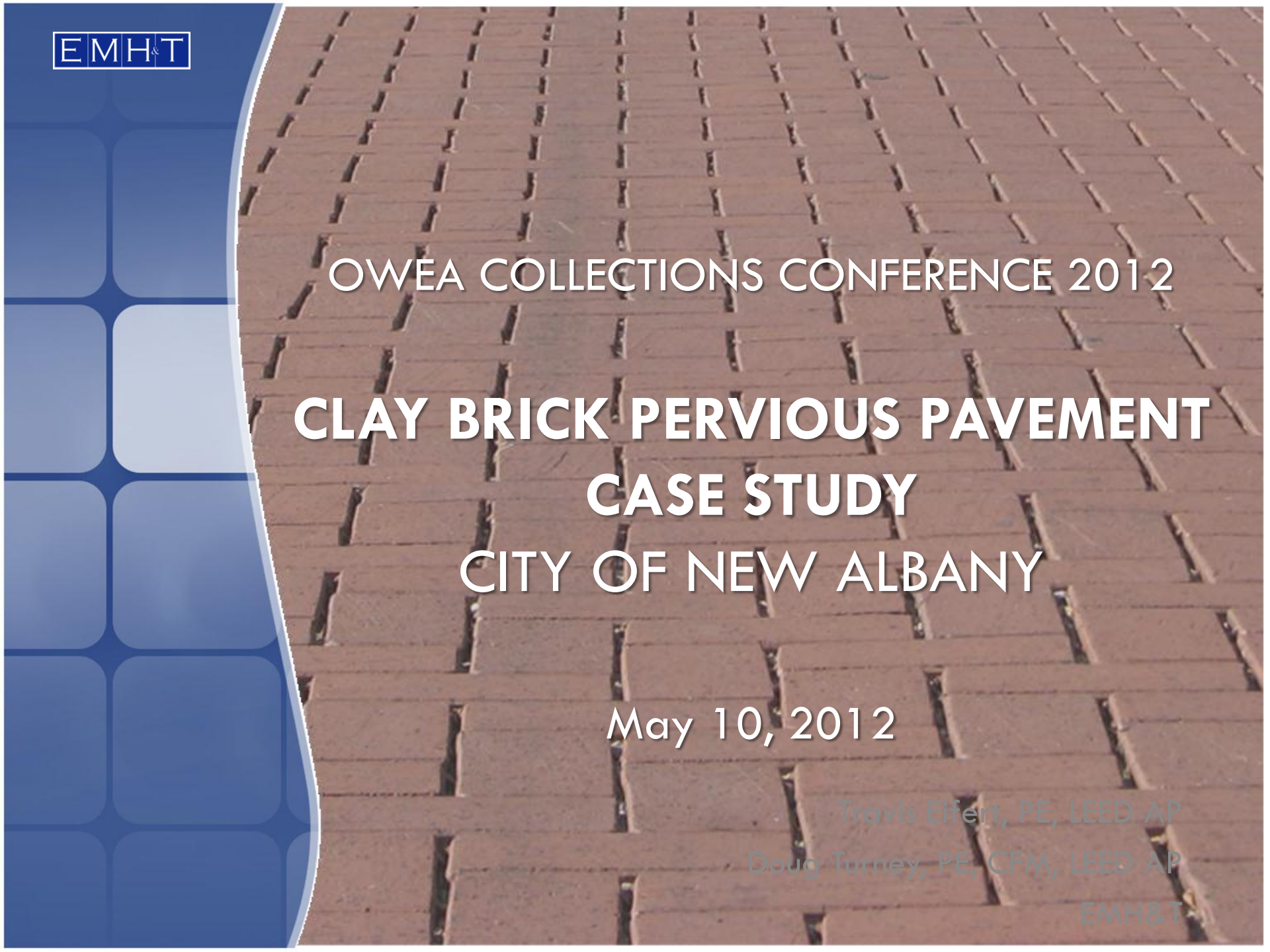

OWEA COLLECTIONS CONFERENCE 2012

CLAY BRICK PERVIOUS PAVEMENT CASE STUDY

CITY OF NEW ALBANY

