Green Sports:
Can Athletic Fields Reflect Sustainable Design?

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Brailsford & Dunlavey – Catalysts for Building Community

B&D helps develop "Sustainable" / "Quality of Life" facilities including:

- Student and Faculty Housing
- Student Athletic, Recreation and Wellness Facilities
- Student Unions
- Campus Edge Development
- Ballparks, Stadiums and Arenas

Sampling of B&D "Sustainable" projects

- Western Washington University
  received LEED Certified status
- University of Vermont Student Center
  on track to be the first LEED Certified student union in the United States
- District of Columbia Public Schools Modernization
  all new schools and renovations to be LEED Silver Certified
- D.C. Major League Ballpark
  on track to be the first LEED Certified MLB Ballpark





Can Athletic Fields reflect Sustainable Design?

Demand for High Quality Athletic Fields

- Competitive advantage
- Recruitment of student athletes
- Safe environment for competitive sports
- Potential source of additional revenue

Major components of High Quality Athletic Fields Design

- Sustainable site management
- Turf selection

Sports programs go green!

GREEN CALIFORNIA SCHOOLS

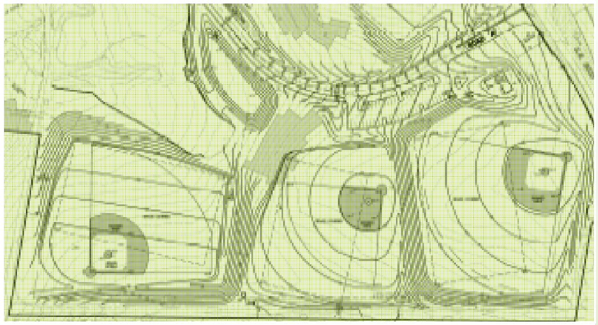
Why do we need Athletic Fields to reflect Sustainable Design?

Sustainable Considerations

- Soil Erosion & Sediment Control
- Heat Island Effect
- Water Use
- Reduction of CO_2 / Pollution
- Fertilizer, Herbicide, Pesticide and fungicide Use
- Energy Consumption for Maintenance
- Recycled Materials Use
- Manufactured Materials Use
- Durability / Weather
- Reduction of Sports Injuries

Planning for High Quality Athletic Fields

Sustainable Site Management



Turf Selection

Case Studies

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Sustainable Site Management

Storm Water Design - Site Context

Green Field Site

Urban Site

Passive Controls

Ability to minimize impacts to existing Ecosystems with onsite controls

Mechanical Controls

Limited opportunities for onsite controls and generally requires mechanical controls

Storm Water Management

Passive Controls

- Detention / Irrigation Basins
  - Detain runoff water and trap sediment using a dam, pipe outlet and emergency spillway
  - Store runoff water for irrigation purposes

- Infiltration Basins and Trenches
  - Located as open to surface or below ground trenches, over porous soils and back filled with gravel
  - Remove fine sediments and pollutants from storm water runoff
  - High pollutant removal efficiency and helps recharge ground water
  - Final storage area to trap sediment before water is discharged from the site

- Outfall Interceptors
  - Fabric socks, blankets and other devices used to trap sediment passing through outfalls

