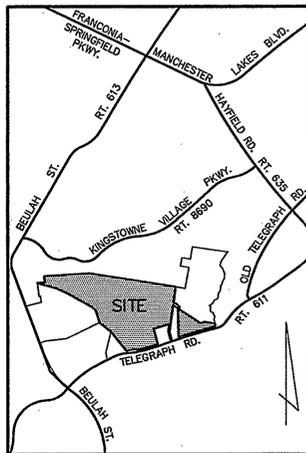


# HILLTOP GOLF COURSE

Lee District Fairfax County, Virginia

## GENERALIZED DEVELOPMENT PLAN / SPECIAL EXCEPTION AMENDMENT

RZ 2008-LE-001 / SEA 2005-LE-027



VICINITY MAP  
SCALE : 1" = 2,000'

Applicant:

Hilltop Sand and Gravel Company, Inc.  
7950 Telegraph Road  
Alexandria, VA 22315

### Sheet Index

1. COVER SHEET
2. GENERALIZED DEVELOPMENT PLAN /  
SPECIAL EXCEPTION AMENDMENT - OVERALL PLAN
3. GENERALIZED DEVELOPMENT PLAN /  
SPECIAL EXCEPTION AMENDMENT - ENLARGEMENT PLAN
4. GENERALIZED DEVELOPMENT PLAN /  
SPECIAL EXCEPTION AMENDMENT - ENLARGEMENT PLAN /  
NOTES AND TABULATION
5. STORMWATER MANAGEMENT - OUTFALL NARRATIVE
6. STORMWATER MANAGEMENT - NARRATIVES
7. STORMWATER MANAGEMENT
8. STORMWATER MANAGEMENT



Dewberry &  
Davis LLC  
A Dewberry Company

8401 ARLINGTON BLVD.  
FAIRFAX, VA 22031  
PHONE: 703.849.0100  
FAX: 703.849.0219  
www.dewberry.com

Application No. SEA 2005-LE-027 Staff C. Lewis

APPROVED (SE) SP PLAN

SEE DEV CONDS DATED 2-12-2009

Date of (BOS) (BZA) Approval 3-9-2009

Sheet 1 OF 8

Concurrent with RZ 2008-LE-001

SEAL



Rev: 01.16.09  
Rev: 12.02.08  
Rev: 10.17.08  
February 12, 2008

RZ 2008-LE-001 / SEA 2005-LE-027  
Hilltop Golf Course  
Generalized Development Plan /  
Special Exception Amendment

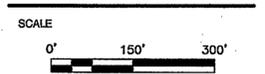
M-10693

RECEIVED  
Department of Planning & Zoning  
JAN 16 2009  
Zoning Evaluation Division

**HILLTOP GOLF COURSE**  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



KEY PLAN



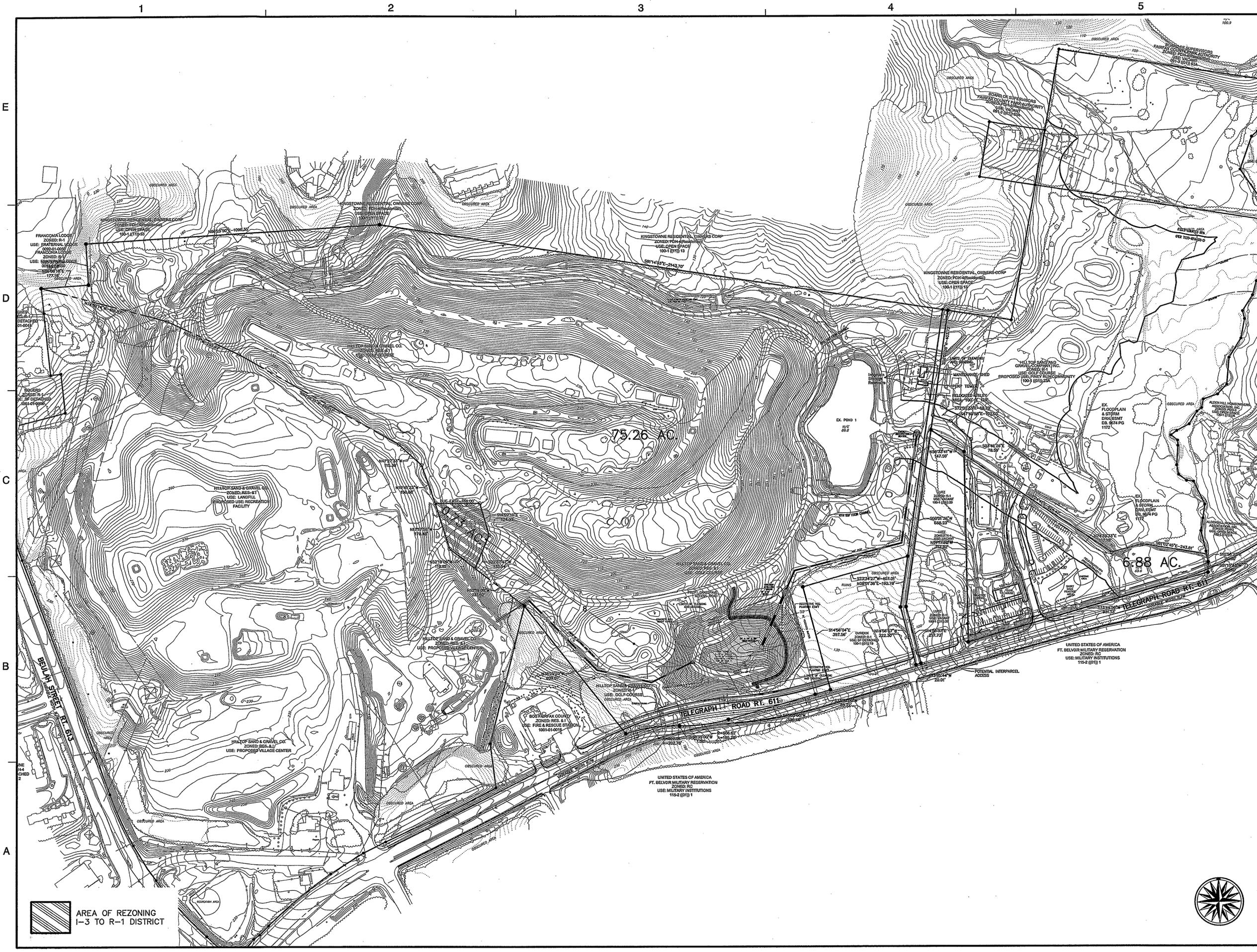
No.	DATE	BY	Description
3	01.16.09	DMC	Site Plan/SEA/SP/SHR in Final Partic. Package
2	12.2.08	DMC	UPDATE / ADD. DETAILS
1	10.17.08		No Change

REVISIONS

DRAWN BY ARW  
 APPROVED BY \_\_\_\_\_  
 CHECKED BY LM  
 DATE February 12, 2008

TITLE  
**Hilltop Golf Course**  
 GDP / SEA  
 Overall Plan

PROJECT NO.