May 10, 2012

Travis Eifert, PE, LEED AP
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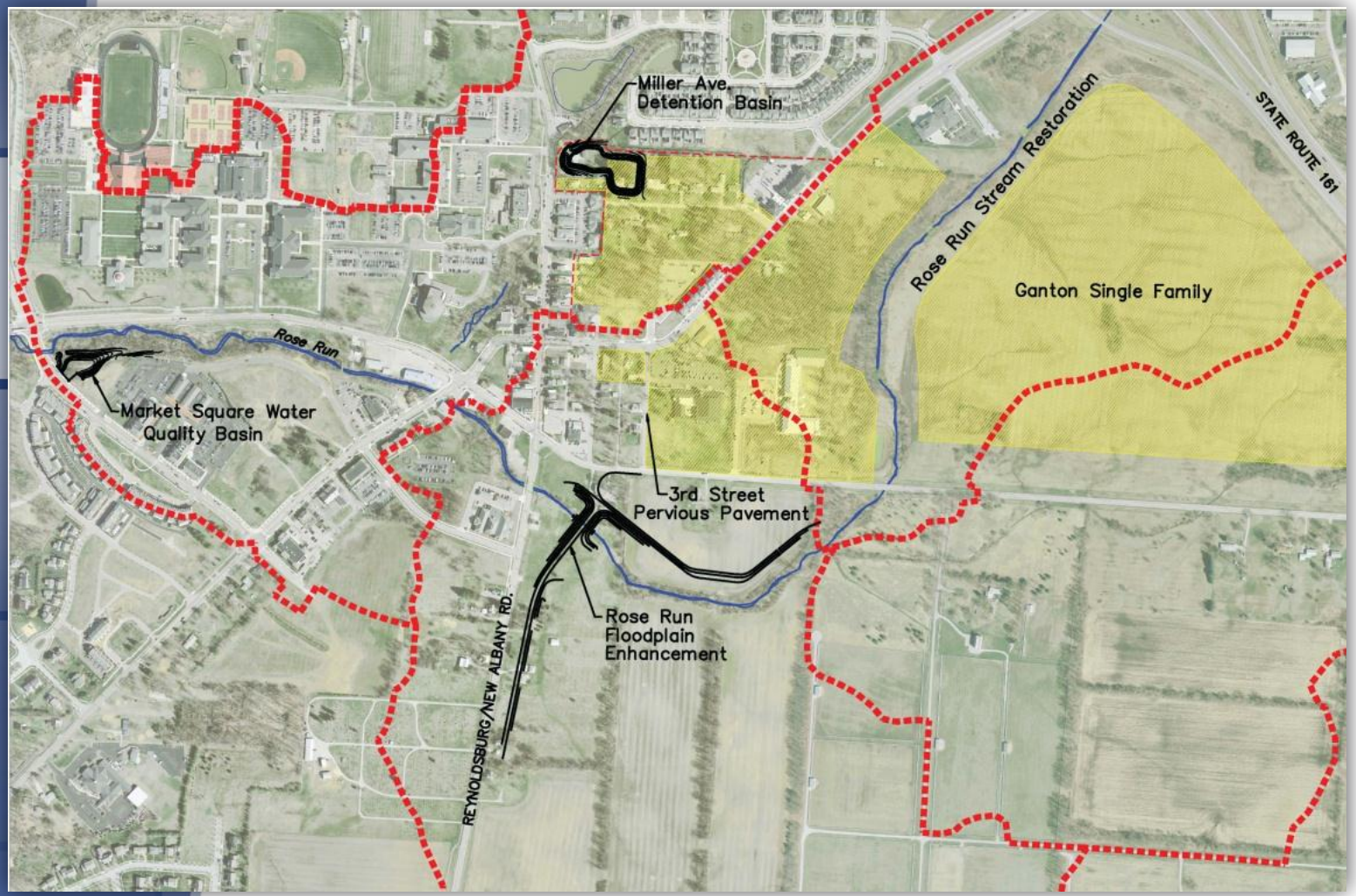
EMH&T