Detention/ Irrigation Basin

Infiltration Trench

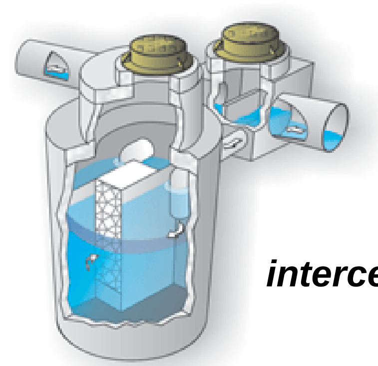
Storm Water Management

GREEN CALIFORNIA SCHOOLS

Mechanical Controls

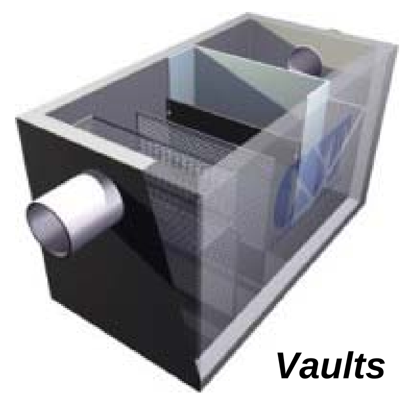
- Inlet Screens / Filters
  - Placed at inlets to storm sewers to trap debris and filter out sediments
- Separators / Interceptors
  - Placed in stormwater sewer lines to remove sediments and contaminants
- Vaults
  - Placed in storm sewer lines to retain, settle out and/or filter sediments and contaminants
  - Sediment Filtered by gravity / baffles or sand & gravel media
  - Contaminates Filtered by carbon or other media

