Foundry Sand - Wisconsin DOT

by

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November 2, 2011

Winners never quit and quitters never win.

Outline

- Legislation & Design/Construction Guidance
- Case Study Projects
  - 1) Marquette Interchange
  - 2) 94 NS Corridor Work , College Avenue abutment backfills and Mitchell Interchange
- Lessons Learned

Only place success comes before work is in the dictionary

Introduction

Reagan challenges Gorbachev

“ Tear down this Wall ” (i.e. Berlin Wall)

What year is it ?

1987

Legislation

-- 1987 --

Bill first introduced that will eventually pave way for recovered materials to be used in Wisconsin for exclusive purpose of building roadways for public transportation facilities. (Chapter 84.076)

Notre Dame are football Champions

Jordan scores 10,000 point in 5th year.

What year is it ?

1989

Legislation

-- 1989 --

Bill revised to basically current language. Foundry sand may now be legally incorporated into work that builds Wisconsin highways. (Chapter 84.078, Act 335)

Earthquake in Kobe, Japan

OJ found not guilt

What year is it ?

1995

Legislation

-- 1995 --

Bill revised to include language that insures against remedial actions and minimizes DOT liabilities for recovered materials. Liabilities to remain with by-product generators. (Chapter 84.078, Act 227)

Guidance (Design & Construction)

- **Facilities and Development Manual** (FDM), under **Section 11-5-15 (2002)**, initiates design guidance statewide to include industrial byproducts as an alternative for construction that is equal and equivalent to other construction means.

- **DNR and DOT Cooperative Agreement**, also appears in FDM, under **Section 20-30-1**, further supports coordination and supports such type business. (Initially developed during 1970s with updates, as needed until present)

