City of Thousand Oaks

SQUIMP Requirements and Guidance Manual Workshop

- Site Design Techniques

June 8, 2005

Site Design Techniques Overview

- Background
  - Development Impacts
    - Hydrology
    - Pollutants
- Mitigation
  - Intro BMP's
    - Hydrology – General Site Design BMP's
    - Pollutants – Site-Specific Source Control BMP's
    - Post-Construction Nuisance/IC/ID Controls

Background: Development Impacts
Hydrologic Response

- Effective Imperviousness up ↑
  → Peak Discharge up ↑
- Paving Natural Waterways: "Gather and Go" Principle
- Shortens Time of Concentration (Tc) ↓
  → Increases Rainfall Intensities ↑
- Higher Rainfall Intensities ↑
  → Increases Peak Discharge ↑

Background: Pollutant Response
(Melinda's "Pollutants of Concern" discussion)

- Roadways: Grease, Oil, Fuel, Metals (Zinc/Copper)
- Commercial/Parking Lots:
  - Roadways + Trash + BOD/Bacteria
- Residential: Parking Lots with Lawns
- Restaurants: Special type of Commercial
  - Greater BOD/Bacteria potential

Background: Mitigating Impacts
with Site Design Best Management Practices (BMP's)

- **What *ARE* B.M.P.'s?**
  - **Definition:** *"BMP's are **methods**, **measures** or **practices** designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water."*
  - **Methods**: site design, planning
  - **Measures**: landscaped areas, pervious paving, basins, sand filters, infiltration
  - **Practices**: good housekeeping, prevention programs, education

Site Design Response/Mitigation
Hydrology

- **Methods**
  - **The old "Gather-and-Go" technique must be unlearned (design behavior)**

Site Design Response/Mitigation
Hydrology

- Runoff Reduction Techniques
  - Measures: Filtration / Infiltration: absorb more water
    - Planning, thinking about site layout
    - Be aware of site relief and discharge connection constraints
    - Grading options: drain to perimeter landscape?
    - Redevelopment situations
      - Example: replacing building with perimeter grade constraints)

A Golden (Arches) Example

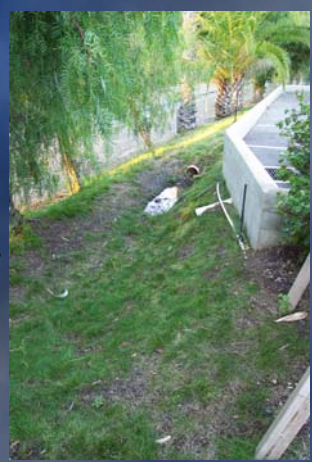
Site Design Response/Mitigation
Hydrology

- Measures: Detention / retention

  (delay peaks, reduce peaks)
  - Parking lot ponding, reduce parking lots grades (Planning Departments)
  - Depressed basins, wet ponds (water features)
  - Buried pipe and vault detention

Site Design Response/Mitigation
Hydrology

- Measures: Infiltration
  - Flatten slopes: think beyond the maximum 2:1 slopes
  - Redirecting Roof Drains: disconnect from on-site drains
    - slows the flow; different set of pollutants
    - Challenge soils engineer argument about saturation
      - 6 feet irrigation per year
      - 1.5 feet rainfall over 3 months = same/less

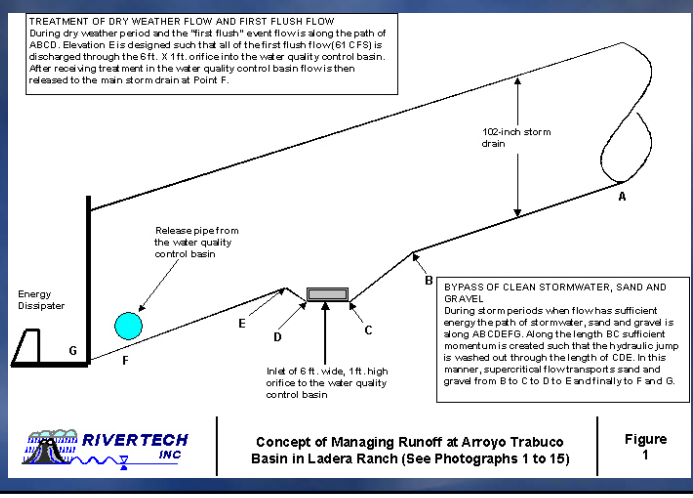


Measures: Refer to Manual
"General" Site Design Control Measures

- G-1: Conserve Natural Areas
  - Cluster development
  - Don't "push" into slopes
  - Exploit setback areas, medians
- G-2: Protect Slopes and Channels
  - Use natural drainage
  - Stabilize Crossings
  - Use Drop Structures
    - Hasan Nouri's Fagan Canyon Creek approach

