Site Planning and Infrastructure Workshop

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Clearwater Commons

Presentation Today

- Overview of Site Planning Considerations
- Overall Challenges with Development
- Site Planning Considerations
- Case Study on the Clearwater Commons
- Changing Low Impact to Positive Impact Development

Overall Challenge - Minimize Problems with Development

- Costs of sprawl - location of development
- Increase in impervious surfaces and pollutants
- Growth management act – Livable Communities
- SEPA, SMA, GMA, ESA, LID – Overlapping rules
- Energy consumption and climate change
- Long-term cost/benefit analysis

Traditional Site Planning Considerations

- ✓ Project Context: Land Use, Zoning, and Development Regulations, Cultural Constraints
- ✓ Physical and Natural Constraints
- ✓ Storm Water Management
- ✓ Circulation Requirements for Vehicles, Bicycles, and Pedestrians
- ✓ Utility Availability and Location
- ✓ Integrating Park and Open Space
- ✓ Cost-Benefit Calculations

Additional Considerations for LID Projects

- For LID Projects, the Following Principles Must Be Emphasized Early in the Site Planning Process:
  1. Understanding of Development Goals
  2. Conserve Natural Areas
  3. Minimize Site Disturbance
  4. Minimize Impervious Coverage
  5. Disconnect Impervious Areas
  6. Maintain Site Hydrology

LID Site Planning Principles

1. Conserve Natural Areas
   - ✓ Protect Sensitive Resources
   - ✓ Cluster Improvements
   - ✓ Retain Trees, Native Vegetation
   - ✓ Create Connected Open Spaces

2. Minimize Site Disturbance
   - ✓ Reduce Disturbance Envelope
   - ✓ Minimize Cuts / Fill
   - ✓ Avoid Site's More Pervious Areas
   - ✓ Consolidate Construction Activities

LID Site Planning Principles

3. Minimize Impervious Coverage
   - ✓Reduce Pavement Width / Sidewalk
   - ✓Incorporate Permeable Surfacing
   - ✓Soil Amendments
   - ✓Green Roofs

4. Disconnect Impervious Areas
   - ✓Reduce Effective Impervious Area
   - ✓Minimize Closed Pipe Conveyance
   - ✓Utilize Multiple Small-Scale Facilities
   - ✓Dispersion not Point Discharge

LID Site Planning Principles

5. Maintain Site Hydrology
   - ✓ Reduce Runoff Leaving the Site
   - ✓ Discharge at the Natural Location
   - ✓ Distribute Flows in Sheet Fashion
   - ✓ Provide for Recharge
   - ✓ Promote Drainage Contact w/Soil and Vegetation

LID and Infrastructure Design

Project Infrastructure Constraints
- Integrate into Existing Built Environment
- Influence of Road Design
- Site Plan Dictates
- Storm Water Management

Clearwater Commons Case Study

- 6 year odyssey to build 16 units in Bothell
- 7 acre property surrounded by wetlands
- Borders North Creek – endangered salmon run
- First comprehensive LID project in SnoCo
- LID processes were a deviation process

Community Goals

- Restore the creek and wetland
- Create wildlife habitat
- Pedestrian friendly layout
- Centralized parking area
- Conserve energy
- Solar hot water and photovoltaic's
- Build sustainably
- Maximize indoor air quality

Low Impact methods Used

- On site storm water management
- Minimal site disturbance
- Rain gardens
- Permeable paving
- Small building footprints
- Pin pile foundations
- Green roofs
- Native plantings

Critical Site Factors

- Critical Area Site Plan and Mitigation
- Geotechnical Studies and Infiltration Rates
  - Soil tests; Pit Infiltration Tests
- Storm Water Hydrology Modeling
- Community Livability –Visual and Aesthetic
- Zoning and Setbacks

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CRITICAL AREA PLAN

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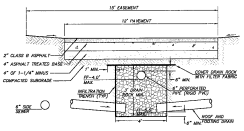
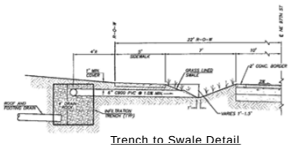
Alternative Road Section