Inlet Screens



interceptors

Courtesy of Park Environmental Equipment

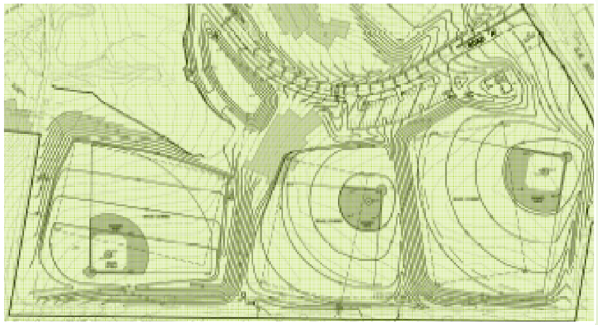


Vaults

Courtesy of ClearStream Technologies

Planning for High Quality Athletic Fields

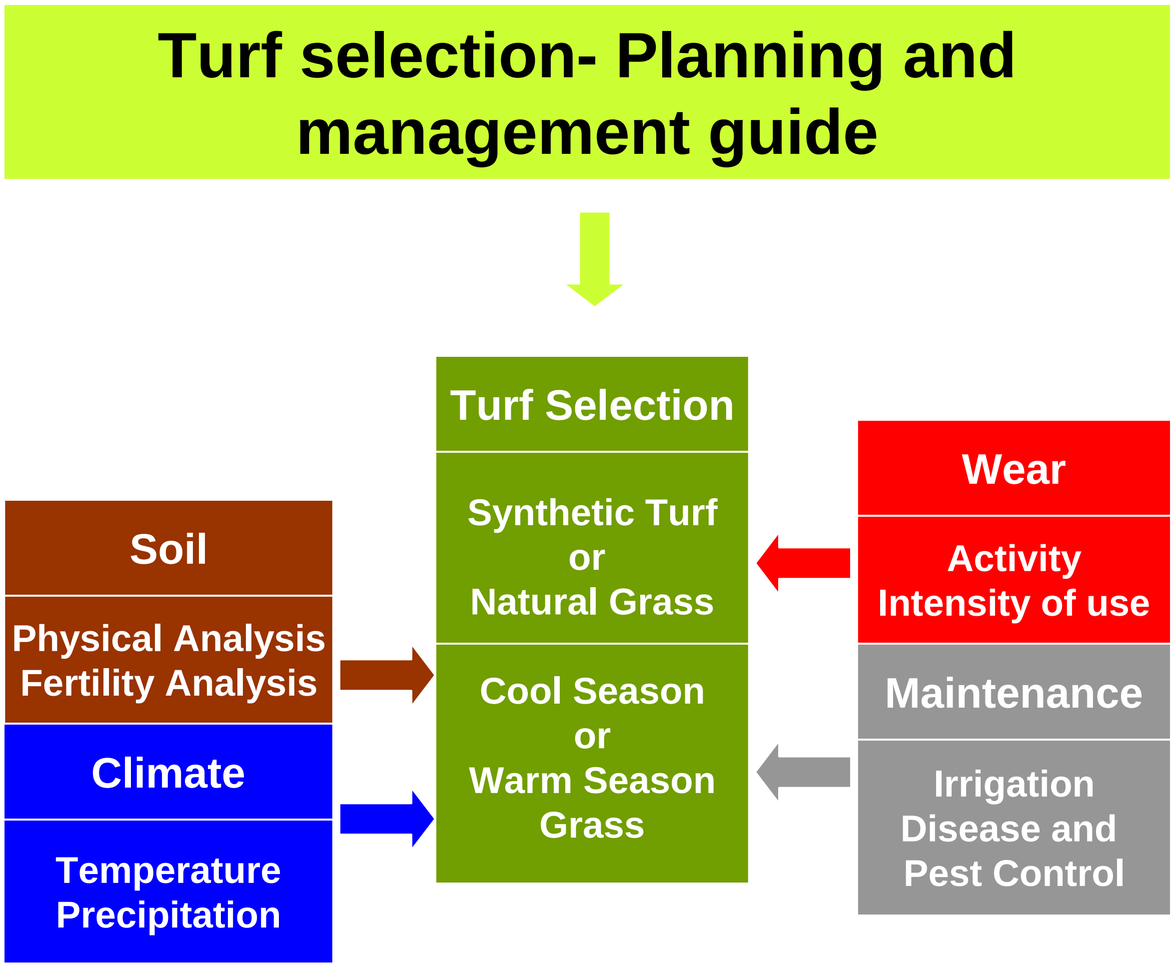
Sustainable Site Management



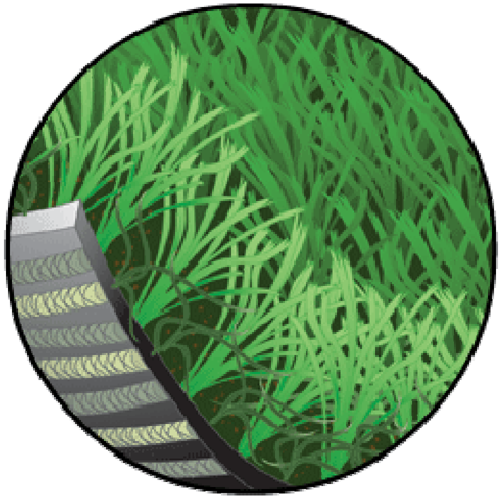
Turf Selection

Case Studies

Turf Selection



Synthetic turf vs. Natural Grass



…the battle continues!

Synthetic turf vs. Natural Grass

GREEN CALIFORNIA SCHOOLS

Selection Criteria	Synthetic turf	Natural Grass
Soil Erosion and Sediment Control	High – sand and gravel base provides high rainwater infiltration. filters out sediments and provides some storage capacity	Varies – depends on base, natural soils base might provide low rainwater infiltration and create runoff, sand base allows for high rainwater infiltration and filters out sediments; Over use can create bare spots that could potentially increase soil erosion by wind an rain
Heat Island Effect	High – requires watering for cooling or alternate times of use in high heat locations	Low – is a source of cooling
Water Use	Low – only needed for cooling and cleaning	Medium to High – depends on grass type, but consistent watering is required, especially in arid climates or high use locations

Synthetic turf vs. Natural Grass

GREEN CALIFORNIA SCHOOLS

Selection Criteria	Synthetic turf	Natural Grass
Energy Consumption for Maintenance	Low – tractors needed for dragging, sweeping, sanitation, and top dressing; blowers need for grooming	Medium to High – tractors needed for mowing, aerating, fertilizing, seeding and top dressing; blowers and trimmers need for grooming; paint sprayers needed for field markings
Use of Recycled Materials	Medium – rubber crumb fill from recycled tires and shoes	Low – grass clippings can be use for compost or left in place
Manufactured Materials Use	High – petroleum based turf fibers and backing, and herbicides	Low to Medium – fertilizers, herbicides, Insecticides, fungicides and field paints;
Potential Reduction of CO2 / Pollution	No data available	Medium – reduces CO2 and creates oxygen through photosynthesis, traps dust and dirt and absorbs noise

