Southgate Neighborhood Green Street Project Design Challenges

Daniel Apt
SCVURPP GI Design & Implementation Workshop
April 19, 2017
Presentation Overview

- Project Location and Background
- Project Objectives
- Planning and Community Outreach
- Design Challenges, Constraints & Solutions
- Construction Phase
- Post Construction
- Single-family residential subdivision developed in the 1920's with 24- to 30-foot-wide streets and no underground storm drains
- Storm runoff is conveyed by gutter flow to single storm drain inlet
- Very flat slopes (less than 0.25% grades)
- Total area of the site is approximately 41 acres
Pre-Project Conditions

- Gutter-based drainage system no longer functional due to deteriorated street condition and sunken/heaved gutter grades.
- Mature street trees in planter strips lining both sides of the street.
- High on-street parking demand due to small garages and adjacent high school.
- Heavy localized street ponding within the neighborhood during rain events.
Ponding Issues
1) Address storm drainage system deficiencies in the neighborhood.

2) Utilize innovative techniques to minimize storm water runoff and improve water quality.

3) Serve as one of the “Green Street” projects within the Bay Area as mandated by the Municipal Regional Storm Water Discharge NPDES Permit.
Planning and Community Outreach
Planning Methodology

- Review of Historic Information
- Site Visits
- Develop Hydrology
- Evaluate Stormwater Harvest & Use at Peers Park
- Paseo Walkway Improvements
- Bioretention Bulb-outs
- Pervious pavement
- New storm drains
- Community Outreach
- Costs
- Planning Feasibility Study
Methodology: Bioretention Bulb Outs

- Locations identified based on field recon and minimizing parking loss
- Bioretention sizing based on:
  - Available area in parkways and street widths
  - Existing utilities
  - Tree protection
- Plant palette developed by LA with resident input
- Irrigation evaluation
- Parking analysis
- Truck turning analysis
- Geotechnical information
Community Outreach

- 3 Community Meetings
  - 2/1/12; 4/3/12; 7/10/12
  - Input from the residents on components and conceptual design

- Meeting with residents – bioretention located in front of their home - 5/4/12

- Memorial Day Block Party

- Neighborhood Voluntary Stormwater Measures

- Bay Friendly Landscape Workshop

- Project Website
Community Outreach

- Lessons Learned
  - Engage the public as early in the project as possible
  - Engage the public in decisions about the project
    - General Concerns
    - Parking
    - Plant Pallete
    - Locations of BMPs
    - Types/color of pavers
    - Signage
  - Work closely with residents who will be most affected
  - Engage the community on their turf
  - Identify champions of the project in the community
Project Components

- Bioretention Bulb-Outs
- Porous Paver Cross Walks
- Paseo Walkway Improvements
- Sequoia Avenue Storm Drain
Porous Paver Crosswalks

PROPOSED BULB-OUT & CROSSWALK AT SEQUOIA AVE. & CASTILLEJA AVE.

EXISTING
Paseo Walkway Improvements

PROPOSED PASEO WALKWAY IMPROVEMENTS

EXISTING
Concept Design Layouts
Final Project Design
Planning - Lessons Learned

- Street Trees – Coordination with Arborist
- Utilities – Significant because older neighborhood
- Parking – Big issue for residents
- Truck Turning Analysis – Small streets
- Geotechnical investigations – critical step
- Lack of storm drain - effected configuration
- Irrigation – source and configuration
Design - Challenges, Constraints & Solutions
Geotechnical

- Low infiltration rates due to approximate 8-10 ft. depth of clay layer

- Higher infiltration rates below 8-10 ft. – sand layer
**Groundwater Quality**

- Historic groundwater is 50 ft. below the surface
- Concerns from the Santa Clara Valley Water District on potential impacts to groundwater quality from infiltration of stormwater
- Re-evaluated design based on the concern
Utility Conflicts
Utilities Strategy

- Use of existing plans for utility identification
- Pothole for existing utilities prior to start of excavation to check depths of existing utility services.
- Use Underground Service Alert (USA).
- 12” Clearance for all utilities
Utility Relocation

SR PER DIRECTION AND APPROVAL OF PULL CABLE

ABANDONED 2" GAS AND 4" WATER

CASTILLEJA AVENUE

CONNECT TO EX CB

GAS SERVICE
WATER SERVICE
GAS SERVICE
WATER SERVICE

REMOVE EXISTING ABANDONED UTILITY AS NOTED (SEE NOTE 1).
RELOCATE EXISTING UTILITIES AS NOTED (SEE NOTE 1).
Utility Coordination/Relocation/Removal

