
CONGRATULATIONS
PAG SW WORKING GROUP

FIRST PLACE IN THE NAFSMA 2009 EXCELLENCE IN COMMUNICATION AWARD

Town of Oro Valley
OUTLINE

- Organization Structure
- Rainwater Harvesting
- Drainage Criteria Manual Update
- SWPPP Program
Organization Chart
for Existing Public Works, Planning & Zoning, and Building Safety Departments

PUBLIC WORKS
Director / Town Engineer

- DEVELOPMENT REVIEW
- TRANSPORTATION
- OPERATIONS
  - TRAFFIC ENGINEERING
  - STREET MAINTENANCE
  - PAVEMENT MANAGEMENT
  - FLEET MAINTENANCE
- ENGINEERING
  - STREET MAINTENANCE
  - STORMWATER
  - FACILITIES MAINTENANCE

PLANNING & ZONING
Director

- PLANNING TEAM
- ZONING ENFORCEMENT
  - CONSERVATION SUSTAINABILITY

BUILDING SAFETY
Director / Building Official

- PLAN REVIEW
- INSPECTION & COMPLIANCE
  - INTAKE & PERMITTING
Stormwater Utility

- David Parker, Utility Manager, 229-5059
  - Utility Administration
  - Stormwater Management, AZPDES
  - CIP Program
  - Regulatory Liaison
- Fernando Laos, Civil Engineer, 229-4818
  - Floodplain Management
  - New Construction Reviews
  - Minor Designs/H&H studies
- Robert Wilson, Civil Tech, 229-4879
  - Field Inspections
  - Vector Control
  - Blue Staking
  - Minor Maintenance and Repair Projects
Rainwater Harvesting
Addressed in
- Drainage Criteria Manual
- Landscape Ordinance of Zoning Code (beginning June 1st)

Goal
- Conserve Water while protecting downstream ecology

Criteria
- Use Passive or Active Systems (passive mandatory)
- WH = Area impervious X 3,000 gal/acre
  - Based upon not taking more than 10% of pre developed flows plus delta
  - Assumes 60% of pre developed is runoff.

All new Houses must be plumbed for potential grey water reuse
Rainwater Harvesting
Criteria Justification

Hydrologic Analysis of Above Theory
The above methodology has been analyzed technically against Rational Equation Calculation of pre vs. post discharge flow volumes. Both the two (2) and ten (10) year events are calculated below to corroborate that the harvesting of 3000 gal/storm/acre is less than the standard statistical rain events analyzed for detention requirements.

1. Volume Produced for the two (2) year, 1 hour rainfall event:
   \[ Q = C_i A \]
   where:
   \( Q_e \) = site discharge prior to development – Pre condition
   \( Q_p \) = site discharge of developed impervious surface
   \( Q_{wh} \) = available discharge that can be retained for water harvesting
   \( A = 1ac \) (assumed acreage for this example for both Pre & Post)
   \( T_c = 5min \) (assumed discharge time of concentration for both Pre and Post conditions)
   \( i = 5in/hr \) (TOV IDF 2 year rainfall intensity)
   \( C_e \) = 0.15 (calculated below using TOV/ADOT method and set as an average of NRCS soil types B and mixed b 50% & C 50%)
   Use \( P_2,1hr = 1.2" \) (rainfall depth for TOV 2 year event)
   \( C_{e,B} = 0.12 \)
   \[ C_{e,B50/C50} = 0.50(0.12) + 0.50(0.23) = 0.18 \]
   \[ C_e = 0.50(0.12) + 0.50(0.18) = 0.15 \]
   \( C_p = 0.91 \) (for rainfall event depth of 1.2” and total development of impervious surface – Buildings, hardscape and paving)
   \( Q_e = C_e i A = 0.15(5in/hr)(1ac) = 0.75cfs \)
   \( Q_p = C_p i A = 0.91(5in/hr)(1ac) = 4.55cfs \)
   \( Q_{wh} = Q_p - Q_e = 4.55cfs - 0.75cfs = 3.80cfs \)
   Volume retained from PCHydro V5.3.1 model analysis = 0.0793af = 25840gal

2. Volume produced for the ten (10) year, 1 hour rainfall event:
   \[ Q = C_i A \]
   where:
   \( Q_e \) = site discharge prior to development – Pre condition
   \( Q_p \) = site discharge of developed impervious surface
   \( Q_{wh} \) = available discharge that can be retained for water harvesting
   \( A = 1ac \) (assumed acreage for this example for both Pre & Post)
   \( T_c = 5min \) (assumed discharge time of concentration for both Pre and Post conditions)
   \( i = 7in/hr \) (TOV IDF 10 year rainfall intensity)
   \( C_e \) = 0.38 (calculated below using TOV/ADOT method and set as an average of NRCS soil types B and mixed b 50% & C 50%)
   \[ P_{10,1hr} = 0.496(P_{2,1hr}) + 0.449(P_{100,1hr}) \]
   \[ P_{10,1hr} = 0.496(1.19") + 0.449(2.69") = 1.79" \] – use 1.8”
   \( C_{e,B} = 0.34 \)
   \[ C_{e,B50/C50} = 0.50(0.34) + 0.50(0.47) = 0.41 \]
   \[ C_e = 0.50(0.34) + 0.50(0.41) = 0.38 \]
   \( C_p = 0.94 \) (for rainfall event depth of 1.8” and total development of impervious surface – Buildings, hardscape and paving)
   The difference between the \( C_p \) and the \( C_e \) is the basis of logic in the theory presented above. Essentially 0.94 – 0.38 = 0.56, or rounded off as 40% of the flow remains on site while 60% runs off. This is important factor in maintaining the hydrologic balance of the desert.
   \( Q_e = C_e i A = 0.38(7in/hr)(1ac) = 2.66cfs \)
   \( Q_p = C_p i A = 0.94(7in/hr)(1ac) = 6.58cfs \)
   \( Q_{wh} = Q_p - Q_e = 6.58cfs - 2.66cfs = 3.92cfs \)
   Volume retained from PCHydro V5.3.1 model analysis = 0.0957af = 31184gal
Revised Manual approved Feb 2010

Major Revisions include:

- Hydrologic Calculations
- First Flush Requirements
- Water Harvesting Requirements
- Riparian Channel Design
- All Weather/Dip Crossings
- Detention Basins
- SWPPP requirements for ALL Construction Projects
CGP Highlights

- New OV SWPPP template being coordinated
- Utility approves and inspects all SWPPPs in Town
- Monthly Inspections by Town
- Notification of Final Stabilization 2 weeks prior to ADEQ NOT submittal
Working with contractor to ensure adequate level of BMPs are used

BMP Maintenance
  – Especially when developed is delayed

Final Stabilization when using vegetation/hydroseeding on slopes
CGP Challenges
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CGP Challenges
Program works very well through construction start

Area that need emphasis are maintenance and final stabilization
QUESTIONS?