FDM (11-5-15) Select Material Systems

- **Select Material System - Estimated Cost per Mile**

  #1 – Breaker Run Stone $110,000

  #2 – Breaker Run Stone with Geogrid $150,000

  #3 – Grade 1 Granular Backfill $ 95,000

  #4 – Grade 2 Grnlr. Backfill or Select Borrow $ 95,000

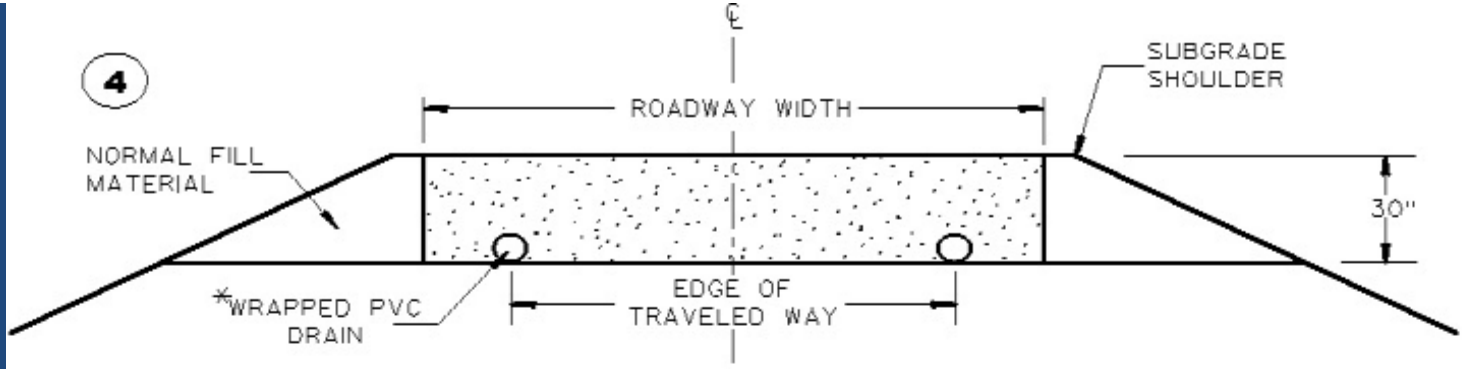
  #5 – Pit Run Sand and Gravel $105,000

  #6 – Pit Run Sand & Gravel with Geogrid $145,000

  #7 – Flyash, Lime, Cement Stabilization $ 90,000

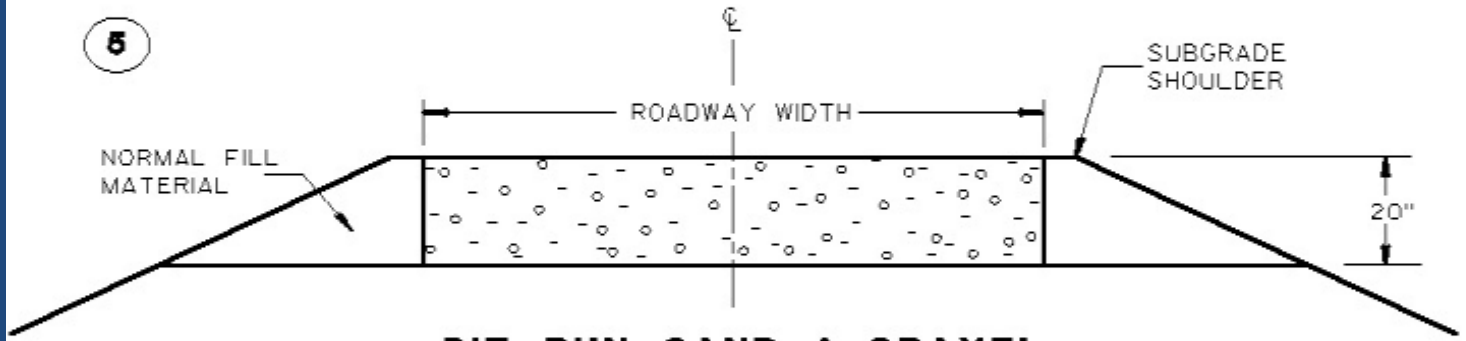
  #8 – Salvgd Matls or Industrial By-Products $100,000

(typical cross sections of these alternatives follow)

