NAGOG POND WATER TREATMENT PLANT
CONCORD, MASSACHUSETTS

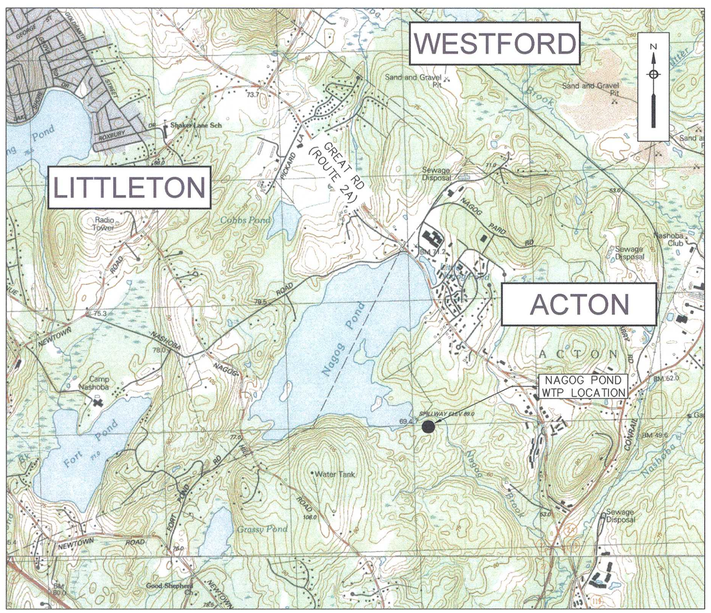
NOVEMBER 2015

FOR PERMITTING

November 18, 2015

COMMONWEALTH OF MASSACHUSETTS
STEPHEN C. OLSON
CIVIL
No. 39143
REGISTERED PROFESSIONAL ENGINEER

11/18/15



VICINITY MAP
1"= 2,000'

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GENERAL NOTES:

1. BASE MAP INFORMATION SHOWN ON THE DESIGN SHEETS IS BASED ON A COMPILATION OF A SURVEY PERFORMED BY ENVIRONMENTAL PARTNERS GROUP IN MAY 2015 AND A SURVEY PERFORMED BY MERRILL CORPORATION IN AUGUST 2015. BASE MAP INFORMATION WAS ALSO COMPILED FROM THE NAGOG POND DAM REPAIRS RECORD DRAWINGS CREATED BY THE PARE CORPORATION IN JULY 2013 AND THE SKYLINE DRIVE ACCESS ROAD DESIGN PLANS CREATED BY BOHLER ENGINEERING IN MARCH 2012.

2. USGS BATHYMETRY WAS OBTAINED FROM LEVIN, A.B., ARCHFIELD, S.A., AND MASSEY, A.J., 2011, REFINEMENT AND EVALUATION OF THE MASSACHUSETTS FIRM–YIELD ESTIMATOR MODEL VERSION 2.0: U.S. GEOLOGICAL SURVEY SCIENTIFIC INVESTIGATIONS REPORT 2011–5125. RAW SURVEY POINTS WERE OBTAINED FROM SARA LEVIN IN AN EMAIL CORRESPONDENCE. BATHYMETRY WAS CONFIRMED BY ENVIRONMENTAL PARTNERS GROUP.

3. ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988.

4. HORIZONTAL DATUM IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983.

5. PROPERTY LINE, STREET LINE, EASEMENT LINE, AND OWNER INFORMATION WAS COMPILED FROM RECORDS ON FILE AT THE MIDDLESEX NORTH REGISTRY OF DEEDS AND THE TOWN OF ACTON ASSESSORS DEPARTMENT.

6. BORDERING VEGETATED WETLAND LIMIT (WL/BVW), MEAN ANNUAL HIGH WATER (MHW), AND VERNAL POOL (VP) FLAGS WERE DELINEATED BY PINEBROOK CONSULTING IN MAY 2015, AUGUST 2015, OCTOBER 2015, AND NOVEMBER 2015 AND WERE SURVEYED BY ENVIRONMENTAL PARTNERS GROUP AND MERRILL CORPORATION.

7. THE SUBJECT PROPERTY IS LOCATED IN ZONE X AND ZONE AE EL. 208 THROUGH 213 OF THE FLOOD INSURANCE RATE MAP, AS SHOWN ON COMMUNITY PANEL No. 250176 0243f, WHICH BEARS AN EFFECTIVE DATE OF JULY 7, 2014, AND IS PARTIALLY WITHIN A SPECIAL FLOOD HAZARD AREA.

