RADNOR TOWNSHIP

ENGINEERING DEPARTMENT

Memorandum

To: Radnor Township Stormwater Management Advisory Committee

From: Stephen F. Norcini, PE, Township Engineer

CC: Robert A. Zienkowski, Township Manager
William M. White, Assistant Township Manager/Finance Director

Date: July 23rd, 2018

Re: July 2018 Stormwater Management Advisory Committee Update

I would like to take this opportunity to update the Stormwater Management Advisory Committee on various stormwater management and stormwater infrastructure projects; for a listing of all current projects, please see the attached table.

At the July 16th, 2018 regularly scheduled Board of Commissioners meeting, the following items were approved:

1. **Flood Reduction Options in North Wayne and the Poplar Bypass, awarded to Meliora Design, $137,310.**

   All are aware of the decades of flooding issues that have occurred in the North Wayne area (Eagle Road, North Wayne Avenue, Willow Avenue, Poplar Avenue, to name a few of the places within the boundary of "North Wayne") of the Township. The project (please see attached cost proposal from Meliora) is to provide flood reduction options for the area, that ultimately, through input from our residents, SWMAC, and approval by the Commissioners, will result in construction projects to that end. This undertaking is not a panacea to end all flooding in North Wayne, but to reduce the probability of flooding during certain storm events. Some of the highlights of the proposal are as follows:

   - In the scope I have required up to ten meetings with residents, in order to update, and subsequently receive feedback on the

301 IVEN AVENUE, WAYNE PA 19087
T 610-688-5600, EXT. 130

project. Also included are meetings with the SWMAC, to update the commission and receive their input. Meetings with staff, and of course the Board of Commissioners are included.

- The possibility of creating flood plain for Gulph Creek, to provide possible flood reduction.
- Looking within the drainage area to include Radnor and Tredyffrin Townships, for areas of possible stormwater management and green infrastructure projects.
- The feasibility of a bypass stormwater pipe on Poplar Avenue, to convey runoff to a subsurface facility at Cowan Park. Please note that the system would be underground at Cowan Park, and if constructed, any part of the park that would be displaced would have new facilities constructed. Cowan Park would remain a recreational area.
- If the projects were to move forward, coordination with utilities and upgrading of Township infrastructure would be included.

There was a meeting with some resident of the area, prior to award of the contract. Valuable firsthand information was provided to the consultant. This was the first of many meetings with residents, as outlined above.

Since this project is in it's infancy, if the SWMAC is agreeable, I would like to schedule Meliora to attend the August or September SWMAC to review the project and receive SWMAC input.

2. **Flood Reduction Options on Midland Avenue, and using the South Wayne Municipal Parking Lot for Stormwater Management, and the Utilization of the SWM System at the Radnor Middle School, $190,660**

The Midland Avenue area of South Wayne *(a general term to include St. Davids Road, Pembroke, South Wayne Avenue, Runnymede, to name a few streets)* has endured flooding issues for many decades. The project (please see attached) is to provide flood reduction options for this area, some of the other highlights of the project are:

- Construction/bidding documents to use the South Wayne Municipal Parking Lot as a SWM facility. After construction of the SWM system, the parking lot will be repaved, have pavement markings installed, the number of curb cuts reduced, have appropriate and consistent lighting installed, as well as trees planted.

- The first step in the Flood Reduction Options portion of the project will be for Meliora to meet with residents in the area, to obtain firsthand knowledge of the flooding issues.
- In the scope I have required up to ten meetings with residents, in order to update, and subsequently receive feedback on the project. Also included are meetings with the SWMAC, to update the commission and receive their input. Meetings with staff, and the Board of Commissioners are included.
- The subsurface system at the Radnor Middle School is currently underutilized. The feasibility of using this system to its fullest extent is to be evaluated.
- Looking throughout the drainage area, upstream of the South Wayne Avenue, to implement SWM and green infrastructure.

I would like to have Meliora present this project to the SWMAC, and receive SWMAC input, at the August or September meeting also.

3. 2019 Stormwater Fund Budget and 5 Year Capital Plan

The budget process will most likely begin in September of this year. The 2019 budget year and those moving forward will be affected by current activity in the stormwater fund. Most notably, there are projects that were not budgeted for:

- Wistar Road Outfall
- Wooton Road Storm Sewer
- Arbor & Cumberland Places
- Mill Road Endwall
- Arthur Road
- Possibly Banbury/Francis/Windsor?

The five-year plan will need to be updated, as well any other projects that may come forth. *Township staff will be seeking SWMAC input on the budget. I respectfully request this be an agenda item of the September SWMAC meeting.*

4. **Authorization for the Engineering Department to Receive Sealed Bids for the Cleaning and Repairing of the North Wayne Field Basin (cost to be determined by sealed bids), plans attached.**

The North Wayne Field Basin consists of an underground SWM system, as well as an above ground basin. The subsurface system, which is comprised of ten runs of 48" perforated CMP, a manifold, outlet structure, and piping is need of repair and cleaning. The pipes contain anywhere from 6" to 2' of debris, and the pipe on the north side of the basin is in need of repair. The bidding plans are attached for your information. The contract calls for:

- The cleaning of all pipes in the subsurface system, and disposal of the spoil
- The repair of the pipe on the north side of the system
- The installation of an additional manifold to better distribute runoff within the system
- The installation of two Vortech Devices (as designed by Contech Engineering Solutions, Incorporated). These devices are designed to separate the sediment and debris (up to a five - year event) prior to the debris entering the subsurface system. they are designed so that they may be cleaned with a vacuum truck.
- This installation of a "cable-crete" spillway. This spillway will also be used for the access of the maintenance trucks to the Vortech units. The concrete allows the travel of large trucks; the voids in the matting will allow grass to grow through.

5. **Authorizing Meliora Design to Provide Stormwater Analysis and Green Infrastructure Design for Projects Upstream of the North Wayne Field Basin, $48,980**

During the budget process last year, the Board of Commissioners requested that projects upstream of the North Wayne Field Basin be evaluated, to possibly reduce stormwater runoff to that facility. The proposal before the Board of Commissioners is to provide services for this purpose. Meliora Design, Incorporated, has submitted a proposal (please see attached) to analyze projects to reduce runoff to the North Wayne Field Basin. Meliora will perform infiltration testing, meet with the Commissioners, staff, and the residents, and ultimately provide design for five projects.

The following projects are in various stages of design or bidding:

6. **Roberts Road Culvert**

   The culvert on Roberts Road that conveys Valley Run is deteriorating. The stone façade needs repointing, erosion has undermined a storm sewer inlet pipe, an additional inlet is needed on Roberts Road, guiderail, to name a few. Gannett Fleming is performing survey and an evaluation of the endwall and associated items.

7. **Malin Road Culvert, Meliora Design, $115,005**

   This infrastructure project has been before the SWAMC several times over the last few years. The culvert is in poor condition, the road above it is subsiding, and there is severe erosion along its foundations. This project, for design, permitting, and bidding documents was awarded to Meliora in June of this year. With the length of time required for permitting, it is anticipated that the project will be bid in 2019.

8. **Maplewood Outfall (price to be determined by sealed bids)**

   This outfall has caused serious erosion, and a dangerous condition, on property on Maplewood Avenue. This project will be bid in July.

Enclosures: Meliora Proposals
Project Spread Sheet
North Wayne Basin Plans

meliora

July 10, 2018

Mr. Stephen F. Norcini
Township Engineer
Radnor Township
301 Iven Avenue
Wayne, PA 19087

RE: North Wayne / Poplar Avenue Flood Reduction Options

Dear Mr. Norcini:

Meliora Design is pleased to submit this proposal to provide Professional Design and Consulting Services for the feasibility study to reduce flooding in North Wayne, specifically in the area of North Wayne Avenue and Poplar Avenue.

Project Understanding and Work Tasks

Recent community engagement on the flood occurrences in the North Wayne neighborhood contributing to Gulph Creek in and around the Poplar Avenue area have formed the basis for this proposal to address flooding in a variety of ways. It was clear from public comments that flooding occurs in the area for a number of reasons. Inefficient drainage infrastructure, lack of flood plain, stream cross-section restrictions, stream alignment, and many other factors create different flooding impacts on different residents. Approaches to alleviate flooding have to be as diverse as the causes which is the foundation of this proposal. Meliora Design's goal for this feasibility study is to build on previous studies and community knowledge to find buildable solutions to area flooding that do not impact downstream residents adversely.
This proposal includes the work effort associated with identifying constructible stormwater solutions to flooding issues, including the following tasks:

1. Review existing information.
2. Determine land use and runoff volume by sub drainage area.
3. Desktop Analysis.
4. Field Investigation.
5. Refine concept opportunities and costs.
6. Public Communication throughout the work effort with both Radnor Township Staff, Board Members, and the public.

Review Existing Information

Meliora Design will review previous modeling exercises for the area in question, compile existing utility information through the use of PA One Call, compile property parcel data, and other background information that will be helpful in guiding this work effort. The previous modeling study by CH2MHill is of use because this area has already been studied for other purposes, but the basic approach of the model can still provide useful information. Meliora Design will rerun the models developed by CH2MHIill in later tasks and extract useful information. We will also coordinate with Township staff to determine utility upgrade needs and extent the future stormwater interventions can overlap with the Township's need for upgrades to

water, sanitary sewer, gas, or telecom services. We will meet with township staff once during this phase for utility coordination purposes.

Land Use and Runoff Volume by Sub-area

Meliora Design will take information gathered in the first task and generate maps and land use data to support the reapplication of CH2MHills modeling effort for this area to determine runoff volumes and sources by sub-area and land use. Where the previous study looked at flood elevation and impacts, our analysis will work to quantify stormwater runoff sources with the goal of illustrating what areas contribute to which flooding issues within the project area. Meliora Design will produce a narrative report of these findings

Tangible Work Products:

- Narrative Report of findings

Desktop Analysis

Based on information gathered from previous community and staff engagement and the reapplication of the CH2MHill modeling effort, Meliora Design will analyze opportunities and constraints of possible flooding interventions. This analysis will include feasibility of the Poplar Bypass as proposed in previous studies with a focus on topography, pipe capacity, storage potential in Cowan Park, and geotechnical evaluations in the study area. Meliora Design will also investigate other similar strategies high in the drainage area to Gulph Creek. Because we believe a diverse approach to the problem is required to address the multitude of reasons for flooding within North Wayne occurs, we will also investigate floodplain capacity, on-lot reduction strategies, localized controlled flooding opportunities, and green infrastructure opportunities throughout the Gulph Creek drainage area in and around the Poplar Avenue area. Within this task we have allotted time for meetings with Township staff, SWMAC, community residents (4), and the Board of Commissioners.

Field Investigation

Meliora Design will conduct three days for field investigation to visually assess conditions that could impact stream flows, storm water discharges from outfalls, disconnections of floodplain, and opportunities for improvement of stormwater conveyance function. We have also allowed for survey time to document detailed conditions as needed that would impact our feasibility analysis. This could include culvert properties, stream cross-sections, floodplain elevations, obstruction locations, etc. This investigation would not provide construction level survey information but would supplement any future work done in this area. We would meet with Township staff to discuss findings following the field investigation.

Refine Concept Opportunities and Costs

In this task, Meliora Design will use information gathered during the field investigation in combination with the desktop analysis to provide recommendations, benefits, and construction

cost estimates of recommended interventions. Discussion of phasing of interventions will also be included to help the Township and residents understand how the order of implementation can help make certain approaches more viable. For instance, volume reducing interventions prior to infrastructure improvements could reduce costs of infrastructure construction by reducing scope of necessary improvements.

Public Communication

Throughout the previous 5 tasks, Meliora Design has allotted time for meetings with Township Staff, SWMAC, residents, and Board of Commissioners. We break out the total number of meetings in this task for clarity. A summary of the meeting totals our scope assumes is below:

- Township Staff – 4 meetings
- SWMAC – 2 meetings
- Community Meetings with residents – 10
- Board of Commissioner meetings – 2

All work products will be provided in hard copy and digital format.

We look forward to supporting Radnor Township in this complex work effort and appreciate the opportunity to complete this project. If you have any questions or concerns, we can be reached at 610-933-0123, or MicheleA@Melioradesign.com and MarcH@Melioradesign.com.

Sincerely yours,

Michele C. Adams, PE, LEED AP
Principal

Marc B. Henderson, PE
Project Manager

North Wayne/ Poplar Avenue Flood Reduction Options
Meliora Detailed Fee Estimate
Prepared for Radnor Township
July 10, 2018

Meliora Design - Fee Estimate - Summary

	Review Existing Information	Hours	Labor	Expenses	Total Fee
	Review Existing Information Total	108	$ 12,260	$ 500	$ 12,760
2	Land Use and Runoff Volume by Sub-area				
	Land Use and Runoff Volume by Sub-area Total	100	$ 11,740	$ 470	$ 12,210
3	Desktop Analysis				
	Desktop Analysis Total	184	$ 21,320	$ 860	$ 22,180
4	Field Investigation				
	Field Investigation Total	76	$ 8,580	$ 350	$ 8,930
5	Refined Concept Opportunities and Costs				
	Refined Concept Opportunities and Costs Total	272	$ 33,600	$ 1,350	$ 34,950
6	Public Communication				
	Public Communication Total	214	$ 30,070	$ 1,210	$ 31,280
	Subconsultants				
	Survey for Cross-sections and constraints			$ 15,000	$ 15,000
	Subconsultants Subtotal			$ 15,000	$ 15,000
	Totals	Hours	Labor	Expenses	Total Fee
	Totals	954	$ 117,570	$ 19,740	$ 137,310

North Wayne/ Poplar Avenue Flood Reduction Options
Meliora Detailed Fee Estimate
Prepared for Radnor Township
July 10, 2018

Meliora Design - Fee Estimate - Detailed

Title	Principal	Senior Engineer	Landscape Architect	Water Resources Designer	Water Resources Designer	Technical Aide	Cad Technician	Total Hours	Total Fee
Billing Rate	$195.00	$135.00	$105.00	$95.00	$95.00	$100.00	$85.00		
1 Review Existing Information								0	$ -
Review previous CH2 model and previous studies	4	8						12	$ 1,860
Request and compile One Call utility information into GIS				24				24	$ 2,280
Update GIS parcel data regarding ownership				16				16	$ 1,520
Obtain Treddyfrin PRP Plan information		8						8	$ 1,080
Clarify and confirm Radnor utility upgrade needs and plans (township meeting)		24		24				48	$ 5,520
								0	$ -
Review Existing Information Hours	4	40	0	64	0	0	0	108	
Review Existing Information Total	$ 780	$ 5,400	$ -	$ 6,080	$ -	$ -	$ -		$ 12,260
2 Land Use and Runoff Volume by Sub-area								0	$ -
Define Sub- Areas, generate maps and land use data		8		16				24	$ 2,600
Re-apply CH2 model to generate runoff volumes and sources by sub-area and land use	4	24		40				68	$ 7,820
Narrative summary of runoff volumes and sources	4	4						8	$ 1,320
								0	$ -
Land Use and Runoff Volume by Sub-area Hours	8	36	0	56	0	0	0	100	
Land Use and Runoff Volume by Sub-area Total	$ 1,560	$ 4,860	$ -	$ 5,320	$ -	$ -	$ -		$ 11,740
3 Desktop Analysis								0	$ -
Analysis of opportunities and constraints	8	80		80			16	184	$ 21,320
Poplar Bypass grade, capacity, Cowan Park capacity, etc.								0	$ -
Neighborhood street bypass/storage opportunities in general								0	$ -
Potential Floodplain capacity								0	$ -
On-lot reduction opportunities								0	$ -
Localized controlled flooding opportunities								0	$ -
GI opportunities								0	$ -
								0	$ -
Mtg with Township								0	$ -
Mtg with SWMAC								0	$ -
Mtg with Community and residents (4)								0	$ -
BOC Mtg								0	$ -
Desktop Analysis Hours	8	80	0	80	0	0	16	184	
Desktop Analysis Total	$ 1,560	$ 10,800	$ -	$ 7,600	$ -	$ -	$ 1,360		$ 21,320
4 Field Investigation								0	$ -
Assume 2 days field work plus 1 day follow-up	4	24		24	24			76	$ 8,580
Survey allowance for cross-sections								0	$ -
GPS documentation of conditions								0	$ -
								0	$ -
Mtg with Township								0	$ -
								0	$ -
Field Investigation Hours	4	24	0	24	24	0	0	76	
Field Investigation Total	$ 780	$ 3,240	$ -	$ 2,280	$ 2,280	$ -	$ -		$ 8,580
5 Refined Concept Opportunities and Costs								0	$ -
Concept recommendations, benefits, and consrruction cost estimate	24	80	40	80				224	$ 27,280
Poplar Bypass grade, capacity, Cowan Park capacity, etc.								0	$ -
Neighborhood street bypass/storage opportunities in general								0	$ -
Potential Floodplain capacity - locations and benefits								0	$ -
On-lot reduction opportunities								0	$ -
Localized controlled flooding opportunities								0	$ -
GI opportunities								0	$ -
Implementation Recommendations with Phasing	8	24		16				48	$ 6,320
								0	$ -
Mtg with Township								0	$ -
Mtg with SWMAC								0	$ -
Mtg with Community and residents (6)								0	$ -
BOC Mtg								0	$ -
Refined Concept Opportunities and Costs Hours	32	104	40	96	0	0	0	272	
Refined Concept Opportunities and Costs Total	$ 6,240	$ 14,040	$ 4,200	$ 9,120	$ -	$ -	$ -		$ 33,600
6 Public Communication								0	$ -
Mtg with Township (4)	24	32						56	$ 9,000
Mtg with SWMAC (2)	8	8						16	$ 2,640
Mtg with Community and residents (10)	20	40	50	20				130	$ 16,450
BOC Mtg (2)	6	6						12	$ 1,980
								0	$ -
Includes preparation of material for meetings								0	$ -
								0	$ -
								0	$ -
Public Communication Hours	58	86	50	20	0	0	0	214	
Public Communication Total	$ 11,310	$ 11,610	$ 5,250	$ 1,900	$ -	$ -	$ -		$ 30,070

North Wayne/ Poplar Avenue Flood Reduction Options
Meliora Detailed Fee Estimate
Prepared for Radnor Township
July 10, 2018

Meliora Design - Fee Estimate - Detailed

Title		Principal	Senior Engineer	Landscape Architect	Water Resources Designer	Water Resources Designer	Technical Aide	Cad Technician	Total Hours	Total Fee
Billing Rate		$195.00	$135.00	$105.00	$95.00	$95.00	$100.00	$85.00		
Project Hours Total		114	370	90	340	24	0	16	954	
Project Labor Total		$ 22,230	$ 49,950	$ 9,450	$ 32,300	$ 2,280	$ -	$ 1,360		$ 117,570
Reimbursables										
Expense Estimated at	4%	of fee (includes mileage, printing, etc.)								$ 4,740
Subconsultants										
Survey for Cross-sections and constraints										$ 15,000
N/A										$ -
N/A										$ -
Subconsultants Subtotal										$ 15,000
Total Fee										$ 137,310

meliora

July 10, 2018

Mr. Stephen F. Norcini
Township Engineer
Radnor Township
301 Iven Avenue
Wayne, PA 19087

RE: South Wayne / Midland Avenue Flood Reduction Options

Dear Mr. Norcini:

Meliora Design is pleased to submit this proposal to provide Professional Design and Consulting Services for the feasibility study to reduce flooding in South Wayne, specifically in the area in the general vicinity of Midland Avenue, within the Ithan Creek watershed downstream from Radnor Middle School.

Project Understanding and Work Tasks

Discussions with Radnor Township staff have described a variety of stormwater issues in the general vicinity of Radnor Middle School and Midland Avenue. Past projects at Radnor Middle School were designed to reduce regional flooding. Due to site constraints at the time of construction, the full benefit of the Radnor Middle School stormwater system below the playing field could not be realized. Other regional opportunities for stormwater management are desired along with an analysis to provide opportunities for flood mitigation and flow reductions in Ithan Creek in the area of Midland Avenue.

Similar to other areas of Radnor Township, inefficient drainage infrastructure, lack of flood plain, stream cross-section restrictions, stream alignment, and many other factors create different flooding impacts on different residents. Approaches to alleviate flooding have to be as diverse as the causes which is the foundation of this proposal. Meliora Design's goal for this feasibility study is to build on previous studies and community knowledge to find buildable solutions to area flooding that do not impact downstream residents adversely.

This proposal includes the work effort associated with identifying constructible stormwater solutions to flooding issues, including the following tasks:

1. Review existing information.
2. Determine land use and runoff volume by sub drainage area.
3. Desktop Analysis.
4. Field Investigation.
5. Refine concept opportunities and costs.
6. Public Communication throughout the work effort with both Radnor Township Staff, Board Members, and the public.

Review Existing Information

Meliora Design will review previous modeling exercises for the area in question, compile existing utility information through the use of PA One Call, compile property parcel data, and other background information that will be helpful in guiding this work effort. The previous modeling study by CH2MHill is of use because this area has already been studied for other purposes, but the basic approach of the model can still provide useful information. Meliora Design will rerun the models developed by CH2MHlill in later tasks and extract useful information. We will also coordinate with Township staff to determine how utility upgrade needs and the future stormwater interventions can overlap to provide cost savings with the Township's need for upgrades to water, sanitary sewer, gas, or telecom services. We will meet with township staff once during this phase for utility coordination purposes.