- Gas – City Gas Utility Department
- Cable – Cable Company
- Water – Contractor per direction of City Engineer
- Electrical
  - Conduits – Contractor per direction of City Engineer
  - Cable – City Electrical Crews

NOTE 1:

A. relocation and removal of the existing gas lines should be completed by city of palo alto gas utility department.

B. relocation and removal of the existing catv line should be completed by cable company.

C. all water services and water mains should be relocated or removed by contractor per direction and approval of the city engineer. all work needs to be completed per 2013 city of palo alto water distribution system specifications and standard details:
   std. wsw-08 - water-sewer separation criteria standard detail
   std. wd-26 - 1" water service line replacement & reconnection standard detail
   std. wd-27 - cut and cap existing main standard detail

D. all electrical conduits should be relocated by contractor per direction and approval of the city engineer. city electrical crews will repair or pull cable.
Storm Drain

- New storm drain line for part of the project
  - Conflicts with sewer and electrical
  - Flat slope
  - Affected depth of some bioretention areas
Final Designs

- Bioretention – no underdrain – infiltration columns
Final Designs

- Permeable Paver Crosswalks – Infiltration Columns

Diagram:

- 1' Concrete Band
- EX Street Section
- 2” Open-Graded Bedding Course (ASTM #8 Stone)
- 4” Open-Graded Base Reservoir (ASTM #57)
- 18” Open-Graded Subbase Reservoir (ASTM #2)
- 2” Sand
- 3” Pea Gravel
- 3” #8 Stone
- 2” Open-Graded Base Reservoir (ASTM #57)
- Open-Graded Subbase Reservoir (ASTM #2)

- Crosswalk with Infiltration Columns
- Section E-E
- N.T.S.
Final Designs

- Paseo – Infiltration Columns

```
ROCK SWALE VARIES FROM
2'(STA 10+08.50 TO STA 10+69) TO
3'(STA 10+74.00 TO STA 12+40)

SIDEWALK VARIES FROM
5'(STA 10+08.50 TO STA 10+69) TO
6'(STA 10+74.00 TO STA 12+40)
```

```
PASEO–PROPOSED SECTION G–G
N.T.S.
```
Final Designs

- Bioretention
  - With underdrain
  - Shallower detention layer
  - Storm Drain
Final Designs

- Permeable Paver Crosswalks – Underdrains

**NOTE:**
1. ALL PAVER CROSSWALK CONSTRUCTION SHALL CONFORM TO RECOMMENDATIONS OF GEOTECHNICAL REPORT NOTED IN GENERAL NOTE #3 - SHEET G-1.
2. CONTRACTOR TO PROTECT AND/OR RELOCATE ANY UNDERGROUND UTILITIES THAT ARE IN CONFLICT WITH THE PROPOSED UNDERGROUND IMPROVEMENT WORK PER DIRECTION AND APPROVAL OF CITY ENGINEER.
Design Phase Lessons Learned

- Utility conflicts – more utility relocations than anticipated as more utilities discovered
  - Significant coordination for relocation
- Integration of sand layer for groundwater quality
  - Direction of Santa Clara Valley Water District
  - Bioretention with no underdrain
  - Pavers no underdrain
- Paver crosswalks structural elements for concrete band to prevent migration of pavers
  - Depth of concrete band
  - Structural elements – 2 #5 reinforcement bars
- Storm Drain Depth
  - Affected depth of bioretention with underdrain
Construction Phase
Construction Phase

Augering Operation for the Infiltration Columns
Construction Phase

Placement of Infiltration Columns and Filter Fabric
Construction Operation Sequencing

- Installation of Concrete Band, Concrete Swale, and Installation of Permeable Pavers
Utility Conflicts: Pothole Prior to Design
Lessons Learned During Construction

- Traffic Control for very narrow street configuration
- Project site is on an existing fully built neighborhood (utility conflicts)
- Coordination with other city projects within the neighborhood (Resurfacing, and Concrete Repair)
- Parking and Access
Post Construction
Pavement Markers and Reflective Delineators for Bikes and Vehicles
Maintenance: Landscaping

- Some plants thrived early on while some had slow growth
Post Construction:
Neighborhood Embracing the Green Street
Post Construction
Post Construction
Questions?

Daniel Apt | President | Olaunu
dapt@olaunu.com