Synthetic turf vs. Natural Grass

Selection Criteria	Synthetic turf	Natural Grass
Potential Sources of Contamination / Pollution	Varies – herbicides, cleaning fluids, carbon emissions from maintenance equipment and disposal of worn out turf; recent allegations suggest rubber crumb fill could be a source of health and environmental concerns	Varies - fertilizers, weed killers, Insecticides, field paints, carbon emissions from maintenance equipment (Potential for use of eco-friendly maintenance materials)
Durability / Co-use of facilities	High	Low to Medium – varies depending upon grass type and base
Prevention of Sports Injuries	TBD	TBD

Natural Grass Selection

Common Athletic Field Grasses

- Kentucky Bluegrass
- Bermuda grass

Seeded Mixtures

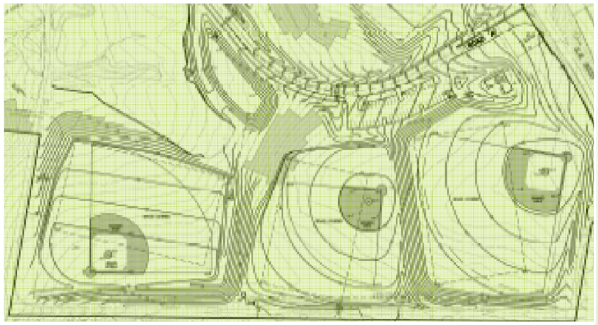
- Two or more species of turf grass
- Facilitate quick stabilization of athletic fields
- Provide long-lasting seasonal coverage

Cool Season vs. Warm Season Grass

Selection Criteria	Bluegrass (Cool Season)	Bermuda grass (Warm Season)
Adaptive range	Northwest to Northeast US 	Southwest to Southeast US 
Leaf Texture	Fine medium, medium dark 	Narrow leaves, medium to dark green 
Preferred Soil Conditions	Well drained soils High nutrient requirements	Best adapted for fertile/ well drained soils
Tolerance to Environmental Stress	High cold tolerance High wear tolerance Low shade tolerance	Good heat tolerance Good wear tolerance Low shade tolerance
Growth Rate	High	Moderate
Nitrogen Requirement	2-4 lbs / 1000 sq. feet	2-3 lbs / 1000 sq. feet
Drought resistance	Low	Moderate
Maintenance	High	Low to moderate

Planning for High Quality Athletic Fields

Sustainable Site Management



Turf Selection

Case Studies

Case Studies

- What was the challenge?

- What did we do?

- What did we learn?

Case Study: The Episcopal Academy

The Challenge

- Client: The Episcopal Academy
- Scope:
  - **Design and construct nine (9) suburban Upper and Lower School multi-purpose athletic fields w/ one (1) running track**
  - **Provide field lighting for the football field and athletic track (field # 3)**
  - **Provide ancillary components including bleachers, restrooms, press boxes, concessions, toilets**
  - **All fields were to support high frequency of use and minimize maintenance**
- Schedule: September 2007 to August 2008 with fields ready for football in September 2008

Aerial View of the Athletic Fields at the Episcopal Academy, Newtown Square, PA

Case Study: The Episcopal Academy

Natural Grass Fields

- Football field # 1
- Softball/ Field Hockey/ Soccer combination field # 2 and 8
- Soccer/ Lacrosse combination field # 5 and 6
- Baseball/ Soccer combination field # 7 and 9

Aerial View of the Athletic Fields
at the Episcopal Academy, Newtown Square, PA

Case Study: The Episcopal Academy

Synthetic Turf Fields

- Football/ Lacrosse combination field # 3 with synthetic athletic track
- Field Hockey/ Lacrosse combination field # 4

Aerial View of the Athletic Fields at the Episcopal Academy, Newtown Square, PA

Case Study: The Episcopal Academy

Storm Water Management-
Passive Controls

- Soccer, Field hockey and Lacrosse require flat fields with minimum grade.
- Turf grass fields have a grade of 1.5 to 2% that reduce run-off
- The artificial turf fields for Football, Field hockey and Lacrosse have 0.5 to 1% grade
- The vegetation / ground cover helps capture rain fall.

