CASE STUDY

Griffin Park

Greenville, South Carolina

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Griffin Park, a DPZ-designed traditional neighborhood development in Greenville, South Carolina, offers one example of Light Imprint (LI) development. While there have been numerous studies comparing Conventional Suburban Development (CSDs) with Traditional Neighborhood Development (TNDs), there have been few comparing standard TNDs to Light Imprint TNDs. The DPZ Charlotte office recently took on such a project, using Griffin Park as a case study.

Landscape architect Guy Pearlman and designer Patrick Kelly, both of the DPZ Charlotte office, developed the LI overlay for Griffin Park to create an environmentally sensitive community, preserve mature tree stands, and lower the construction costs for the first development phase.

Pearlman explains, "The conventional TND engineering plan is engineered for both county review and bidding purposes; it reaches an extensive level of detail. The LI engineering plan is based on many of the variables developed in the conventional plan. Added consideration, however, is given to environmental and preservation factors. Those factors enhance the overall value of the community and lower the total cost of construction."

Environmental strategies at Griffin Park included the introduction of rain gardens and a tree protection fence. The introduction of these elements allowed for the development's underground piping system as well as curbs and gutters to be downsized

thereby lessening the environmental impact of the development and saving significant sums on construction.

In order to achieve the desired goals of the LI TND plan, a tree protection fence is introduced in the erosion control phase to protect the existing mature trees.

That strategy results in a 27% cost increase when compared with the conventional proposed method. Yet, a cost saving between the two methods was found in the storm water management phase. A 50% cost savings would be achieved by the following simple actions: 1) omission of curb and gutter in strategic areas; 2) reduction in the amount of pipe required as well as reduction in their lengths and size; 3) reduction in the need for inlets to underground pipes; and 4) the introduction of smaller rain gardens throughout the community to replace the one large retention pond.

The introduction of rain gardens also adds aesthetically pleasing natural areas and neighborhood recreation areas. Rain gardens would remove a greater amount of pollutants from runoff before the pollutants could reach the Reedy River. Also, there are two road pavement issues that reduce costs.

First, building 24 feet wide roads instead of 26 feet wide roads results in a significant reduction of land coverage and paving costs. Second, substituting crushed stone in place of asphalt-paved alleys saves over 20% in development costs.

Pearlman summarizes, "Implementing the LI engineering method results in over 30% cost savings in actual construction dollars for the first phase. That cost saving is in addition to the added value realized by the preserved mature trees and communal rain gardens."

Stephen L. Davis, P.E., of Davis & Floyd Engineers, is also active in the development of Griffin Park. He is an enthusiastic supporter of the Light Imprint approach to New Urbanism but tempers it with reality from a long-range standpoint. Davis uses the term "ground truthing" to determine how practical it is to get Light Imprint communities approved by municipalities and then actually built. Ultimately, their success must be measured over the life of the community.

Davis explains, "Standard engineering methods are quicker to complete and easier to submit for permits for processing. In order to have the Light Imprint approach embraced by advocates of New Urbanism within municipalities and the development and building industry, it is important to have the Light Imprint model presented as a comprehensive strategy."

He also advises that this strategy should not substantially affect the New Urbanist design of street and lot layout along with other standard practices for common infrastructure elements including water and sanitary sewer.

Additionally, when practicing Light Imprint, he states emphatically, "Engineering hydrology becomes critical." For example,

Griffin Park, South Carolina

Griffin Park Master Plan

Griffin Park Master Plan - Phase One

The first built street in Griffin Park

Neighborhood Center house fronting the natural creek

Main Street illustration

soil analyses are needed to verify that soil is in compliance with rain garden absorption requirements and to confirm that smaller pipe size is sufficient for the system.

Even though a comprehensive approach works best when applying the Light Imprint model, it is also important to make sure some of the technical issues work within the framework of good engineering practices. Davis points to the LI strategy of allowing more storm water surface sheet-flow across pervious surfaces to encourage onsite absorption and to reduce the typical number of drain inlets and length of drainage pipe. This technique is good, but users should still apply the rule-of-thumb of a 400 linear feet maximum distance from a drain inlet using curb and gutter. Davis also finds additional ways to reduce infrastructure that may become over-designed for LI. He suggests considering that the lots and streets along the neighborhood perimeter may not need swales since it may be possible to sheet flow the stormwater through the filtration landscaping directly into existing natural drainage systems.

Field supervision and ongoing maintenance issues are also a major factor to consider. Additional supervision is needed to make sure the rain gardens are constructed properly. Proper design assures that water does not bypass the drainage area. Perforated drainpipes must be installed properly. Davis voices concern that there may be some binding with the rain gardens where they become dysfunctional over time.

It helps if the rain garden plant material is indigenous and water tolerant; it should also be compatible with the desired community character and maintenance program. If pervious road surfaces are being considered for alleys, lanes, and streets without curb and gutter, then measures are needed to stabilize the road and alley shoulders to prevent soil erosion and tire rutting.

Finally, Davis advises that it will take time for LI to become the norm rather than the exception. Designers and developers may not be able to implement all Light Imprint elements right away, but they could implement LI in incremental stages as certain components are approved. Due to the pace of development and the need for projects to succeed, it is especially important to plan for incremental implementation.

