

Project 1.1: Improved Intersection Stormwater Management Dataset

Please refer to the Supporting Information Document for background information.

Intersection: Norchester Ave. & Victoria Ave., Chesterfield Heights, Norfolk, VA

1. Drainage Areas (SF), Storage Volume (cf), and Hydrograph for 24-hr 10 yr storm event are shown below broken out by each corner of the intersection.
2. Included below is a figure with existing topographic survey and utilities.
3. The CADD file for the intersection is available upon request.
4. Infiltration Rate – we recommend providing 1 in/hr (GET recorded 1.9 in/hr in the area, but we recommend 1 in /hr for purposes of conservatism and other data collected at other intersections).
5. Stormwater system is approximately 3-3.5' below existing ground for connecting underdrains
6. Maintenance Costs – We propose that maintenance requirements from the proposed solutions be evaluated based on categories of frequency and effort. The below table is based on VDEQ's latest BMP Standards and Specifications (2013 DRAFT) Maintenance Schedule with an added subjective qualitative placement of effort category (low, medium & high).

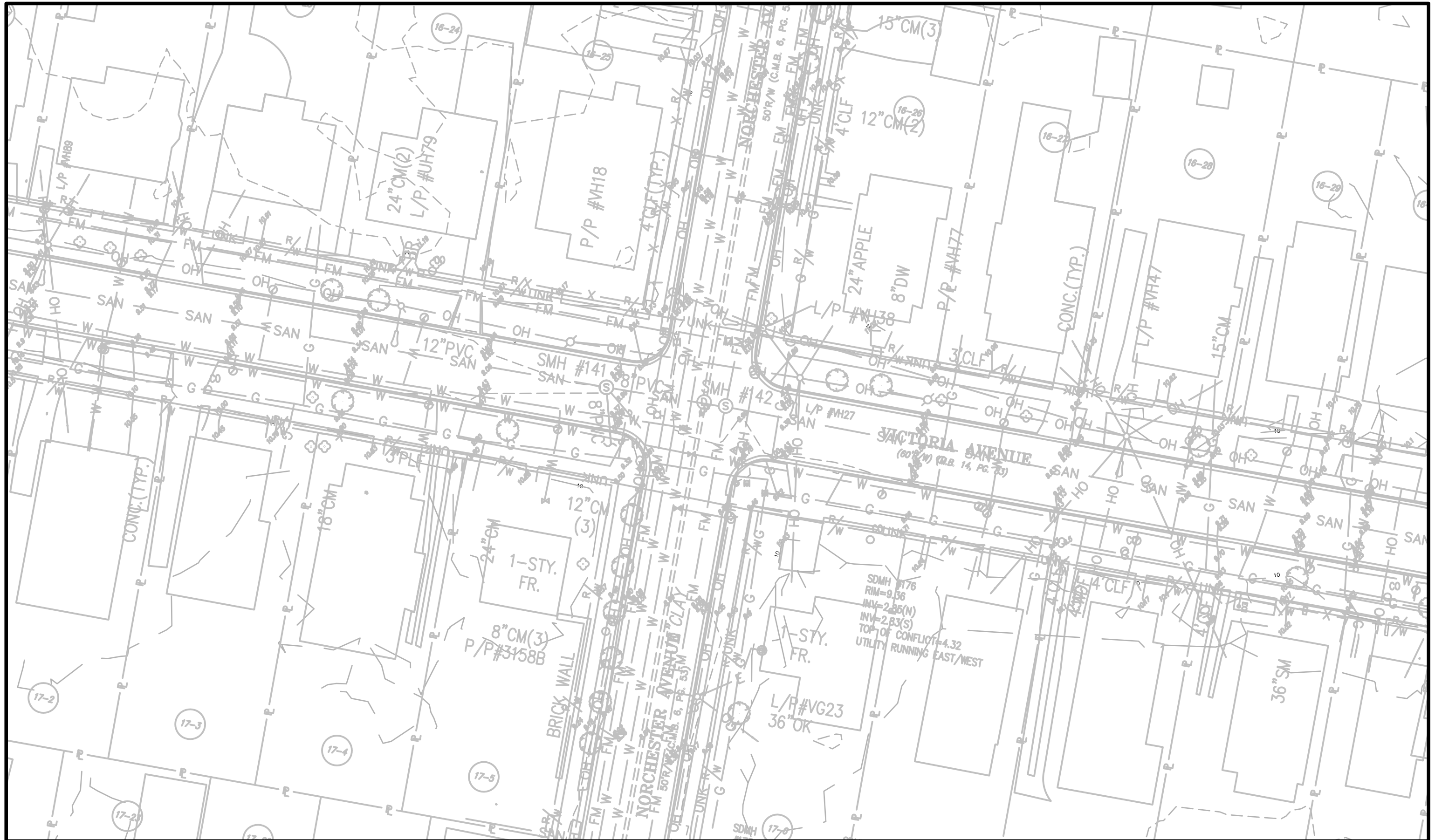
| Recommended Maintenance Tasks for Permeable Pavement Practices | Frequency ¹ | Effort |
|---|--|----------------------------|
| For the first 6 months following construction, the practice and contributing drainage area should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization. | After installation | Medium |
| Stabilize the CDA to prevent erosion Remove any soil or sediment deposited on pavement. Replace or repair any necessary pavement surface areas that are degenerating or spalling | As needed | Medium Medium Medium |
| Vacuum pavement with a standard street sweeper to prevent clogging | 2-4 times per year (depending on use) | Medium |
| Conduct a maintenance inspection | Annually | Low |
| Remove any accumulated sediment in pre-treatment cells and inflow points | Once every 2 to 3 years | Medium |
| Conduct maintenance using a regenerative street sweeper Replace any necessary joint material | If clogged | Medium Medium |
| ¹ Required frequency of maintenance will depend on pavement use, traffic loads, and surrounding land use. | | |