Land Use and Runoff Volume by Sub-area

Meliora Design will take information gathered in the first task and generate maps and land use data to support the reapplication of CH2MHills modeling effort for this area to determine runoff volumes and sources by sub-area and land use. Where the previous study looked at flood elevation and impacts, our analysis will work to quantify stormwater runoff sources with the goal of illustrating what areas contribute to which flooding issues within the project area. Meliora Design will produce a narrative report of these findings

Tangible Work Products:

- Narrative Report of findings

Desktop Analysis

Based on information gathered from previous community and staff engagement and the reapplication of the CH2MHill modeling effort, Meliora Design will analyze opportunities and constraints of possible flooding interventions. This analysis will include feasibility of the Radnor Middle School accepting more stormwater runoff as proposed in previous designs with a focus on existing utilities, pipe capacity, storage potential in the subsurface stormwater system, and geotechnical evaluations in the study area as necessary. Meliora Design will also investigate other similar strategies high in the drainage area to Ithan Creek. Because we believe a diverse approach to the problem is required to address the multitude of reasons for flooding within Midland Avenue and surrounding areas occurs, we will also investigate floodplain capacity, on-lot reduction strategies, localized controlled flooding opportunities, and green infrastructure opportunities throughout the Ithan Creek drainage area in and around the Radnor Middle School / Midland Avenue area. Within this task we have allotted time for meetings with Township staff, SWMAC, community residents (4), and the Board of Commissioners.

Field Investigation

Meliora Design will conduct three days for field investigation to visually assess conditions that could impact stream flows, storm water discharges from outfalls, disconnections of floodplain, and opportunities for improvement of stormwater conveyance function. Because of the larger area and more complicated subsurface conditions of Ithan Creek, we have allotted more time for the interpretation of the data gathered in the 3 days of site visits we are proposing. We have also allowed for survey time to document detailed conditions as needed that would impact our feasibility analysis. This could include culvert properties, stream cross-sections, floodplain elevations, obstruction locations, etc. This investigation would not provide construction level survey information but would supplement any future work done in this area. We would meet with Township staff to discuss findings following the field investigation.

Refine Concept Opportunities and Costs

In this task, Meliora Design will use information gathered during the field investigation in combination with the desktop analysis to provide recommendations, benefits, and construction cost estimates of recommended interventions. Discussion of phasing of interventions will also be included to help the Township and residents understand how the order of implementation can help make certain approaches more viable. For instance, volume reducing interventions prior to infrastructure improvements could reduce costs of infrastructure construction by reducing scope of necessary improvements.

Construction Documents

As part of the project, we will document parking lot improvements in the South Wayne Parking Lot owned by Radnor Township on S. Wayne Avenue to improve stormwater management on site, benefit downstream residents, and improve a surface lot in need of repair. Because this project site takes place in the drainage area of this feasibility study, an earmarked project can be addresses efficiently as part of an overall approach to addressing stormwater management issues in this area. The refinement of concept opportunities in previous tasks that include this site area will allow Meliora Design to produce a buildable project from this feasibility study as it has already been identified to have a high priority, but not necessarily a quantifiable benefit.

Tangible Work Products:

- Construction Documents
    - Existing Conditions
    - Erosion and Sediment Control Plans
    - Site Plan
    - Grading Plan
    - Stormwater Plan
    - Lighting Plan
    - Landscape Plan
- Construction Specifications

- Necessary Permit submissions
- Two (2)Board of Commissioner Presentations
- Two (2) Meetings with Township Staff

Public Communication

Throughout the first 5 tasks, Meliora Design has allotted time for meetings with Township Staff, SWMAC, residents, and Board of Commissioners. We break out the total number of meetings in this task for clarity. Separate meetings were provided as part of the South Wayne Parking Lot documentation task. A summary of the meeting totals our scope assumes is below:

- Township Staff – 4 meetings
- SWMAC – 2 meetings
- Community Meetings with residents – 10
- Board of Commissioner meetings – 2

All work products will be provided in hard copy and digital format.

We look forward to supporting Radnor Township in this complex work effort and appreciate the opportunity to complete this project. If you have any questions or concerns, we can be reached at 610-933-0123, or MicheleA@Melioradesign.com and MarcH@Melioradesign.com.

Sincerely yours,

Michele C. Adams, PE, LEED AP
Principal

Marc B. Henderson, PE
Project Manager

Midland Avenue Flood Reduction Options
Meliora Detailed Fee Estimate
Prepared for Radnor Township
July 10, 2018

Meliora Design - Fee Estimate - Summary

		Hours	Labor	Expenses	Total Fee
1	Review Existing Information				
	Review Existing Information Total	100	$ 11,180	$ 450	$ 11,630
2	Land Use and Runoff Volume by Sub-area				
	Land Use and Runoff Volume by Sub-area Total	100	$ 11,740	$ 470	$ 12,210
3	Desktop Analysis				
	Desktop Analysis Total	184	$ 21,320	$ 860	$ 22,180
4	Field Investigation				
	Field Investigation Total	116	$ 13,260	$ 540	$ 13,800
5	Refined Concept Opportunities and Costs				
	Refined Concept Opportunities and Costs Total	272	$ 33,600	$ 1,350	$ 34,950
6	Public Communication				
	Public Communication Total	214	$ 30,070	$ 1,210	$ 31,280
7	Construction Documents				
	Construction Documents Total	388	$ 47,700	$ 1,910	$ 49,610
	Subconsultants				
	Survey for Cross-sections and constraints			$ 15,000	$ 15,000
	Subconsultants Subtotal			$ 15,000	$ 15,000
	Totals	Hours	Labor	Expenses	Total Fee
	Totals	1374	$ 168,870	$ 21,790	$ 190,660

Midland Avenue Flood Reduction Options
Mellora Detailed Fee Estimate
Prepared for Radnor Township
July 10, 2018

Mellora Design - Fee Estimate - Detailed

Title	Principal	Senior Engineer	Landscape Architect	Water Resources Designer	Water Resources Designer	Technical Aide	Cad Technician	Total Hours	Total Fee
Billing Rate	$195.00	$135.00	$105.00	$95.00	$95.00	$100.00	$85.00		
1 Review Existing Information									
								0	$ -
Review previous CH2 model and previous studies	4	8						12	$ 1,860
Request and compile One Call utility information into GIS				24				24	$ 2,280
Update GIS parcel data regarding ownership				16				16	$ 1,520
								0	$ -
Clarify and confirm Radnor utility upgrade needs and plans (township meeting)		24		24				48	$ 5,520
								0	$ -
Review Existing Information Hours	4	32	0	64	0	0	0	100	
Review Existing Information Total	$ 780	$ 4,320	$ -	$ 6,080	$ -	$ -	$ -		$ 11,180
2 Land Use and Runoff Volume by Sub-area									
								0	$ -
Define Sub- Areas, generate maps and land use data		8		16				24	$ 2,600
Re-apply CH2 model to generate runoff volumes and sources by sub-area and land use	4	24		40				68	$ 7,820
Narrative summary of runoff volumes and sources	4	4						8	$ 1,320
								0	$ -
Land Use and Runoff Volume by Sub-area Hours	8	36	0	56	0	0	0	100	
Land Use and Runoff Volume by Sub-area Total	$ 1,560	$ 4,860	$ -	$ 5,320	$ -	$ -	$ -		$ 11,740
3 Desktop Analysis									
								0	$ -
Analysis of opportunities and constraints	8	80		80			16	184	$ 21,320
Middle School SW System, storm sewer capacity, South Wayne Parking Lot capacity, etc.								0	$ -
Neighborhood street bypass/storage opportunities in general								0	$ -
Potential Floodplain capacity								0	$ -
On-lot reduction opportunities								0	$ -
Localized controlled flooding opportunities								0	$ -
GI opportunities								0	$ -
								0	$ -
Mtg with Township								0	$ -
Mtg with SWMAC								0	$ -
Mtg with Community and residents (4)								0	$ -
BOC Mtg								0	$ -
								0	$ -
Desktop Analysis Hours	8	80	0	80	0	0	16	184	
Desktop Analysis Total	$ 1,560	$ 10,800	$ -	$ 7,600	$ -	$ -	$ 1,360		$ 21,320
4 Field Investigation									
								0	$ -
Assume 2 days field work plus 1 day follow-up	8	36		36	36			116	$ 13,260
Survey allowance for cross-sections								0	$ -
GPS documentation of conditions								0	$ -
								0	$ -
Mtg with Township								0	$ -
								0	$ -
Field Investigation Hours	8	36	0	36	36	0	0	116	
Field Investigation Total	$ 1,560	$ 4,860	$ -	$ 3,420	$ 3,420	$ -	$ -		$ 13,260
5 Refined Concept Opportunities and Costs									
								0	$ -
Concept recommendations, benefits, and construction cost estimate	24	80	40	80				224	$ 27,280
Middle School SW System, storm sewer capacity, South Wayne Parking Lot capacity, etc.								0	$ -
Neighborhood street bypass/storage opportunities in general								0	$ -
Potential Floodplain capacity								0	$ -
On-lot reduction opportunities								0	$ -
Localized controlled flooding opportunities								0	$ -
GI opportunities								0	$ -
Implementation Recommendations with Phasing	8	24		16				48	$ 6,320
								0	$ -
Mtg with Township								0	$ -
Mtg with SWMAC								0	$ -
Mtg with Community and residents (6)								0	$ -
BOC Mtg								0	$ -
								0	$ -
Refined Concept Opportunities and Costs Hours	32	104	40	96	0	0	0	272	
Refined Concept Opportunities and Costs Total	$ 6,240	$ 14,040	$ 4,200	$ 9,120	$ -	$ -	$ -		$ 33,600
6 Public Communication									
								0	$ -
Mtg with Township (4)	24	32						56	$ 9,000
Mtg with SWMAC (2)	8	8						16	$ 2,640
Mtg with Community and residents (10)	20	40	50	20				130	$ 16,450
BOC Mtg (2)	6	6						12	$ 1,980
								0	$ -
Includes preparation of material for meetings								0	$ -
								0	$ -
Public Communication Hours	58	86	50	20	0	0	0	214	
Public Communication Total	$ 11,310	$ 11,610	$ 5,250	$ 1,900	$ -	$ -	$ -		$ 30,070

Midland Avenue Flood Reduction Options
Mellora Detailed Fee Estimate
Prepared for Radnor Township
July 10, 2018

Mellora Design - Fee Estimate - Detailed

Title	Principal	Senior Engineer	Landscape Architect	Water Resources Designer	Water Resources Designer	Technical Aide	Cad Technician	Total Hours	Total Fee
Billing Rate	$195.00	$135.00	$105.00	$95.00	$95.00	$100.00	$85.00		
7 Construction Documents									
South Wayne Parking Bid Documents including Existing Conditions, E&S Plan, Site Plan, Grading, Stormwater, Lighting, Landscape Plan	16	160	60	120				356	$ 42,420
Specifications								0	$ -
Permit Submissions								0	$ -
								0	$ -
BoC Presentations (2)	8	8						16	$ 2,640
								0	$ -
Twp Meetings (2)	8	8						16	$ 2,640
								0	$ -
Construction Documents Hours	32	176	60	120	0	0	0	388	
Construction Documents Total	$ 6,240	$ 23,760	$ 6,300	$ 11,400	$ -	$ -	$ -		$ 47,700
Project Hours Total	150	550	150	472	36	0	16	1,374	
Project Labor Total	$ 29,250	$ 74,250	$ 15,750	$ 44,840	$ 3,420	$ -	$ 1,360		$ 168,870
Reimbursables									
Expense Estimated at 4% of fee (includes mileage, printing, etc.)									$ 6,790
Subconsultants									
Survey for Cross-sections and constraints									$ 15,000
N/A									$ -
N/A									$ -
Subconsultants Subtotal									$ 15,000
Total Fee									$ 190,660

PROJECT INFORMATION:
FILE PATH: G:\Projects\RADN\00011\Plans\
FILE NAME: RADN00011_SHTD1_CVR.dwg
LAST SAVED DATE AND TIME: 11 May 2018, 2:55PM
LAST SAVE BY: dkstrik

PLANS FOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR
DELAWARE COUNTY, PENNSYLVANIA

CONTRACT No. XXXXXXX

UTILITY OWNERS

RADNOR TOWNSHIP
STREET
TOWNSHIP, STATE ZIP
ATTN: XXXXXXXXX (XXX) XXX-XXXX

SEPTA
STREET
TOWNSHIP, STATE ZIP
ATTN: XXXXXXXXX (XXX) XXX-XXXX

LOCATION OF UTILITIES SHOWN ON THESE PLANS ARE NOT WARRANTED AS TO EXACTNESS. CONTRACTOR SHALL DETERMINE EXACT LOCATION AND DEPTH OF UTILITIES PRIOR TO CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND OTHER APPLICABLE LAWS.

811
Know what's below.
Call before you dig.

KEY MAP

100' 50' 0 100' 200'
1" = 100'

INDEX

PREPARED BY
RICHARD A YOUNG
P.E.

T AND M
YOUR GOALS. OUR MISSION.
74 WEST BROAD STREET, STE 530
BETHLEHEM, PA 18018
TEL 610-625-2999
FAX 610-625-2969
www.tandmassociates.com

STANDARD LEGEND

EXISTING	PROPOSED	
		NORTH ARROW
		STORM PIPE
		CHAINLINK FENCE
		MINOR CONTOUR
		MAJOR CONTOUR
	OHU — OHU	OVERHEAD UTILITY
		BUILDING FOOTPRINT
	LOD	LIMIT OF DISTURBANCE
	X — X — X	CONSTRUCTION FENCE
		18" SILT FENCE
		8" COMPOST FILTER SOCK

SYMBOLS

EXISTING

PROPOSED

- MANHOLE (TYPE INDICATED)
- MANHOLE COVER
- INLET BOX (TYPE INDICATED)

ABBREVIATIONS:

ADA	AMERICANS WITH DISABILITIES ACT	LP	LOW POINT
AGG.	AGGREGATE	LS	LUMP SUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE		
APPROX.	APPROXIMATE, APPROXIMATELY	MAX	MAXIMUM
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	MH	MANHOLE
AVG.	AVERAGE	MIN	MINIMUM
BM	BENCHMARK	N	NORTH
		NAD	NORTH AMERICAN DATUM
C	CUT	NAVD	NORTH AMERICAN VERTICAL DATUM
CC, C TO C	CENTER-TO-CENTER	NE	NORTHEAST
CF	CUBIC FEET	NGVD	NATIONAL GEODETIC VERTICAL DATUM
CFS	CUBIC FEET PER SECOND	NTS	NOT TO SCALE
CIP	CAST IN PLACE, CAST IRON PIPE	NW	NORTHWEST
CLF	CHAIN LINK FENCE		
CMP	CORRUGATED METAL PIPE	OC	ON CENTER
CONC	CONCRETE		
COV.	COVER	PE	PROFESSIONAL ENGINEER
CY	CUBIC YARDS	PROP	PROPOSED
		PSF	POUNDS PER SQUARE FOOT
PADEP	PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION	PSI	POUNDS PER SQUARE INCH
DIA	DIAMETER		
PennDOT	PENNSYLVANIA DEPARTMENT OF TRANSPORTATION	S	SOUTH
		S.C.F.	SEDIMENT CONTROL FENCE
E	EAST	DCCD	DELAWARE COUNTY CONSERVATION DISTRICT
EL, ELEV	ELEVATION	SE	SOUTHEAST
EX, EXIST	EXISTING	SF	SQUARE FEET
		SHT	SHEET
F	FILL	SQ	SQUARE
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY	SW	SOUTHWEST
		SY	SQUARE YARDS
GPS	GLOBAL POSITIONING SYSTEM		
GR, GRT	GRATE	TBA	TO BE ABANDONED
GRD	GRADE, GRADED	TBR	TO BE REMOVED
		TEMP	TEMPORARY
HDS	HYDRODYNAMIC SEPARATOR	TG	TOP OF GRATE
HDPEP	HIGH DENSITY POLYETHYLENE PIPE	THK	THICK
HP	HIGH POINT	TYP	TYPICAL
IN.	INCHES	UP	UTILITY POLE
INV	INVERT		
		VAR	VARIES, VARIABLE
LF	LINEAL FEET		
LOD	LIMIT OF DISTURBANCE	W	WEST

Pennsylvania811

ATTENTION ALL CONTRACTORS: LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM UTILITY COMPANY RECORDS AND/OR ABOVE-GROUND INSPECTION OF THE SITE COMPLETENESS OR ACCURACY OF TYPE, SIZE, DEPTH OR HORIZONTAL LOCATION OF UNDERGROUND FACILITIES OR STRUCTURES CANNOT BE GUARANTEED. PURSUANT TO REQUIREMENTS OF PENNSYLVANIA LEGISLATIVE ACT NUMBER 287 OF 1974 AS AMENDED BY ACT 121 OF 2008, CONTRACTORS MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO START OF WORK. SERIAL NO. 20173242717-000 WAS PLACED FOR DESIGN PURPOSES ON NOVEMBER 20,2017.