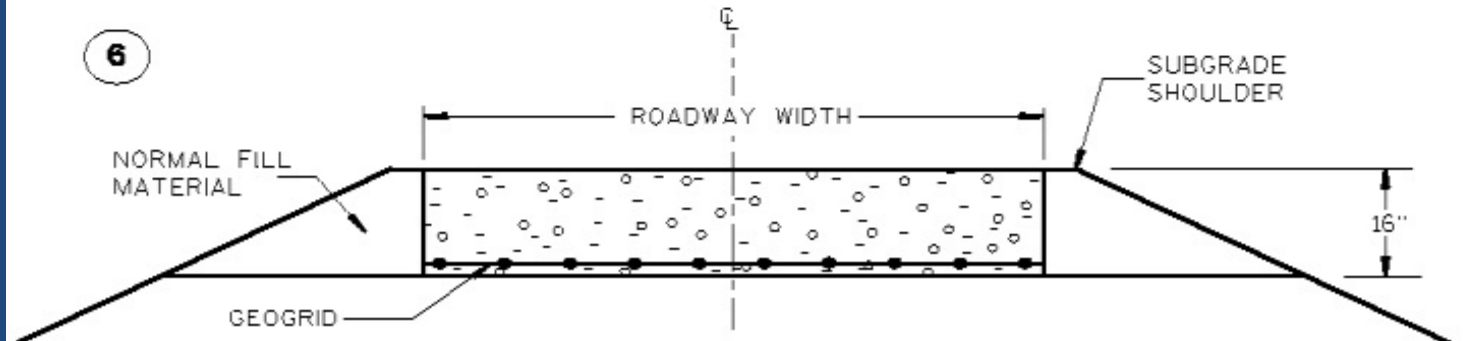


GRANULAR BACKFILL, GRADE 2 OR SELECT BORROW

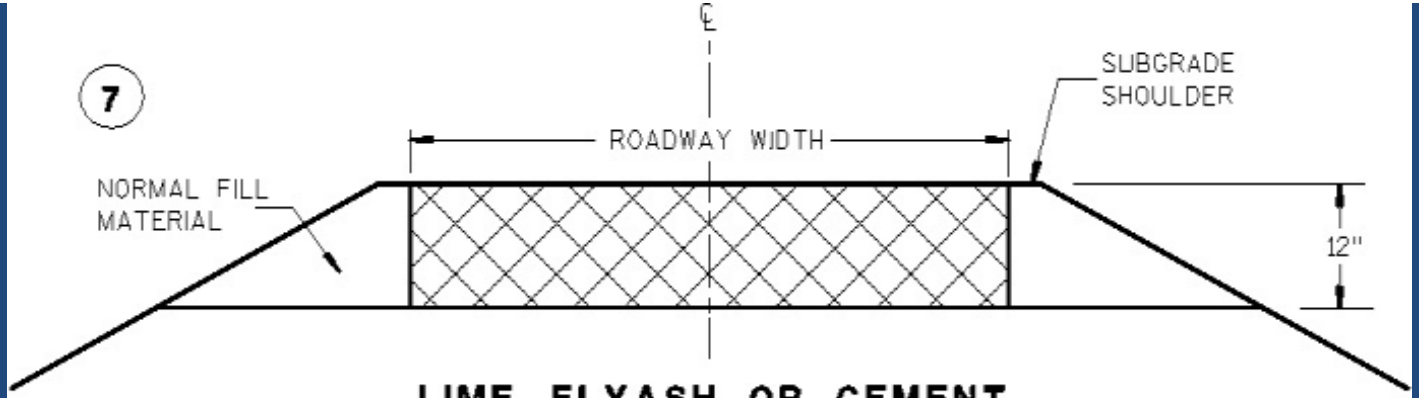
* MAY BE ELIMINATED IF GRANULAR BACKFILL SLOPES ARE COVERED WITH 3"-4" OF CABC



PIT RUN SAND & GRAVEL

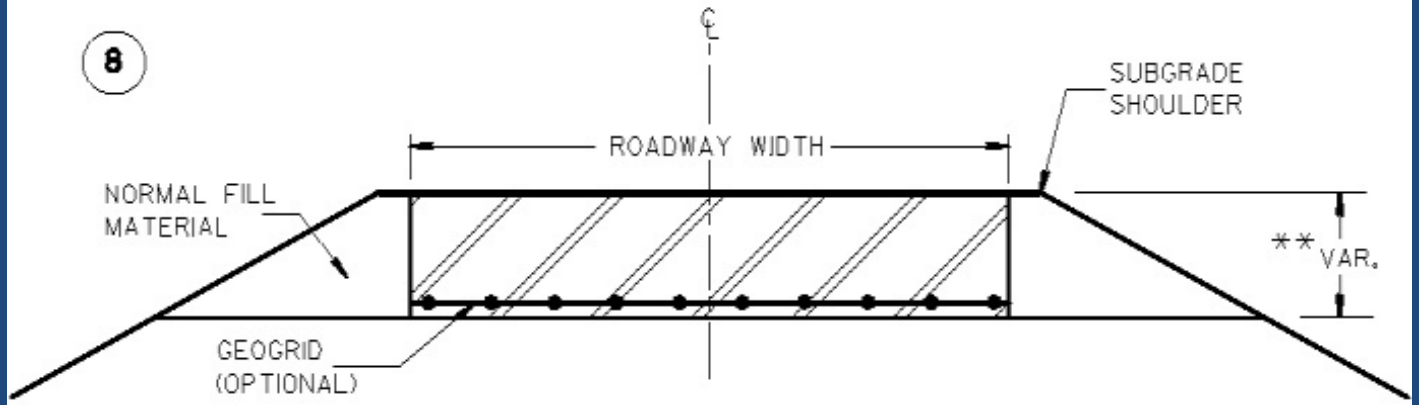


PIT RUN SAND & GRAVEL



LIME, FLYASH OR CEMENT STABILIZED SOIL

APPLIES ONLY TO SUBGRADE SOILS CLASSIFIED AS CLAY SOILS



RECYCLED CONCRETE, STEEL SLAG, FOUNDRY SLAG, BOTTOM ASH, RECYCLED ASPHALTIC PAVEMENT WITH GEOGRID

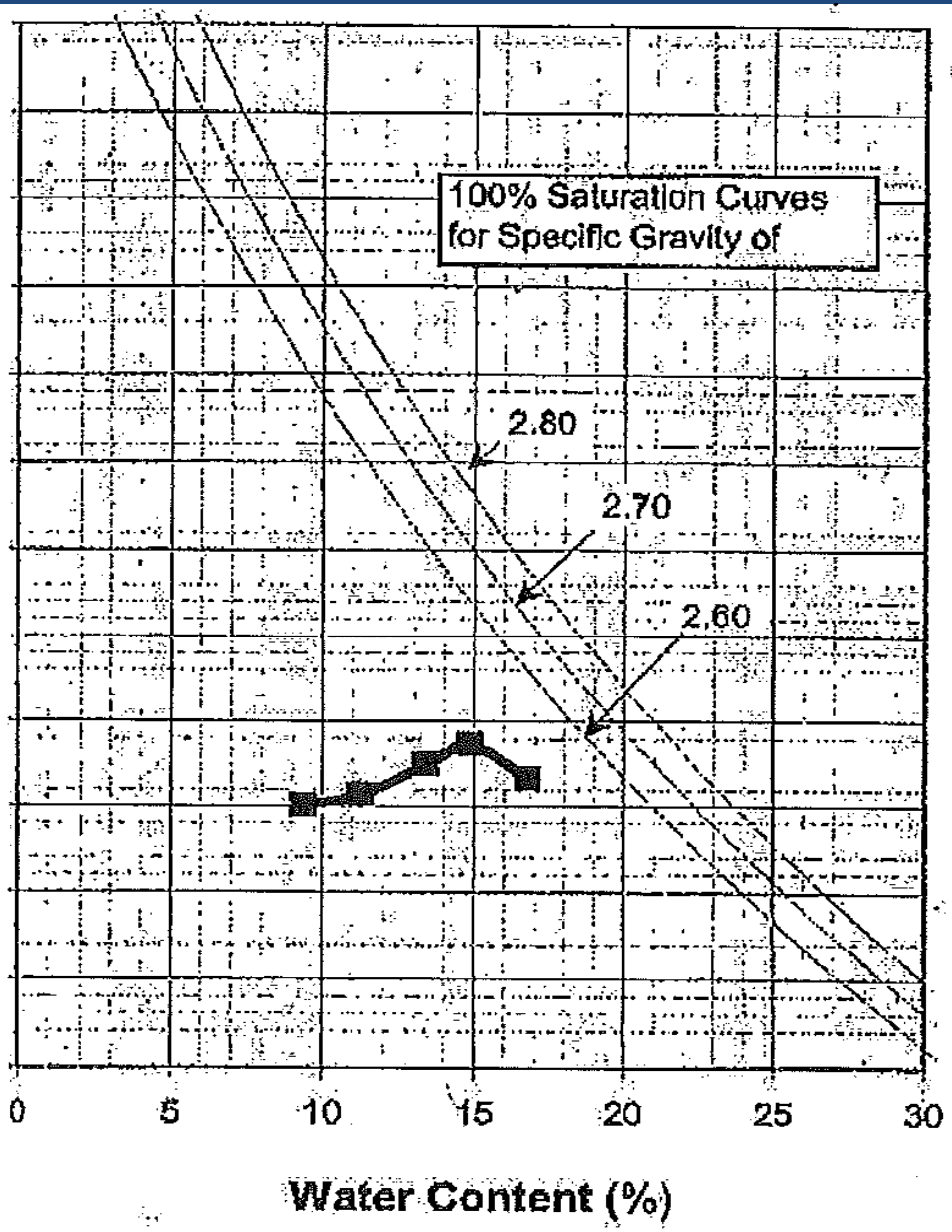
** SEE RECOMMENDATION IN SOILS REPORT

THE RELIEF TRENCH DETAIL SHOWN IN FIGURE 3 SHALL BE USED IN CONJUNCTION WITH ALL THE SELECT MATERIAL SYSTEMS EXCEPT #7.

Foundry Sand satisfies Granular Backfill Specifications

Sieve Number	% Finer for Sample	Gradation Specification
6”	100	100
3”	100	85-100
1”		
½”		
#4	84.6	25-100

Sieve Number	% Finer for Sample	Gradation Specification
#4	100	100
#40	74.6	0 - 75
#100	6.0	0 - 15
#200	2.4	0 - 8



Oversize Correction [1]	
Maximum Dry Unit Weight, lbf/ft^3	113.9
Optimum Water Content, % [2]	12.8

Specimen Data

As Received Water Content, %	2.9
Liquid Limit	NA
Plastic Limit	NA
Plasticity Index	NA
Specific Gravity (Estimated)	2.50
% Gravel	15.4
% Sand	82.6
% Fines	2.0
USCS	SP
% Oversize	15.4
Oversize Sieve	#4
Preparation Method	Dry
Procedure Used	A
Type of Rammer	Manua

Perfection is not attainable.
but if we chase perfection,
we can catch excellence.

CASE STUDIES

Wisconsin ….