Soccer/ Lacrosse Fields 5 and 6

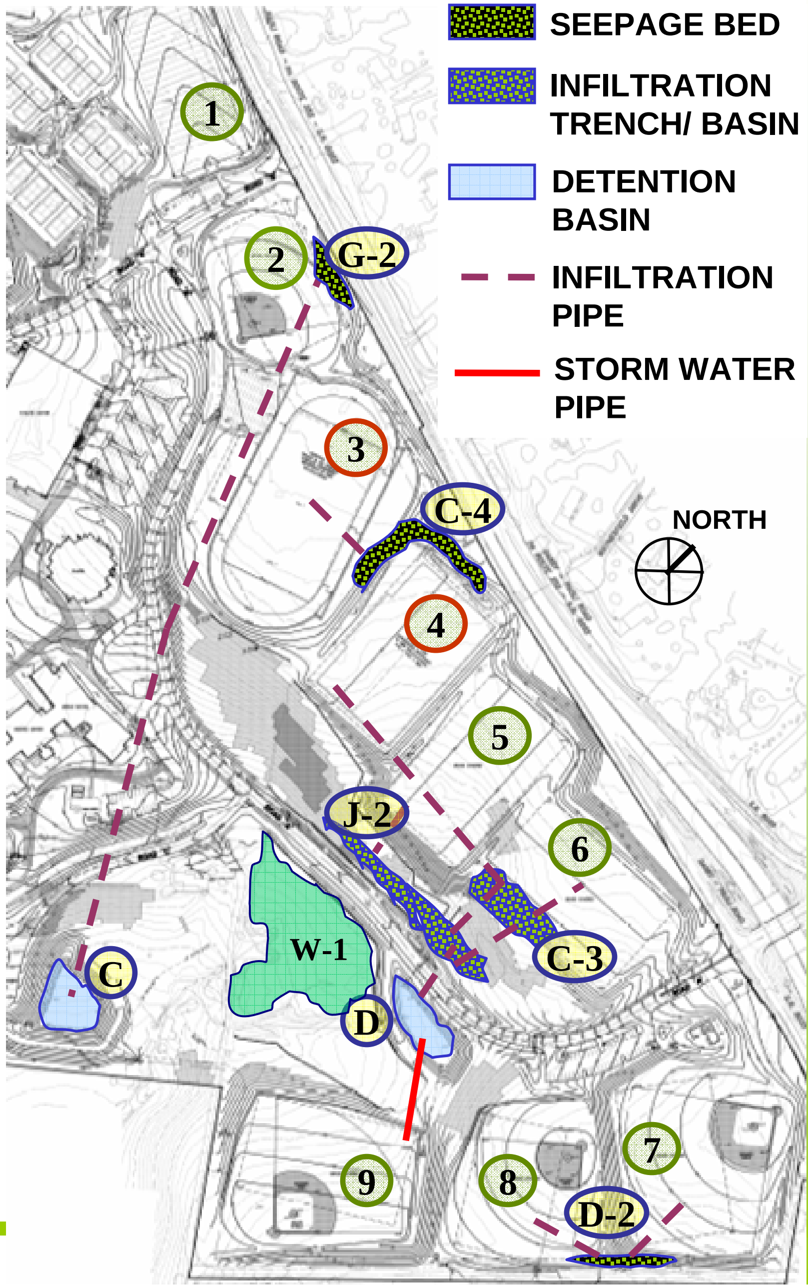
JV Baseball Field 9

Case Study: The Episcopal Academy

Storm Water Management- Passive Measures

Infiltration Basins and Trenches

- Seepage bed G-2 collects run off from field # 1,2 and 3
- Seepage bed C-4 collects run off from field # 3
- Infiltration basin C-3 collects run off from field # 4
- Inlets at Infiltration trench J-2 collect run-off from basin C-3 and field # 5 and 6
- Seepage bed D-2 collects run off from field # 7 and 8.
- Ball field # 9 is graded to drain toward detention basin-D