GENERAL NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW ALL OF THE DRAWINGS, SPECIFICATIONS, AND REFERENCED DOCUMENTS ASSOCIATED WITH THE PROJECT WORK SCOPE PRIOR TO THE INITIATION OF CONSTRUCTION. SHOULD THE CONTRACTOR FIND A CONFLICT WITH THE DRAWINGS AND DOCUMENTS RELATIVE TO THE SPECIFICATIONS OR APPLICABLE CODES, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE PROJECT ENGINEER OF RECORD IN WRITING PRIOR TO THE START OF CONSTRUCTION. FAILURE BY THE CONTRACTOR TO NOTIFY THE PROJECT ENGINEER SHALL CONSTITUTE THE SCOPE OF WORK AS DEFINED BY THE DRAWINGS, SPECIFICATIONS, AND REFERENCED DOCUMENTS IN FULL COMPLIANCE WITH LOCAL REGULATIONS AND CODES.
2. ATTENTION ALL CONTRACTORS: LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM UTILITY COMPANY RECORDS AND/OR ABOVEGROUND INSPECTION OF THE SITE. COMPLETENESS OR ACCURACY OF TYPE, SIZE, DEPTH OR HORIZONTAL AND VERTICAL LOCATION OF UNDERGROUND FACILITIES OR STRUCTURES CANNOT BE GUARANTEED. PURSUANT TO REQUIREMENTS OF THE PENNSYLVANIA LEGISLATIVE ACT NUMBER 287 OF 1974, AS AMENDED BY ACT 181 OF 2006, CONTRACTORS MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO START OF WORK. PA LAW REQUIRES THREE WORKING DAYS NOTICE FOR CONSTRUCTION PHASE. CALL THE PA ONE CALL SYSTEM AT 1-800-242-1776. SERIAL NO. 20173242717 WAS PLACED FOR SURVEY AND DESIGN PURPOSES ONLY.
3. PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED. NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED ALL PLANS AND OTHER DOCUMENTS BY ALL OF THE PERMITTING AUTHORITIES.
4. ALL MATERIALS, PLANS, SPECIFICATIONS, AND REPORTS REFERENCED ARE TO BE CONSIDERED PART OF THE DESIGN DOCUMENTS. THE GENERAL CONTRACTOR IS RESPONSIBLE TO REVIEW ALL DOCUMENTS AND SHALL NOTIFY THE ENGINEER IMMEDIATELY IN WRITING IF ANY CONFLICTS OR DISCREPANCIES ARE DISCOVERED.
5. CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH PENNDOT "PUBLICATION 408", LATEST EDITION, AND MUNICIPAL STANDARDS AND SPECIFICATIONS, WHICHEVER IS MORE RESTRICTIVE.
6. STRUCTURAL DESIGN CALCULATIONS AND CONSTRUCTION DETAILS OF PROPOSED RETAINING WALL(S) SHALL BE SUBMITTED TO AND APPROVED BY THE MUNICIPALITY PRIOR TO CONSTRUCTION.
7. CONTRACTOR SHALL FURNISH AND INSTALL ALL ITEMS AND COMPLETE ALL WORK INDICATED OR IMPLIED ON THE PROJECT PLANS AND/OR SPECIFICATIONS THAT ARE NOT EXISTING ON THE PROJECT SITE AND THAT ARE NOT SPECIFICALLY NOTED AS 'FUTURE' OR 'NOT IN CONTRACT (NIC)', 'BY OTHERS', OR 'BY OTHER CONTRACTORS'.
8. RADNOR TOWNSHIP SHALL MAINTAIN OWNERSHIP OF AND BE RESPONSIBLE FOR THE MAINTENANCE OF THE STORM SEWER SYSTEM, HYDRODYNAMIC SEPARATORS, AND DETENTION FACILITY.
9. THE OWNER/CONTRACTOR SHALL BE FAMILIAR WITH AND RESPONSIBLE FOR ANY/ALL CERTIFICATIONS, INSPECTIONS, ETC. REQUIRED BY ALL GOVERNING JURISDICTIONAL AGENCIES DURING AND AFTER CONSTRUCTION FOR SIGN-OFF AND CERTIFICATE OF OCCUPANCY ISSUANCE INCLUDING BUT NOT LIMITED TO PROCUREMENT OF SERVICES, SCHEDULING OF FIELD OBSERVATIONS AND COORDINATION WITH REPRESENTATIVES OF THE APPROPRIATE PARTIES. CONTRACTOR IS RESPONSIBLE TO COORDINATE CERTIFICATIONS, SIGN-OFFS, ETC. NECESSARY FOR JOB CLOSEOUT AND ISSUANCE OF CERTIFICATE OF OCCUPANCY.
10. THESE PLANS ARE BASED ON INFORMATION PROVIDED TO OUR OFFICE AT THE TIME OF PLAN PREPARATION. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND NOTIFY THE ENGINEER IN WRITING IF ACTUAL SITE CONDITIONS DIFFER FROM THAT SHOWN ON THE PLAN, OR IF THE PROPOSED WORK WOULD BE INHIBITED BY ANY OTHER EXISTING SITE FEATURES.
11. ALL DIMENSIONS SHOWN ON THE PLANS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER IN WRITING IF ANY DISCREPANCIES EXIST PRIOR TO PROCEEDING WITH CONSTRUCTION. NO EXTRA COMPENSATION SHALL BE PAID TO THE CONTRACTOR FOR WORK HAVING TO BE REDONE DUE TO DIMENSIONS OR GRADES SHOWN INCORRECTLY ON THE PLANS IF SUCH NOTIFICATION HAS NOT BEEN GIVEN.
12. DEBRIS SHALL NOT BE BURIED ON THE SUBJECT SITE. ALL EXCAVATED MATERIAL AND DEBRIS (SOLID WASTE) SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL TOWN, COUNTY, STATE AND FEDERAL LAWS AND APPLICABLE CODES. CONTRACTOR SHALL PROPERLY REMOVE AND DISPOSE OF HAZARDOUS/UNSUITABLE MATERIAL OFF-SITE IN ACCORDANCE WITH ALL APPLICABLE CODES, ORDINANCES AND LAWS.
13. THE CONTRACTOR IS RESPONSIBLE FOR ALL SHORING REQUIRED DURING EXCAVATION AND SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT OSHA STANDARDS, AS WELL AS ADDITIONAL PROVISIONS TO ASSURE STABILITY OF CONTIGUOUS STRUCTURES, AS FIELD CONDITIONS DICTATE.
14. THE CONTRACTOR IS TO EXERCISE CARE WHEN PERFORMING WORK ACTIVITIES ADJACENT TO PAVEMENT, STRUCTURES AND FACILITIES THAT ARE TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING THE APPROPRIATE MEASURES AS NECESSARY TO ENSURE THE STRUCTURAL STABILITY OF SIDEWALKS AND PAVEMENT TO REMAIN, AND PROVIDE A SAFE WORK AREA.
15. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE DONE TO EXISTING ITEMS DURING CONSTRUCTION SUCH AS BUT NOT LIMITED TO DRAINAGE, UTILITIES, PAVEMENT, STRIPING, CURB, SIDEWALK, ETC. REPAIR SHALL BE EQUAL TO OR BETTER THAN EXISTING CONDITIONS. CONTRACTOR IS RESPONSIBLE TO PROVIDE DOCUMENTATION OF THE CONDITION OF EXISTING ITEMS TO THE OWNER'S DESIGNATED REPRESENTATIVE PRIOR TO CONSTRUCTION START.
16. CONCRETE SHALL HAVE THE MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS AS INDICATED IN SPECIFICATIONS AND REFERENCE DOCUMENTS UNLESS OTHERWISE NOTED ON THE PLANS, DETAILS AND/OR GEOTECHNICAL REPORT.
17. THE ENGINEER IS NOT RESPONSIBLE FOR CONSTRUCTION METHODS/MEANS FOR COMPLETION OF THE WORK DEPICTED ON THESE PLANS NOR ANY CONFLICTS/SCOPE REVISIONS WHICH RESULT FROM THE SAME. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING METHODS/MEANS FOR COMPLETION OF THE WORK PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND NOTIFICATION OF OWNER AND ENGINEER OF RECORD IN WRITING WHEN A CONFLICT IS IDENTIFIED.
18. PERMANENT REMOVAL OF TOPSOIL FROM ANY PARCEL OF LAND SHALL BE PROHIBITED EXCEPT AS FOLLOWS:
    - 18.1. DURING ACTUAL CONSTRUCTION ON PREMISES, THAT PORTION OF THE TOPSOIL PRESENT WHICH COVERS AN AREA TO BE OCCUPIED BY PERMANENT STRUCTURES OR PERMANENTLY LOCATED MATERIALS OF AN IMPERVIOUS NATURE.
    - 18.2. DURING RE-GRADING OPERATIONS CONDUCTED UPON PREMISES, WHETHER OR NOT CARRIED ON IN CONJUNCTION WITH ON-SITE CONSTRUCTION, EXCESS TOPSOIL REMAINING AFTER RESTORING PROPER TOPSOIL COVER (AT LEAST TWELVE (12) INCHES) TO THE AREAS OF THE PARCEL UPON WHICH REGRADING OPERATIONS WERE CONDUCTED.
19. NEITHER THE PROFESSIONAL ACTIVITIES OF T&M ASSOCIATES NOR THE PRESENCE OF T&M ASSOCIATES OR ITS EMPLOYEES AND SUB-CONSULTANTS AT A CONSTRUCTION/PROJECT SITE, SHALL RELIEVE THE CONTRACTOR OF ITS OBLIGATIONS, DUTIES AND RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION MEANS, METHODS, SEQUENCE, TECHNIQUES OR PROCEDURES NECESSARY FOR PERFORMING, SUPERINTENDING AND COORDINATING THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ANY HEALTH OR SAFETY PRECAUTIONS REQUIRED BY ANY REGULATORY AGENCIES. T&M ASSOCIATES AND ITS PERSONNEL HAVE NO AUTHORITY TO EXERCISE CONTROL OVER THE CONSTRUCTION CONTRACTOR OR ITS EMPLOYEES IN CONNECTION WITH THEIR WORK OR HEALTH OR SAFETY PROGRAMS OR PROCEDURES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR JOB SITE SAFETY. THE ENGINEER OF RECORD HEREIN IS NOT RESPONSIBLE FOR JOB SITE SAFETY NOR HAS HE BEEN RETAINED FOR SUCH PURPOSES. T&M ASSOCIATES SHALL BE INDEMNIFIED BY THE CONTRACTOR AND SHALL BE MADE AN ADDITIONAL INSURED UNDER THE CONTRACTOR'S POLICIES OF GENERAL LIABILITY INSURANCE.
20. T&M ASSOCIATES SHALL REVIEW AND COMMENT OR TAKE OTHER APPROPRIATE ACTION ON THE CONTRACTOR SUBMITTALS, SUCH AS SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND OTHER DATA, WHICH THE CONTRACTOR IS REQUIRED TO SUBMIT, BUT ONLY FOR THE LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH THE DESIGN CONCEPT AND THE INFORMATION SHOWN IN THE CONSTRUCTION MEANS OR METHODS. COORDINATION OF THE WORK WITH OTHER TRADES AND CONSTRUCTION SAFETY PRECAUTIONS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. T&M ASSOCIATES REVIEW SHALL BE CONDUCTED WITH REASONABLE PROMPTNESS WHILE ALLOWING SUFFICIENT TIME TO PERMIT ADEQUATE REVIEW. REVIEW OF A SPECIFIC ITEM SHALL NOT INDICATE THAT T&M ASSOCIATES HAS REVIEWED THE ENTIRE ASSEMBLY OF WHICH THE ITEM IS A COMPONENT. T&M ASSOCIATES SHALL NOT BE RESPONSIBLE FOR ANY DEVIATIONS FROM THE CONSTRUCTION DOCUMENTS NOT BROUGHT TO THE ATTENTION OF T&M ASSOCIATES IN WRITING BY THE CONTRACTOR. T&M ASSOCIATES SHALL NOT BE REQUIRED TO REVIEW PARTIAL SUBMISSIONS OR THOSE FOR WHICH SUBMISSIONS OR CORRELATED ITEMS HAVE NOT BEEN RECEIVED.
21. SEE GRADING, SITE, UTILITY, AND SOIL EROSION AND SEDIMENT CONTROL PLANS FOR ADDITIONAL NOTES.

EXISTING DATA SOURCES

1. SURVEY DATA:
   - 1.1. TOPOGRAPHIC FEATURES SHOWN FROM ACTUAL FIELD SURVEY BY ASH ASSOCIATES COMPLETED NOVEMBER 2, 2017 AND IS LIMITED TO SHOWING FEATURES OF INTEREST ONLY.
   - 1.2. VERTICAL DATUM IS NAVD 1988 AND ESTABLISHED BY GPS OBSERVATIONS REFERENCED TO THE NGS CORS NETWORK. SITE BENCHMARK IS A CAPPED METAL SPIKE SET AS SHOWN. SITE BM ELEVATION = 388.17'.
   - 1.3. THIS PLAN DOES NOT SHOW PROPERTY INFORMATION AND WAS MADE AS PER INSTRUCTIONS OF APPLICANT, WITHOUT THE BENEFIT OF A TITLE REPORT. OTHER RIGHTS TO PROPERTY MAY EXIST.
   - 1.4. THIS PLAN DOES NOT SHOW ENVIRONMENTAL HAZARDS, OR ARCHEOLOGICAL SITES.
   - 1.5. THE COORDINATED SYSTEM UTILIZED FOR THIS PLAN IS THE PENNSYLVANIA STATE PLANE COORDINATE SYSTEM NORTH AMERICAN DATUM OF 1983 - SOUTH ZONE.
2. WETLANDS / WATERS OF THIS COMMONWEALTH / WATERS OF THE UNITED STATES:
   - 2.1. AN ON-SITE INVESTIGATION WAS PERFORMED BY T&M ASSOCIATES IN FEBRUARY 2018 TO EVALUATE THE SITE FOR THE PRESENCE OF FRESHWATER WETLANDS, WATERS OF THIS COMMONWEALTH, AND/OR WATERS OF THE UNITED STATES. BASED UPON THIS INVESTIGATION, IT HAS BEEN DETERMINED THAT NO WETLANDS OR WATERS OF THE UNITED STATES EXIST ON SITE. ONSITE WATERS OF THIS COMMONWEALTH INCLUDE EXISTING STORM SEWERS AND SWALES.
3. FLOODPLAINS:
   - 3.1. ENTIRE SITE IS LOCATED IN FLOOD ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. PER FEMA FLOOD INSURANCE RATE MAP (FIRM) OF DELAWARE COUNTY, PANEL 17 OF 250, MAP # 42045C0017F, REVISED NOVEMBER 18, 2009.
4. GEOLOGIC FORMATIONS:
   - 4.1. AS DERIVED FROM HTTP://WWW.DEPGIS.STATE.PA.US/EMAPPA/ IN MARCH 2018, THE SUBJECT TRACT HAS BEEN DETERMINED TO CONTAIN THE FOLLOWING FORMATIONS:

     Cch - CHICKIES FORMATION
     mgp - MAFIC GNEISS
5. SOILS:
   - 5.1. SOILS DATA SHOWN HEREON TAKEN FROM THE SOIL SURVEY GEOGRAPHIC (SSURGO) DATABASE FOR DELAWARE COUNTY, PENNSYLVANIA, AS PREPARED FOR THE U.S. DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, DATED NOVEMBER 27, 2017. THE ONLY SOIL ON-SITE IS:

     Ma - MADE LAND, SCHIST AND GNEISS MATERIALS - HYDROLOGIC SOIL GROUP "C"
6. EXISTING UNDERGROUND DETENTION BASIN
   - 6.1. THE LOCATION AND EXTENTS OF THE EXISTING UNDERGROUND BASIN ARE BASED ON DESIGN PLANS TITLED "NORTH WAYNE AVENUE PARL" BY PENNONI ASSOCIATES INC. DATED JULY, 1998.
   - 6.2. ACTUAL LOCATION, EXTENTS, AND LAYOUT OF THE EXISTING UNDERGROUND DETENTION BASIN SHALL BE FIELD VERIFIED BY THE CONTRACTOR

PA ONE-CALL RESPONSES

PA ONE-CALL SERIAL NUMBER 20173242717-000 WAS PLACED ON NOVEMBER 20, 2017 FOR SURVEY AND DESIGN.
UTILITY COMPANY RESPONSES ARE AS FOLLOWS:

UTILITY RESPONSE	
AMERIGAS PROPANE	DID NOT RESPOND
AT&T ATLANTA	DID NOT RESPOND
AQUA PA	DID NOT RESPOND
COMCAST CABLE COMMUNICATIONS INC	DID NOT RESPOND
PENNSYLVANIA ELEC CO (OD)	DID NOT RESPOND
LEVEL 3 COMMUNICATIONS	DID NOT RESPOND
MCI	DID NOT RESPOND
XO COMMUNICATIONS	DID NOT RESPOND
SEPTA	DID NOT RESPOND
VERIZON EASTERN	CLEAR- NO FACILITIES
RADNOR TOWNSHIP	DID NOT RESPOND

GENERAL DEMOLITION NOTES

1. ALL DEMOLITION ACTIVITIES ARE TO BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS AS WELL AS ALL FEDERAL, STATE AND LOCAL REGULATIONS. ANY DISCREPANCIES OR DEVIATIONS IDENTIFIED BY THE CONTRACTOR SHALL BE REPORTED TO THE ENGINEER IN WRITING FOR RESOLUTION PRIOR TO INITIATION OF ACTIVITY.
2. THE FIRM OR ENGINEER OF RECORD IS NOT RESPONSIBLE FOR JOB SITE SAFETY OR SUPERVISION. CONTRACTOR IS TO PROCEED WITH THE DEMOLITION IN A SYSTEMATIC AND SAFE MANNER, FOLLOWING ALL THE OSHA REQUIREMENTS AND OTHER FEDERAL, STATE, AND LOCAL REGULATIONS, TO ENSURE THE PUBLIC AND CONTRACTOR SAFETY.
3. PRIOR TO STARTING ANY DEMOLITION CONTRACTOR IS RESPONSIBLE FOR/TO:
   - 3.1. ENSURE COPIES OF ALL PERMITS AND APPROVALS ARE ON SITE FOR REVIEW.
   - 3.2. THE REQUIRED SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO SITE DISTURBANCE.
   - 3.3. ALL EXISTING UTILITIES AND SERVICES, INCLUDING BUT NOT LIMITED TO GAS, WATER, ELECTRIC, SANITARY AND STORM SEWER, TELEPHONE, CABLE, FIBER OPTIC CABLE, ETC. WITHIN THE LIMITS OF DISTURBANCE, SHALL BE VERTICALLY AND HORIZONTALLY LOCATED. THE CONTRACTOR SHALL USE AND COMPLY WITH THE REQUIREMENTS OF THE APPLICABLE UTILITY NOTIFICATION SYSTEM TO LOCATE ALL THE UNDERGROUND UTILITIES.
   - 3.4. PROTECT AND MAINTAIN IN OPERATION, ALL ACTIVE SYSTEMS THAT ARE NOT BEING REMOVED DURING DEMOLITION ACTIVITIES.
   - 3.5. FAMILIARIZE THEMSELVES WITH THE APPLICABLE UTILITY SERVICE PROVIDER REQUIREMENTS AND IS RESPONSIBLE FOR ALL COORDINATION REGARDING UTILITY DEMOLITION AND RELOCATION AS IDENTIFIED OR REQUIRED FOR PROJECT. THE CONTRACTOR SHALL PROVIDE THE OWNER WRITTEN NOTIFICATION THAT THE EXISTING UTILITIES AND SERVICES HAVE BEEN TERMINATED AND ABANDONED IN ACCORDANCE WITH JURISDICTION AND UTILITY COMPANY REQUIREMENTS.
   - 3.6. COORDINATE WITH UTILITY COMPANIES REGARDING WORKING "OFF-PEAK" HOURS OR ON WEEKENDS AS MAY BE REQUIRED TO MINIMIZE THE IMPACT OF THE AFFECTED PARTIES.
   - 3.7. A COMPLETE INSPECTION FOR CONTAMINANTS, BY A LICENSED ENVIRONMENTAL TESTING AGENCY, OF ALL BUILDINGS AND/OR STRUCTURES TO BE REMOVED SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL ENVIRONMENTAL REGULATIONS. ALL CONTAMINANTS SHALL BE REMOVED AND DISPOSED OF BY A FEDERALLY LICENSED CONTRACTOR IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. ALL ENVIRONMENTAL WORK INCLUDING HAZARDOUS MATERIAL, SOILS, ASBESTOS, OR OTHER REFERENCED OR IMPLIED HEREIN IS SOLELY THE RESPONSIBILITY OF THE OWNER'S ENVIRONMENTAL CONSULTANT.
4. THE CONTRACTOR SHALL PROVIDE ALL THE "MEANS AND METHODS" NECESSARY TO PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF EXISTING STRUCTURES AND ANY OTHER IMPROVEMENTS TO REMAIN ON OR OFF SITE.
5. IN ABSENCE OF SPECIFIC SPECIFICATION, THE CONTRACTOR SHALL PERFORM EARTH MOVING ACTIVITIES, DEMOLITION AND REMOVAL OF ALL FOUNDATION WALLS, FOOTINGS, AND OTHER MATERIALS WITHIN THE LIMITS OF DISTURBANCE IN ACCORDANCE WITH DIRECTION BY OWNER'S GEOTECHNICAL ENGINEER.
6. EXPLOSIVES SHALL NOT BE USED WITHOUT PRIOR WRITTEN CONSENT OF BOTH THE OWNER AND APPLICABLE GOVERNMENTAL AUTHORITIES. ALL THE REQUIRED PERMITS AND EXPLOSIVE CONTROL MEASURES THAT ARE REQUIRED BY THE FEDERAL, STATE, AND LOCAL GOVERNMENTS SHALL BE IN PLACE PRIOR TO STARTING AN EXPLOSIVE PROGRAM. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ALL INSPECTION AND SEISMIC VIBRATION TESTING THAT IS REQUIRED TO MONITOR THE EFFECTS ON ALL LOCAL STRUCTURES.
7. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL AND GENERALLY ACCEPTED SAFE PRACTICES IN CONFORMANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL" AS WELL AS FEDERAL, STATE, AND LOCAL REGULATIONS WHEN DEMOLITION RELATED ACTIVITIES IMPACT ROADWAYS OR ROADWAY RIGHT-OF-WAYS.
8. CONDUCT DEMOLITION ACTIVITIES IN SUCH A MANNER TO ENSURE MINIMUM INTERFERENCE WITH ROADS, STREETS, SIDEWALKS, WALKWAYS, AND OTHER ADJACENT FACILITIES. STREET CLOSURE PERMITS MUST BE RECEIVED FROM THE APPROPRIATE GOVERNMENTAL AUTHORITY.
9. DEMOLITION ACTIVITIES AND EQUIPMENT SHALL NOT USE AREAS OUTSIDE THE DEFINED PROPERTY LINES, WITHOUT WRITTEN PERMISSION OF THE OWNER, AND/OR APPROPRIATE GOVERNMENT AGENCY.
10. USE DUST CONTROL MEASURES TO LIMIT THE AMOUNT OF AIRBORNE DUST AND DIRT RISING AND SCATTERING IN THE AIR TO WITHIN FEDERAL, STATE, AND/OR LOCAL STANDARDS. AFTER THE DEMOLITION IS COMPLETE, ADJACENT STRUCTURES AND IMPROVEMENTS SHALL BE CLEANED OF ALL DUST AND DEBRIS CAUSED BY THE DEMOLITION OPERATIONS. THE CONTRACTOR IS RESPONSIBLE FOR RETURNING ALL ADJACENT AREAS TO THEIR "PRE-DEMOLITION" CONDITION.
11. CONTRACTOR IS RESPONSIBLE TO SAFEGUARD SITE AS NECESSARY TO PERFORM THE DEMOLITION IN SUCH A MANNER AS TO PREVENT THE UNAUTHORIZED ENTRY OF PERSONS AT ANY TIME.
12. THIS DEMOLITION PLAN IS INTENDED TO IDENTIFY THOSE EXISTING ITEMS/CONDITIONS WHICH ARE TO BE REMOVED. IT IS NOT INTENDED TO PROVIDE DIRECTION OTHER THAN THAT ALL METHODS AND MEANS ARE TO BE IN ACCORDANCE WITH STATE, FEDERAL, LOCAL, AND JURISDICTIONAL REQUIREMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OSHA AND OTHER SAFETY PRECAUTIONS NECESSARY TO PROVIDE A SAFE WORK SITE.
13. THE DEMOLITION CONTRACTOR IS RESPONSIBLE FOR ALL REPAIRS OF DAMAGE TO ALL ITEMS THAT ARE TO REMAIN AS A RESULT OF HIS ACTIVITIES. ALL REPAIRS SHALL USE NEW MATERIAL. THE REPAIRS SHALL RESTORE THE ITEM TO THE PRE-DEMOLITION CONDITION.
14. DEBRIS SHALL NOT BE BURIED ON THE SUBJECT SITE. ALL EXCAVATED MATERIAL AND DEBRIS (SOLID WASTE) SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL MUNICIPAL, COUNTY, STATE, AND FEDERAL LAWS AND APPLICABLE CODES. CONTRACTOR SHALL PROPERLY REMOVE AND DISPOSE OF HAZARDOUS/UNSUITABLE MATERIAL OFFSITE IN ACCORDANCE WITH ALL APPLICABLE CODES, ORDINANCES, AND LAWS.
15. THE CONTRACTOR SHALL COORDINATE SERVICE SHUTOFF AND DISCONNECT/REMOVAL PROCEDURES WITH EACH RESPECTIVE UTILITY COMPANY FOR THE EXISTING UTILITIES SHOWN TO BE REMOVED.
16. THE DEMOLITION PLAN IS NOT INTENDED TO SHOW EROSION CONTROL MEASURES. FOR SUCH GUIDELINES AND DETAILS, SEE THE EROSION AND SEDIMENT CONTROL PLAN AND DETAILS.

RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

LEGEND AND GENERAL NOTES

T AND M

YOUR GOALS. OUR MISSION.