STORMWATER MASTER PLAN



VILLAGE CENTER STREETSCAPE CONCEPTS

- Development of Historic Center and Village Core
- Pedestrian experience and accessibility
- Design of streets and public places
- Amenities

PILOT PROJECT OPPORTUNITIES

CITY EVALUATION CRITERIA

- Aesthetics consistent with Historic Village Center
- Third Street must be reconstructed
- Options explored
  - Overlay (Not Possible)
  - Spot repair (Not Possible)
  - Full depth reconstruction (Standard Section)
  - Reconstruction with considerations for future developments
- Stormwater requirements
  - Incentives for redevelopment

THIRD STREET: EXISTING CONDITIONS

THIRD STREET: CONCEPT PLAN

THIRD STREET:
GREEN INFRASTRUCTURE OPTIONS EVALUATED

Recommended Solution

- Pervious Pavers
  - Most cost effective
  - Functional
  - Aesthetically pleasing
  - Water quality credits per draft OEPA standards
  - Low maintenance

PAVEMENT SELECTION – CONCRETE OR CLAY?

PERMEABLE INTERLOCKING CONCRETE PAVEMENT

- Solid Concrete (3-1/8”)
- 8,000 psi (avg)
- Can Be Machine Installed
- Can Be Used on Low Volume Streets
- Traffic Calming
- Aesthetic Value
- Life Cycle Cost Savings

CLAY PERVIOUS PAVERS

- 2-3/4” Paver
- 14,000 psi (avg)
- Better Durability
- Less Likely to Fade
- Installed by Hand
- Aesthetic Value
- Traffic Calming
- Can Be Used on Low Volume Streets
- Life Cycle Cost Savings

SELECTED PAVER:
PINE HALL BRICK – NORTH CAROLINA
COLOR: IRON SPOT

Ohio Permeable Clay Paver Manufacturers:
Whitacre Greer – Alliance
Belden Brick - Canton

PRELIMINARY COST ESTIMATE

Traditional Street Full Depth Replacement

Excavation, Street, Pavement $191,364

Storm Sewer/Water Quality Unit$107,990

10 year Maintenance (mill & pave) $ 18,597

Street & Storm Total: $317,951

Project Total: $426,052

Clay Pervious Paver Full Depth Replacement

Excavation, Street, Pavement $268,822

Storm Sewer/Water Quality Unit$ 42,152

Totals: $310,974

Project Total: $415,851

Winning Bid $424,389

CLAY PAVER COSTS

Clay Paver Section Costs (11,916 sq.ft.)	
Clay Paver Installation Cost	$4.90 sq.ft.
Clay Paver Material Cost*	$5.85 sq.ft.
No. 2/No. 57 Aggregate Cost	$3.54 sq.ft
Total	$14.29 sq. ft.

*Includes extra 10% for future repairs

PAVEMENT DESIGN

How thick does pavement have to be?

STRUCTURAL DESIGN: AASHTO FLEXIBLE PAVEMENT

- Two Geotechnical Borings
  - CBR of 4.6 and 8.0
  - CBR value of 4.6 used
- Traffic Count of 780 ADT
- 2% Truck Traffic Assumed

Structural Number Required 2.28

STRUCTURAL DESIGN: AASHTO FLEXIBLE PAVEMENT

- Compacted Base – ODOT 204
- Stone sub-base and pavement layer coefficient of 0.14 used

Required Structural Thickness:

2.28/0.14 = <u>16.3”</u>

- Interlocking Pavement Industry uses 0.44 for pavement course

Required Structural Thickness:

2.75”x0.44 = 1.21

(2.28—1.21)/0.14 = 7.6” + 2.75” = <u>10.4”</u>

FROST DEPTH

- Recommended Thickness of Pavement System
  - Pavement + Stone Layer = 0.65 * Frost Depth
    (based on UNH Stormwater Center, 2009)
  - Pavement + Stone Layer = 0.50 * Frost Depth
    (based on National Ready Mix Concrete Association)

Source: Floyd (1978)

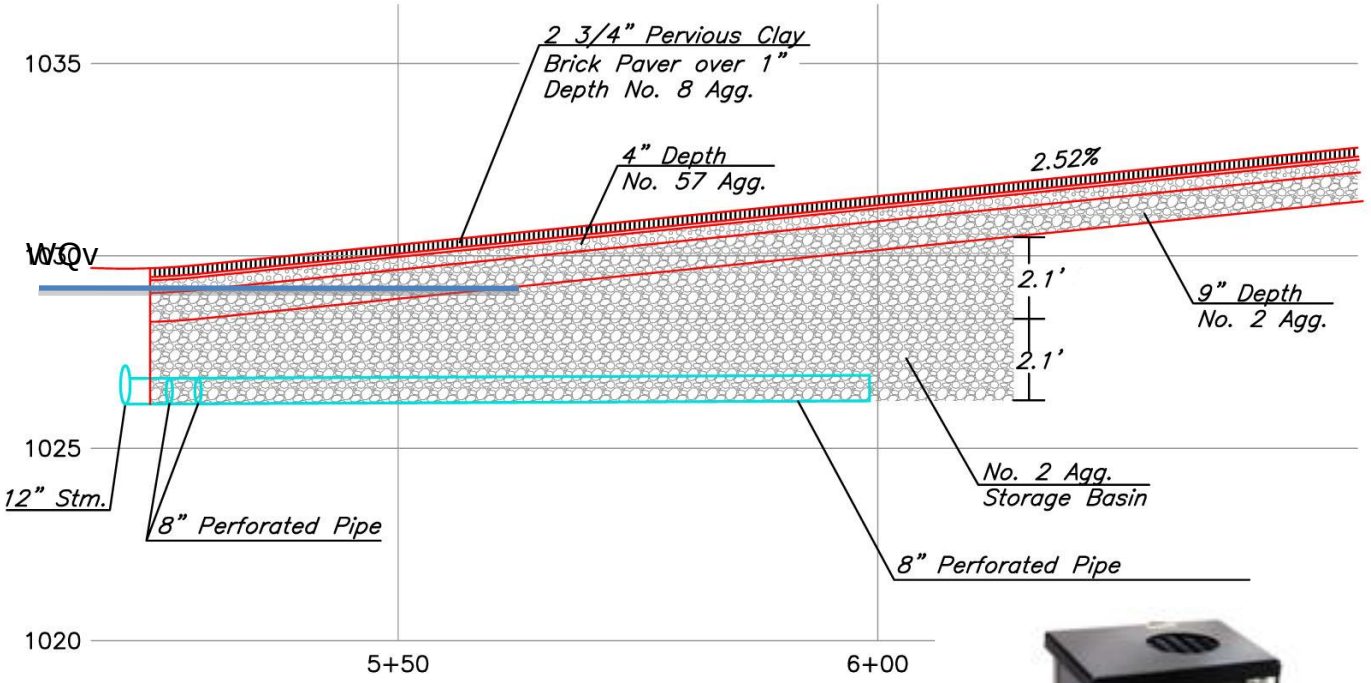
Located North of Latitude	Max. Frost Depth (in)	Min. Recommended Thickness (0.65 x Frost Depth) (in)
38.3 Ironton	24	16
38.7	26	17
39.0 Cincinnati	28	18
39.3	30	20
39.7	32	21
40.0 Columbus	34	22
40.3	36	24
40.7	38	25
41.0	40	26
41.3 Cleveland	42	27
41.7 Ashtabula	44	29

* Tentative 12/10

WATER QUALITY VOLUME (WQV)