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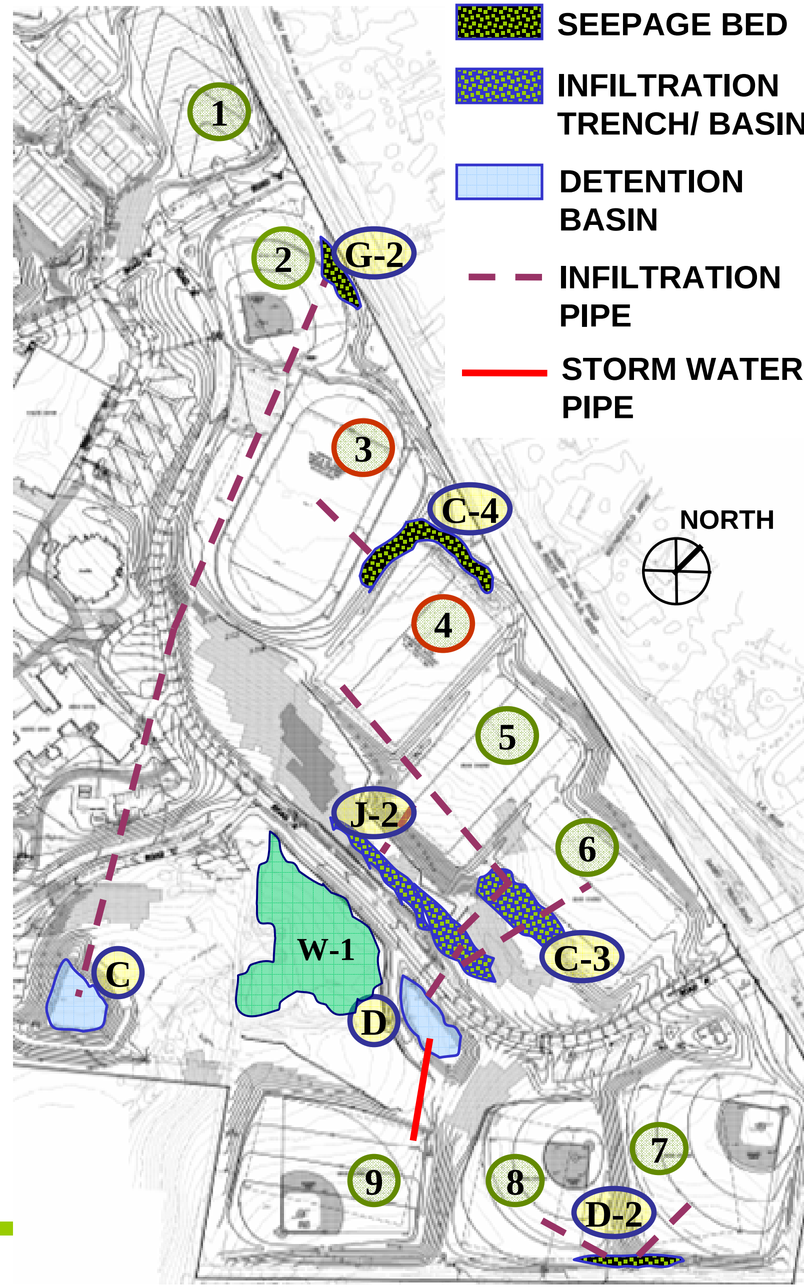
Case Study: The Episcopal Academy

Storm Water Management- Passive Measures

Infiltration Piping

- Perforated, corrugated metal pipes for seepage beds and infiltration basins
- Storm water pipes for conveying run off from fields to detention basin
  - High density Polyethylene Pipe at a depth of 18” or less
  - Concrete pipes at a depth of more than 18”