| Suggested Annual Maintenance Activities for Dry Swale (and Bumpouts) | Frequency | Effort |
|---|-----------------------------|--|
| For the first 6 months following construction, the practice and contributing drainage area should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization. | After installation | Medium |
| Check inflow points for clogging or accumulated sand, sediment, and trash and remove Inspect side slopes and grass filter strips for evidence of rill or gully erosion and repair it Check dry swale for evidence of excessive ponding or concentrated flows and take remedial action If sediment accumulation is present, look for bare soil or sediment sources in the drainage area and stabilize them immediately Check for clogging or slow-draining soil media, a crust formed on the top layer, inappropriate soil media, or other causes of insufficient filtering time, and restore proper filtration characteristics. Inspect check dams for evidence of undercutting or erosion, and remove trash or blockages at weepholes | Each Spring | Low Medium Medium Medium High Low |
| Mowing of grass filter strips and turf cover Pruning and management of trees and shrubs | At least 4 times a year | Medium Medium |
| Spot weeding, erosion repair, trash removal, and mulch raking | Twice during growing season | Medium |
| Add reinforcement planting to maintain desired the vegetation density Remove invasive plants using recommended control methods Stabilize the contributing drainage area to prevent erosion | As needed | Medium Medium Medium |
| Remove accumulated fine sediment in filter bed and till 2 to 3 inches of sand into the upper 8 to 12 inches of soil Clear the underdrain Install sand wicks to promote infiltration in the soil layer | If clogged | Medium Medium Medium |