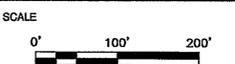
AREA OF REZONING  
 I-3 TO R-1 DISTRICT



**HILLTOP GOLF COURSE**  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



KEY PLAN

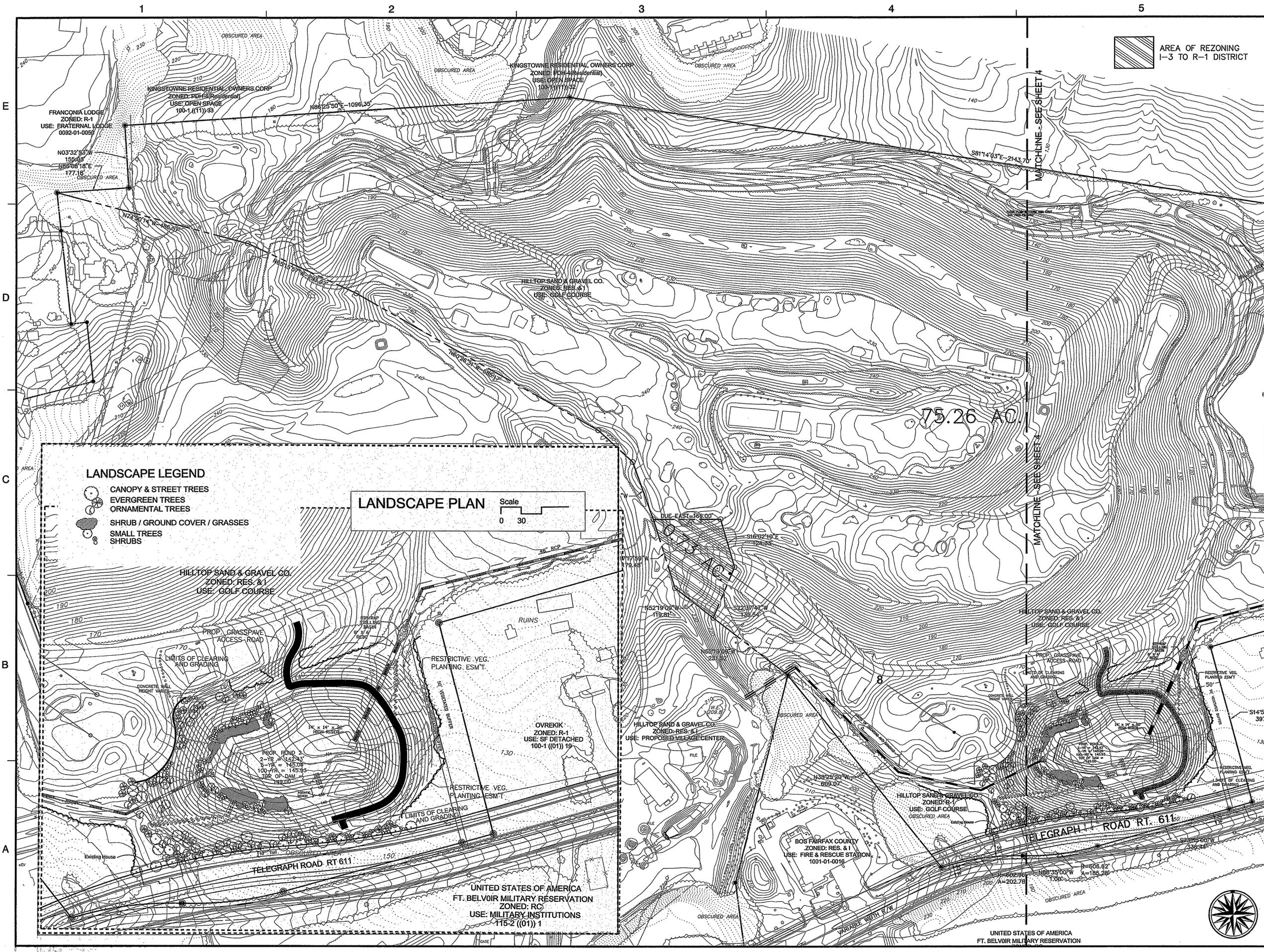


No.	DATE	BY	Description
3	01.16.09	DMC	Rev. Telegraph Trs/RDM/Agmt
2	12.02.08	DMC	POND REV. / ADD. DETAIL
1	10.17.08		+ Landscape Plan

DRAWN BY: ARW  
 APPROVED BY: LM  
 CHECKED BY: LM  
 DATE: February 12, 2008  
 TITLE: Hilltop Golf Course

GDP / SEA  
 Enlargement Plan  
 & Landscape Plan

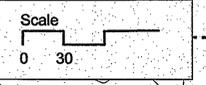
PROJECT NO.



**LANDSCAPE LEGEND**

- CANOPY & STREET TREES
- EVERGREEN TREES
- ORNAMENTAL TREES
- SHRUB / GROUND COVER / GRASSES
- SMALL TREES
- SHRUBS

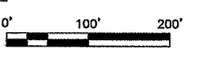
**LANDSCAPE PLAN**



Application No. **SEA 2005-LE-027** Staff **C. Lewis**  
 APPROVED **SE** / **SP** PLAN  
 SEE PROFFERS DATED **2-12-2009**  
 Date of **BOS** (BZA) Approval **3-9-2009**  
 Sheet **4** OF **8**  
 Concurrent with RZ 2008-LE-001