Where…


Omro
Ripon
Rosendale
Fond du Lac
Waupun
Lake
Mayville
Horicon
Allenton
Hartford
Germantown
Menomonee Falls
Brookfield
Lake Mills
Jefferson
Waukesha
New Berlin
Fort Atkinson
Eagle
Mukwonago
Whitewater
Muskego
Franklin
Milton
Elkhorn
Delavan
Burlington
Waterford
Lake Geneva
Union Grove
Williams Bay
Darien
Walworth
Fontana
Genoa City
Bristol
Woodstock
Kenosha
Pleasant Prairie
Racine
Oak Creek
Milwaukee
Sturtevant
Kewaskum
Random Lake
Plymouth
Greenbush
Elkhart Lake
Marytown
Kiel
New Holstein
Cleveland
Sheboygan
Sheboygan Falls, Kohler
Waldo
Cedar Grove
West Bend
Saukville
Jackson
Port Washington
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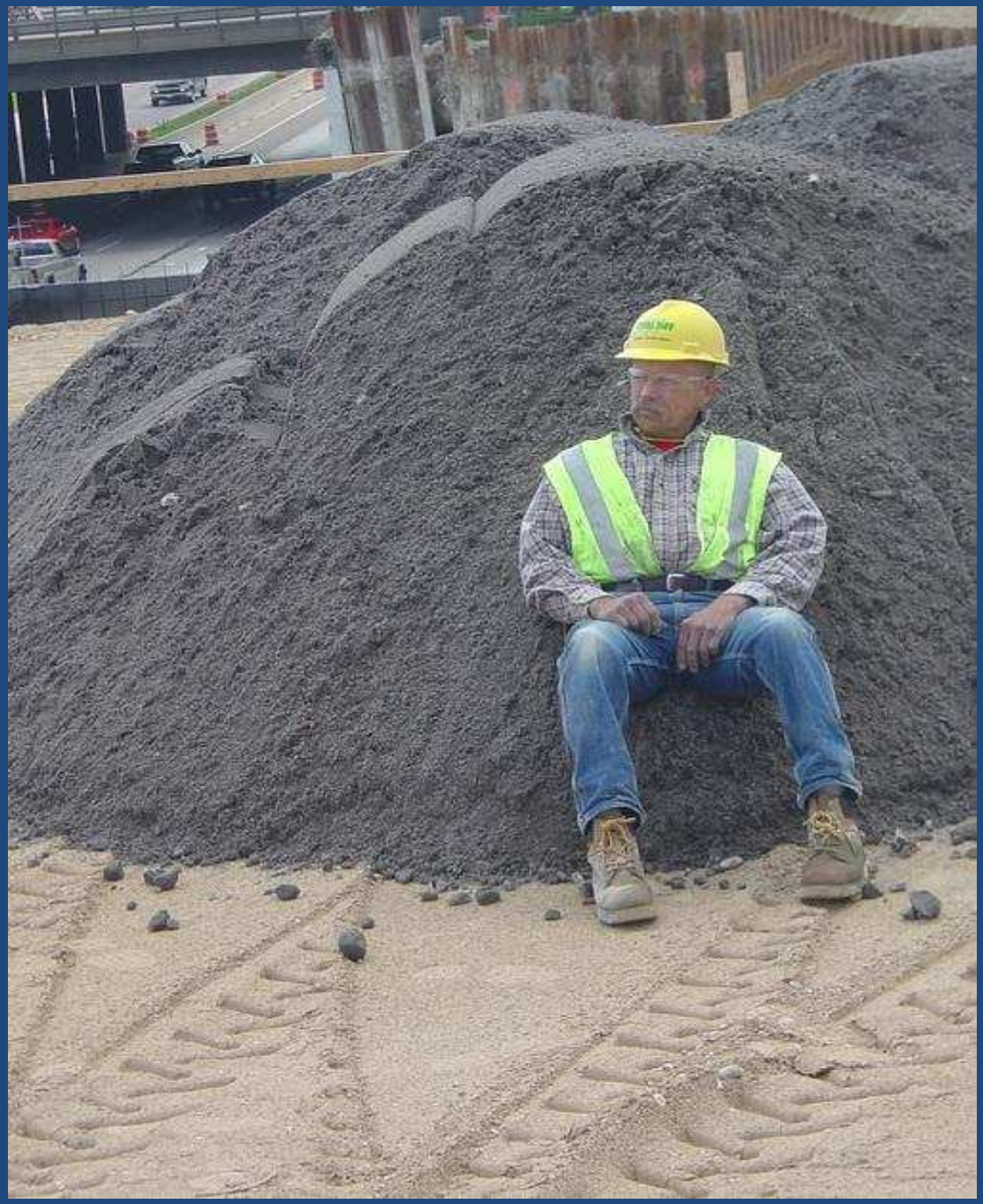
6th
1st
41
94
Morgan
Howard
27th
43
Y
Layton
Whitnall
Mitchell Airport
Grange
College
Pennsylvania

MARQUETTE INTERCHANGE

Foundry Sand Applications
of
Trench & Abutment Backfill
from 2004 to 2008

Project placed 8800 tons



If you aren’t fired with enthusiasm,
you will be fired with enthusiasm.