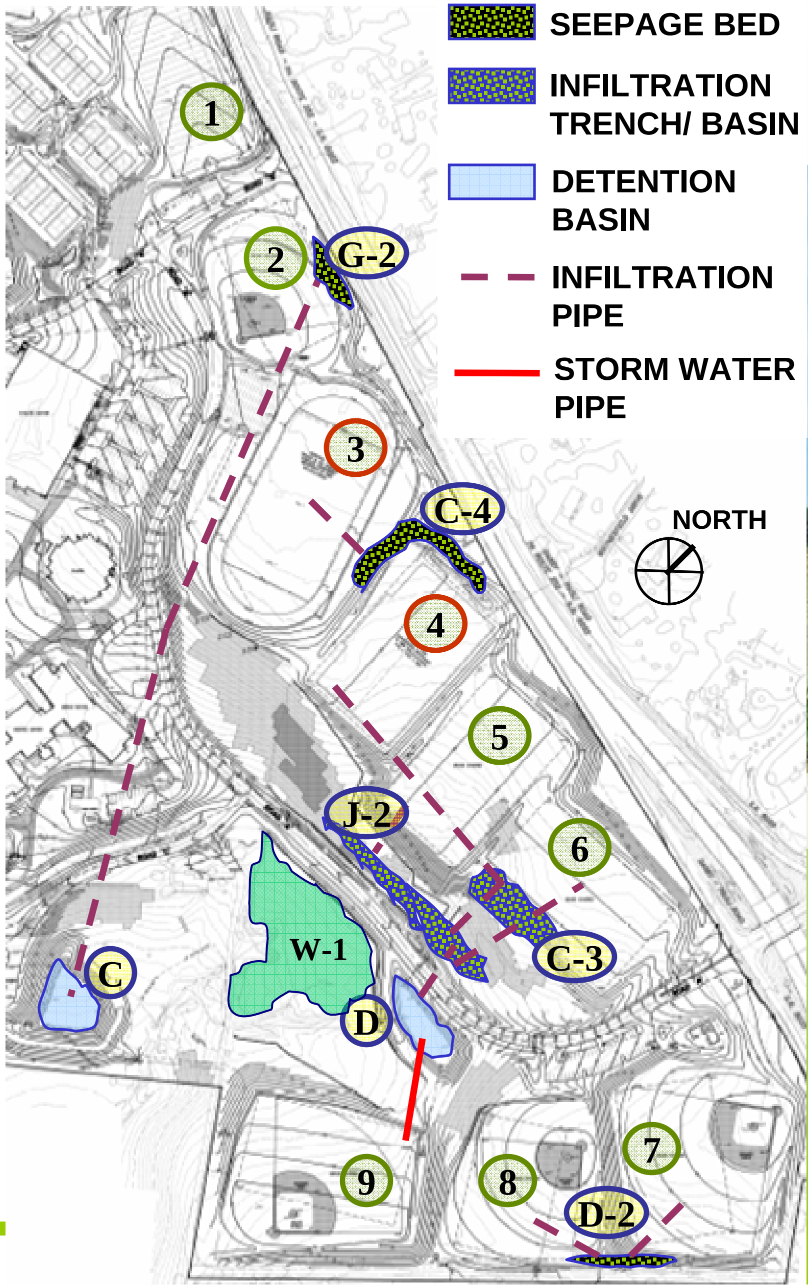


Case Study: The Episcopal Academy

Storm Water Management- Passive Measures

Detention / Irrigation Basins

- 70,000 cubic feet capacity
- Basin C collects run off from seepage bed G-2 and field # 1,2 and 3
- Basin D collects run off from infiltration basins C-3, C-4 and field # 9
- The two basins have a spill way for discharge of storm water overflow to a wetland (W1) and stream on site



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Case Study: The Episcopal Academy