Joe W. Jelks, III, developer and founder of Griffin Park, sees the value in applying LI. He explains, "For Griffin Park, the LI case study for the first phase was compelling enough to lead our development team to apply LI techniques even after the construction had started. The case study also convinced us to work with local stakeholders and approval agencies to holistically apply the LI approach for the next phases."

LI Tools used at Griffin Park

PAVING
Crushed Stone/Shell
Asphalt
Concrete
Pea Gravel
Stone Paving Blocks

CHANNELING
Natural Creek
Vegetative Swale
Shallow Channel Footpath
Concrete Pipe
Gutter

STORAGE
Retention Basin with Sloping Bank
Detention Pond
Landscaped Tree Wells
Underground Vault-Plastic
Grated Tree Wells

FILTRATION
Wetland/Swamp
Filtration Ponds
Surface Landscape
Natural Vegetation
Green Finger
Bio-Retention Swale
Rain Garden

CHARTS & GRAPHS:

The study, prepared by Duany Plater-Zyberk & Company, contains six plates of plan diagrams and one chart. The first two plates compare the master plan before and after the application of light imprint engineering. The second two plates show the engineering infrastructure for each of these plans. The fifth plate shows the Light Imprint TND catchment drainage area plan. The sixth plate shows the master plan with proposed reductions of pavement and curb and gutter. The chart is key, as it shows the substantial cost savings associated with applying the light imprint engineering techniques.

The referenced table shows the comparison between the two engineering methods for the first phase of the development of 42 acres and 174 lots. The table compares the costs of the two methods based on erosion control measures, storm water infrastructure, and pavement width and materials. Finally, it summarizes the cost of each.

Conventional TND Master Plan

Light Imprint TND Master Plan

These two plates of six compare the master plan before and after the application of Light Imprint engineering.

Conventional TND Storm Water Plan

KEY

- Stormwater inlet
- Manhole
- Stormwater Pipe
- Storm Water Discharge
- Underground Stormwater Storage
- Rain Garden

Light Imprint TND Storm Water Plan

The second two plates of six show the engineering infrastructure for each of these plans.

Light Imprint TND Catchment Drainage Area Plan

KEY

- Stormwater Inlet
- Manhole
- Stormwater Pipe
- Stormwater Discharge
- Underground Stormwater Storage
- Rain Garden

This plate shows the Light Imprint TND catchment drainage area plan, based on laminar flow and soil hydrology.

Street and Alley Reduction Plan

KEY

1) Replace Impervious Paving with Crushed Stone

2) Remove Curb and Gutter from Street

3) Reduce All Street Widths by 2 Feet

The sixth plate shows the master plan with proposed reductions of pavement and curb and gutter.

Conventional TND Engineering				
Material	Quantity	Unit	Cost/Unit	Total
Erosion Control				
Silt Fence	8,450	LF	$4.00	$33,800.00
Rip Rap	200	Tons	$55.00	$11,000.00
Total				$44,800.00
Storm Water				
Inlets	101	Ea.	$2,500.00	$252,500.00
Pipes	9,434	LF	$30.93	$291,793.62
Retention Pond	1	Lump	$48,400.00	$48,400.00
Total				$592,693.62
Pavement				
Curb & Gutter	18,910	LF	$7.60	$143,716.00
Sidewalk	8,276	SY	$25.00	$206,900.00
Paved Road	26,705	SY	$18.64	$497,781.20
Paved Alley	6,470	SY	$13.36	$86,439.20
Total				$934,836.40
Grand Total				$1,572,330.02
Cost per Lot	176			$8,933.69

Engineering Comparison

Project: Light Imprint New Urbanism Study
Date: December 06, 2006
Details: Phase 1, 42 Acres, 176 Lots

The chart is key, as it shows the substantial cost savings associated with applying the light imprint engineering techniques. The referenced table shows the comparison between the two engineering methods for the first phase of the development of 42 acres and 176 lots. The table compares the costs of the two methods based on erosion control measures, storm water infrastructure, and pavement width and materials. Finally, it summarizes the cost of each.

Light Imprint TND Engineering				
Material	Quantity	Unit	Cost/Unit	Total
Erosion Control				
Silt Fence	8,450	LF	$4.00	$33,800.00
Rip Rap	200	Tons	$55.00	$11,000.00
TPF	4,225	LF	$4.00	$16,900.00
Total				$61,700.00
Storm Water				
Inlets	24	Ea.	$2,500.00	$60,000.00
Pipes	4,182	LF	$30.93	$129,349.26
Rain Gardens	20	Ea.	$5,120.00	$102,400.00
Total				$291,749.26
Pavement				
Curb & Gutter	13,091	LF	$8.00	$104,728.00
Sidewalk	7,000	SY	$25.00	$175,000.00
Paved Road	20,515	SY	$18.64	$382,399.60
Crushed Stone Alley	5,765	SY	$12.00	$69.180.00
Total				$731,307.60
Grand Total				$1,084,756.86
Cost per Lot	174			$6,234.23

Conclusions

Overall 31% Savings
Per Lot 30% Savings

Notes:
TPF - Tree Protection Fence
LF - Linear Feet
SY - Square Yard
Ea. - Each