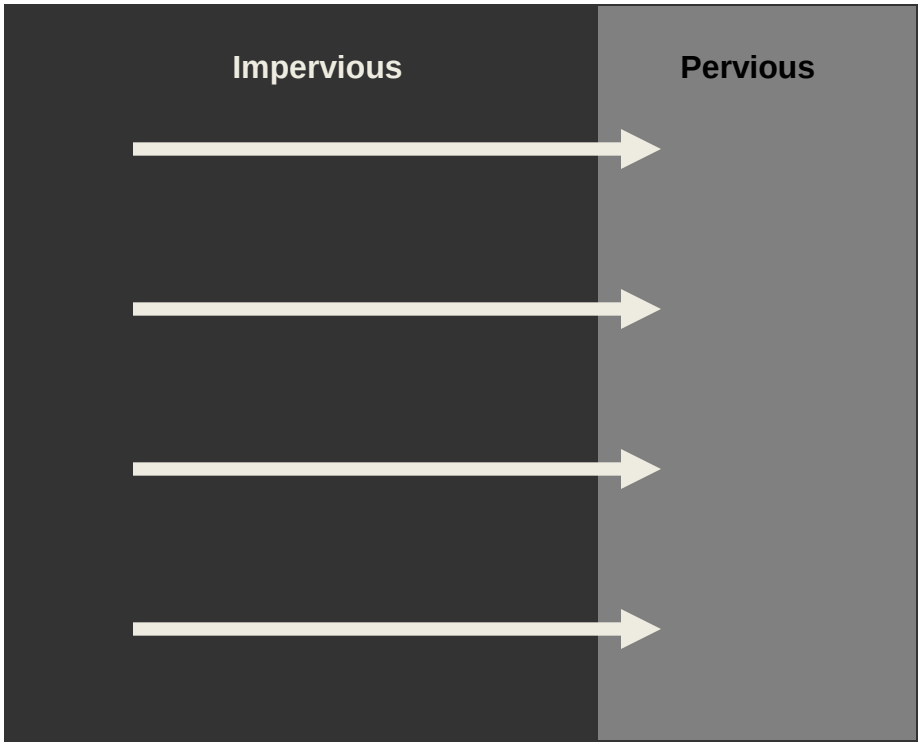
- Full Infiltration of WQv within 48 hours
  - pre- approval from Ohio EPA not required
- No Infiltration of WQv (lined system or compacted subgrade) drain within 24 hours
  - case-by-case, prior approval required by EPA and MS4
- Partial Infiltration of WQv within 48 hours
  - case-by-case, prior approval required by EPA and MS4
- Redevelopment Projects

WATER QUALITY DESIGN



The Agri Drain Inline Water Level Control Structures

DRAINAGE FROM ADJACENT AREAS



$$A_{impervious} < 2*A_{pervious}$$

CONSTRUCTION & OVERSIGHT: LESSONS LEARNED 3RD STREET NEW ALBANY

- Use perforated 6” PVC pipe
  - Protect against collapse during compaction
  - Video inspect after compaction to verify integrity

CONSTRUCTION & OVERSIGHT: LESSONS LEARNED 3RD STREET NEW ALBANY

- Compaction of Aggregate Layer
  - Use 10-15 ton vibratory roller
  - Try to eliminate settlement of stone layer

CONSTRUCTION & OVERSIGHT: LESSONS LEARNED 3RD STREET NEW ALBANY

- Compaction of Aggregate Layer
  - ODNR Recommends Lightly Compacted
  - Village of New Albany wanted Full Compaction

NO. 9 AGGREGATE

NO. 9 AGGREGATE SCREED

INSTALLATION

PINE HALL BRICK – IRON SPOT

WHITE BRICK STOP BAR

SIDEWALK SETTLEMENT

ROAD SALT

INSTALLATION

POST SWEEPING OF NO. 9 INTO VOIDS

MID-APRIL 2011

BEFORE

AFTER (JULY 2011)

QUESTIONS?

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