**HILLTOP GOLF COURSE**  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA

SEAL  
  
 PROFESSIONAL ENGINEER

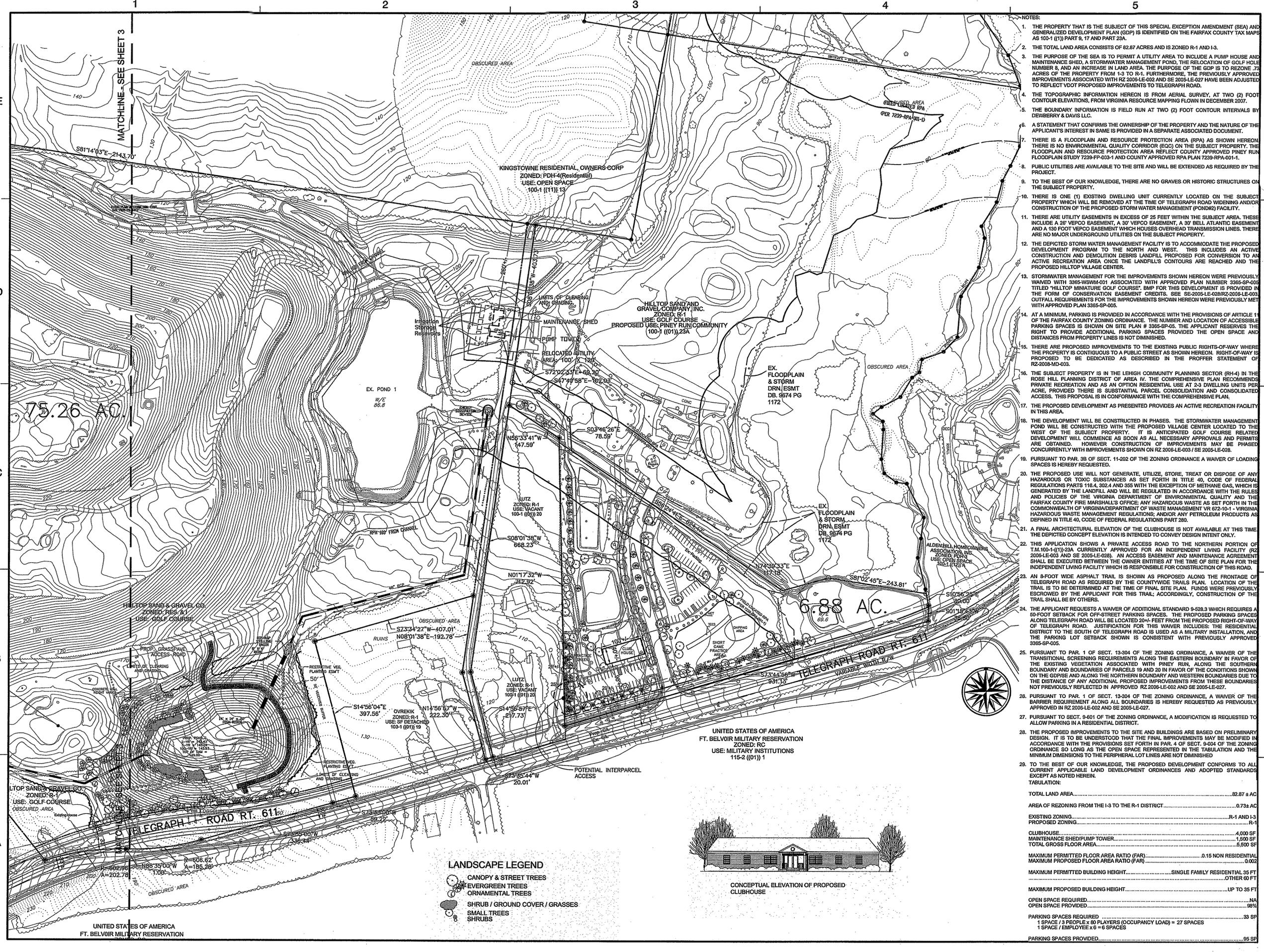
KEY PLAN  
 SCALE  


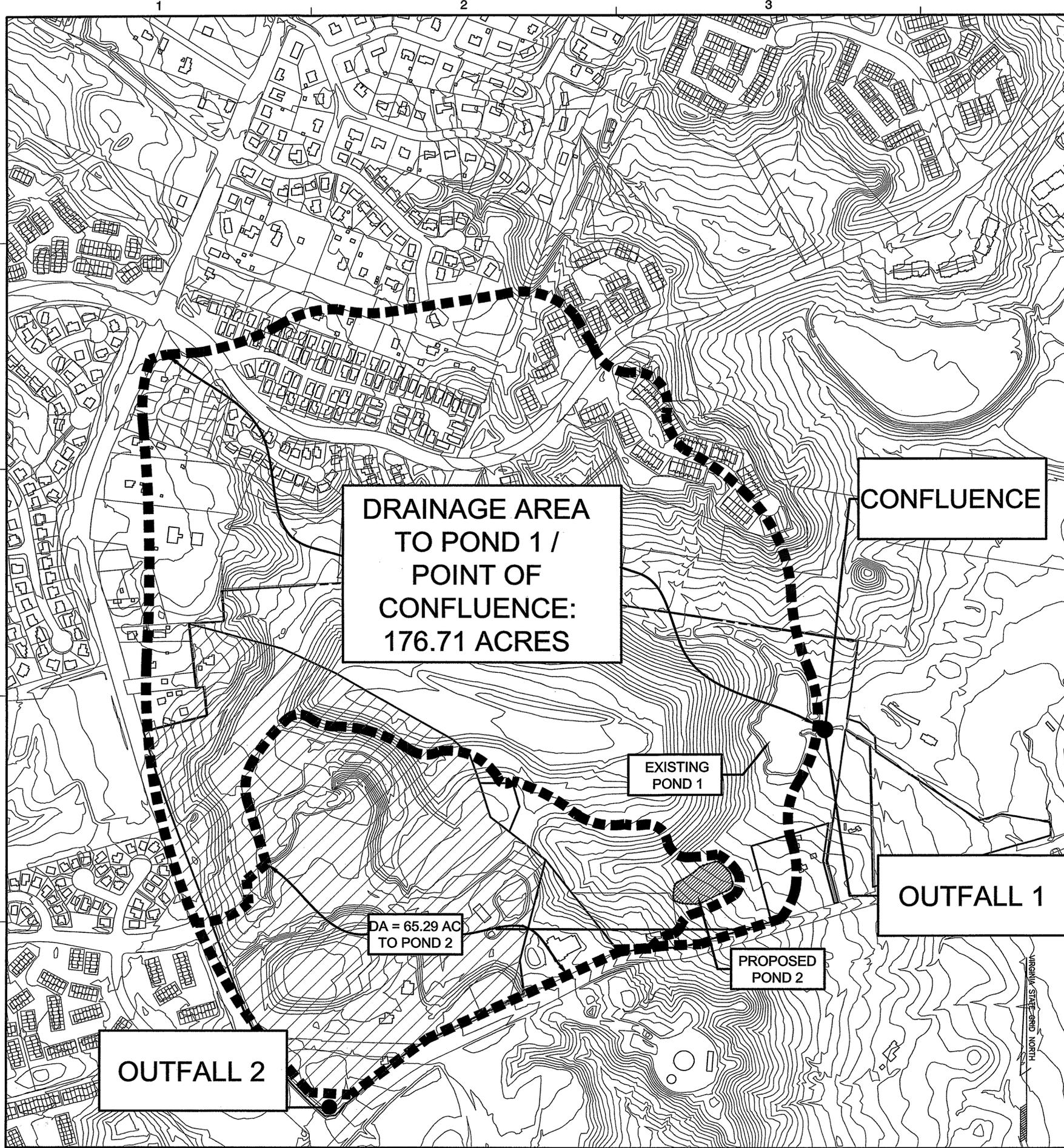
No.	DATE	BY	Description
3	01.16.09	DMC	Rev. (See Notes 190 & 200) in 190
2	12.02.08	DMC	ADD. DETAIL
1	10.17.08		

DRAWN BY **ARW**  
 APPROVED BY **LM**  
 CHECKED BY **LM**  
 DATE **February 12, 2008**

TITLE  
**Hilltop Golf Course**  
**GDP / SEA**  
**Enlargement Plan /**  
**Notes and Tabulation**

PROJECT NO.  
**4**  
 SHEET NO. **4** OF **8**  
**M-10693**





Hilltop Village Center and Recreation Area Stormwater Management (SWM) AND DRAINAGE OUTFALL Narrative

**I. Stormwater Management**  
 The Hilltop Village Center (33± AC) and Recreation Area (35.86 AC) (project site) is a 68.86 acre development located in southeastern Fairfax County predominantly within the Dogue Creek watershed. The project site includes commercial and recreational uses and is a part of the overall Hilltop Sand and Gravel site (151 acres) where existing land use includes an active debris land fill and a nine hole golf course.

The majority of the overall Hilltop Sand and Gravel site, including the proposed Hilltop Village Center and Recreation Area site, drains to an existing stormwater management facility (wet pond) known as existing Pond 1. The drainage area for existing Pond 1 is 242 acres, of which 136 acres comes from the Hilltop Sand and Gravel site and 106 acres comes from the adjacent Kingstowne development. A 1996 site plan for the Hilltop Reclamation Project demonstrated that the existing Pond 1 provides stormwater detention and BMP for that portion of the Hilltop site draining to the facility assuming current land uses (i.e. nine hole golf course and active debris land fill). A small portion of the proposed Hilltop Village Center site (4 acres) located at the intersection of Telegraph Road and Beulah Street does not drain to existing Pond 1 but instead drains to the west into an existing storm sewer system along Telegraph Road, labeled as Outfall 2.