CURRENT COST ESTIMATE

| NORCHESTER & VICTORIA AVE INTERSECTION | | | | |
|---|------|------|-----------|-------------------|
| GREEN INFRASTRUCTURE* | QTY | UNIT | UNIT COST | COST |
| SAWCUT AND REMOVE EXISTING PAVEMENT | 354 | SY | \$ 11.00 | \$ 3,892 |
| EXCAVATION (REMOVE FROM SITE) | 552 | CY | \$ 19.00 | \$ 10,479 |
| GEOTECH FABRIC | 1128 | SY | \$ 6.00 | \$ 6,770 |
| CURB AND GUTTER | 1354 | LF | \$ 24.00 | \$ 32,496 |
| UNDERDRAIN - PVC - 6" | 677 | LF | \$ 13.00 | \$ 8,801 |
| PLANTS | 2294 | SF | \$ 5.00 | \$ 11,469 |
| ENGINEERED SOIL | 85 | CY | \$ 49.00 | \$ 4,163 |
| STONE RESERVOIR | 313 | CY | \$ 72.00 | \$ 22,565 |
| BEDDING MATERIAL (STONE) | 42 | CY | \$ 45.00 | \$ 1,907 |
| PAVE DRAIN | 2288 | SF | \$ 8.50 | \$ 19,448 |
| Total | | | | \$ 122,000 |
| * Construction items do not include traffic control, survey, existing utility protection/relocation in this opinion of cost. Opinion of cost only includes materials and associated labor for Green Infrastructure. | | | | |