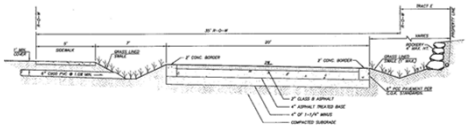
Alternative Street Section



Driveway Infiltration Trench Detail



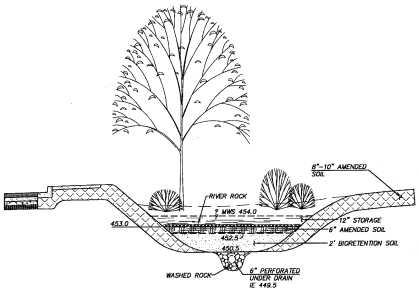
Trench to Swale Detail



Low Impact Road Section

Clearwater Commons Rain Garden

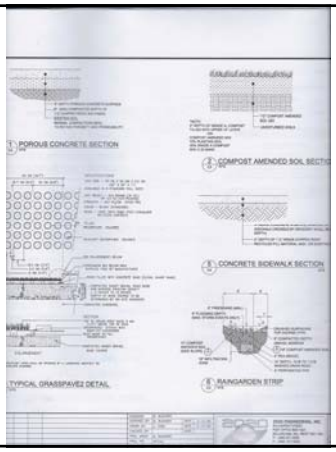
Rain Garden



Rain Garden Section

Green Retaining Wall- Deltalok

LID DRAWINGS



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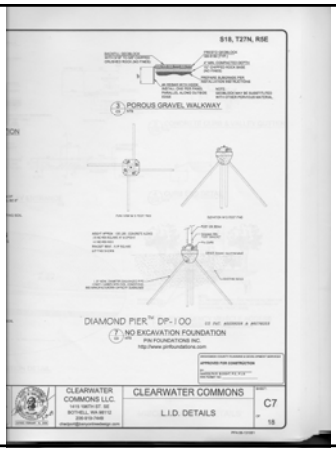
Fire Lane – Drivable Grass

Pervious Path

DIAMOND PIERS



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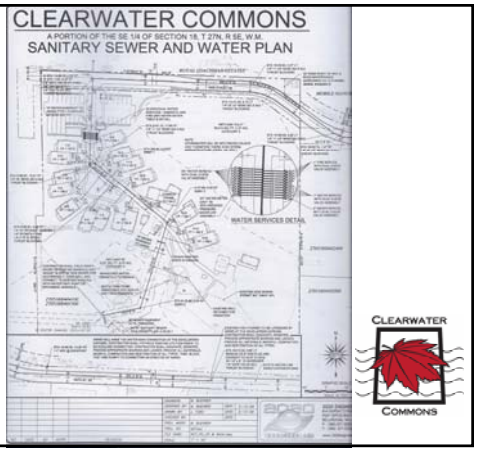
Not As Easy As It Looks

Infiltration Trench



Low Impact in a Riparian Zone

Compaction and LID

The old 1950 farmhouse remodeled and occupied in 2008

Certified Passive House – Mini B; Designed Joe Giampietro – Student Built

Blower Test .38. Quadruple pane windows; 12 in insulation, rain screen, solar hot water

Photovoltaic Solar System and EV Charging Station

Flooding Prior to Restoration

Low Impact Development or Positive Impact Development?

- Evaluate level of impact
- Determine needs of community/eco-system/species/habitat
- Critical watersheds – Protect and Restore
- Areas of Opportunity/Positive Impact
- Energy/Food Production

Positive Impact Development

- Jobs and economic benefits
- Community livability and neighborhood vitality
- Sustainable product life cycle
- Energy impact and production
- Eco-system benefits
- Agriculture and food production
- Innovations and new market development

Scale of Analysis

- Home
- Planned Development
- Community
- Watershed
- County/City
- Region

Clearwater Commons Team

- **2020 Engineering** – Mark Buehrer
- **Banyon Tree Design** – Chad and Lisa Port
- **Site Developer** -LMH Construction Lane Hopkins
- **Watershed Company** Wetland Services
- **Capital Resource Company and Cobalt Mortgage** – Financing
- **Stream Restoration** – Geo Engineers; Aquatic Engineering, Snohomish County Surface Water
- **CascadeBuilt** – Sloan Ritchie

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