OFFICES LOCATED IN:
CALIFORNIA, INDIANA, KENTUCKY
MASSACHUSETTS, MICHIGAN, NEW JERSEY
OHIO AND PENNSYLVANIA

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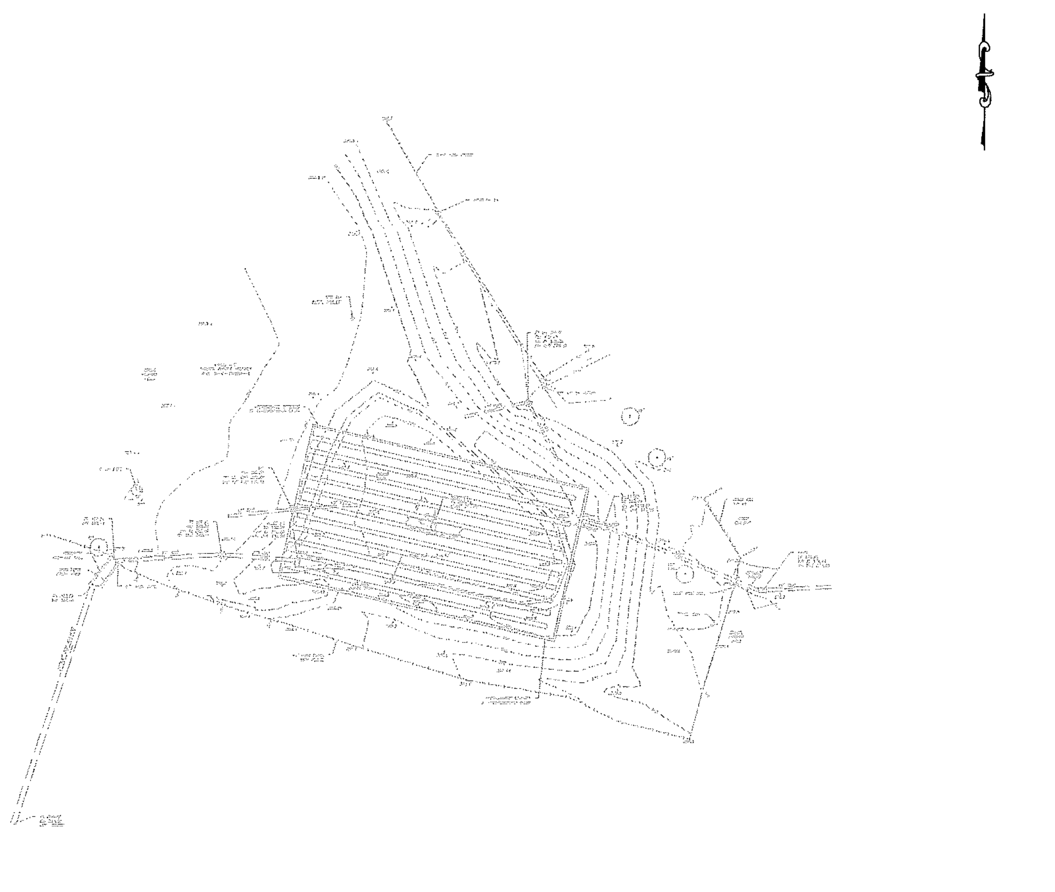

RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No.

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

EXISTING FEATURES PLAN

YOUR GOALS. OUR MISSION.

OFFICES LOCATED IN:
CALIFORNIA, INDIANA, KENTUCKY,
MASSACHUSETTS, MICHIGAN, NEW JERSEY
OHIO AND PENNSYLVANIA

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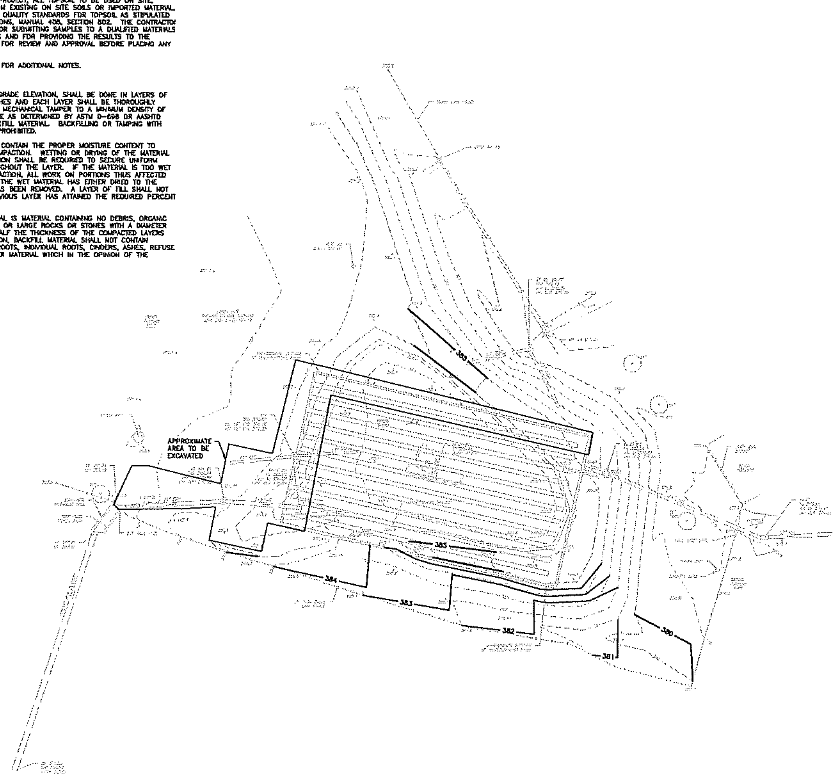
GRADING NOTES

1. VERTICAL DATUM IS NAVD 1988 AND ESTABLISHED BY OBSERVATIONS REFERENCED TO THE NGS CORS NETWORK.
2. THE MINIMUM SLOPE IN GRASSED AREAS SHALL NOT BE LESS THAN 2% AND THE MINIMUM IN PAVED AREAS SHOULD NOT BE LESS THAN 1%.
3. RUNOFF FROM IMPERVIOUS AREAS SHALL NOT BE DIRECTED INTO THE SANITARY SEWER OR ONTO ADJACENT PROPERTIES. WHERE POSSIBLE, RUNOFF SHALL BE DIRECTED TO THE NEAREST PUBLIC RIGHT-OF-WAY OR STORM WATER CONVEYANCE SYSTEM.
4. ALL DEBRIS FROM REMOVAL OPERATIONS SHALL BE REMOVED FROM THE SITE AT THE TIME OF EXCAVATION. STOCKPILING OF DEBRIS WILL NOT BE PERMITTED.
5. IN CASE OF DISCREPANCIES BETWEEN PLANS, THE SITE / RECORD PLAN WILL SUPERSEDE IN ALL CASES. THE ENGINEER OF RECORD MUST BE IMMEDIATELY NOTIFIED IN WRITING OF ANY CONFLICTS.
6. THE CONTRACTOR SHALL BE REQUIRED TO SECURE ALL NECESSARY PERMITS (INCLUDING DEP, ETC.) FOR ALL OFF-SITE HAUL AND/OR BORROW SITES. CONTRACTOR SHALL SUPPLY A COPY OF APPROVALS TO ENGINEER AND OWNER PRIOR TO INITIATING WORK.
7. EXISTING INLETS AND STORM SEWER SHOWN TO BE FILLED W/DEBRIS SHALL BE CLEANED AND FLUSHED. NEW INLETS AND PIPES SHALL BE CHECKED FOR SILT/DEBRIS AFTER CONSTRUCTION AND FLUSHED/CLEANED IF NECESSARY.
8. DEPTH OF EXISTING UTILITIES IN PORTIONS OF THE SITE ARE UNKNOWN. WHERE EXISTING UTILITIES ARE TO REMAIN AND ARE FOUND TO HAVE INADEQUATE GROUND COVER AFTER FINAL PROPOSED GRADES HAVE BEEN ESTABLISHED, THE DESIGN ENGINEER SHALL BE CONTACTED IMMEDIATELY AND PRIOR TO FURTHER CONSTRUCTION ACTIVITIES IN THE AREA OF SAID CONFLICT.
9. ALL DESIGNERS AND CONTRACTORS UTILIZING THIS PLAN AND THE INFORMATION CONTAINED THEREON ARE CAUTIONED TO COMPLY WITH THE REQUIREMENTS OF PENNSYLVANIA ACT 287. LOCATION OF EXISTING AND PROPOSED UNDERGROUND UTILITIES AND FACILITIES SHOWN ON THE DRAWINGS HAVE BEEN DEVELOPED FROM INFORMATION MADE AVAILABLE. COMPLETENESS AND ACCURACY OF LOCATION AND DEPTH OF UTILITIES AND FACILITIES CANNOT BE GUARANTEED. THE CONTRACTOR IS TO VERIFY THE DEPTH AND LOCATION OF ALL UTILITIES AND FACILITIES BEFORE THE START OF WORK. UTILIZE HAND EXCAVATION AS REQUIRED. WORK IS ALSO TO BE DONE IN ACCORDANCE WITH THE STANDARDS OF THE UTILITY COMPANIES WHOSE FACILITIES ARE IN THE PROXIMITY OF THE WORK. OTHER UTILITIES MAY BE REQUIREMENTS OF PENNSYLVANIA ACT 38 (1991). THE CONTRACTOR SHALL CONTACT THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776, AT LEAST 3 DAYS PRIOR TO EXCAVATION.
10. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE FEDERAL, STATE AND LOCAL CODES, AND ALL REGULATIONS APPURTENANT TO THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970. ALL WORK SHALL BE DONE IN ACCORDANCE WITH PROJECT SPECIFICATIONS INCLUDING CURRENT APPLICABLE STANDARDS AND REQUIREMENTS. WHERE ANY STANDARDS SEEM IN CONFLICT WITH THESE DRAWINGS, NOTIFY THE CONSTRUCTION MANAGER FOR DIRECTION PRIOR TO PROCEEDING WITH WORK.
11. CONTRACTORS SHALL HAVE ALL REQUIRED SUBMITTAL APPROVALS PRIOR TO BEGINNING WORK OR ORDERING MATERIALS.
12. CONTRACTORS SHALL VERIFY ALL DIMENSIONS, INVERTS, ELEVATIONS, AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH THE WORK. VARIATIONS BETWEEN DRAWINGS AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND RESOLVED PRIOR TO PROCEEDING WITH THE WORK.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR SAFETY, PROCEDURES, MEANS AND METHODS, SEQUENCING, AND COORDINATION.
14. ALL WORK SHALL BE PERFORMED BY QUALIFIED, EXPERIENCED PERSONNEL.
15. CONTRACTOR SHALL NOTIFY THE OWNER OF PREEXISTING CONDITIONS OF DETERIORATION IN AREAS OF WORK THAT ARE UNCOVERED OR EXPOSED DURING THE WORK.
16. FIELD CHANGES REQUIRE PRIOR ENGINEERING REVIEW AND WRITTEN CONFIRMATION.
17. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR TO ANY SIDEWALKS, LAWN, TREES, PAVING, AND OTHER IMPROVEMENTS DISTURBED OR DAMAGED BY DEMOLITION ACTIVITIES PROPOSED HEREIN.
18. CONTRACTOR SHALL PROVIDE PROPER TEMPORARY BRACING AND SHORING OF ALL CONSTRUCTION TO REMAIN OR DEMOLITION WORK IN PROGRESS.
19. CONTRACTOR SHALL PROVIDE LAYOUT, LINE AND GRADE UNLESS OTHERWISE NOTED.
20. CONTRACTOR SHALL NOTIFY THE OWNER OF ANY DISCREPANCIES WITHIN THE DRAWINGS, SPECIFICATIONS, CODES OR STANDARDS FOR CORRECTIVE ACTION PRIOR TO START OF WORK.
21. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND PROTECTION OF VEHICULAR AND PEDESTRIAN TRAFFIC. ALL TRAFFIC CONTROL MEASURES SHALL BE IN ACCORDANCE WITH LOCAL, PENNDOT & OSHA REGULATIONS.
22. CONTRACTOR SHALL PROVIDE PROTECTION FOR EXISTING UTILITIES UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL IMMEDIATELY REPAIR ANY UTILITY LINE INTERRUPTION AT NO ADDITIONAL CONTRACT COST. THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION AND SUPPORT FOR ALL UTILITIES EXPOSED DURING THE WORK TO INSURE AGAINST DAMAGE AT NO ADDITIONAL COST.
23. CONTRACTOR SHALL PROVIDE TEMPORARY DEWATERING OF EXCAVATIONS THROUGHOUT THE DURATION OF CONTRACT AT NO ADDITIONAL COST.
24. EXISTING UTILITIES SHOWN ARE BASED ON AVAILABLE DATA. DUE TO THE POTENTIAL LACK OF COMPLETE OR ACCURATE DATA REGARDING EXISTING ONSITE AND OFFSITE UTILITIES, THE CONTRACTOR SHALL ASSESS AVAILABLE DATA, SHALL REQUEST UTILITY COMPANY MARKOUTS, SHALL COORDINATE WITH AFFECTED UTILITY COMPANIES, AND SHALL DIG TEST PITS AT ALL PROPOSED UTILITY CROSSING LOCATIONS SO THAT ELEVATIONS CAN BE TAKEN TO ASSESS POTENTIAL CONFLICTING PIPES/UTILITIES PRIOR TO ANY PROPOSED UTILITY CONSTRUCTION. IF UNEXPECTED UTILITY LOCATIONS OR ELEVATIONS OR PIPE CONFLICTS ARE ENCOUNTERED DURING CONSTRUCTION, OR IF TEST PITS REVEAL POTENTIAL CONFLICT, ENGINEER SHALL BE NOTIFIED SO THAT ELEVATIONS AND LOCATIONS (WHERE NECESSARY) OF AFFECTED UTILITIES CAN BE OBTAINED TO FACILITATE NECESSARY DESIGN ADJUSTMENTS.
25. REMOVAL OF EXISTING UTILITIES SHALL BE COORDINATED WITH RADNOR TOWNSHIP AND APPROPRIATE UTILITY COMPANIES.
26. UNLESS SPECIFIED ELSEWHERE IN THE PLANS OR A MANUAL OF TECHNICAL SPECIFICATIONS FOR THE PROJECT, ALL TOPSOIL TO BE USED ON SITE, WHETHER STOCKPILED FROM EXISTING ON SITE SOILS OR IMPORTED MATERIAL, SHALL MEET THE MINIMUM QUALITY STANDARDS FOR TOPSOIL AS STIPULATED IN THE PADOT SPECIFICATIONS, MANUAL 408, SECTION 802. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING SAMPLES TO A QUALIFIED MATERIALS LABORATORY FOR ANALYSIS AND FOR PROVIDING THE RESULTS TO THE OWNER'S REPRESENTATIVE FOR REVIEW AND APPROVAL BEFORE PLACING ANY TOPSOIL.
27. REFER TO THE SITE PLAN FOR ADDITIONAL NOTES.

PLACEMENT OF FILL NOTES:

1. BACKFILLING, TO THE SUBGRADE ELEVATION, SHALL BE DONE IN LAYERS OF SIX (6) TO EIGHT (8) INCHES AND EACH LAYER SHALL BE THOROUGHLY TAMPED BY AN APPROVED MECHANICAL TAMPER TO A MINIMUM DENSITY OF 95% AT OPTIMUM MOISTURE AS DETERMINED BY ASTM D-698 OR AASHTO T-99 WITH SUITABLE BACKFILL MATERIAL. BACKFILLING OR TAMPING WITH TRENCHING MACHINES IS PROHIBITED.
2. THE FILL MATERIAL SHALL CONTAIN THE PROPER MOISTURE CONTENT TO OBTAIN THE REQUIRED COMPACTION. WETTING OR DRYING OF THE MATERIAL OR ANY OTHER MANIPULATION SHALL BE REQUIRED TO SECURE UNIFORM MOISTURE CONTENT THROUGHOUT THE LAYER. IF THE MATERIAL IS TOO WET TO PERMIT PROPER COMPACTION, ALL WORK ON PORTIONS THUS AFFECTED SHALL BE DELAYED UNTIL THE WET MATERIAL HAS EITHER DRIED TO THE MOISTURE CONTENT OR HAS BEEN REMOVED. A LAYER OF FILL SHALL NOT BE ADDED UNTIL THE PREVIOUS LAYER HAS ATTAINED THE REQUIRED PERCENT COMPACTION.
3. SUITABLE BACKFILL MATERIAL IS MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE ROCKS OR STONES WITH A DIAMETER OF GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED. IN ADDITION, BACKFILL MATERIAL SHALL NOT CONTAIN VEGETATION, MASSES OF ROOTS, INDIVIDUAL ROOTS, CINDERS, ASHES, REFUSE, BOULDERS, AND ANY OTHER MATERIAL WHICH IN THE OPINION OF THE ENGINEER, IS UNSUITABLE.



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NO. | DATE | REVISIONS

RICHARD A YOUNG
P.E.
LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NUM

TOWNSHIP OF RADNOR
NORTH WAYNE BASIN
TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA
90% PROGRESS PLANS
GRADING PLAN

YOUR GOALS. OUR MISSION.

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DATE	
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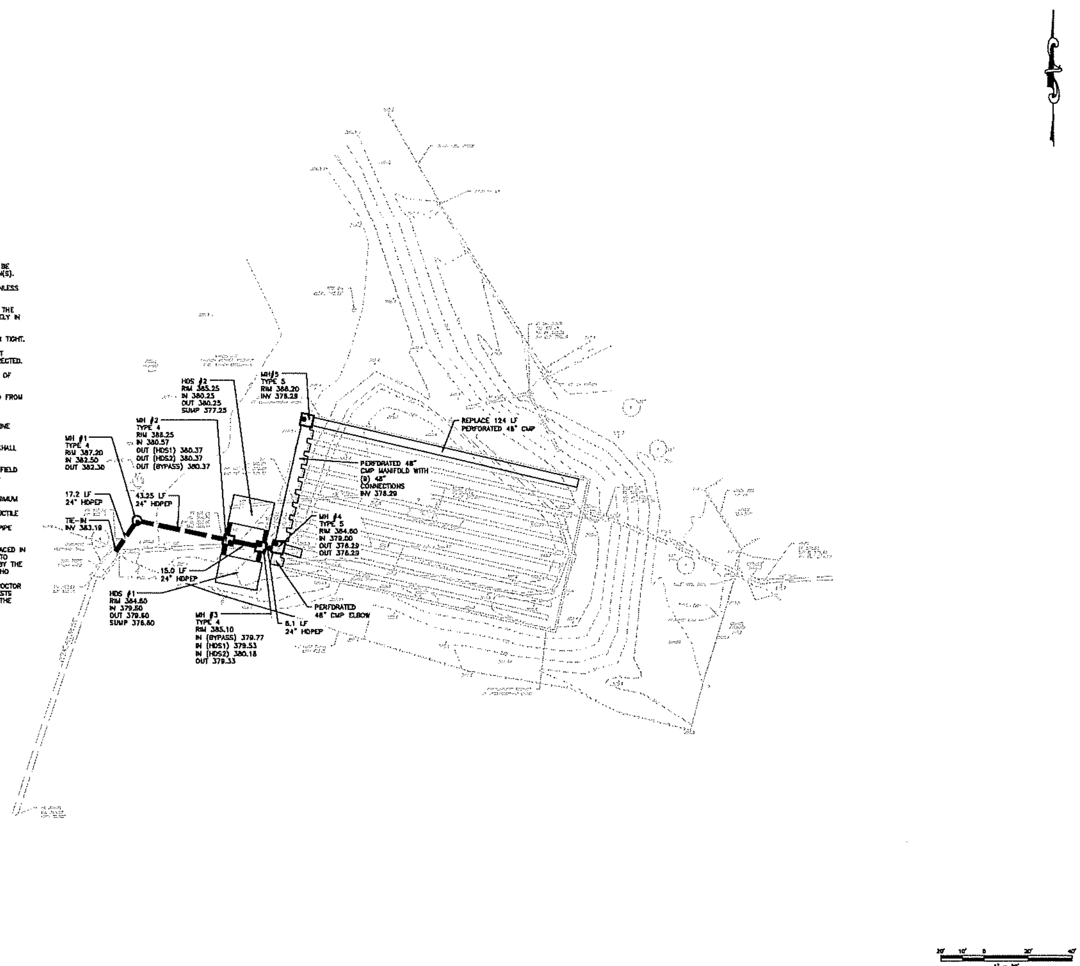
GENERAL UTILITIES NOTES

1. CONSTRUCTION SHALL COMMENCE BEGINNING AT THE LOWEST INVERT (POINT OF CONNECTION) AND PROGRESS UP GRADIENT. PROPOSED INTERFACE POINTS (CROSSINGS) WITH EXISTING UNDERGROUND UTILITIES SHALL BE FIELD VERIFIED BY TEST PIT PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. DEFINE AND LOCATE VERTICALLY AND HORIZONTALLY ALL ACTIVE UTILITY AND/OR SERVICE SYSTEMS THAT ARE NOT TO REMAIN. THE CONTRACTOR IS RESPONSIBLE TO PROTECT AND MAINTAIN ALL ACTIVE SYSTEMS THAT ARE NOT BEING REMOVED/RELOCATED DURING SITE ACTIVITY.
3. SHOULD ANY CHANGE BE PRECIPITATED FROM FIELD CONDITIONS ENCOUNTERED, OR IF ANY CHANGE FROM THE CONSTRUCTION DRAWINGS IS NECESSARY, A CHANGE ORDER REQUEST MUST BE FILED WITH THE TOWNSHIP. THIS CHANGE MAY NOT COMMENCE UNTIL APPROVAL OF THE CHANGE ORDER IS GRANTED.
4. ALL EXISTING UTILITY LINES TO BE ABANDONED SHALL EITHER BE REMOVED, OR FILLED WITH SAND/SMALL STONE AND ADEQUATELY CAPPED/PLUGGED.
5. DEPTH OF EXISTING UTILITIES IN PORTIONS OF THE SITE ARE UNKNOWN. WHERE EXISTING UTILITIES ARE TO REMAIN AND ARE FOUND TO HAVE INADEQUATE GROUND COVER AFTER FINAL PROPOSED GRADES HAVE BEEN ESTABLISHED, THE DESIGN ENGINEER SHALL BE CONTACTED IMMEDIATELY AND PRIOR TO FURTHER CONSTRUCTION ACTIVITIES IN THE AREA OF SAID CONFLICT.