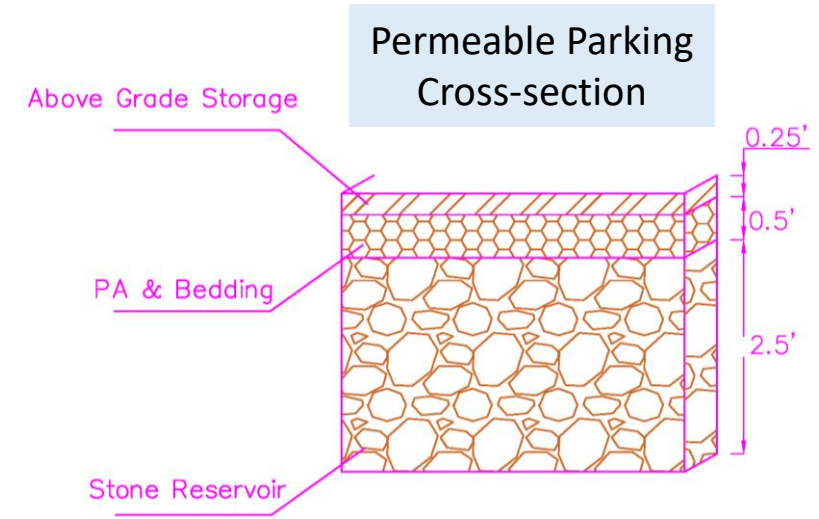
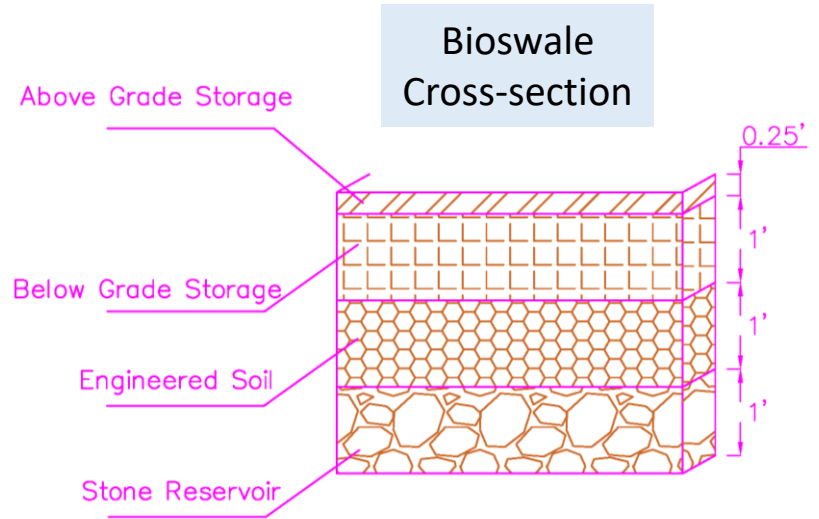
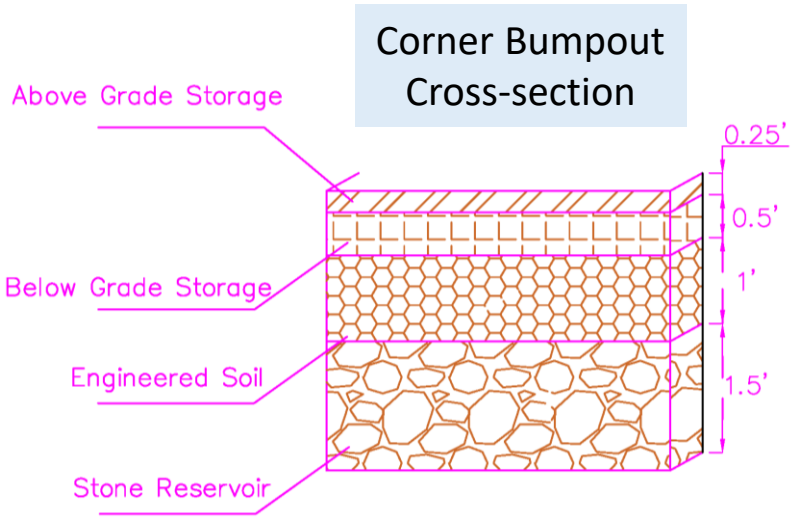