The proposed commercial and recreational uses for the Hilltop Village Center and Recreation Area site will result in increased runoff to Pond 1 which would exceed its original design capacity. Therefore, the majority of the proposed runoff from the 68.86 acre project site will be directed to a proposed new SWM facility (wet pond) referred to as future Pond 2 located 600 feet southwest of Pond 1 outside of the 70 acre project site but within the original Hilltop Sand and Gravel site. In addition, approximately 3 acres of the project site that naturally drains to Telegraph Road (Outfall 2) will be directed into Pond 2 to avoid increasing runoff into the existing Telegraph storm sewer system and maintain an adequate drainage outfall. The discharge from Pond 2 will be conveyed via a proposed storm sewer pipe to the outfall immediately downstream of Pond 1. The stormwater detention design for Pond 2 is such that the combined discharge from Ponds 1 and 2 will be less than the predevelopment discharge into the outfall downstream of Pond 1 as shown in the attached computations (HEC-1 model output). The computations for pre-developed runoff and existing Pond 1 are taken from the approved site plan for the Hilltop Reclamation project (County Plan No. 3365-LF-001-1).

The normal pool volume of Pond 2 has been sized to provide 4 times the runoff of the mean storm for the entire acreage of the Hilltop Sand and Gravel site draining to the facility thereby providing a 50% P removal for this area. BMP computations are provided showing that Pond 2 alone will provide the required 40% overall P removal for the 68.86 acre Hilltop Village Center and Recreation Area site.

**II. Drainage Outfall**  
 There are two existing drainage outfalls for the 68.86 acre project site.

**Outfall No. 1**  
 The majority of the site (65.29 acres) naturally drains to existing Pond 1 which discharges to an engineered drainage channel having a drainage area of approximately 242 acres (minor floodplain). The 242 acres is comprised of the 65.29 acre project site as well as an additional 176.71 acres through Pond 1, which is more than 90% of the site's 65.29 drainage area and is therefore the point of confluence. This engineered channel was analyzed 150' down stream with three separate cross section to determine no overtopping of the channel occurs, and the 2 year velocity was determined to be non-erosive. See computation sheets for cross sections.

The proposed site design includes construction of a new stormwater management facility (Pond 2) to augment the performance of existing Pond 1. Together these facilities will work in parallel to reduce proposed site runoff for the 2- and 10-year storms to below predevelopment flow rates. Runoff from the majority of the 70 acre project site will be directed to proposed Pond 2 and then into a proposed storm sewer system discharging into the engineered channel downstream of Pond 1, a minor floodplain.

Computations will be provided which demonstrate that the engineered channel and associated roadway culverts between Pond 1 and the major floodplain can adequately convey the combined 2 and 10-year discharges exiting from Ponds 1 and 2. The stream channel within the major floodplain immediately downstream of the confluence with the engineered channel will be evaluated for adequacy to convey the 2-year storm. For the uncontrolled portion of the site directed towards Telegraph Road (U-1) the existing storm sewer system will be evaluated for adequacy to convey the required 10-year design storm. The second portion of the site that is uncontrolled (U-2) will be conveyed to the existing Pond 1 as it does today, and no increase in runoff is expected as the proposed development in that area is vegetated ground cover.

**Outfall No. 2**  
 The remainder of the site (4 acres identified as U-2) drains to the west into an existing storm sewer system along Telegraph Road. It is proposed that 3 of the 4 acres be diverted to proposed Pond 2 in order that post development flow rates to this outfall are not increased and the existing storm sewer system will have adequate capacity for the 10-year design storm. If this diversion is determined to not be feasible then underground detention will be proposed in this location to attenuate the 2- and 10-year runoff to at or below predevelopment discharge rates such that the existing storm sewer outfall can adequately convey proposed runoff from the project site.

**MINIMUM STORMWATER INFORMATION FOR REZONING, SPECIAL EXCEPTION, SPECIAL PERMIT AND DEVELOPMENT PLAN APPLICATIONS**

The following information is required to be shown or provided in all zoning applications, or a waiver request of the submission requirement with justification shall be attached. Note: Waivers will be acted upon separately. Failure to adequately address the required submission information may result in a delay in processing this application.

This information is required under the following Zoning Ordinance paragraphs:  
 Special Permits (9-011 2J & 2L)      Special Exceptions (9-011 2J & 2L)  
 Cluster Subdivision (9-615 1G & 1N)      Commercial Revitalization Districts (9-622 2A (12) & 14))  
 Development Plans PRC District (16-302 3 & 4L)      PRC Plan (16-303 1E & 1O)  
 FDP P Districts (except PRC) (16-302 1F & 1Q)      Amendments (18-202 10F & 10I)

<input checked="" type="checkbox"/>	1. Plat is at a minimum scale of 1" = 50' (unless it is depicted on one sheet with a minimum scale of 1" = 100').																												
<input checked="" type="checkbox"/>	2. A graphic depicting the stormwater management facility(ies) and limits of clearing and grading accommodate the stormwater management facility(ies), storm drainage pipe systems and outlet protection, pond spillways, access roads, site outfalls, energy dissipation devices, and stream stabilization measures as shown on sheet 6.																												
<input checked="" type="checkbox"/>	3. Provide:																												
	<table border="1"> <thead> <tr> <th>Facility Name/ Type &amp; No.</th> <th>On-site area served (acres)</th> <th>Off-site area served (acres)</th> <th>Drainage area (acres)</th> <th>Footprint area (sf)</th> <th>Storage Volume (cf)</th> <th>If pond, dam height (ft)</th> </tr> </thead> <tbody> <tr> <td>Wet Pond</td> <td>48.91</td> <td>16.38</td> <td>65.29</td> <td>82,764</td> <td>1,075,932</td> <td>32.0</td> </tr> <tr> <td colspan="7"><small>(e.g. dry pond A, infiltration, trench, underground, vault, etc.)</small></td> </tr> <tr> <td><b>Totals</b></td> <td><b>48.91</b></td> <td><b>16.38</b></td> <td><b>65.29</b></td> <td><b>82,764</b></td> <td><b>1,075,932</b></td> <td><b>32.0</b></td> </tr> </tbody> </table>	Facility Name/ Type & No.	On-site area served (acres)	Off-site area served (acres)	Drainage area (acres)	Footprint area (sf)	Storage Volume (cf)	If pond, dam height (ft)	Wet Pond	48.91	16.38	65.29	82,764	1,075,932	32.0	<small>(e.g. dry pond A, infiltration, trench, underground, vault, etc.)</small>							<b>Totals</b>	<b>48.91</b>	<b>16.38</b>	<b>65.29</b>	<b>82,764</b>	<b>1,075,932</b>	<b>32.0</b>
Facility Name/ Type & No.	On-site area served (acres)	Off-site area served (acres)	Drainage area (acres)	Footprint area (sf)	Storage Volume (cf)	If pond, dam height (ft)																							
Wet Pond	48.91	16.38	65.29	82,764	1,075,932	32.0																							
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<b>Totals</b>	<b>48.91</b>	<b>16.38</b>	<b>65.29</b>	<b>82,764</b>	<b>1,075,932</b>	<b>32.0</b>																							