STORM SEWER NOTES

1. THE TOPS OF EXISTING MANHOLES, AND INLET STRUCTURES SHALL BE ADJUSTED, IF REQUIRED, TO MATCH THE GRADING AND UTILITY PLAN(S).
2. ALL STORM CONVEYANCE PIPE SHALL BE SMOOTH LINED HDPEP, UNLESS OTHERWISE SPECIFIED.
3. IF A CONFLICT ARISES DURING THE INSTALLATION OF ANY PART OF THE STORM SEWER SYSTEM THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY IN WRITING.
4. ALL STORM SEWER PIPE JOINTS AND STRUCTURES SHALL BE WATER TIGHT.
5. ALL MANHOLE AND INLET STRUCTURES SHALL BE MADE OF PRECAST CONCRETE, MEETING TOWNSHIP STANDARDS, UNLESS OTHERWISE DIRECTED.
6. ALL DIAGONAL AND BICYCLE SAFETY INLET GRATES SHALL BE MADE OF FABRICATED STEEL.
7. STRUCTURE LOCATION (STATION) AND PIPE LENGTHS ARE MEASURED FROM THE CENTER OF STRUCTURE.
8. LL STORM SEWERS WITH A SLOPE LESS THAN 1.0% ARE TO BE CONSTRUCTED USING A LASER BEAM DEVICE TO ASSURE PROPER LINE AND GRADE, UNLESS OTHERWISE DIRECTED.
9. ALL STORM SEWER STRUCTURES, THAT EXCEED 4 FEET IN DEPTH SHALL BE CONSTRUCTED WITH STEPS PER PENNDOT RC 38M AND 46M.
10. SIZE AND CONFIGURATION OF THE PROPOSED MANIFOLD SHALL BE FIELD MEASURED AND VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS.
11. WHENEVER SEWERS MUST CROSS WATER MAINS OR UTILITIES, A MINIMUM OF 18" OF VERTICAL CLEARANCE MUST BE MAINTAINED. IF NOT ATTAINABLE, A 6" CONCRETE ENCASEMENT MUST BE PROVIDED. DUCTILE IRON PIPE MUST BE UTILIZED AT CROSSINGS WITH CONCRETE ENCASEMENTS. THIS PIPE MUST CONSISTENTLY BE DUCTILE IRON PIPE BETWEEN THE TWO MANHOLES OF THE AFFECTED AREA.
12. ALL DETENTION AND RETENTION BASIN EMBANKMENTS SHALL BE PLACED IN 8 INCH MAXIMUM LIFTS TO A MINIMUM 95% DRY DENSITY. PRIOR TO PROCEEDING TO THE NEXT LIFT, COMPACTION SHALL BE CHECKED BY THE MUNICIPAL ENGINEER OR AN APPROVED GEOTECHNICAL ENGINEER WHO SHALL PROVIDE THE MUNICIPAL ENGINEER WITH A WRITTEN REPORT. COMPACTION TESTS SHALL BE PERFORMED USING THE MODIFIED PROCTOR METHOD IN ACCORDANCE WITH ASTM D-1577-07. COMPACTION TESTS SHALL BE RUN ON THE LEADING AND TRAILING EDGE AS WELL AS THE TOP OF THE BERM.
13. REFER TO GRADING AND SITE PLAN FOR ADDITIONAL NOTES.



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RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NUM

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

UTILITY PLAN

YOUR GOALS. OUR MISSION.

14 WEST BROAD STREET, STE 530
BETHLEHEM, PA 18018
TEL 610-625-2999
FAX 610-625-2946

OFFICES LOCATED IN:
CALIFORNIA INDIANA KENTUCKY
MASSACHUSETTS MICHIGAN NEW JERSEY
OHIO AND PENNSYLVANIA

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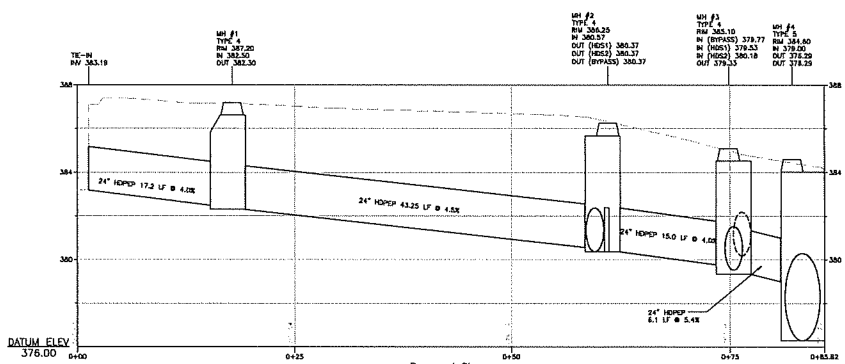

Proposed Storm
TIE-IN TO MH #4

RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No.

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

STORM SEWER PROFILE

YOUR GOALS. OUR MISSION.

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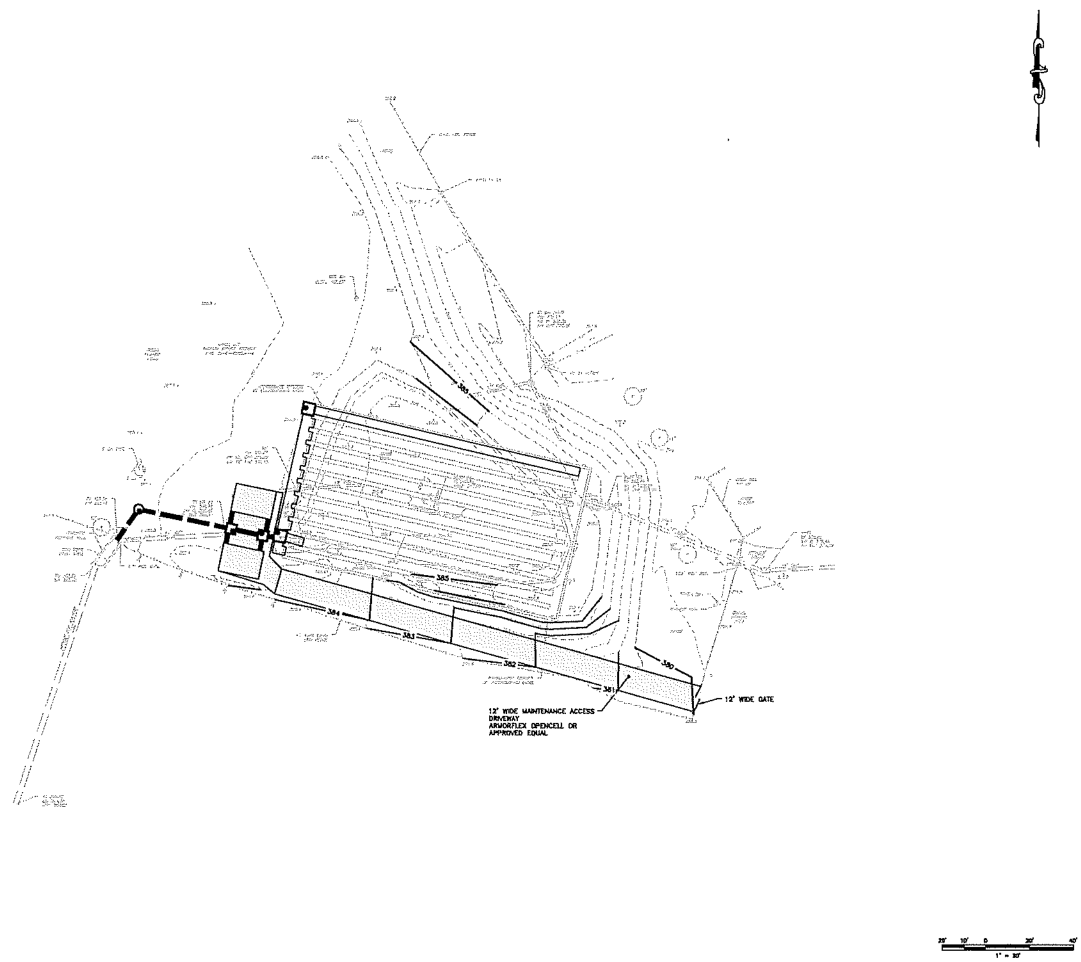

RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_MAJ

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

SITE PLAN

T AND M
YOUR GOALS. OUR MISSION.
74 WEST BROAD STREET, STE 530
BETHLEHEM, PA 18018
TEL 610-625-2999
FAX 610-625-2940

OFFICES LOCATED IN:
CALIFORNIA, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA

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PROJECT INFORMATION:
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CONSTRUCTION SEQUENCE

ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE FOLLOWING SEQUENCE. EACH STAGE SHALL BE COMPLETED BEFORE ANY FOLLOWING STAGE IS INITIATED. CLEARING AND GRUBBING SHALL BE LIMITED ONLY TO THOSE AREAS DESCRIBED IN EACH STAGE.

AT LEAST SEVEN (7) DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, THE OPERATOR SHALL INVITE ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES, THE LAND OWNER, ALL APPROPRIATE MUNICIPAL OFFICIALS, THE EROSION AND SEDIMENT CONTROL PLAN PREPARER AND THE GOVERNING CONSERVATION DISTRICT TO AN ON-SITE PRECONSTRUCTION MEETING.

WHILE EXECUTING THIS PLAN'S SEQUENCE, ALL AREAS, UPON REACHING FINAL GRADE, SHALL BE IMMEDIATELY STABILIZED UNLESS INSTRUCTION TO THE CONTRARY IS SPECIFICALLY PROVIDED. AT NO TIME SHOULD MORE THAN 15,000 SQUARE FEET, WHICH IS TO BE STABILIZED BY VEGETATION, REACH FINAL GRADE WITHOUT BEING SEEDED AND MULCHED. CESSATION OF ACTIVITY FOR 4 DAYS OR LONGER SHALL REQUIRE TEMPORARY STABILIZATION OF ALL DISTURBED AREAS.

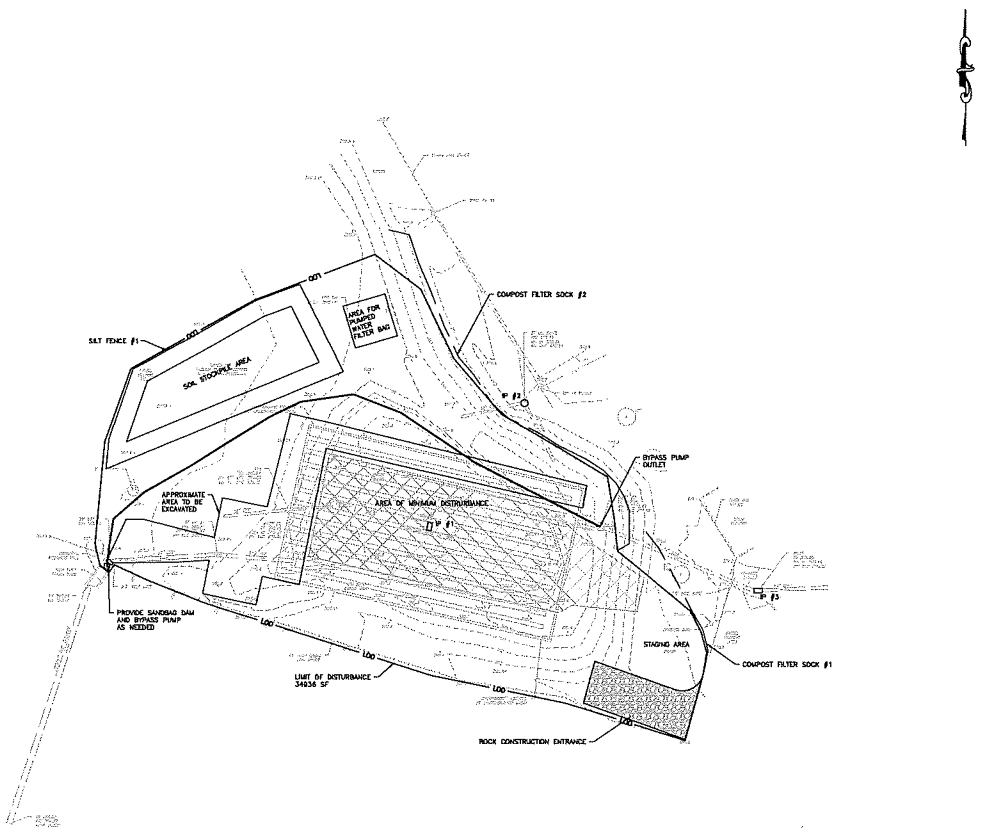
IF, DURING CONSTRUCTION, SEDIMENT LADEN RUNOFF IS SEEN LEAVING THE SITE UNTREATED, THE DESIGN ENGINEER OR CONSERVATION DISTRICT SHALL BE IMMEDIATELY CONTACTED AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING SUPPLEMENTARY BMPS, EVEN IF NOT DEPICTED ON THE PLAN, TO CORRECT SUCH INSTANCES.

1. INSTALL ROCK CONSTRUCTION ENTRANCES, DOWNSLOPE SILT FENCE, AND INLET PROTECTION. ESTABLISH CONCRETE WASHOUT AREA.
2. MINIMIZE ANY DISTURBANCE IN THE INDICATED AREA TO PREVENT DAMAGE TO EXISTING UNDERGROUND DETENTION FACILITY AND BASIN SOILS BY LIMITING STOCKPILING AND VEHICLE TRAFFIC.
3. PROVIDE SANDBAG DAM AND BYPASS PUMP AS INDICATED IF NEEDED.
4. EXCAVATE ENDS OF EXISTING 48" CMP DETENTION FACILITY. PROVIDE DEWATERING AS NECESSARY WITH DISCHARGE THROUGH A FILTER BAG.
5. REMOVE SEDIMENT FROM EXISTING 48" CMP PIPES, MANIFOLD, AND OUTLET STRUCTURE. REMOVE 48" CMP PREVIOUSLY REPAIRED ALONG WITH ANY CONCRETE MATERIALS.
6. REPLACE 124 LF OF PERFORATED 48" CMP. INSTALL NEW ACCESS MANHOLES, 48" PERFORATED CMP MANIFOLD AND ELBOW.
7. RESTORE EXISTING GRADE AND STABILIZE THIS AREA. INSTALL TEMPORARY EROSION CONTROL BLANKETS ON INTERNAL/EXTERNAL SLOPES GREATER THAN 3:1.
8. EXCAVATE AREA FOR HYDRODYNAMIC SEPARATORS AND REMOVE EXISTING STORM SEWER.
9. INSTALL HYDRODYNAMIC SEPARATORS AND ASSOCIATED STORM SEWER AND STRUCTURES.
10. RESTORE EXISTING GRADE AND STABILIZE THIS AREA. INSTALL TEMPORARY EROSION CONTROL BLANKETS ON INTERNAL/EXTERNAL SLOPES GREATER THAN 3:1.
11. GRADE ACCESS DRIVEWAY AND PROPOSED GRADES.
12. STABILIZE ALL REMAINING DISTURBED AREAS ACCORDING TO THE PLAN. INSTALL TEMPORARY EROSION CONTROL BLANKETS ON INTERNAL/EXTERNAL SLOPES GREATER THAN 3:1.
13. UPON STABILIZATION OF ALL DISTURBED AREAS, CONTACT THE GOVERNING CONSERVATION DISTRICT PRIOR TO REMOVING ANY SEDIMENT CONTROL DEVICES OR FACILITIES. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED ONLY AFTER PERMANENT STABILIZATION OF MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER WITH A DENSITY CAPABLE OF RESISTING ACCELERATED EROSION AND SEDIMENTATION HAS BEEN ACHIEVED ACROSS UPSLOPE AREAS.
14. WITH AUTHORIZATION FROM THE CONSERVATION DISTRICT, AND WITH ALL TRIBUTARY AREAS STABILIZED, REMOVE TEMPORARY E&S FACILITIES IMMEDIATELY STABILIZING AREAS DISTURBED.

IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE, THE OPERATOR SHALL STABILIZE ANY AREAS DISTURBED BY THE ACTIVITIES. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT THE SPECIFIED RATES. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE RE-DISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY VEGETATIVE STABILIZATION SPECIFICATIONS. DISTURBED AREAS WHICH ARE AT FINISHED GRADE OR WHICH WILL NOT BE RE-DISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE PERMANENT VEGETATIVE STABILIZATION SPECIFICATIONS.

AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.

AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS MUST BE REMOVED. AREAS DISTURBED DURING REMOVAL OF THE BMPS MUST BE STABILIZED IMMEDIATELY.



RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NLAI

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

SOIL EROSION AND SEDIMENT CONTROL PLAN

YOUR GOALS. OUR MISSION.

OFFICES LOCATED IN
CALIFORNIA, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA

DESIGNED BY DP	DRAWING SEP-1
CHECKED BY RAY	
DRAWN BY DP	SHEET 8 of 14
DATE	
SCALE 1" = 20'	
PROJ. NO.	

GENERAL EROSION & SEDIMENT CONTROL PROCEDURES

1. ALL EARTH DISTURBANCES, INCLUDING CLEARING AND GRUBBING AS WELL AS CUTS AND FILLS SHALL BE DONE IN ACCORDANCE WITH THE APPROVED E&S PLAN. A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. THE REVIEWING AGENCY SHALL BE NOTIFIED OF ANY CHANGES TO THE APPROVED PLAN PRIOR TO IMPLEMENTATION OF THOSE CHANGES. THE REVIEWING AGENCY MAY REQUIRE A WRITTEN SUBMITTAL OF THOSE CHANGES FOR REVIEW AND APPROVAL AT ITS DISCRETION.

2. AT LEAST SEVEN (7) DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, INCLUDING CLEARING AND GRUBBING, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE EROSION AND SEDIMENT CONTROL PLAN PREPARER, THE LICENSED PROFESSIONAL RESPONSIBLE FOR OVERSIGHT OF CRITICAL STAGES OF IMPLEMENTATION OF THE PCSM PLAN, AND A REPRESENTATIVE OF THE DELAWARE COUNTY CONSERVATION DISTRICT TO AN ON-SITE PRECONSTRUCTION MEETING.

3. AT LEAST THREE (3) DAYS PRIOR TO THE START OF ANY EARTH DISTURBANCE ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES SHALL NOTIFY THE PENNSYLVANIA ONE CALL SYSTEM INCORPORATED AT 1-800-242-1776 FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.

4. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE SEQUENCE PROVIDED ON THE PLAN DRAWINGS. DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM THE LOCAL CONSERVATION DISTRICT OR BY THE DEPARTMENT PRIOR TO IMPLEMENTATION.

5. AREAS TO BE FILLED ARE TO BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL.

6. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASE OF THE PROJECT UNTIL THE E&S BMPS SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN.

7. AT NO TIME SHALL CONSTRUCTION VEHICLES BE ALLOWED TO ENTER AREAS OUTSIDE THE LIMIT OF DISTURBANCE BOUNDARIES SHOWN ON THE PLAN MAPS. THESE AREAS MUST BE CLEARLY MARKED AND FENCED OFF BEFORE CLEARING AND GRUBBING OPERATIONS BEGIN.

8. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED AT THE LOCATION(S) SHOWN ON THE PLAN IN THE AMOUNTS NECESSARY TO COMPLETE THE FINISH GRADING OF ALL EXPOSED AREAS THAT ARE TO BE STABILIZED BY VEGETATION. EACH STOCKPILE SHALL BE PROTECTED IN THE MANNER SHOWN ON THE PLAN DRAWINGS. STOCKPILE HEIGHTS SHALL NOT EXCEED 15 FEET. STOCKPILE SLOPES SHALL BE 2H:1V OR FLATTER.

9. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE LOCAL CONSERVATION DISTRICT AND/OR THE REGIONAL OFFICE OF THE DEPARTMENT.

10. ALL BUILDING MATERIALS AND WASTES SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR AND RECYCLED OR DISPOSED IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1 ET SEQ., AND 287.1 ET SEQ. NO BUILDING MATERIALS OR WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURNED, BURIED, DUMPED, OR DISCHARGED AT THIS SITE.

11. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY THE LOCAL CONSERVATION DISTRICT OR THE DEPARTMENT FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED.

12. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY MATERIAL BROUGHT ON SITE IS CLEAN FILL. FORM FP-001 MUST BE RETAINED BY THE PROPERTY OWNER FOR ANY FILL MATERIAL AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE BUT QUALIFYING AS CLEAN FILL DUE TO ANALYTICAL TESTING.

13. ALL PUMPING OF WATER FROM ANY WORK AREA SHALL BE DONE ACCORDING TO THE PROCEDURE DESCRIBED IN THIS PLAN, OVER UNDISTURBED VEGETATED AREAS. ALL PUMPING OF SEDIMENT LADEN WATER SHALL BE THROUGH A SEDIMENT CONTROL BMP, SUCH AS A PUMPED WATER FILTER BAG DISCHARGING OVER NON-DISTURBED AREAS.

14. VEHICLES AND EQUIPMENT MAY NEITHER ENTER DIRECTLY NOR EXIT DIRECTLY FROM THE CONSTRUCTION SITE ONTO ANY PUBLIC ROAD. VEHICLES AND EQUIPMENT MAY ENTER AND EXIT THE CONSTRUCTION SITE ONLY VIA A STABILIZED ROCK CONSTRUCTION ENTRANCE.

15. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS SHALL BE MAINTAINED PROPERLY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. THE OPERATOR WILL MAINTAIN AND MAKE AVAILABLE TO DELAWARE COUNTY CONSERVATION DISTRICT COMPLETE, WRITTEN INSPECTION LOGS OF ALL THOSE INSPECTIONS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING AND RENETTING MUST BE PERFORMED IMMEDIATELY. IF THE E&S BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

16. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ANY DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.

17. SEDIMENT TRACKED ON TO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE BY THE END OF EACH WORK DAY AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVELED, OR SWEPT INTO ANY ROADSIDE DITCH, STORM SEWER, OR SURFACE WATER.

18. ALL SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN A MANNER DESCRIBED ON PLAN DRAWINGS. SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED, OR PLACED IN TOPSOIL STOCKPILES.