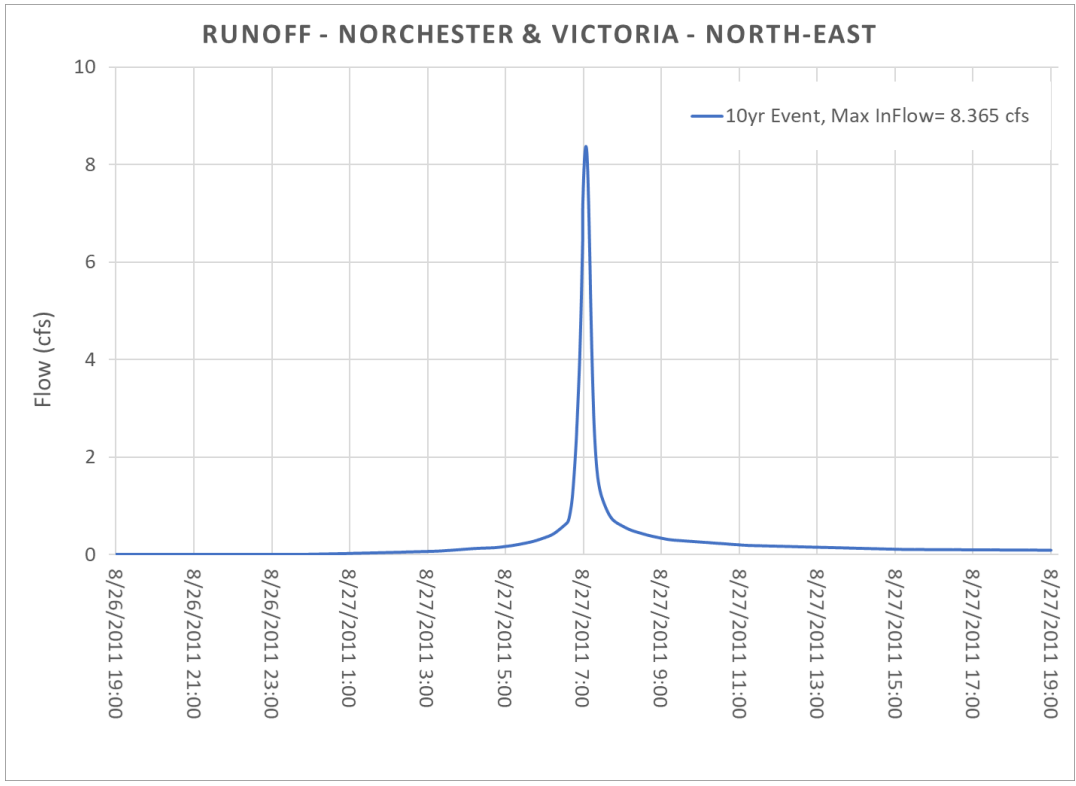
NORCHESTER AVE. AND VICTORIA AVE. EXISTING CONDITIONS EXHIBIT