- 4. Onsite drainage channels, outfalls and pipe systems are shown on Sheet 6. Pond inlet and outlet pipe systems are shown on Sheet 6.
- 5. Maintenance access (road) to stormwater management facility(ies) are shown on Sheet 6. Type of maintenance access road surface noted on the plat is 6 (e.g. asphalt, geoblock, gravel, etc.).
- 6. Landscaping and tree preservation shown in and near the stormwater management facility is shown on Sheet 6.
- 7. A stormwater management narrative which contains a description of how detention and best management practice requirements will be met is provided on Sheet 5.
- 8. A description of the existing conditions of each numbered site outfall extended downstream from the site to a point which is at least 100 times the site area or which has a drainage area of at least one square mile (640 acres) is provided on Sheet 5.
- 9. A description of how the outfall requirements, including contributing drainage areas of the Public Facilities Manual will be satisfied is provided on Sheet 5.
- 10. Existing topography with maximum contour intervals of two (2) feet and a note as to whether it is an air survey or field run is provided on Sheets 3, 4.
- 11. A submission waiver is requested for N/A.
- 12. Stormwater management is not required because N/A.

Industry Letter 05-03 dated 02/02/05

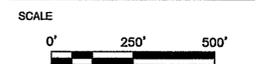
**Dewberry**  
 Dewberry & Davis LLC  
 8403 ARLINGTON BLVD.  
 FAIRFAX, VA 22031  
 PHONE: 703.849.0100  
 FAX: 703.849.0519  
 www.dewberry.com

Application No. SEA 2005-LE-027 Staff C. Lewis  
 APPROVED (SE) SP PLAN

SEE PROFFERS DATED 2-12-2009  
 Date of (BOS) (BZA) Approval 3-9-2009  
 Sheet 5 OF 8  
 Concurrent with RZ 2008-LE-001

HILLTOP GOLF COURSE  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA

SEAL  
  
 KEY PLAN



No.	DATE	BY	Description
3	01.16.09	DMC	No Change
2	12.02.08	DMC	Outfall
1	10.17.08		No Change

REVISIONS  
 DRAWN BY ARW  
 APPROVED BY LM  
 CHECKED BY LM  
 DATE February 12, 2008

TITLE  
 Hilltop Golf Course  
 GDP / SEA  
 Stormwater Outfall Narrative

PROJECT NO.

5

HILLTOP GOLF COURSE  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



KEY PLAN

SCALE

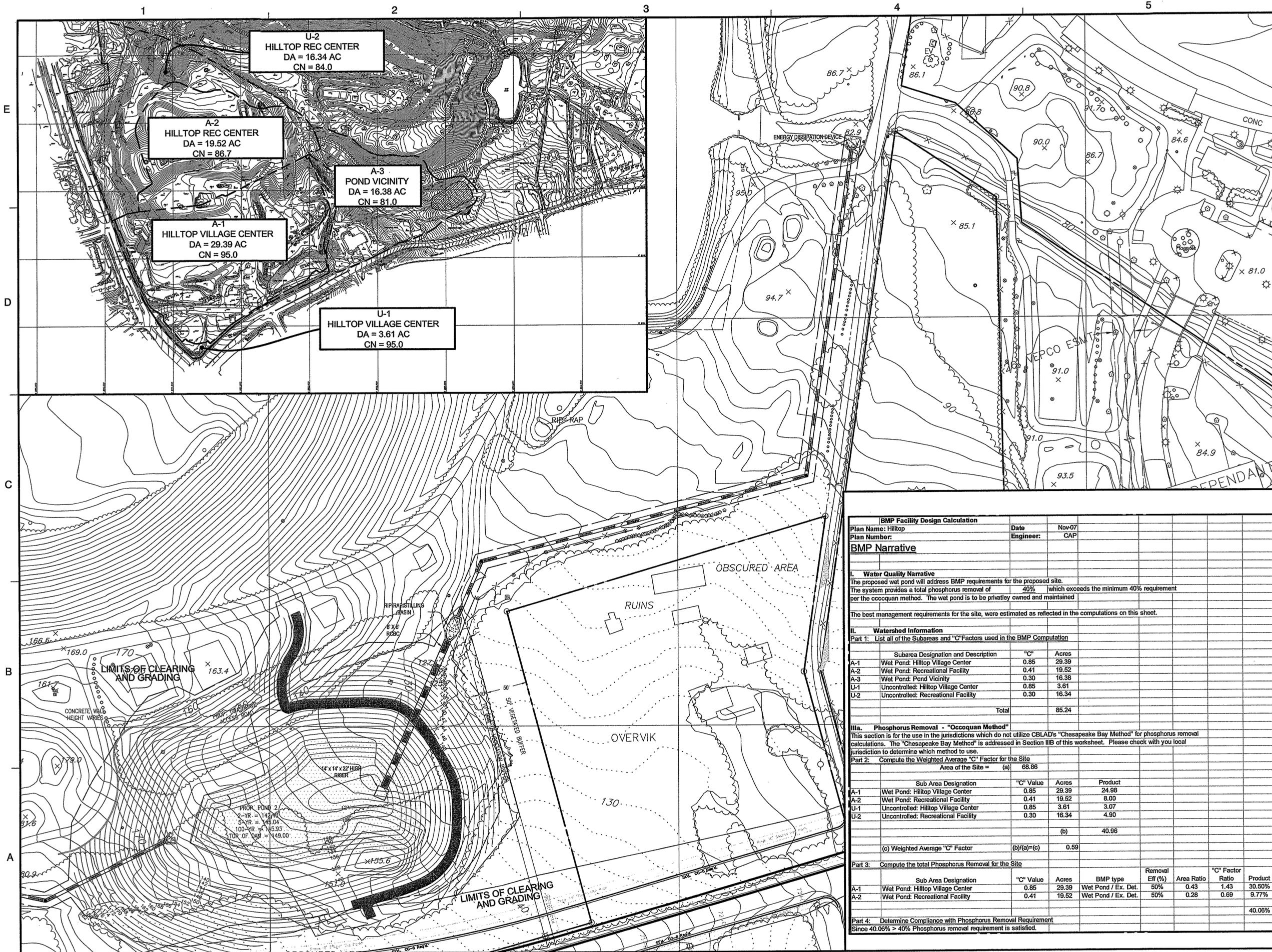
No.	DATE	BY	Description
3	01.16.09	DMC	No Change
2	12.02.08	DMC	
1	10.17.08		No Change

REVISIONS

DRAWN BY ARW  
 APPROVED BY  
 CHECKED BY LM  
 DATE February 12, 2008

TITLE  
**Hilltop Golf Course**  
 GDP / SEA  
 Stormwater Narratives

PROJECT NO.