Hasan Nouri's Fagan Canyon Bypass concept

- Permits larger sediments to proceed
- Extracts pollutants/small particles in low-flow



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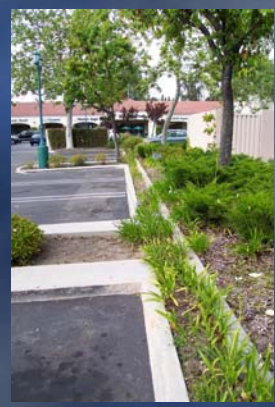


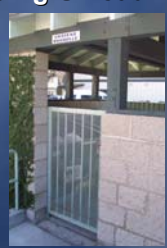
- G-3: Control Peak Stormwater Runoff Rates
  - Detention: Match Existing Discharge
  - Detention: Set limit of Peak Discharge
- G-4: Minimize Imperviousness Area
  - Cluster Buildings
  - Reduce Paving/Flatwork
    - Consider Pervious Paving

      ("Cottage Cheese", Turf-block, Pavers)
- G-5.1: Minimize Effective Imperviousness, Turf Buffers
- G-5.2: Grass-lined Channels

Site Design Response/Mitigation

- Site-Specific Source Control Measures:

  "An ounce of prevention is worth a kilogram of cure"
  - S-1: Storm Drain Message and Signage
    - Placards, stenciling
  - S-2: Outdoor Material Storage Area Design
    - Impervious surfaces, covers, containment
  - S-3: Outdoor Trash Storage Area Design (S-1 + S-2)
  - S-4: Outdoor Loading/Unloading Dock Area Design (S-2)



Site Design Response/Mitigation

- Site-Specific Source Control Measures (cont.)
  - S-5: Outdoor Repair/Maintenance Bay Design
    - Other codes (Fire/Bldg) + Trash Encl. (S-2)
  - S-6: Outdoor Vehicle/Equipment/Accessory Washing Area Design (~Trash Encl. S-2)
  - S-7: Fueling Area Design
    - Outdoor Bay (S-5) + Blind-sump (volatiles)
  - S-8: Proof of Control Measure Maintenance
    - Deed restriction, Maintenance Agreements
    - Vicki Musgrove

Eliminating Nuisance Flow and ID/IC *("methods, measures and practices")*

- Site Design (Pre-construction)
  - Bypass offsite "intrusion"
  - Landscape design
    - Graded flatter, less runoff
    - Plant selection: drought tolerant → less over-irrigation
  - Drainage Design: Don't tempt folks to connect (Illicit Connection)
    - Reduce number of on-site storm drains
    - Conceal their inlets in landscaping
    - Apply signage in inlets

Eliminating Nuisance Flow and ID/IC *("methods, measures and practices")*

- Management (post-construction) Practices
  - Maintenance Plans

    attached to property title (Vicki Musgrove)
    - Illicit Discharge: Licensed/informed pesticide/herbicide application
    - Illicit Discharge: Adjust irrigation
    - Illicit Connection: Education programs
    - Maintenance Agreements

Site Design Techniques Summary

- SQUIMP Tech Manual "Philosophy" → Behavioral Change (design and operation)
- Unlearn the "Gather and Go" drainage design practice
- Think Stormwater
  - Plan the site with Site Measures in mind
    - General Site Design Control Measures "G"
    - Site-Specific Source Control Measures "S"
- Be Aware of Pollutants of Concern (Melinda McCoy)
- Establish Post-Construction Maintenance (Vicki Musgrove)
- Questions: Break, Panel Discussion
  - Call me Jim Taylor (805) 449-2442

Thousand Oaks
California Lutheran University
Case Study, Ed Gripp

- Education and Technology Building
  - South Campus Redevelopment
- Extended Detention Basin (T-3)
- Landscape Plant Selection (Appendix F)