SCALE 1" = 30'

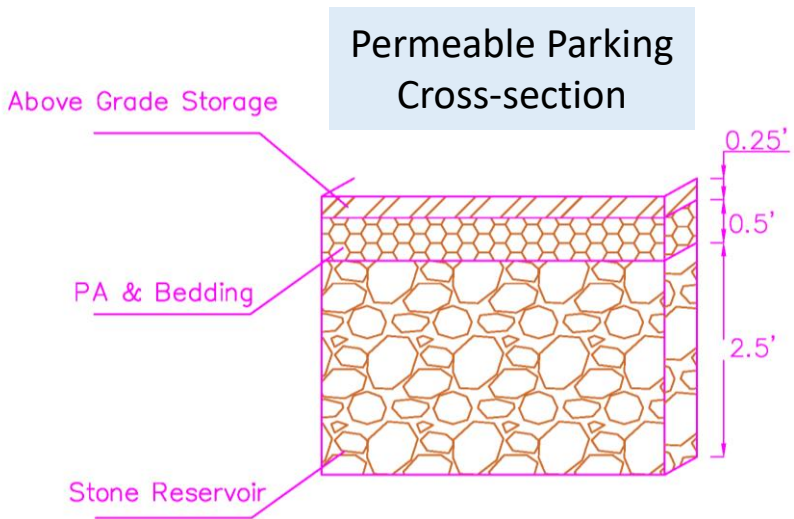
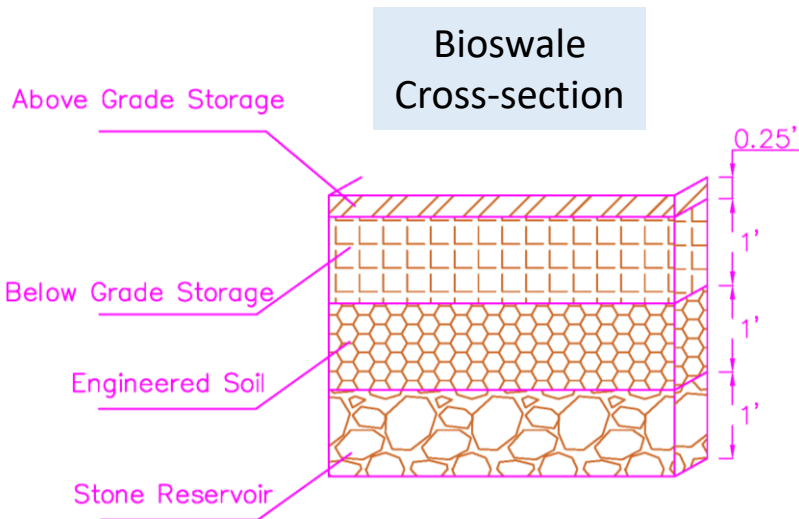
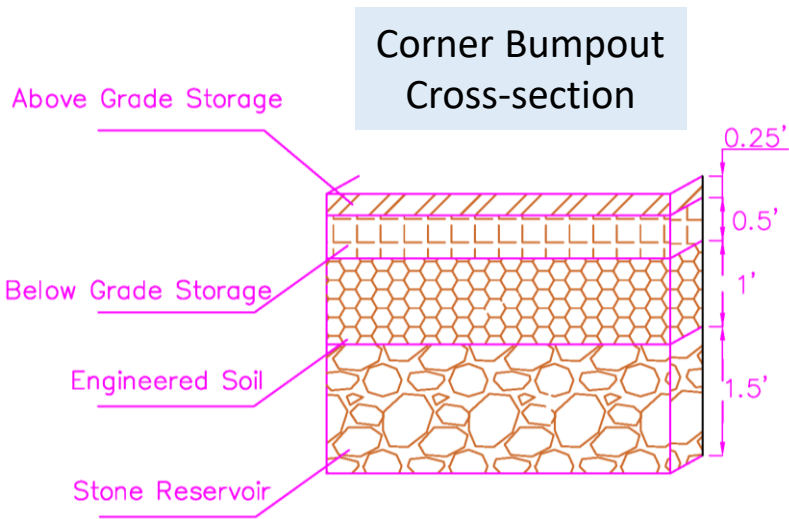
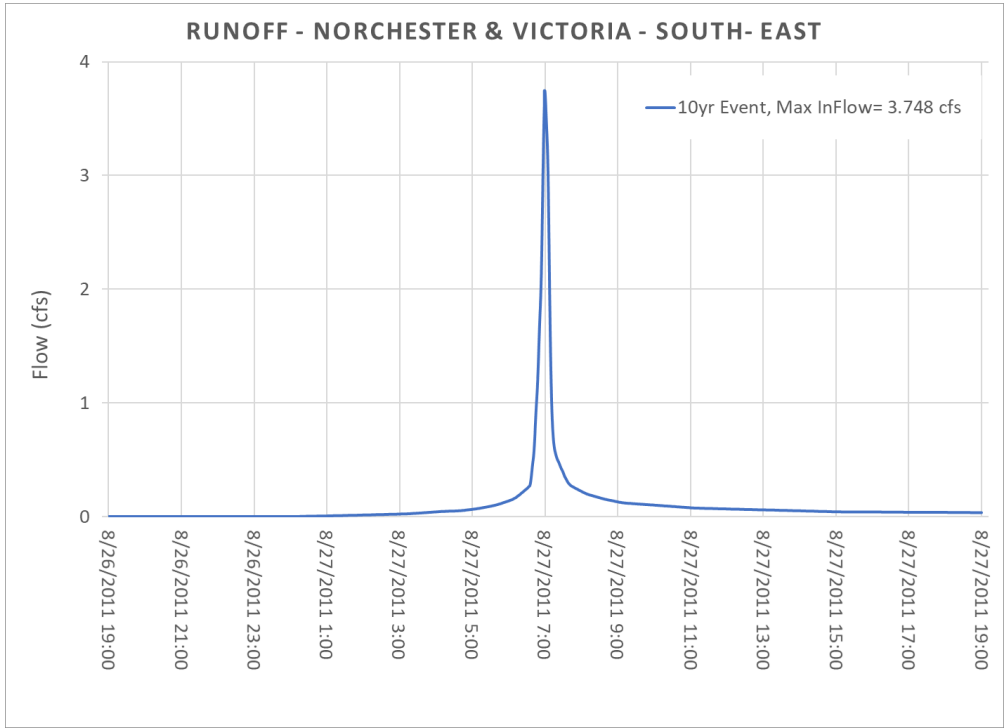