COLLEGE AVENUE BRIDGE

Foundry Sand Application

of

Abutment Backfills

State of Wisconsin
Department of Natural Resources
Box 7921, Madison, WI 53707-7921

BENEFICIAL USE OF INDUSTRIAL BYPRODUCTS
PROPERTY OWNER NOTIFICATION

Form 4400-199 (2/98)

Instructions: This form must be completed by the industrial byproduct generator (or their designee) and provided to the property owner when industrial byproducts are utilized in one or more of the beneficial uses described in s. NR 538.10(5) to (08), Wis. Adm. Code. This form is not required to be sent to the Department. Unless this form is completed and provided to the property owner in accordance with s. NR 538.22, Wis. Adm. Code, the beneficial use of industrial byproducts may be subject to licensing under s. 289.31, Wis. Stats., and the regulatory requirements under chs. NR 500 to 536, Wis. Adm. Code.

Property owner: This is your notification that an industrial byproduct has been beneficially used on the property described below. The beneficial use of these materials in accordance with ch. NR 538, Wis. Adm. Code, is considered to be protective of human health and the environment. The Department encourages the beneficial use of industrial byproducts in order to preserve resources, conserve energy, and reduce or eliminate the need to dispose of industrial byproducts in landfills.

The property owner is required, by s. NR 538.22(1), Wis. Adm. Code, to retain this notification form and any attached information. The property owner must provide this form and any attached documents to any subsequent purchaser of this property. Disturbance of the industrial byproduct or the overlying soil, pavement or structure must be done in accordance with the requirements of ch. NR 538, Wis. Adm. Code. If more than 10,000 cubic yards of industrial byproducts are used in a project, the generator of the industrial byproduct or their designee are responsible for recording an affidavit with the register of deeds indicating that industrial byproducts were beneficially used on the property, and where this form and any attached information may be obtained.

Industrial Byproduct Generator

Company			
Rexnord Industries LLC			
Contact/Title	Telephone		
Matt Shepstone - Director EHS	414-937-4307		
Mailing Address	City	State	ZIP
3001 West Canal Street	Milwaukee	WI	53208