19. UPON FINAL GRADING, AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3 TO 5 INCHES – 6 TO 12 INCHES ON COMPACTED SOILS – PRIOR TO PLACEMENT OF TOPSOIL. AREAS TO BE VEGETATED SHALL HAVE A MINIMUM FOUR (4) INCHES OF TOPSOIL IN PLACE PRIOR TO SEEDING AND MULCHING. FILL OUTSLOPES SHALL HAVE A MINIMUM OF 4 INCHES OF TOPSOIL.

20. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.

21. ALL EARTHEN FILLS SHALL BE PLACED IN COMPACTED LAYERS NOT TO EXCEED 8 INCHES IN THICKNESS.

22. FILL MATERIALS SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS. FROZEN MATERIALS OR SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED INTO FILLS.

23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.

24. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.

25. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY UPON REACHING FINISHED GRADE. CUT SLOPES IN COMPETENT BEDROCK AND ROCK FILLS NEED NOT BE VEGETATED. SEEDED AREAS WITHIN 50 FEET OF A SURFACE WATER, OR AS OTHERWISE SHOWN ON THE PLAN DRAWINGS, SHALL BE BLANKETED ACCORDING TO THE STANDARDS OF THIS PLAN.

26. IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE IN ANY AREA OR SUBAREA OF THE PROJECT, THE OPERATOR SHALL STABILIZE THOSE AREAS DISTURBED BY THE ACTIVITIES. DURING NON-GERMINATING PERIODS, MULCH OR OTHER PROTECTIVE BLANKETING SHALL BE APPLIED AT THE RECOMMENDED RATES AND METHODS. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE RE-DISTURBED WITHIN 1 YEAR SHALL BE SEEDED AND MULCHED WITH A QUICK GROWING TEMPORARY SEEDING MIXTURE AND MULCH. DISTURBED AREAS, WHICH ARE EITHER AT FINISHED GRADE OR WILL NOT BE RE-DISTURBED WITHIN 1 YEAR SHALL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SPECIFICATIONS.

27. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION. CUT AND FILL SLOPES SHALL BE CAPABLE OF RESISTING FAILURE DUE TO SLUMPING, SLIDING, OR MOTHER MOVEMENTS.

28. EROSION AND SEDIMENT CONTROLS (BMP'S) MUST BE CONSTRUCTED, STABILIZED, AND FUNCTIONAL BEFORE GENERAL SITE DISTURBANCE BEGINS WITHIN THE TRIBUTARY AREAS OF THOSE CONTROLS. EROSION AND SEDIMENT BMPS SHALL REMAIN FUNCTIONAL AS SUCH UNTIL ALL AREAS TRIBUTARY TO THEM ARE PERMANENTLY STABILIZED OR UNTIL THEY ARE REPLACED BY ANOTHER BMP APPROVED BY THE LOCAL CONSERVATION DISTRICT OR THE DEPARTMENT.

29. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT THE LOCAL CONSERVATION DISTRICT FOR AN INSPECTION PRIOR TO REMOVAL/CONVERSION OF THE E&S BMPS. TEMPORARY CONTROLS MAY BE REMOVED ONLY UPON APPROVAL OF THE DELAWARE COUNTY CONSERVATION DISTRICT.

30. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE REMOVED OR CONVERTED TO PERMANENT POST CONSTRUCTION STORMWATER MANAGEMENT BMPS. AREAS DISTURBED DURING REMOVAL OR CONVERSION OF THE CONTROLS SHALL BE STABILIZED IMMEDIATELY. IN ORDER TO ENSURE RAPID REVEGETATION OF DISTURBED AREAS, SUCH REMOVALS/CONVERSIONS ARE TO BE DONE ONLY DURING GERMINATING SEASON.

31. FAILURE TO CORRECTLY INSTALL SEDIMENT CONTROL FACILITIES OR FAILURE TO PREVENT SEDIMENT LADEN RUNOFF FROM LEAVING THE CONSTRUCTION SITE OR FAILURE TO TAKE IMMEDIATE CORRECTIVE ACTIONS TO RESOLVE FAILURES OF SEDIMENT CONTROL FACILITIES MAY RESULT IN ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES BEING INSTITUTED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION AS DEFINED IN SECTION 602 OF THE CLEAN STREAMS LAW OF PENNSYLVANIA. THE CLEAN STREAMS LAW PROVIDES FOR UP TO $10,000 PER DAY IN CIVIL PENALTIES, UP TO $10,000 IN SUMMARY CRIMINAL PENALTIES, AND UP TO $25,000 IN MISDEMEANOR CRIMINAL PENALTIES FOR EACH VIOLATION.

32. IN THE EVENT OF SINKHOLE DISCOVERY OR OCCURRENCE, A PROFESSIONAL GEOLOGIST OR ENGINEER SHALL BE CONTACTED CONCERNING MITIGATION. ADDITIONAL, THE DELAWARE COUNTY CONSERVATION DISTRICT SHALL BE IMMEDIATELY MADE AWARE OF THE SINKHOLE DISCOVERY.

33. THE OPERATOR SHALL ASSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY AND COMPLETELY IMPLEMENTED.

34. THE CONTRACTOR IS ADVISED TO BECOME THOROUGHLY FAMILIAR WITH THE PROVISIONS OF THE APPENDIX 64, EROSION CONTROL RULES AND REGULATIONS, TITLE 25, PART 1, DEPARTMENT OF ENVIRONMENTAL PROTECTION, SUBPART C, PROTECTION OF NATURAL RESOURCES, ARTICLE II, WATER RESOURCES, CHAPTER 102, EROSION CONTROL.

35. STRAW MULCH SHALL BE APPLIED IN LONG STRANDS, NOT CHOPPED OR FINELY BROKEN.

36. THE OPERATOR / PERMITTEE SHALL BE RESPONSIBLE FOR THE PROPER INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENTATION CONTROLS (BMPS) AND RELATED ITEMS INCLUDED WITHIN THIS PLAN AND NARRATIVE.

37. EROSION AND SEDIMENT BMP CONTROLS MUST BE CONSISTENT WITH STANDARDS AND SPECIFICATIONS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION "EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL" DATED MARCH 2012.

38. ALL EROSION AND SEDIMENTATION CONTROL FACILITIES SHALL BE MAINTAINED IN THE APPROVED DESIGN CONDITION THROUGHOUT THE CONSTRUCTION PERIOD OR UNTIL THE DESIGN AREA IS STABILIZED.

39. SHOULD ANY MEASURES CONTAINED WITHIN THIS PLAN PROVE INCAPABLE OF ADEQUATELY REMOVING SEDIMENT FROM ON-SITE FLOWS PRIOR TO DISCHARGE OR OF STABILIZING THE SURFACES INVOLVED, ADDITIONAL MEASURES MUST BE IMMEDIATELY IMPLEMENTED BY THE OPERATOR TO ELIMINATE ALL SUCH PROBLEMS.

40. BEFORE INITIATING ANY REVISIONS TO THE APPROVED EROSION AND SEDIMENT CONTROL PLAN OR REVISIONS TO OTHER PLANS WHICH MAY AFFECT THE EFFECTIVENESS OF THE APPROVED E&S CONTROL PLAN, THE OPERATOR MUST RECEIVE APPROVAL OF THE REVISIONS FROM THE DELAWARE COUNTY CONSERVATION DISTRICT.

41. THE CONTRACTOR SHALL NOTIFY THE DELAWARE COUNTY CONSERVATION DISTRICT PRIOR TO ANY CESSATION IN EARTHMOVING ACTIVITIES OF MORE THAN TWENTY (20) DAYS.

42. THE OPERATOR SHALL ASSURE THAT AN EROSION AND SEDIMENT CONTROL PLAN HAS BEEN PREPARED, APPROVED BY THE APPLICABLE COUNTY CONSERVATION DISTRICT, AND IS BEING IMPLEMENTED AND MAINTAINED FOR ALL SOIL AND/OR ROCK SPOIL AND BORROW AREAS, REGARDLESS OF THEIR LOCATIONS.

43. MULCH WITH MULCH CONTROL NETTING OR EROSION CONTROL BLANKETS MUST BE INSTALLED ON ALL SLOPES 3:1 AND STEEPER.

44. HAY OR STRAW MULCH MUST BE APPLIED AT 3.0 TONS PER ACRE.

45. STOCKPILE HEIGHTS MUST NOT EXCEED 15 FEET. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.

46. SEDIMENT MUST BE REMOVED FROM STORM WATER INLET PROTECTION AFTER EACH RUNOFF EVENT.

47. EROSION CONTROL BLANKETING SHALL BE INSTALLED ON ALL SLOPES 3H:1V OR STEEPER, WITHIN 50 FEET OF A SURFACE WATER, AND ON ALL OTHER DISTURBED AREAS SPECIFIED ON THE PLAN MAPS AND/OR DETAIL SHEETS.

48. ALL VEGETATED AREAS IN UNDISTURBED SECTIONS WILL REMAIN FOR EROSION PROTECTION. CONTRACTORS AND EQUIPMENT WILL BE RESTRAINED FROM VENTURING INTO ALL AREAS NOT BEING GRADED. DISTURBED AREAS WILL REMAIN EXPOSED FOR THE SHORTEST TIME POSSIBLE.

49. DUST WILL BE KEPT WITHIN TOLERABLE LIMITS BY EITHER THE USE OF CHEMICAL AGENTS, SUCH AS CALCIUM CHLORIDE, OR BY SPRINKLING THE AREAS CONTRIBUTING TO AIR-DUST POLLUTION WITH WATER.

50. UNTIL THE SITE ACHIEVES FINAL STABILIZATION, THE OPERATOR SHALL ASSURE THAT THE BEST MANAGEMENT PRACTICES (BMPS) ARE IMPLEMENTED, OPERATED, AND PROPERLY MAINTAINED MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING AND RENETTING MUST BE PERFORMED IMMEDIATELY. IF THE E&S BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

51. AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS HAS BEEN ACHIEVED ACROSS THE UPSLOPE AREAS.

RESPONSIBILITIES FOR FILL MATERIALS

1. THE OPERATOR MUST USE ENVIRONMENTAL DUE DILIGENCE TO ENSURE THAT ANY NECESSARY FILL MATERIAL ASSOCIATED WITH THIS PROJECT QUALIFIES AS CLEAN FILL. ALL FILL MATERIAL MUST BE USED IN ACCORDANCE WITH PADEP'S POLICY "MANAGEMENT OF FILL", DOCUMENT NUMBER 258-2182-773. A COPY OF THIS POLICY IS AVAILABLE ONLINE AT WWW.DEP.PA.GOV.

2. CLEAN FILL IS DEFINED AS: UNCONTAMINATED, NON-WATER SOLUBLE, NON-DECOMPOSED, INERT, SOLID MATERIAL. THE TERM INCLUDES SOIL, ROCK, STONE, DREDGED MATERIAL, USED ASPHALT, AND BRICK, BLOCK OR CONCRETE FROM CONSTRUCTION AND DEMOLITION ACTIVITIES THAT IS SEPARATE FROM THE WASTE AND IS RECOGNIZABLE AS SUCH. THE TERM DOES NOT INCLUDE MATERIALS PLACED IN OR ON THE WATERS OF THE COMMONWEALTH UNLESS OTHERWISE AUTHORIZED (THE TERM "USED ASPHALT" DOES NOT INCLUDE MILLED ASPHALT OR ASPHALT THAT HAS BEEN PROCESSED FOR RE-USE).

3. CLEAN FILL AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE: FILL MATERIALS AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE STILL QUALIFIES AS CLEAN FILL PROVIDED THE TESTING REVEALS THAT THE FILL MATERIAL CONTAINS CONCENTRATIONS OF REGULATED SUBSTANCES THAT ARE BELOW THE RESIDENTIAL LIMITS IN TABLES FP-1A AND FP-1B FOUND IN PADEP'S POLICY "MANAGEMENT OF FILL"

4. ANY PERSON PLACING CLEAN FILL THAT HAS BEEN AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE MUST USE PADEP FORM FP-001 TO CERTIFY THE ORIGIN OF THE FILL MATERIAL AND THE RESULTS OF THE ANALYTICAL TESTING TO QUALIFY THE MATERIAL AS CLEAN FILL. FORM FP-001 MUST BE RETAINED BY THE OWNER OF THE PROPERTY RECEIVING THE FILL. A COPY OF FORM FP-001 CAN BE FOUND AT WWW.DEP.PA.GOV.

5. ENVIRONMENTAL DUE DILIGENCE: INVESTIGATIVE TECHNIQUES, INCLUDING, BUT NOT LIMITED TO, VISUAL PROPERTY INSPECTIONS, ELECTRONIC DATA BASE SEARCHES, REVIEW OF PROPERTY OWNERSHIP, REVIEW OF PROPERTY USE HISTORY, SANBORN MAPS, ENVIRONMENTAL QUESTIONNAIRES, TRANSACTION SCREEN, ANALYTICAL TESTING, ENVIRONMENTAL ASSESSMENTS OR AUDITS.

6. ANALYTICAL TESTING IS NOT A REQUIRED PART OF DUE DILIGENCE UNLESS VISUAL INSPECTION AND/OR REVIEW OF THE PAST LAND USE OF THE PROPERTY INDICATES THAT THE FILL MAY HAVE BEEN SUBJECTED TO A SPILL OR RELEASE OF A REGULATED SUBSTANCE. IF THE FILL MAY HAVE BEEN AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE, IT MUST BE TESTED TO DETERMINE IF IT QUALIFIES AS CLEAN FILL. TESTING SHOULD BE PERFORMED IN ACCORDANCE WITH APPENDIX A OF PADEP'S POLICY "MANAGEMENT OF FILL".

7. FILL MATERIAL THAT DOES NOT QUALIFY AS CLEAN FILL IS REGULATED FILL. REGULATED FILL IS WASTE AND MUST BE MANAGED IN ACCORDANCE WITH THE MUNICIPAL OR RESIDUAL WASTE REGULATIONS IN 25 PA CODE CHAPTERS 287 RESIDUAL WASTE MANAGEMENT OR 271 MUNICIPAL WASTE MANAGEMENT, WHICHEVER IS APPLICABLE.

8. ALL FILLS SHALL BE COMPACTED SUFFICIENTLY FOR THEIR INTENDED PURPOSE AND AS REQUIRED TO REDUCE SLIPPING, EROSION OR EXCESS SATURATION.

UTILITY TRENCH EXCAVATION/DISTURBANCE GUIDELINES

1. LIMIT ADVANCED CLEARING AND GRUBBING OPERATIONS TO A DISTANCE EQUAL TO TWO TIMES THE LENGTH OF PIPE INSTALLATION THAT CAN BE COMPLETED IN ONE (1) DAY.

2. LIMIT DAILY TRENCH EXCAVATION TO THE LENGTH OF PIPE PLACEMENT, PLUG INSTALLATION AND BACKFILLING THAT CAN BE COMPLETED THE SAME DAY. DAILY BACKFILLING MAY BE DELAYED A MAXIMUM OF SIX (6 DAYS IF PRESSURE TESTING IS REQUIRED.

3. WATER WHICH ACCUMULATES IN THE OPEN TRENCH SHALL BE COMPLETELY REMOVED BY PUMPING BEFORE PIPE PLACEMENT AND / OR BACKFILLING BEGINS. WATER REMOVED FROM THE TRENCH SHALL BE PUMPED THROUGH A FILTRATION DEVICE SUCH AS A PUMPED WATER FILTER BAG.

4. ON THE DAY FOLLOWING PIPE PLACEMENT AND TRENCH BACKFILLING, THE DISTURBED AREA SHALL BE GRADED TO FINAL CONTOURS.

5. SEE SPECIFICATIONS AND DETAILS FOR BACKFILLING AND COMPACTION REQUIREMENTS IN UTILITY TRENCH. ALL FILL, COMPACTION, AND BACKFILL MATERIALS REQUIRED FOR UTILITY INSTALLATION SHALL BE AS PER THE RECOMMENDATIONS PROVIDED IN THE GEOTECHNICAL REPORT AND SHALL BE COORDINATED WITH THE APPLICABLE UTILITY COMPANY SPECIFICATIONS.

6. THE CONTRACTOR SHALL COMPLY TO THE FULLEST EXTENT WITH THE LATEST STANDARDS OF OSHA DIRECTIVES, OR ANY OTHER AGENCY HAVING JURISDICTION FOR EXCAVATION AND TRENCHING PROCEDURES. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE "MEANS AND METHODS" REQUIRED TO MEET THE INTENT AND PERFORMANCE CRITERIA OF OSHA, AS WELL AS ANY OTHER ENTITY THAT HAS JURISDICTION FOR EXCAVATION AND/OR TRENCHING PROCEDURES.

7. SEEDING AND MULCHING OF ALL DISTURBED AREAS SHALL BE DONE WITHIN TWO (2) CALENDAR DAYS.

MONITORING, INSPECTION, AND REPORTING REQUIREMENTS

VISUAL INSPECTIONS

THE CONTRACTOR MUST ENSURE THAT VISUAL SITE INSPECTIONS ARE CONDUCTED WEEKLY, AND WITHIN 24 HOURS AFTER EACH MEASURABLE RAINFALL EVENT THROUGHOUT THE DURATION OF CONSTRUCTION AND UNTIL THE RECEIPT AND ACKNOWLEDGEMENT OF PROJECT COMPLETION. THE VISUAL SITE INSPECTIONS AND REPORTS SHALL BE COMPLETED IN A FORMAT PROVIDED BY THE DEPARTMENT, AND CONDUCTED BY QUALIFIED PERSONNEL, TRAINED AND EXPERIENCED IN EROSION AND SEDIMENT CONTROL, TO ASCERTAIN THAT E&S BMPS ARE PROPERLY CONSTRUCTED AND MAINTAINED TO EFFECTIVELY MINIMIZE POLLUTION TO THE WATERS OF THIS COMMONWEALTH. A WRITTEN REPORT OF EACH INSPECTION SHALL BE KEPT AND INCLUDE AT A MINIMUM:

1. A SUMMARY OF SITE CONDITIONS, E&S BMP, IMPLEMENTATION AND MAINTENANCE AND COMPLIANCE ACTIONS; AND
2. THE DATE, TIME, NAME AND SIGNATURE OF THE PERSON CONDUCTING THE INSPECTION.

NONCOMPLIANCE REPORTING

WHERE E&S BMPS ARE FOUND TO BE INOPERATIVE OR INEFFECTIVE DURING AN INSPECTION, OR ANY OTHER TIME, THE CONTRACTOR SHALL, WITHIN 24 HOURS, CONTACT THE DEPARTMENT OR AUTHORIZED CONSERVATION DISTRICT, BY PHONE OR PERSONAL CONTACT, FOLLOWED BY THE SUBMISSION OF A WRITTEN REPORT WITHIN 5 DAYS OF THE INITIAL CONTACT. NONCOMPLIANCE REPORTS SHALL INCLUDE THE FOLLOWING INFORMATION:

1. ANY CONDITION ON THE PROJECT SITE WHICH MAY ENDANGER PUBLIC HEALTH, SAFETY, OR THE ENVIRONMENT, OR INVOLVE INCIDENTS WHICH CAUSE OR THREATEN POLLUTION;
2. THE PERIOD OF NONCOMPLIANCE, INCLUDING THE EXACT DATES AND TIMES AND/OR ANTICIPATED TIME WHEN THE ACTIVITY WILL RETURN TO COMPLIANCE;
3. STEPS BEING TAKEN TO REDUCE, ELIMINATE, AND PREVENT RECURRENCE OF THE NONCOMPLIANCE; AND
4. THE DATE OR SCHEDULE OF DATES, AND IDENTIFYING REMEDIES FOR CORRECTING NONCOMPLIANCE CONDITIONS.

REDUCTION, LOSS, OR FAILURE OF THE BMPS

UPON REDUCTION, LOSS, OR FAILURE OF THE BMPS, THE CONTRACTOR SHALL TAKE IMMEDIATE ACTION TO RESTORE THE BMPS OR PROVIDE AN ALTERNATE METHOD OF TREATMENT. SUCH RESTORED BMPS OR ALTERNATE TREATMENT SHALL BE AT LEAST AS EFFECTIVE AS THE ORIGINAL BMPS.

MAINTENANCE OF EROSION CONTROL FACILITIES

1. THE OPERATOR SHALL BE RESPONSIBLE FOR THE PROPER CONSTRUCTION, STABILIZATION AND MAINTENANCE OF ALL EROSION AND SEDIMENTATION CONTROLS AND RELATED ITEMS INCLUDED WITHIN THE PLAN HEREWITH. THE CONTRACTOR SHALL SCHEDULE AND CONDUCT HIS OPERATIONS TO MINIMIZE EROSION OF SOILS AND TO PREVENT SILTING AND MUDDYING OF STREAMS, RIVERS AND DRAINAGE SYSTEMS.

2. EROSION AND SEDIMENTATION POLLUTION CONTROL SPECIALISTS' CONTACTS:
   DELAWARE COUNTY CONSERVATION DISTRICT: (610) 892-9484
   PADEP SOUTHEAST REGIONAL OFFICE (484) 250-5970

3. ALL EROSION AND SEDIMENTATION POLLUTION CONTROL MEASURES MUST REMAIN IN PLACE UNTIL THE SITE IS STABILIZED, REGARDLESS IF CONSTRUCTION IS TAKING PLACE OR NOT.

4. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT POLLUTION CONTROLS (BMPS) MUST BE PROPERLY MAINTAINED. MAINTENANCE MUST INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT CONTROL BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING, AND RENETTING, MUST BE PERFORMED IMMEDIATELY. IF EROSION AND SEDIMENT CONTROL BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT CONTROLS OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

5. SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED, OR PLACED IN TOPSOIL STOCKPILES.

6. SEEDED AREAS THAT WASH OUT MUST BE FILLED AND GRADED AS NECESSARY, AND THEN RESEEDED, AN ANCHORING METHOD SHOULD THEN BE USED TO HOLD SEED AND MULCH IN PLACE; THIS IS ESPECIALLY IMPORTANT AROUND WATER COURSES, IN SWALES, AND AREAS OF CONCENTRATED FLOWS, AND ON SLOPES.