| Norchester-Victoria (North-East) | |
|----------------------------------|--------------------|
| Drainage Area (sf) | 68868 |
| Impervious | 53% |
| Pervious Area Curve Number | 76 |
| | |
| Green Infrastructure Type | Total Storage (cf) |
| Corner Bumpout | 234 |
| Bioswale | 1804 |
| Permeable Parking | 1698 |
| Total | 3736 |





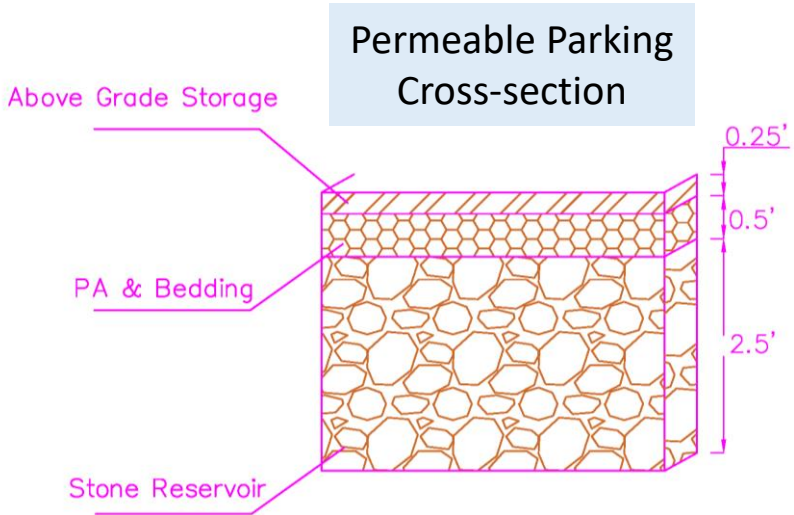
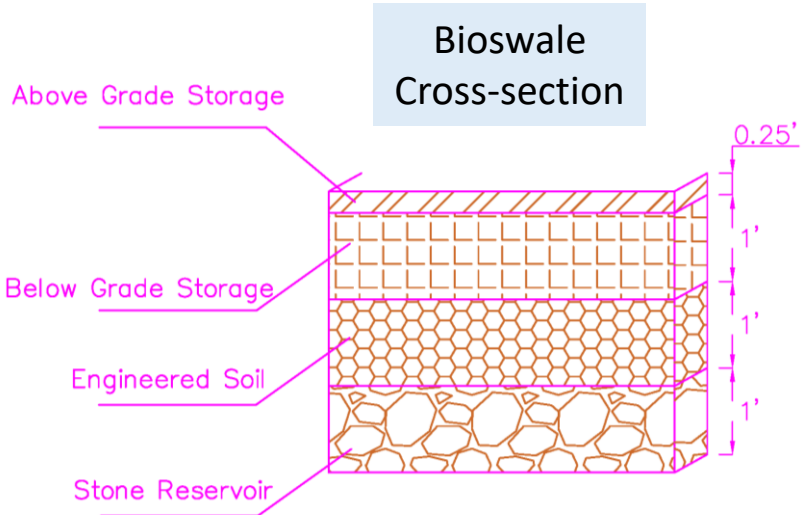
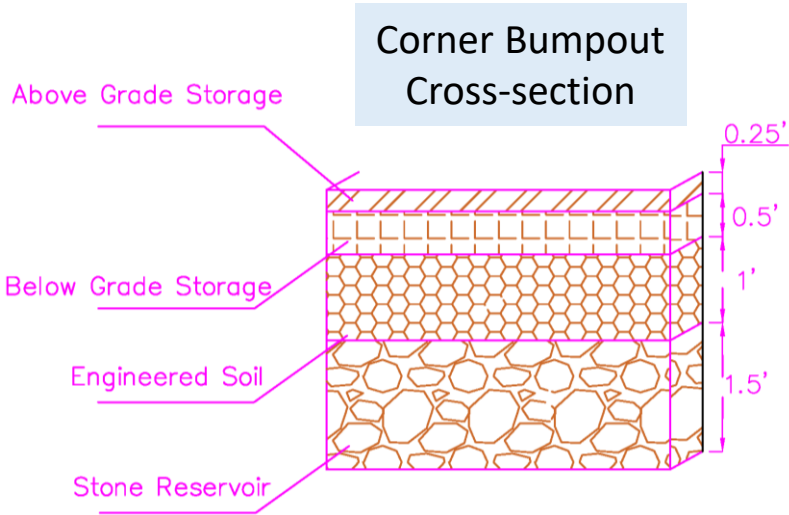
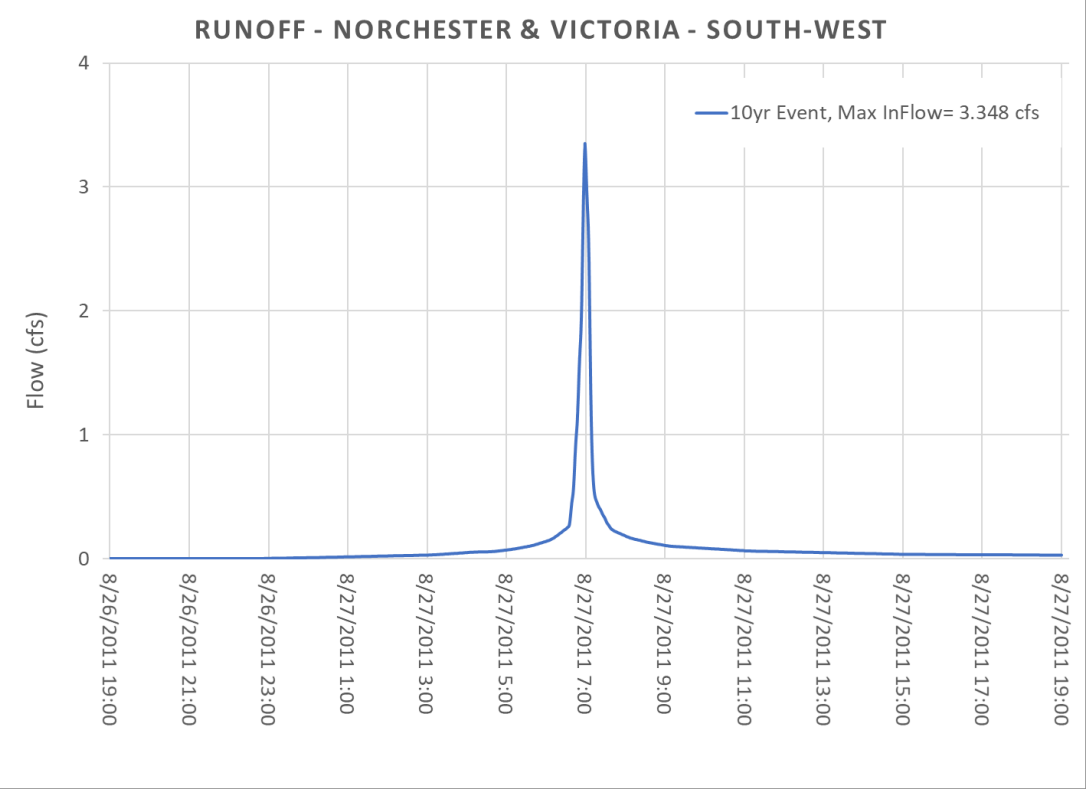
| Norchester-Victoria (South-East) | |
|----------------------------------|--------------------|
| Drainage Area (sf) | 28009 |
| Impervious | 50% |
| Pervious Area Curve Number | 75 |
| | |
| Green Infrastructure Type | Total Storage (cf) |
| Corner Bumpout | 95 |
| Bioswale | 734 |
| Permeable Parking | 691 |
| Total | 1520 |





| Norchester-Victoria (South-West) | |
|----------------------------------|-------|
| Drainage Area (sf) | 22390 |
| Impervious | 65% |
| Pervious Area Curve Number | 77 |

| Green Infrastructure Type | Total Storage (cf) |
|---------------------------|--------------------|
| Corner Bumpout | 76 |
| Bioswale | 587 |
| Permeable Parking | 552 |
| Total | 1215 |





| Norchester-Victoria (South-West) | |
|----------------------------------|-------|
| Drainage Area (sf) | 54755 |
| Impervious | 54% |
| Pervious Area Curve Number | 77 |

| Green Infrastructure Type | Total Storage (cf) |
|---------------------------|--------------------|
| Corner Bumpout | 186 |
| Bioswale | 1434 |
| Permeable Parking | 1350 |
| Total | 2971 |