BMP Facility Design Calculation								
Plan Name:	Hilltop	Date:	Nov-07					
Plan Number:		Engineer:	CAP					
<b>BMP Narrative</b>								
<b>I. Water Quality Narrative</b>								
The proposed wet pond will address BMP requirements for the proposed site. The system provides a total phosphorus removal of 40% which exceeds the minimum 40% requirement per the ocoquan method. The wet pond is to be privately owned and maintained.								
The best management requirements for the site, were estimated as reflected in the computations on this sheet.								
<b>II. Watershed Information</b>								
Part 1: List all of the Subareas and "C" Factors used in the BMP Computation								
	Subarea Designation and Description	"C"	Acres					
A-1	Wet Pond: Hilltop Village Center	0.85	29.39					
A-2	Wet Pond: Recreational Facility	0.41	19.52					
A-3	Wet Pond: Pond Vicinity	0.30	16.38					
U-1	Uncontrolled: Hilltop Village Center	0.85	3.61					
U-2	Uncontrolled: Recreational Facility	0.30	16.34					
	<b>Total</b>		<b>85.24</b>					
<b>IIIa. Phosphorus Removal - "Ocoquan Method"</b>								
This section is for the use in the jurisdictions which do not utilize CBLAD's "Chesapeake Bay Method" for phosphorus removal calculations. The "Chesapeake Bay Method" is addressed in Section IIIB of this worksheet. Please check with you local jurisdiction to determine which method to use.								
Part 2: Compute the Weighted Average "C" Factor for the Site								
	Area of the Site = (a)	68.86						
	Sub Area Designation	"C" Value	Acres					
A-1	Wet Pond: Hilltop Village Center	0.85	29.39					
A-2	Wet Pond: Recreational Facility	0.41	19.52					
U-1	Uncontrolled: Hilltop Village Center	0.85	3.61					
U-2	Uncontrolled: Recreational Facility	0.30	16.34					
		(b)	40.96					
	(c) Weighted Average "C" Factor	(b)/(a)=(c)	0.59					
Part 3: Compute the total Phosphorus Removal for the Site								
	Sub Area Designation	"C" Value	Acres	BMP type	Removal Eff (%)	Area Ratio	"C" Factor	Product
A-1	Wet Pond: Hilltop Village Center	0.85	29.39	Wet Pond / Ex. Det.	50%	0.43	1.43	30.50%
A-2	Wet Pond: Recreational Facility	0.41	19.52	Wet Pond / Ex. Det.	50%	0.28	0.69	9.77%
								40.06%
Part 4: Determine Compliance with Phosphorus Removal Requirement								
Since 40.06% > 40% Phosphorus removal requirement is satisfied.								

1\*\*\*\*\*  
 \* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
 \* JUN 1998 \*  
 \* VERSION 4.1 \*  
 \* RUN DATE 14JAN08 TIME 11:10:43 \*  
 \*\*\*\*\*

\*\*\*\*\*  
 \* U.S. ARMY CORPS OF ENGINEERS \*  
 \* HYDROLOGIC ENGINEERING CENTER \*  
 \* 609 SECOND STREET \*  
 \* DAVIS, CALIFORNIA 95616 \*  
 \* (916) 756-1104 \*  
 \*\*\*\*\*

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X X XXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXX XXXXX XXX
  
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.  
 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
 THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*DIAGRAM
ID Hilltop Sand & Gravel SWM
ID Existing Conditions
ID USING RAINFALL DATA FROM FFX CO PFM AND NRCS TYPE II 24-HR STORM
ID FILENAME Existing.IH1
IT 2 800
IO 5
JR PREC 3.2 5.2 7.3
KK PREDEV
KM Predevelopment Conditions Hydrograph - Open Space in Good Condition
KO 21
BA 0.378
IN 6
PC 0.0 .00101 .00202 .00305 .00408 .00513 .00618 .00725 .00832 .00941
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PC .98875 .9899 .99104 .99218 .99331 .99444 .99556 .99668 .99779 .9989
PC 1.0 79
LS UD 0.372
*
KK INFLOW
KM Existing Conditions Inflow to Existing SWM Pond 1 (without Prop Hilltop Villag
KO 21
BA 0.378
LS 84.17
UD 0.288
*
  
```

HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
KK EXSWMI
KM Route Through Existing SWM Pond 1 With Existing 12.5' Weir
KO 21
RS 1 STOR 0
SV 0 1.34 4.7 8.59 12.79 17.34 18.52
SE 85 86 88 90 92 94 94.5
SQ 0 13.26 37.5 68.89 106.07 148.23 194.86 245.55 300 357.97
SQ 419.25 483.7 551.14 647.96 769.51 908.02 1060.66 1225.77 1402.21 1589.13
SE 85 85.5 86 86.5 87 87.5 88 88.5 89 89.5
SE 90 90.5 91 91.5 92 92.5 93 93.5 94 94.5
ZZ
  
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
8 PREDEV
.
.
40 INFLOW
.
.
V
46 EXSWMI
.
  
```

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

1\*\*\*\*\*  
 \* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
 \* JUN 1998 \*  
 \* VERSION 4.1 \*  
 \* RUN DATE 14JAN08 TIME 11:10:43 \*  
 \*\*\*\*\*

\*\*\*\*\*  
 \* U.S. ARMY CORPS OF ENGINEERS \*  
 \* HYDROLOGIC ENGINEERING CENTER \*  
 \* 609 SECOND STREET \*  
 \* DAVIS, CALIFORNIA 95616 \*  
 \* (916) 756-1104 \*  
 \*\*\*\*\*

Hilltop Sand & Gravel SWM  
 Existing Conditions  
 USING RAINFALL DATA FROM FFX CO PFM AND NRCS TYPE II 24-HR STORM  
 FILENAME Existing.IH1

```

6 IO OUTPUT CONTROL VARIABLES
IFPRINT 5 PRINT CONTROL
IPILOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA
NMIN 2 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 800 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0238 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .03 HOURS
TOTAL TIME BASE 26.63 HOURS
  
```

ENGLISH UNITS  
 DRAINAGE AREA SQUARE MILES  
 PRECIPITATION DEPTH INCHES  
 LENGTH, ELEVATION FEET  
 FLOW CUBIC FEET PER SECOND  
 STORAGE VOLUME ACRE-Feet  
 SURFACE AREA ACRES  
 TEMPERATURE DEGREES FAHRENHEIT

```

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
3.20 5.20 7.30
  
```

\*\*\*\*\*

```

*****
* *
* * PREDEV *
* *
*****
  
```

```

10 KO OUTPUT CONTROL VARIABLES
IFPRINT 5 PRINT CONTROL
IPILOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE
IPNCH 0 PUNCH COMPUTED HYDROGRAPH
IOUT 21 SAVE HYDROGRAPH ON THIS UNIT
ISAV1 1 FIRST ORDINATE PUNCHED OR SAVED
ISAV2 800 LAST ORDINATE PUNCHED OR SAVED
TIMINT .033 TIME INTERVAL IN HOURS
  
```

\*\*\*\*\*

```

*****
* *
* * INFLOW *
* *
*****
  
```

```

42 KO OUTPUT CONTROL VARIABLES
IFPRINT 5 PRINT CONTROL
IPILOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE
IPNCH 0 PUNCH COMPUTED HYDROGRAPH
IOUT 21 SAVE HYDROGRAPH ON THIS UNIT
ISAV1 1 FIRST ORDINATE PUNCHED OR SAVED
ISAV2 800 LAST ORDINATE PUNCHED OR SAVED
TIMINT .033 TIME INTERVAL IN HOURS
  