Turf Selection

Feature	Comments
Bluegrass Seeded Mix – 90% Bluegrass and 10% Rye grass	Seven fields for Soccer, Baseball, Softball, Lacrosse, Field Hockey and Football
Synthetic Turf – Nylon and polyethylene blade with granulated rubber and sand infill, gravel sub grade and J-drains	Two fields for Football, Lacrosse and Field Hockey

Soccer/ Lacrosse Fields 5 and 6

Case Study: The Episcopal Academy

Outcome

- Competitive sports program that attracts student athletes
- Provide a safe and healthy environment for playing sports
- Source of additional revenue
  - Donor Opportunities
  - Advertising
  - Renting of athletic fields for regional conferences

Case Study: The Episcopal Academy

Sustainability Lessons Learned

- The vegetation/ ground cover helps capture rain fall and decreases the amount of surface runoff, soil erosion and sediments
- Passive controls such as infiltration trenches and filtered inlets help filter pollutants and sediment from run-off and enable ground water recharge
- Storm water run-off stored in irrigation basins will be used to irrigate five (5) athletic fields and surrounding landscape
- Excess storm water run-off gradually discharged from the irrigation basins help preserve the natural wetland on the site

Case Study: D.C. Public Schools

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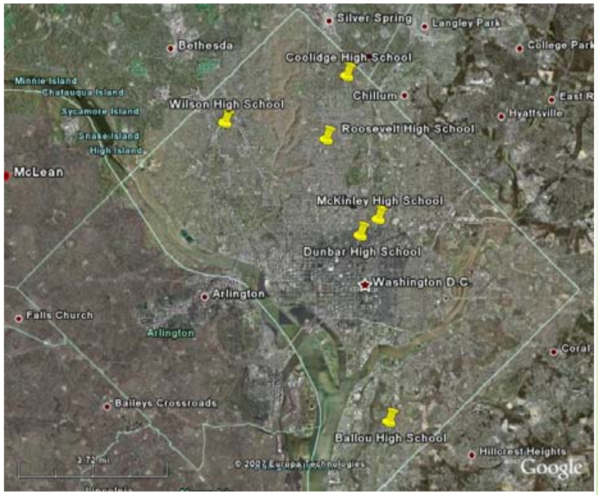
The Challenge

- Client: DC Sports & Entertainment Commission / DC Public Schools
- Budget: approximately $25 million
- Scope:
  - **Design and reconstruct six (6) urban high school multi-purpose athletic fields and adjacent running tracks**
  - **Refurbish ancillary components including bleachers, restrooms, press boxes, concessions, toilets and field lighting**
  - **Fields were to support high frequency of use and minimize maintenance**
- Schedule: June to October 2007 w/ fields ready for football in September



District of Columbia

Roosevelt SHS

Case Study: D.C. Public Schools

Implementation

- Utilized a Design-Build delivery method, because of the short schedule duration
- Selected synthetic turf athletic fields and synthetic running tracks, because of the high frequency of use and lower maintenance requirements
- Field and track drainage is collected by the below grade drainage system and piped to the storm sewer
- Playing fields were ready for the football season in September, additional work continued into October
- Budget savings used to fund additional upgrades of ancillary facilities

Installation of drainage system

Installation of turf

Case Study: D.C. Public Schools

GREEN CALIFORNIA SCHOOLS

Outcome

- Provided safer environment for playing sports
- Increased community pride and interest in schools and their sports programs
- Reduced surface runoff and erosion
- Reduced the volume of outfall into storm sewers
- Reduced maintenance requirements from previous fields

Case Study: D.C. Public Schools

Sustainability Lessons Learned

- High quality athletic fields by design provide a high level of rainwater infiltration and provide rainwater storage capacity, thus decreasing the amount of surface runoff, soil erosion and sediments entering the storm sewer system

- A longer schedule duration and more pre-planning could have allowed for the incorporation of more sustainable components into the design

Q & A

Brailsford & Dunlavey – Catalysts for Building Community

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