7. IN THE EVENT OWNERS OF THE PROPERTY OR THE OPERATOR FAILS TO PROPERLY MAINTAIN THE CONTROL FACILITIES, RADNOR TOWNSHIP SHALL HAVE THE RIGHT TO ENTER SAID AREA AND PERFORM THE REQUIRED MAINTENANCE AFTER PROPER NOTIFICATION OF THE OWNERS.

8. IN THE EVENT THAT THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, THE DELAWARE COUNTY CONSERVATION DISTRICT, THE MUNICIPALITY OR THE DESIGN ENGINEER OR THEIR AGENTS DEEM THAT ADDITIONAL CONTROLS, MEASURES OR PROCEDURES BEYOND THOSE SHOWN OR DESCRIBED ARE NECESSARY TO CONTROL OR CORRECT CONDITIONS WHICH WERE UNFORESEEN DURING THE DESIGN STAGE, THE CONTRACTOR SHALL BE RESPONSIBLE TO IMPLEMENT ADDITIONAL CONTROLS, MEASURES OR PROCEDURES AS IS DEEMED REASONABLY NECESSARY AND WARRANTED.

9. NO SEDIMENT, STONES OR DEBRIS SHALL BE TRACKED ON TO SURROUNDING ROADS. ANY SEDIMENT THAT IS TRACKED ONTO THE SURROUNDING ROADS MUST BE CLEANED OFF BEFORE THE END OF THE DAY UTILIZING MECHANICAL METHODS OR VIA HAND SWEEPING TO THE SATISFACTION OF THE DELAWARE COUNTY CONSERVATION DISTRICT AND TOWNSHIP ENGINEER.

10. ANY FILTER FABRIC FENCE, WHICH HAS BEEN UNDERMINED OR TOPPED, MUST BE REPLACED IMMEDIATELY WITH ROCK FILTER OUTLETS.

11. ANY SOIL BORROW OR SPOIL SITES, ON OR OFFSITE SHALL HAVE AN APPROVED AND IMPLEMENTED EROSION CONTROL PLAN BY THE LOCAL COUNTY CONSERVATION DISTRICT. TRANSPORTATION OF ANY EXCESS MATERIALS SHALL BE SUCH THAT SPILLAGE, TRACKING OFF SITE, AND OTHER DISTURBANCES ARE KEPT TO A MINIMUM.

12. THE CONTRACTOR SHALL PERIODICALLY AND ESPECIALLY AFTER HEAVY RAINFALL, INSPECT ALL CONTROL FACILITIES FOR PROPER FUNCTION. FACILITIES SHALL BE REPAIRED IF DAMAGED OR MALFUNCTIONING OR REPLACED AS NECESSARY. MAINTENANCE OF ALL CONTROL FACILITIES SHALL CONTINUE UNTIL THE ENTIRE AREA TRIBUTARY TO THE FACILITY IS STABILIZED.

13. THE DELAWARE COUNTY CONSERVATION DISTRICT MUST BE CONTACTED PRIOR TO REMOVAL OF ANY EROSION AND SEDIMENTATION CONTROL DEVICE SUCH AS FILTER FABRIC FENCES, ROCK FILTERS, INLET PROTECTION, TEMPORARY CHANNELS, ETC. TEMPORARY CONTROLS MAY BE REMOVED ONLY AFTER A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER, WITH A DENSITY CAPABLE OF RESISTING ACCELERATED EROSION AND SEDIMENTATION HAS BEEN ACHIEVED ACROSS THE UPSLOPE AREAS.

RECYCLING OR DISPOSAL METHODS

1. THE OPERATOR SHALL REMOVE FROM THE SITE, RECYCLE, OR DISPOSE OF ALL BUILDING MATERIALS AND WASTE IN ACCORDANCE WITH ANY AND ALL APPLICABLE MUNICIPAL OR OTHER GOVERNMENT AGENCY CURRENT REGULATIONS INCLUDING BUT NOT LIMITED TO: THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1 ET SEQ., AND 287.1 ET SEQ. THE CONTRACTOR SHALL NOT ILLEGALLY BURY, DUMP, OR DISCHARGE ANY BUILDING MATERIAL OR WASTES AT THE SITE.

2. EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN ON THE PROPERTY, DEMOLISHED OR EXCAVATED MATERIALS SHALL BE REMOVED FROM THE SITE. MATERIALS SLATED FOR REMOVAL FROM THE SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH ANY AND ALL APPLICABLE MUNICIPAL OR OTHER GOVERNMENTAL AGENCY CURRENT REGULATIONS.

3. DEBRIS SHALL NOT BE PERMITTED TO ACCUMULATE ON THE JOB-SITE. DUST AND DIRT SHALL BE HELD TO A MINIMUM DURING DEMOLITION, BY WETTING DOWN, AS REQUIRED. ON SITE BURNING OF MATERIALS WILL NOT BE PERMITTED. AT THE COMPLETION OF WORK, THE ENTIRE AREA INVOLVED SHALL BE CLEAN AND LEFT IN A NEAT CONDITION, FREE OF RUBBISH AND DEBRIS.

4. RECYCLING OR DISPOSAL OF MATERIALS ASSOCIATED WITH OR FROM THIS PROJECT SITE SHALL BE UNDERTAKEN IN ACCORDANCE WITH PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION RULES AND REGULATIONS.

5. SEDIMENT REMOVED FROM CONTROL FACILITIES AS A PART OF REGULAR MAINTENANCE SHALL BE DISPOSED OF UPSLOPE OF CONTROL FACILITIES IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED, OR PLACED IN TOPSOIL STOCKPILES.

NO.	DATE	REVISIONS	BY	CHKD

RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NUM

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

SOIL EROSION AND SEDIMENT CONTROL NOTES

YOUR GOALS. OUR MISSION.
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BETHLEHEM, PA 18018
TEL 610-625-2999
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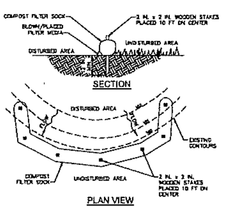
CHECKED BY RAY	
DRAWN BY DF	SHEET 9 OF 14
DATE 05-11-2018	
SCALE —	
PROJ. NO. RADN00011	

PROJECT INFORMATION:
FILE NAME: RADN00011_SHT09_SED.dwg
LAST SAVED DATE AND TIME: 11 May 2018, 2:25PM



NOTES:

SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1 OF THE PA DEP EROSION CONTROL MANUAL. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 OF THE PA DEP EROSION CONTROL MANUAL.

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SOCK AND THE SLOPE OF ITS TRIBUTARY AREA.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST FILTER SOCKS.

ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

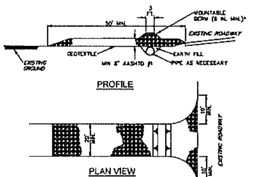
COMPOST FILTER SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

STANDARD CONSTRUCTION DETAIL #4-1
COMPOST FILTER SOCK

NOT TO SCALE



* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

NOTES:

REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.

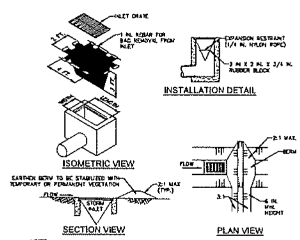
RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.

MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.

MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

STANDARD CONSTRUCTION DETAIL #3-1
ROCK CONSTRUCTION ENTRANCE

NOT TO SCALE



NOTES:

MAXIMUM DRAINAGE AREA = 1/2 ACRE.

INLET PROTECTION SHALL NOT BE REQUIRED FOR INLET TRIBUTARY TO SEDIMENT BASIN OR TRAP. BERMS SHALL BE REQUIRED FOR ALL INSTALLATIONS.

ROLLED EARTHEN BERM IN ROADWAY SHALL BE MAINTAINED UNTIL ROADWAY IS STONED. ROAD SUBBASE BERM ON ROADWAY SHALL BE MAINTAINED UNTIL ROADWAY IS PAVED. EARTHEN BERM IN CHANNEL SHALL BE MAINTAINED UNTIL PERMANENT STABILIZATION IS COMPLETED OR REMAIN PERMANENTLY.

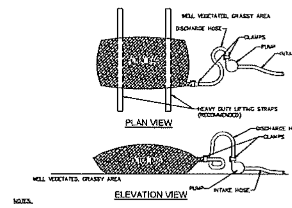
AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS., A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS. FILTER BAGS SHALL BE CAPABLE OF TRAPPING ALL PARTICLES NOT PASSING A NO. 40 SIEVE.

INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE INLET. DAMAGED OR CLOGGED BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE PLAN NOTES.

DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.

STANDARD CONSTRUCTION DETAIL #4-16
FILTER BAG INLET PROTECTION - TYPE M INLET

NOT TO SCALE



NOTES:

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.

NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

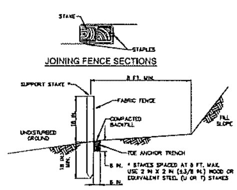
THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

STANDARD CONSTRUCTION DETAIL #3-16
PUMPED WATER FILTER BAG

NOT TO SCALE



NOTES:

FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN TABLE 4.3 OF THE PA DEP EROSION CONTROL MANUAL.

FABRIC WIDTH SHALL BE 30 IN. MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES.

SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.

SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVE GROUND HEIGHT OF THE FENCE.

ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL # 4-6).

FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.

STANDARD CONSTRUCTION DETAIL #4-7
STANDARD SILT FENCE (18" HIGH)

NOT TO SCALE

TYPICAL SOIL STOCKPILE CROSS SECTION

NTS

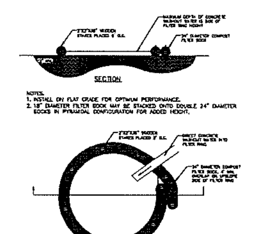
NOTE: SILT FENCE MUST COMPLETELY ENCIRCLE STOCKPILE

NOTE: TOPSOIL SHALL NOT BE REMOVED FROM THE DEVELOPMENT SITE OR USED AS FILL. TOPSOIL SHALL BE REMOVED FROM THE AREAS OF CONSTRUCTION AND STORED SEPARATELY. THE TOPSOIL SHALL BE STABILIZED TO MINIMIZE EROSION DURING STORAGE. UPON COMPLETION OF CONSTRUCTION, THE TOPSOIL SHALL BE UNIFORMLY REDISTRIBUTED ON THE SITE.

RADNOR TOWNSHIP

APRIL 2014

GANNETT FLEMING



NOTES:
1. INSTALL ON FLAT GRADE FOR OPTIMUM PERFORMANCE.
2. 18" DIAMETER FILTER SOCK MAY BE STACKED ONTO DOUBLE 24" DIAMETER SOCKS IN PYRAMIDAL CONFIGURATION FOR ADDED HEIGHT.

A SUITABLE IMPERVIOUS GEOMEMBRANE SHALL BE PLACED AT THE LOCATION OF THE WASHOUT PRIOR TO THE INSTALLING SOCKS.

COMPOST SOCK WASHOUT DETAIL

CONCRETE WASHOUT NOTES

1. FOR ANY PROJECT ON WHICH CONCRETE WILL BE POURED OR OTHERWISE FORMED ON SITE, A SUITABLE WASHOUT FACILITY MUST BE PROVIDED FOR THE CLEANING OF CHUTES, MIXERS, AND HOPPERS OF THE DELIVERY VEHICLES UNLESS SUCH A FACILITY WILL BE USED AT THE SOURCE OF THE CONCRETE. UNDER NO CIRCUMSTANCES MAY WASH WATER FROM THESE VEHICLES BE ALLOWED TO ENTER ANY SURFACE WATERS. PROPER SIGNAGE SHALL BE PROVIDED TO DRIVERS SO THAT THEY ARE AWARE OF THE PRESENCE OF WASHOUT FACILITIES.
2. CONCRETE WASHOUT SHOULD NOT BE PLACED WITHIN 50 FEET OF ANY STORM DRAIN, OPEN DITCH, OR SURFACE WATERS.
3. WHENEVER POSSIBLE, CONCRETE WASHOUT SHALL BE PLACED ON SLOPES NOT EXCEEDING A 2% GRADE.
4. WHEREVER COMPOST SOCK WASHOUTS ARE USED, A SUITABLE IMPERVIOUS GEOMEMBRANE SHOULD BE PLACED AT THE LOCATION OF THE WASHOUT. COMPOST SOCKS SHOULD BE STAKED IN THE MANNER RECOMMENDED BY THE MANUFACTURER AROUND PERIMETER OF THE GEOMEMBRANE SO AS TO FORM A RING WITH THE ENDS OF THE SOCK LOCATED AT THE UPSLOPE CORNER (SEE DETAIL). CARE SHOULD BE TAKEN TO ENSURE CONTINUOUS CONTACT OF THE SOCK WITH THE GEOMEMBRANE AT ALL LOCATIONS. WHERE NECESSARY, SOCKS MAY BE STACKED AND STAKED SO AS TO FORM A TRIANGULAR CROSS-SECTION.
5. WASH WATER SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS.
6. ALL CONCRETE WASHOUT FACILITIES SHOULD BE INSPECTED DAILY. DAMAGED OR LEAKING WASHOUTS SHOULD BE DEACTIVATED AND REPAIRED OR REPLACED IMMEDIATELY.
7. ACCUMULATED MATERIALS SHOULD BE REMOVED WHEN THEY REACH 75% CAPACITY.
8. PLASTIC LINERS SHOULD BE REPLACED WITH EACH CLEANING OF THE WASHOUT FACILITY

TABLE 4.1
Compost Sock Fabric Minimum Specifications

Material Type	5 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MFPP)	Heavy Duty Multi-Filament Polypropylene (HDMFPP)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12" 18"	12" 18" 24" 32"	12" 18" 24"	12" 18" 24"	12" 18" 24"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Tensile Strength		26 psi	26 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years
Two-ply systems					
Inner Containment Netting	HDPE biaxial net Continuously wound Fusion-welded junctures 3/4" X 3/4" Max. aperture size				
Outer Filtration Mesh	Composite Polypropylene Fabric (Woven layer and non-woven fleece mechanically fused via needle punch) 3/16" Max. aperture size				
Sock fabrics composed of burlap may be used on projects lasting 6 months or less.					

Filtrexx & JMD

Compost should be a well decomposed, weed-free organic matter derived from agricultural, food, stump grindings, and yard or wood/bark organic matter sources. The compost should be aerobically composted. The compost should possess no objectionable odors and should be reasonably free (<1% by dry weight) of man-made foreign matter. The compost product should not resemble the raw material from which it was derived. Wood and bark chips, ground construction debris or reprocessed wood products are not acceptable as the organic component of the mix.

The physical parameters of the compost should comply with the standards in Table 4.2. The standards contained in the PennDOT Publication 408 are an acceptable alternative.

TABLE 4.2
Compost Standards

Organic Matter Content	25% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - 8.0
Moisture Content	30% - 60%
Particle Size	30% - 50% pass through 3/8" sieve
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

NO.	DATE	REVISIONS	BY	CHKD

RICHARD A YOUNG
P.E.

LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NLAI

TOWNSHIP OF RADNOR

NORTH WAYNE BASIN

TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA

90% PROGRESS PLANS

SOIL EROSION AND SEDIMENT CONTROL DETAILS

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DESIGNED BY: DP	DRAWING: SED-2
CHECKED BY: RAY	SHEET
DRAWN BY: DP	10
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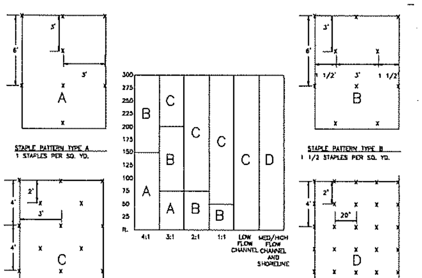


STAPLE PATTERN TYPE A
1 STAPLES PER SQ. YD.

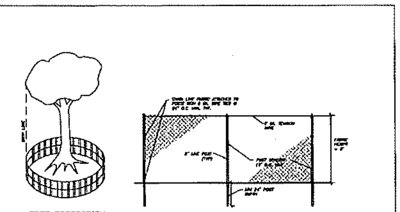
STAPLE PATTERN TYPE B
1 1/2 STAPLES PER SQ. YD.

STAPLE PATTERN TYPE C
2 STAPLES PER SQ. YD.

STAPLE PATTERN TYPE D
3.5 STAPLES PER SQ. YD.

NORTH AMERICAN GREEN STAPLE PATTERNS

RADNOR TOWNSHIP
APRIL 2014



TREE PROTECTION

1. PROTECTION BARRIERS SHALL BE 5 FEET HIGH, CONSTRUCTED OF 2" CHAIN LINK MESH FABRIC.
2. FABRIC SHALL BE SECURED TO 2" POSTS WITH 9 GA. ALUMINUM WIRE TIES AT 24" O.C.
3. POSTS SHALL BE A MINIMUM OF 2 FEET IN THE GROUND AND SPACED 10 FEET ON CENTER MAX.
4. PLASTIC ZIP-TIES MAY NOT BE USED TO SECURE FABRIC TO POSTS.

TREE PROTECTION BARRIER FENCING

TABLE 11.4
Recommended Seed Mixtures

Mixture Number	Species	Seeding Rate - Pure Live Seed[1] Most Sites	Adverse Sites
1[2]	Spring oats (spring), or	64	96
	Annual ryegrass (spring or fall), or	10	15
	Winter wheat (fall), or	90	120
	Winter rye (fall)	56	112
2[3]	Tall fescue, or	60	75
	Fine fescue, or	35	40
	Kentucky bluegrass, plus	25	30
	Redtop[4], or	3	3
	Perennial ryegrass	15	20
3	Birdsfoot trefoil, plus	6	10
	Tall fescue	30	35
4	Birdsfoot trefoil, plus	6	10
	Reed canarygrass	10	15
5[5]	Crownvetch, plus	10	15
	Tall fescue, or	20	25
	Perennial ryegrass	20	25
6[5]	Crownvetch, plus	15	15
	Annual ryegrass	20	25
7[5]	Birdsfoot trefoil, plus	6	10
	Crownvetch, plus	10	15
	Tall fescue	20	30
8	Flatpea, plus	20	30
	Tall fescue, or	20	30
	Perennial ryegrass	20	25
9[6]	Sericea lespedeza, plus	10	20
	Tall fescue, plus	20	25
	Redtop[4]	3	3
10	Tall fescue, plus	40	60
	Fine fescue	10	15
11	Deertongue, plus	15	20
	Birdsfoot trefoil	6	10
12[7]	Switchgrass, or	15	20
	Big bluestem, plus	15	20
	Birdsfoot trefoil	6	10
13	Orchardgrass, or	20	30
	Smooth bromegrass, plus	25	35
	Birdsfoot trefoil	6	10

Penn State, "Erosion Control and Conservation Plantings on Noncropland"
1. PLS is the product of the percentage of pure seed times percentage germination divided by 100. For example, to secure the actual planting rate for switchgrass, divide 12 pounds PLS shown on the seed tag. Thus, if the PLS content of a given seed lot is 35%, divide 12 PLS by 0.35 to obtain 34.3 pounds of seed required to plant one acre. All mixtures in this table are shown in terms of PLS.
2. If high quality seed is used, for most sites seed spring oats at a rate of 2 bushels per acre, winter wheat at 1.5 bushels per acre, and winter rye at 1 bushel per acre. If germination is below 90%, increase these suggested seeding rates by 0.5 bushel per acre.
3. This mixture is suitable for frequent mowing. Do not cut shorter than 4 inches.
4. Keep seeding rate to that recommended in table. These species have many seeds per pound and are very competitive. To seed small quantities of small seeds such as weeping lovegrass and redtop, dilute with dry sawdust, sand, rice hulls, buckwheat hulls, etc.
5. Use for highway slopes and similar sites where the desired species after establishment is crownvetch.
6. Use only in extreme southeastern or extreme southwestern Pennsylvania. Sericea lespedeza is not well adapted to most of PA.
7. Do not mow shorter than 9 to 10 inches.
8. Seed mixtures containing crown vetch should not be used in areas adjacent to wetlands or stream channels due to the invasive nature of this species.

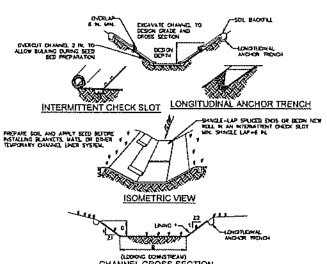
NOTE: MIX 1 FROM TABLE 11.4 IS TO BE USED AS TEMPORARY SEEDING IF NECESSARY FOR ALL AREAS OF THE PROJECT. MIX 2 FROM TABLE 11.4 IS TO BE USED AS PERMANENT STABILIZATION FOR ALL AREAS OF THE PROJECT.MULCH PER TABLE 11.6. FERTILIZE PER TABLE 11.2 ONLY IF DEEMED NECESSARY AFTER A SOIL TEST.

TABLE 11.6
Mulch Application Rates

Mulch Type	Application Rate (Min.) Per Acre	Per 1,000 sq. ft.	Per 1,000 sq. yd.	Notes
Straw	3 tons	140 lb.	1,240 lb.	Either wheat or oat straw, free of weeds, not chopped or finely broken
Hay	3 tons	140 lb.	1,240 lb.	Timothy, mixed clover and timothy or other native forage grasses
Wood Chips	4 - 6 tons	185 - 275 lb.	1,650 - 2,500 lb.	May prevent germination of grasses and legumes
Hydromulch	1 ton	47 lb.	415	See limitations above

Mulch on slopes of 8% or steeper should be held in place with netting. Lightweight plastic, fiber, or paper nets may be stapled over the mulch according to manufacturer's recommendations.