```

\*\*\*\*\*

```

*****
* *
* * EXSWMI *
* *
*****
  
```

```

48 KO OUTPUT CONTROL VARIABLES
IFPRINT 5 PRINT CONTROL
IPILOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE
IPNCH 0 PUNCH COMPUTED HYDROGRAPH
IOUT 21 SAVE HYDROGRAPH ON THIS UNIT
ISAV1 1 FIRST ORDINATE PUNCHED OR SAVED
ISAV2 800 LAST ORDINATE PUNCHED OR SAVED
TIMINT .033 TIME INTERVAL IN HOURS
  
```

1 PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES  
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION		
				2-YEAR: RATIO 1	10-YEAR: RATIO 2	100-YR: RATIO 3
HYDROGRAPH AT	PREDEV	.38	1	244.12.27	557.12.27	909.12.23
HYDROGRAPH AT	INFLOW	.38	1	370.12.17	755.12.17	1169.12.17
ROUTED TO	EXSWMI	.38	1	274.12.33	604.12.30	1038.12.27
				** PEAK STAGES IN FEET **		
			1	88.76	91.27	92.93
				12.33	12.30	12.27

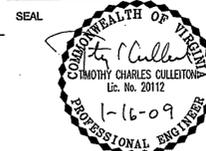


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Application No SEA 2005-LE-027 Staff C.Lewis  
 APPROVED SE/SP PLAN

SEE PROFFERS DATED 2-12-2009  
 Date of (BOS) (BZA) Approval 3-9-2009  
 Sheet 7 of 8  
 Concurrent with RZ 2008-LE-001

HILLTOP GOLF COURSE  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



KEY PLAN

SCALE

No.	DATE	BY	Description
3	01.16.09	DMC	No Change
2	12.02.08	DMC	
1	10.17.08		No Change

REVISIONS  
 DRAWN BY ARW  
 APPROVED BY LM  
 CHECKED BY LM  
 DATE February 12, 2008

TITLE  
 Hilltop Golf Course  
 GDP / SEA  
 Stormwater Management

PROJECT NO.

\*\*\*\*\*  
 \* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
 \* JUN 1998 \*  
 \* VERSION 4.1 \*  
 \* RUN DATE 27JAN08 TIME 11:59:31 \*  
 \*\*\*\*\*