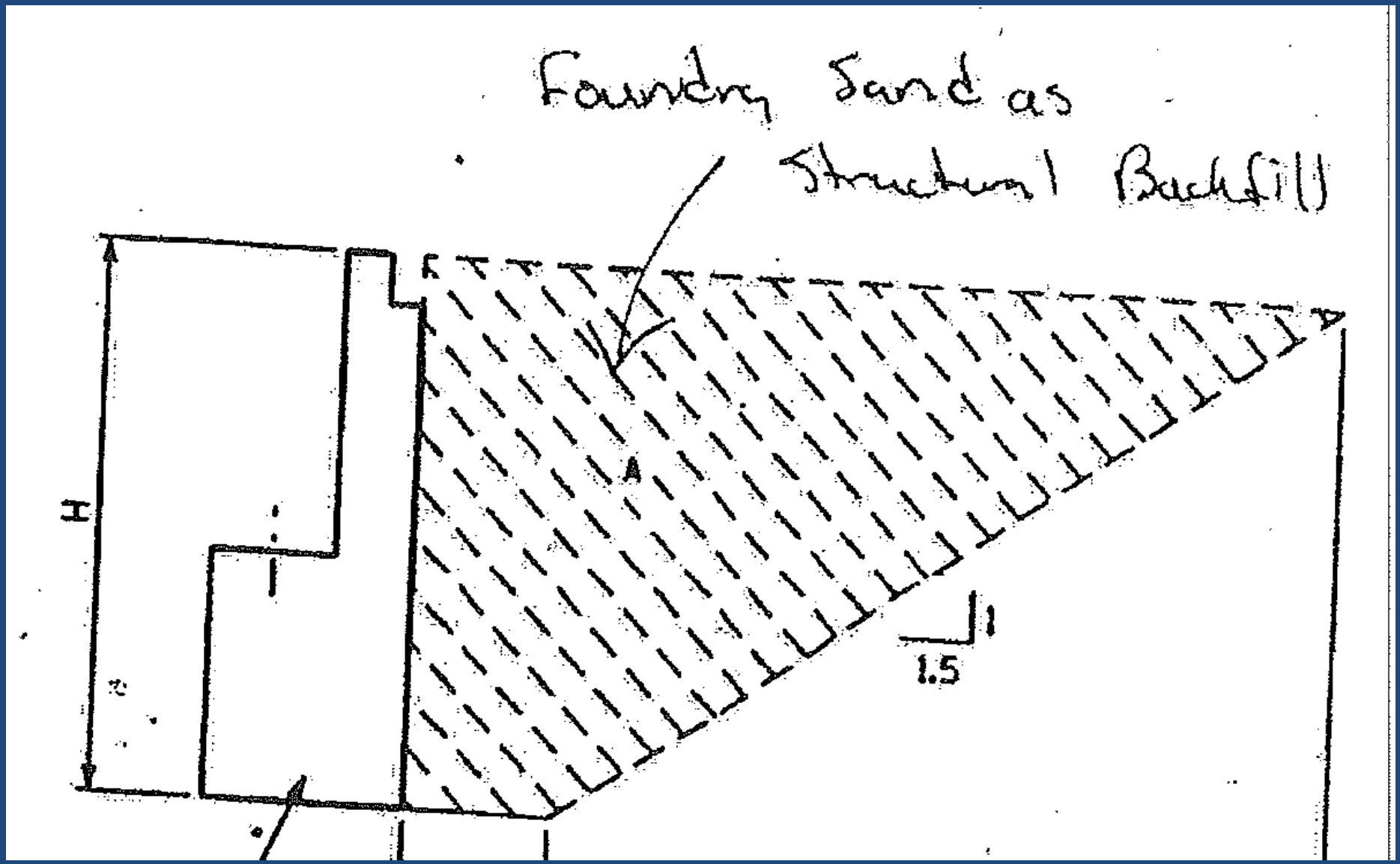
Industrial Byproduct Information

Type of industrial byproduct:

☒ ferrous foundry system sand ☐ ferrous foundry slag ☐ coal fly ash ☐ coal bottom ash/slag
☐ other - Describe:

NR 538 Category of industrial byproduct: ☒ 2 ☐ 3 ☐ 4 ☐ 5 (Note: This form is not required for category 1 materials)

Volume of industrial byproduct in place (in cubic yards):


Foundry Sand as
Structural Backfill
H
1.5
1

College Avenue

East & West Abutments

- Constructed in 2009
- Foundry Sand was accepted as satisfying the Granular Backfill specified at this structure.
- 16,000 tons were placed at both abutments
- Total of 38,000 tons placed in 2009 including other project work


Omro
Ripon
Rosendale
Fond du Lac
Waupun
Lake
Mayville
Horicon
Allenton
Hartford
Germantown
Menomonee Falls
Brookfield
Lake Mills
Jefferson
Waukesha
New Berlin
Fort Atkinson
Eagle
Mukwonago
Whitewater
Muskego
Franklin
Milton
Elkhorn
Delavan
Burlington
Waterford
Lake Geneva
Union Grove
Williams Bay
Darien
Walworth
Fontana
Genoa City
Bristol
Woodstock
Kenosha
Pleasant Prairie
Racine
Oak Creek
Milwaukee
Sturtevant
Kewaskum
Random Lake
Plymouth
Greenbush
Elkhart Lake
Marytown
Kiel
New Holstein
Cleveland
Sheboygan
Sheboygan Falls, Kohler
Waldo
Cedar Grove
West Bend
Saukville
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Mitchell Airport
Grange
College
Pennsylvania

Other SE applications

Zoo Interchange (emergency work) plus other regional projects in 2010, placed 91,000 tons.

Mitchell Interchange has 41,000 tons placed in 2011, to-date.

Never make the mistake of thinking that you know everything about anything.

--- Unkown Author

Attention to Details

- Know horizontal limitations
- Know vertical limitations
- Make sure technically that your specific foundry sand meets needs for application (i.e. non-plastic)
- Know your encapsulation / capping requirements
- Know your storage / stockpiling requirements

The harder you work,
the harder it is to surrender.

--- Vince Lombardi

World is full of tribulations,
but be encourage,
Jesus has overcome the world.

Questions