Shredded paper hydromulch should not be used on slopes steeper than 5%. Wood fiber hydromulch may be applied on steeper slopes provided a tackifier is used. The application rate for any hydromulch should be 2,000 lb/acre at a minimum.



CHANNEL CROSS-SECTION

* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, VEGETATIVE STABILIZATION FOR SOIL AMENDMENTS, SEED MIXTURES AND MULCHING INFORMATION

CHANNEL NO.	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Z1 (FT)	Z2 (FT)	LINING *
SWALE FROM IW 1 TO IW 2	8	3	14	2	2	NAG C350

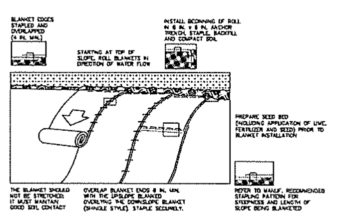
NOTES:

ANCHOR TRENCHES SHALL BE INSTALLED AT BEGINNING AND END OF CHANNEL IN THE SAME MANNER AS LONGITUDINAL ANCHOR TRENCHES.

CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION.
SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.

NO MORE THAN ONE THIRD OF THE SHOOT (GRASS LEAF) SHALL BE REMOVED IN ANY MOWING. GRASS HEIGHT SHALL BE MAINTAINED BETWEEN 2 AND 3 INCHES UNLESS OTHERWISE SPECIFIED. EXCESS VEGETATION SHALL BE REMOVED FROM PERMANENT CHANNELS TO ENSURE SUFFICIENT CHANNEL CAPACITY.

STANDARD CONSTRUCTION DETAIL #6-1
VEGETATED CHANNEL
NOT TO SCALE



NOTES:

SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.

PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.

SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.

BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.

THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.

STANDARD CONSTRUCTION DETAIL #11-1
EROSION CONTROL BLANKET INSTALLATION
NOT TO SCALE

TABLE 11.2
Soil Amendment Application Rate Equivalents

Soil Amendment	Permanent Seeding Application Rate Per Acre	Per 1,000 sq. ft.	Per 1,000 sq. yd.	Notes
Agricultural lime	6 tons	240 lb.	2,480 lb.	Or as per soil test; may not be required in agricultural fields
10-10-20 fertilizer	1,000 lb.	25 lb.	210 lb.	Or as per soil test; may not be required in agricultural fields
	Temporary Seeding Application Rate			
Agricultural lime	1 ton	40 lb.	410 lb.	Typically not required for topsoil stockpiles
10-10-10 fertilizer	500 lb.	12.5 lb.	100 lb.	Typically not required for topsoil stockpiles

Adapted from Penn State, "Erosion Control and Conservation Plantings on Noncropland"

PROJECT INFORMATION:
LAST SAVED DATE AND TIME: 11 May 2018, 2:25PM

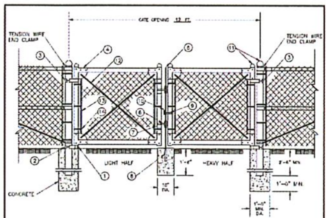
NO.	DATE	REVISIONS	BY	CHK'D

RICHARD A YOUNG
P.E.
LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NUM

TOWNSHIP OF RADNOR
NORTH WAYNE BASIN
TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA
90% PROGRESS PLANS
SOIL EROSION AND SEDIMENT CONTROL DETAILS

YOUR GOALS. OUR MISSION.
74 WEST BROAD STREET, STE 530
BETHLEHEM, PA 18018
TEL 610-625-2999
FAX 610-625-2960
OFFICES LOCATED IN:
CALIFORNIA, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA

DESIGNED BY DP	DRAWING SED-3
CHECKED BY RAY	
DRAWN BY DP	SHEET 11 OF 14
DATE 05-11-2018	
SCALE AS SHOWN	
PROJ. NO. RADN00011	



GATE DETAIL

LEGEND

PART NO.	DESCRIPTION	QUANTITY
1	STRAIGHT PLUG	2
2	BOTTOM HINGE	2
3	TOP HINGE	2
4	CORNER ELBOW	8
5	PLUNGER ROD	1
6	LATCH FORK	2
7	FORK CATCH	2
8	PLUNGER ROD CATCH	1
9	LOCK KEEPER GUIDE	1
10	LOCK KEEPER	1
11	ORNAMENTAL TOPS	6
12	TRUSS RODS	4
13	STRETCHER BAR	4
14	HOOK BOLTS	12

NOTE:
THE FENCING SHALL BE #9 GAGE FENCE FABRIC, STANDARD 2-INCH CHAIN LINK DIAMOND MESH.

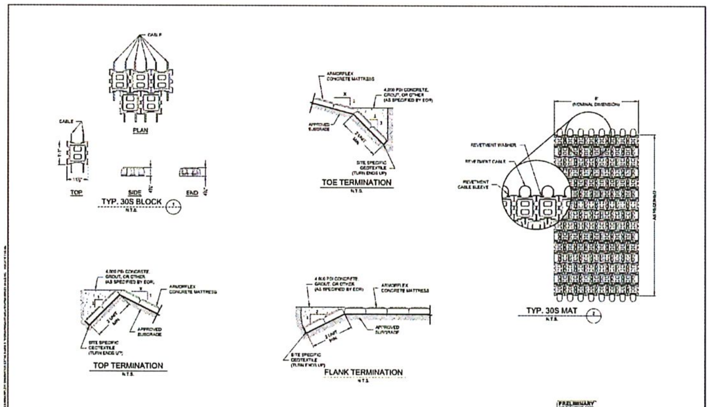
THIS STANDARDIZED DESIGN MUST BE ADAPTED TO THE SPECIFIC SITE

USDA United States Department of Agriculture
Natural Resources Conservation Service

CHAIN LINK FENCE VEHICLE GATE INSTALLED IN EARTH

CLIENT: ----
COUNTY: ----

Designed ---- Date ----
Drawn
Checked
Approved
File Name
Date 07/14
Sheet of

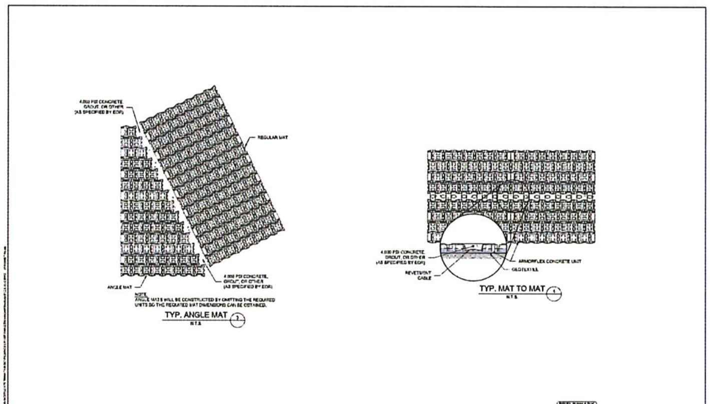


CONTECH ENGINEERED SOLUTIONS LLC

ARMORTEC PROPOSAL

ARMORFLEX
CLASS 30 SMALL
STANDARD TERMINATION DETAILS

CT1 - CT2



CONTECH ENGINEERED SOLUTIONS LLC

ARMORTEC PROPOSAL

ARMORFLEX
CLASS 30 SMALL
STANDARD TERMINATION DETAILS

CT2 - CT2

NO.	DATE	REVISIONS	BY	CHK'D

RICHARD A YOUNG
P.E.

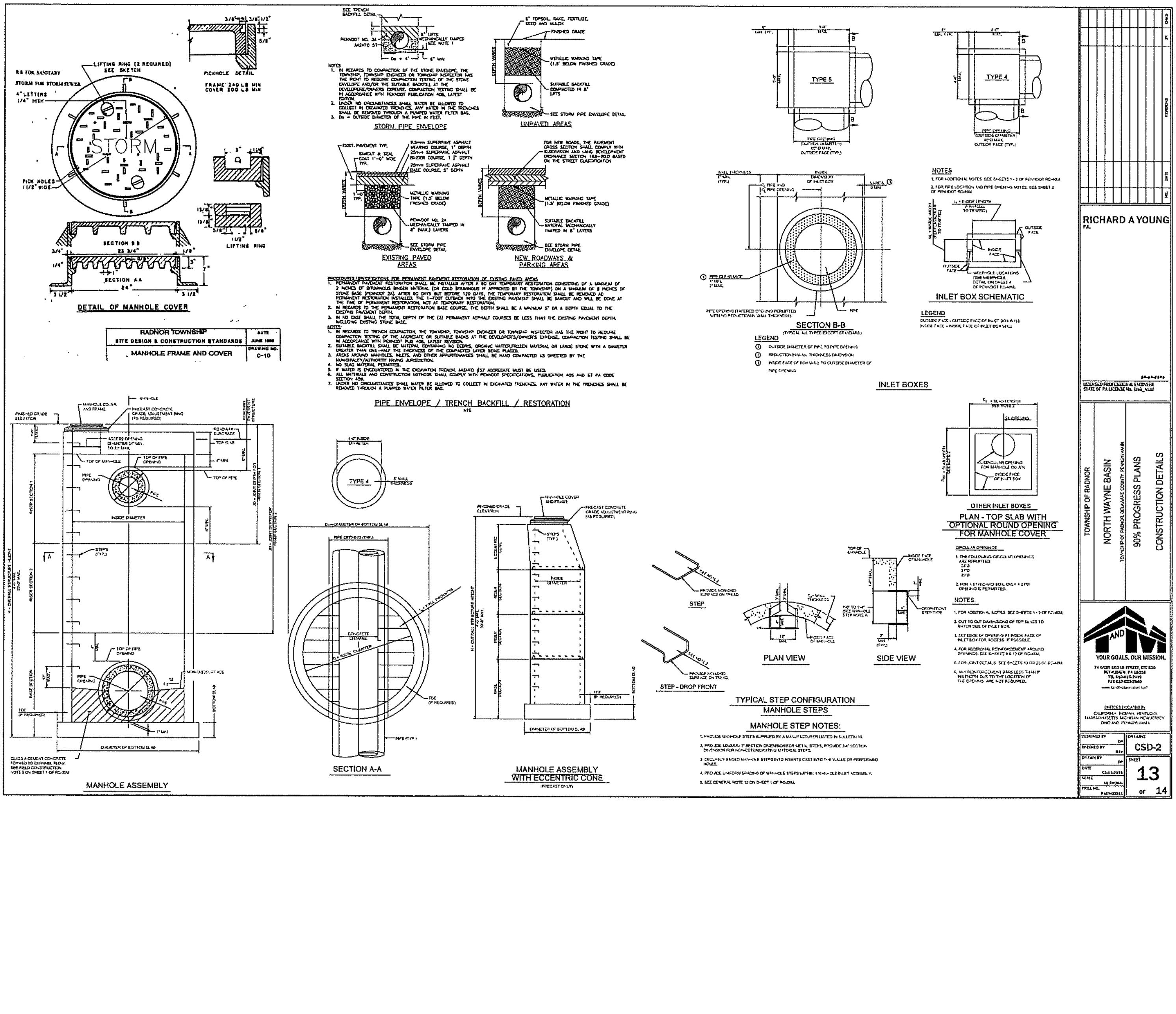
LICENSED PROFESSIONAL ENGINEER
STATE OF PA LICENSE No. ENG_NUM

TOWNSHIP OF RADNOR
NORTH WAYNE BASIN
TOWNSHIP OF RADNOR, DELAWARE COUNTY, PENNSYLVANIA
90% PROGRESS PLANS
CONSTRUCTION DETAILS

T AND M
YOUR GOALS. OUR MISSION.
74 WEST BROAD STREET, STE 530
BETHLEHEM, PA 18018
TEL 610-625-2999
FAX 610-625-2969

OFFICES LOCATED IN:
CALIFORNIA, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA

DESIGNED BY: DP	DRAWING: CSD-1
CHECKED BY: RAY	
DRAWN BY: DP	SHEET 12 OF 14
DATE: 05-13-2016	
SCALE: AS SHOWN	
PROJ. NO.: RADN00011	



DETAIL OF MANHOLE COVER
STORM
RADNOR TOWNSHIP
SITE DESIGN & CONSTRUCTION STANDARDS
MANHOLE FRAME AND COVER
C-10
STORM PIPE ENVELOPE
UNPAVED AREAS
EXISTING PAVED AREAS
NEW ROADWAYS & PARKING AREAS
PIPE ENVELOPE / TRENCH BACKFILL / RESTORATION
TYPE 5
TYPE 4
SECTION B-B
LEGEND
INLET BOX SCHEMATIC
INLET BOXES
OTHER INLET BOXES
PLAN - TOP SLAB WITH OPTIONAL ROUND OPENING FOR MANHOLE COVER
NOTES
MANHOLE ASSEMBLY
SECTION A-A
MANHOLE ASSEMBLY WITH ECCENTRIC CONE
STEP
STEP - DROP FRONT
PLAN VIEW
SIDE VIEW
TYPICAL STEP CONFIGURATION MANHOLE STEPS
MANHOLE STEP NOTES:
RICHARD A YOUNG
TOWNSHIP OF RADNOR
NORTH WAYNE BASIN
90% PROGRESS PLANS
CONSTRUCTION DETAILS
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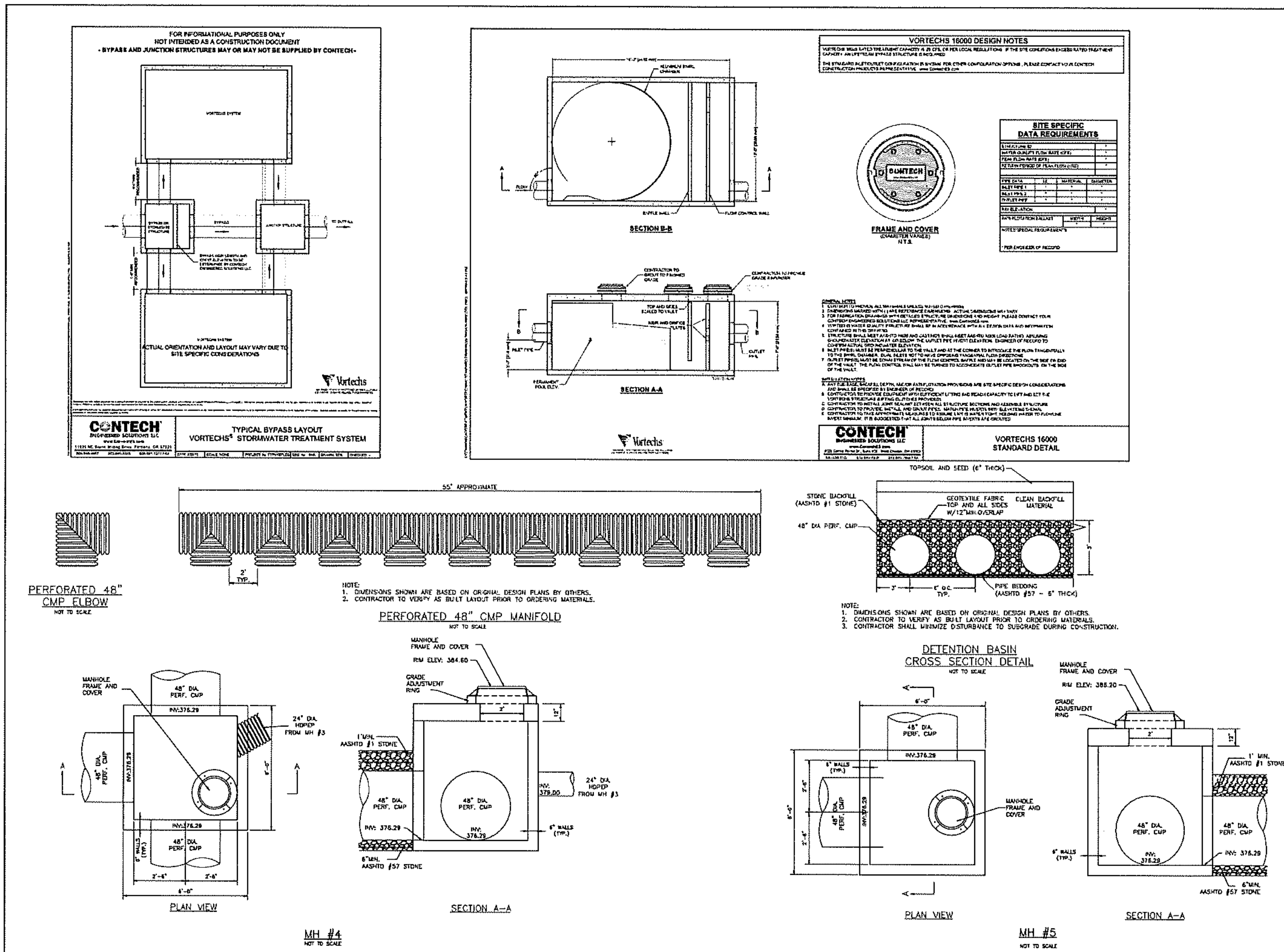
CSD-2
13
OF 14



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DRAWING: CSD-3
SHEET 14 OF 14
SCALE: AS SHOWN

April 16, 2018

Mr. Stephen F. Norcini
Township Engineer
Radnor Township
301 Iven Avenue
Wayne, PA 19087

RE: North Wayne Basin – Stormwater Analysis and Green Infrastructure Design Documentation

Dear Mr. Norcini:

Meliora Design is pleased to submit this proposal to provide Professional Design and Consulting Services for the North Wayne Basin Stormwater Analysis and Green Infrastructure Design Documentation. This work effort will identify and evaluate five (5) viable Green Infrastructure projects in the North Wayne Basin drainage area, and develop these designs to a Design Development, or pre-Construction document level.

Project Understanding and Work Tasks

Previous work efforts by CH2 provided a high level hydrologic analysis of the flooding conditions downstream of the North Wayne Basin, and evaluated several scenarios for stormwater management options. This effort will focus on identifying and developing viable, effective, and constructible Green Infrastructure (GI) solutions upstream of the North Wayne Basin. We will provide a detailed analysis of the volume, flow rate, and pollutant reduction benefits of these GI measures within the drainage area to the North Wayne Basin. This study will not focus on demonstrating flood reductions through models but instead the use of GI practices to provide a downstream reduction in stormwater runoff volume. Upon Township approval, five Green Infrastructure projects will be documented to a "Design Development" level including the following tasks:

1. Brief review of CH2 Analysis to understand previous works in the study area.
2. Compilation of Drainage Area Base Maps to include existing utilities based on Township information and PA One Call documents, as well as right-of-way information, soils, etc.
3. Site Visits to evaluate opportunities and constraints, and to identify potential GI locations, types, and sizes.
4. Quantification of stormwater benefits (volume reduction, flow rate reduction into basin, and Pollutant Reduction benefit for PRP). Development of initial Concept Costs.
5. Meeting with Radnor Township to review the findings and recommendations.
6. Infiltration testing at up to five locations.
7. Design Documentation level plans for five GI installations.
8. Meeting with Township to review documentation.
9. Two Public Meetings including powerpoint presentation for public documentation.

If five feasible GI projects cannot be identified, work will be billed on a Time and Materials not to exceed basis.

Tangible Work Products:

- Working base to include utilities, ROWs, soils, etc.
- Site evaluation GI opportunities
- Quantified stormwater benefits (volume reduction, flow rate reduction into basin, and Pollutant Reduction benefits) for PRP for each GI project.

- Two (2) Township meetings
- Design Documentation level plans for five (5) GI projects, suitable for survey confirmation and Construction Documentation (not in this scope).

All work products will be provided in hard copy and digital format.

We appreciate the opportunity to undertake this effort. If you have any questions or concerns, we can be reached at 610-933-0123, or MicheleA@Melioradesign.com and MarcH@Melioradesign.com.

Sincerely yours,

Michele C. Adams, PE, LEED AP
Principal

Marc B. Henderson, PE
Project Manager

Radnor Township North Wayne Green Infrastructure Feasibility and Design
Meliora Detailed Fee Estimate
Prepared for Steve Norcini
April 16, 2018

Meliora Design - Fee Estimate - Detailed

	Title	Principal	Senior Engineer	Water Resources Engineer	Total Hours	Total Fee
	Billing Rate	$195.00	$135.00	$95.00		
1	Green Infrastructure Feasibility Analysis and Design					
					0	$ -
	Brief review of previous study within proposed area	2	4	4	10	$ 1,310
	Compilation of base map to include existing utilities (One Call) and conditions		4	16	20	$ 2,060
	Site Visits to evaluate opportunities and constraints; Identify potential GI locations, types, and sizes.		16	16	32	$ 3,680
	Quantification of stormwater volume reduction, peak rate reduction from sub-watershed, and pollutant reduction for identified GI opportunities. Develop initial Concept cost estimate for construction.	4	16	32	52	$ 5,980
	Two (2) Meetings with Township to review opportunities and constraints, and proposed GI locations, sizes, construction costs, and recommendations.	4	8	4	16	$ 2,240
	Coordination of Infiltration Testing Five (5) locations			8	8	$ 760
	Design Documentation of five (5) GI installations.	8	40	120	168	$ 18,360
	Public Meetings (2)	4	8		12	$ 1,860
					0	$ -
					0	$ -
	Green Infrastructure Feasibility Analysis and Design Hours	**22**	**96**	**200**	318	
	Green Infrastructure Feasibility Analysis and Design Total	**$ 4,290**	**$ 12,960**	**$ 19,000**		$ 36,250
	Project Hours Total	**22**	**96**	**200**	**318**	
	Project Labor Total	**$ 4,290**	**$ 12,960**	**$ 19,000**		**$ 36,250**
	Reimbursables					
	Expense Estimated at 2% of fee (includes mileage, printing, etc.)					**$ 730**
	Subconsultants					
	Geotechnical Investigation					$ 12,000
	Subconsultants Subtotal					**$ 12,000**
	Total Fee					**$ 48,980**