\*\*\*\*\*  
 \* U.S. ARMY CORPS OF ENGINEERS \*  
 \* HYDROLOGIC ENGINEERING CENTER \*  
 \* 609 SECOND STREET \*  
 \* DAVIS, CALIFORNIA 95616 \*  
 \* (916) 756-1104 \*  
 \*\*\*\*\*

```

X X XXXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXXX XXXX X XXXXX
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX
  
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.  
 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
 THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT PAGE 1

LINE	ID	PREC	3.2	5.2	7.3	10.95	18.25	8.35
1	*DIAGRAM							
2	ID	HILLTOP VILLAGE CENTER AND RECREATIONAL CENTRE						
3	ID	PROPOSED CONDITIONS						
4	ID	USING RAINFALL DATA FROM FFX PFM AND NRCS TYPE II 24-HR STORM						
5	ID	FILENAME: Prop_Rev.inh						
6	IT	2						
7	IO	5						
8	JR	PREC	3.2	5.2	7.3	10.95	18.25	8.35
9	KK	BASIN1						
10	KM	Inflow to Existing SWM Pond 1						
11	KO							
12	BA	0.281						
13	IN	6						
14	PC	0.0	.00101	.00202	.00305	.00408	.00513	.00618
15	PC	.01050	.01161	.01272	.01385	.01498	.01613	.01728
16	PC	.022	.02321	.02442	.02565	.02688	.02813	.02938
17	PC	.03450	.03581	.03712	.03845	.03978	.04113	.04248
18	PC	.048	.04941	.05084	.05229	.05376	.05525	.05676
19	PC	.063	.06461	.06624	.06789	.06956	.07125	.07296
20	PC	.08	.08181	.08364	.08549	.08736	.08925	.09116
21	PC	.099	.10101	.10304	.10509	.10716	.10925	.11136
22	PC	.12	.12225	.12460	.12705	.12960	.13225	.135
23	PC	.147	.1502	.15340	.1566	.1598	.163	.16628
24	PC	.181	.18512	.18948	.19408	.19892	.204	.2094
25	PC	.235	.24268	.25132	.26092	.27148	.283	.30684
26	PC	.663	.68196	.69864	.71304	.72516	.735	.74344
27	PC	.772	.77796	.78364	.78904	.79416	.799	.8036
28	PC	.82	.82367	.82726	.83079	.83424	.83763	.84094
29	PC	.85350	.85647	.85936	.86219	.86494	.86763	.87024
30	PC	.88	.88229	.88455	.88679	.889	.89119	.89335
31	PC	.90175	.90379	.9058	.90779	.90975	.91169	.9136
32	PC	.921	.92279	.92455	.92629	.928	.92969	.93135
33	PC	.93775	.93929	.9408	.94229	.94375	.94519	.9466
34	PC	.952	.9533	.95459	.95588	.95716	.95844	.95971
35	PC	.96475	.966	.96724	.96848	.96971	.97094	.97216
36	PC	.977	.9782	.97939	.98058	.98176	.98294	.98411
37	PC	.98875	.9899	.99104	.99218	.99331	.99444	.99556
38	PC	1.0						
39	UD	0.288						
40	KK	EXSWM1						
41	KM	Route Through Existing SWM Pond 1 With Existing 12.5' Weir						
42	KO							
43	RS	1						
44	SA	0	1.34	4.7	8.59	12.79	17.34	18.52
45	SE	85	86	87	88	89	90	91
46	SQ	0	13.26	37.5	68.89	106.07	148.23	194.86
47	SQ	419.26	483.7	551.14	647.96	769.51	908.02	1060.66
48	SE	85	85.5	86	86.5	87	87.5	88
49	SE	90	90.5	91	91.5	92	92.5	93

HEC-1 INPUT PAGE 2

LINE	ID	PREC	3.2	5.2	7.3	10.95	18.25	8.35
50	KK	BASIN2						
51	KM	Inflow to Proposed SWM Pond 2						
52	KO							
53	BA	0.101						
54	LS			90				
55	UD	0.15						
56	KK	PRSWM2						
57	KM	Route Through Proposed SWM Pond 2						
58	KO							
59	RS	1						
60	SA	0.07	0.16	0.38	0.48	0.57	0.67	0.76
61	SA	1.47	1.61	1.75	1.9			
62	SE	128	130	132	134	136	138	140
63	SE	148	150	152	154			
64	SL	142	4.5	0.6	0.5			
65	SS	147.5	56	3	1.5			
66	ST	152	500	2.6	1.5			
67	KK	COMB12						
68	KM	Combine Outflow From SWM Ponds 1 and 2						
69	KO							
70	HC	2						
71	ZZ							

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES  
 TIME TO PEAK IN HOURS

RATIOS APPLIED TO PRECIPITATION

OPERATION	STATION	AREA	PLAN	2-YEAR:	10-YEAR:	100-YR:	FBH	SDF	NOAA
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
HYDROGRAPH AT	BASIN1	.28	1 FLOW	275.	562.	869.	1401.	2448.	1022.
			TIME	12.17	12.17	12.17	12.17	12.17	12.17
ROUTED TO	EXSWM1	.28	1 FLOW	200.	433.	727.	1276.	2299.	889.
			TIME	12.33	12.33	12.30	12.23	12.23	12.27
			** PEAK STAGES IN FEET **						
			1 STAGE	88.05	90.11	91.82	93.64	96.40	92.43
			TIME	12.33	12.33	12.30	12.23	12.23	12.27
HYDROGRAPH AT	BASIN2	.10	1 FLOW	169.	308.	452.	700.	1189.	524.
			TIME	12.03	12.03	12.03	12.03	12.03	12.03
ROUTED TO	PRSWM2	.10	1 FLOW	40.	120.	343.	644.	1140.	437.
			TIME	12.37	12.27	12.13	12.10	12.07	12.10
			** PEAK STAGES IN FEET **						
			1 STAGE	145.43	148.04	148.93	149.79	150.95	149.22
			TIME	12.37	12.27	12.13	12.10	12.07	12.10
2 COMBINED AT	COMB12	.38	1 FLOW	240.	547.	967.	1723.	3125.	1190.
			TIME	12.33	12.30	12.23	12.20	12.17	12.20
			SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION PRSWM2						
			(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)						

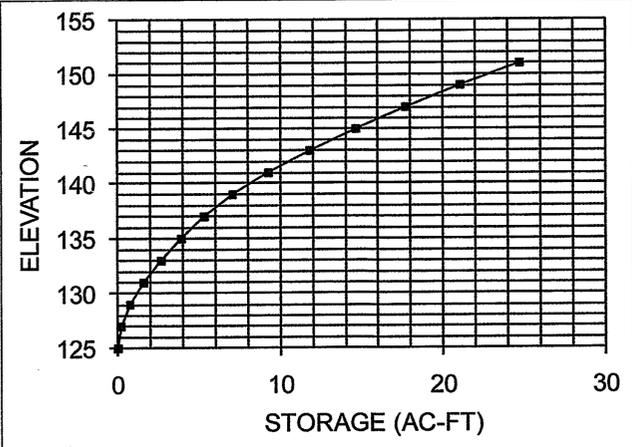
PLAN	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	STORAGE	142.00	147.50	152.00
	OUTFLOW	7.	14.	21.
		0.	51.	1672.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF FAILURE HOURS	TIME OF FAILURE HOURS
3.20	145.43	.00	11.	40.	.00	12.37	.00
5.20	148.04	.00	15.	120.	.00	12.27	.00
7.30	148.93	.00	16.	343.	.00	12.13	.00
10.95	149.79	.00	17.	644.	.00	12.10	.00
18.25	150.95	.00	19.	1140.	.00	12.07	.00
8.35	149.22	.00	16.	437.	.00	12.10	.00

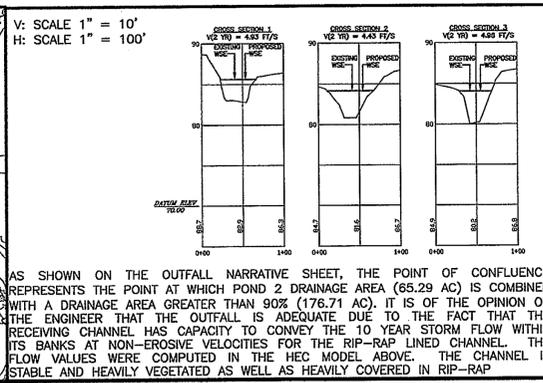
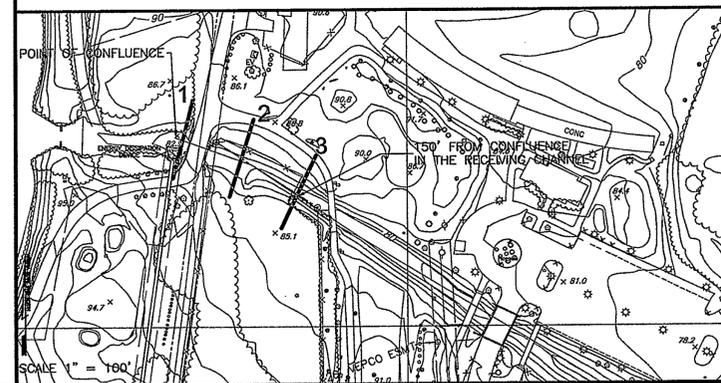
\*\*\* NORMAL END OF HEC-1 \*\*\*  
 NOTE: A DATUM SHIFT IN THE POND ELEVATION OCCURRED, WHICH REQUIRES THE ELEVATIONS IN THE COMPUTATIONS TO BE REDUCED BY 3 FEET. THE SHAPE OF THE POND HAS BEEN MAINTAINED AND THE STAGE STORAGE CURVE HAS BEEN UPDATED.

STAGE STORAGE CURVE FOR PROPOSED POND 2



STAGE VS. STORAGE USING CONIC METHOD

ELEVATION (FEET)	AREA (ACRES)	INCREMENTAL VOLUME (ACRE-FEET)	TOTAL VOLUME (ACRE-FEET)
125	0.07		0.0000
127	0.16	0.2239	0.2239
129	0.38	0.5244	0.7483
131	0.48	0.8581	1.6063
133	0.57	1.0487	2.6550
135	0.67	1.2387	3.8937
137	0.76	1.4291	5.3227
139	0.98	1.7353	7.0581
141	1.22	2.1956	9.2537
143	1.34	2.5591	11.8128
145	1.47	2.8090	14.6218
147	1.61	3.0789	17.7007
149	1.75	3.3590	21.0597
151	1.9	3.6490	24.7087



AS SHOWN ON THE OUTFALL NARRATIVE SHEET, THE POINT OF CONFLUENCE REPRESENTS THE POINT AT WHICH POND 2 DRAINAGE AREA (65.29 AC) IS COMBINED WITH A DRAINAGE AREA GREATER THAN 90% (176.71 AC). IT IS OF THE OPINION OF THE ENGINEER THAT THE OUTFALL IS ADEQUATE DUE TO THE FACT THAT THE RECEIVING CHANNEL HAS CAPACITY TO CONVEY THE 10 YEAR STORM FLOW WITHIN ITS BANKS AT NON-EROSIVE VELOCITIES FOR THE RIP-RAP LINED CHANNEL. THE FLOW VALUES WERE COMPUTED IN THE HEC MODEL ABOVE. THE CHANNEL IS STABLE AND HEAVILY VEGETATED AS WELL AS HEAVILY COVERED IN RIP-RAP

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Application No. SEA 2005-LE-027 Staff C. Lewis  
 APPROVED SP PLAN  
 SEE PROFFERS DATED 2-12-2009  
 Date of (BOS) (BZA) Approval 3-9-2009  
 Sheet 8 OF 8  
 Concurrent with RZ 2008-LE-001

HILLTOP GOLF COURSE  
 GENERALIZED DEVELOPMENT PLAN /  
 SPECIAL EXCEPTION AMENDMENT  
 LEE DISTRICT  
 FAIRFAX COUNTY, VIRGINIA

SEAL  
 PROFESSIONAL ENGINEER  
 1-16-09

KEY PLAN

SCALE

No.	DATE	BY	Description
3	01.16.09	DMC	No Change
2	12.02.08	DMC	Outfall X-Sept
1	10.17.08		No Change

REVISIONS

DRAWN BY ARW  
 APPROVED BY LM  
 CHECKED BY LM  
 DATE February 12, 2008  
 TITLE Hilltop Golf Course GDP / SEA Stormwater Management