8. THE CONTRACTOR SHALL NOT STORE ANY APPARATUS, MATERIALS, SUPPLIES, OR EQUIPMENT ON DRAINAGE STRUCTURES, PRIVATE PROPERTY OR WITHIN 100 FEET OF WETLANDS, UNLESS DIRECTED TO DO SO BY THE CONTRACT DOCUMENTS.

9. NORTH DIRECTION SHOWN IS APPROXIMATE.

10. ALL EXISTING UTILITIES SHOWN ARE APPROXIMATE, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES. CONTRACTOR SHALL NOTIFY DIG SAFE AT LEAST 72 HOURS IN ADVANCE, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO ANY EXCAVATION.

11. DO NOT SCALE DRAWINGS UNLESS OTHERWISE NOTED. WRITTEN DIMENSION AND STATIONING SHALL PREVAIL. REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.

12. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

13. THE CONTRACTOR SHALL RESTORE ALL PUBLIC AND PRIVATE PROPERTY TO ITS PRE–CONSTRUCTION CONDITION AT NO ADDITIONAL COST TO THE OWNER.

14. IN THOSE INSTANCES WHERE POWER OR TELEPHONE POLE SUPPORT IS REQUIRED, THE CONTRACTOR SHALL PROVIDE A MINIMUM 48–HOUR NOTIFICATION TO THE RESPECTIVE UTILITY COMPANY. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR TEMPORARY BRACING OF UTILITIES.

15. THE CONTRACTOR IS TO TAKE SPECIAL CARE NOT TO DAMAGE TREES, BUSHES, PLANTS, FLOWERS, STONEWALLS, FENCES, ETC. WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED. CONTRACTOR SHALL REPLACE ALL DAMAGED ITEMS AT NO COST TO OWNER.

16. CONTRACTOR SHALL REMOVE AND REPLACE, OR REPAIR, ALL CURBS, SIDE WALKS, PAVEMENT AND OTHER ITEMS DAMAGED BY THEIR CONSTRUCTION ACTIVITIES TO AT LEAST THEIR ORIGINAL CONDITION, AND TO THE SATISFACTION OF THE OWNER AND ENGINEER.

17. THE CONTRACTOR SHALL INSTALL AND MAINTAIN TRAFFIC CONTROL DEVICES AS NECESSARY AND IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

18. THE CONTRACTOR SHALL BE REQUIRED TO FURNISH AND MAINTAIN A TELEPHONE NUMBER WHERE THE CONTRACTOR CAN BE REACHED 24 HOURS A DAY, 7 DAYS A WEEK.

19. THE CONTRACTOR IS RESPONSIBLE FOR SECURING SITE STORAGE AND LAYDOWN AREAS. THE LOCATION AND LIMITS OF ALL ON–SITE WORK AND STORAGE AREAS SHALL BE REVIEWED/COORDINATED WITH, AND ACCEPTED BY THE TOWN OF HOLBROOK. THE CONTRACTOR SHALL LIMIT HIS ACTIVITIES TO THESE AREAS.

20. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR WORK IN ROADWAYS AND FOR BLASTING. THE CONTRACTOR IS RESPONSIBLE FOR CONFORMING TO ALL PERMITS AS AN INTEGRAL PART OF THE WORK.

21. THE CONTRACTOR SHALL HANDLE GROUNDWATER, WHERE ENCOUNTERED, IN AN APPROVED MANNER. DURING ANY DEWATERING, THE CONTRACTOR SHALL USE STONE AROUND THE SUCTION END TO MINIMIZE DISCHARGE OF TRENCH MATERIALS. THE DISCHARGED WATER SHALL PASS THROUGH FILTER FABRIC.

23. HAULING OF EARTH TO AND FROM THE SITE SHALL BE RESTRICTED TO BETWEEN THE HOURS OF 9 AM AND 4 PM ON WEEKDAYS.

24. ALL MATERIALS TO BE REMOVED MUST BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

25. THE LOCATION AND LIMITS OF ALL ON–SITE WORK AREAS SHALL BE REVIEWED/COORDINATED WITH, AND ACCEPTABLE TO THE OWNER AND THE ENGINEER. THE CONTRACTOR SHALL LIMIT HIS/HER ACTIVITIES TO THESE AREAS.

26. THE CONTRACTOR SHALL MARK THE LIMITS OF WORK IN THE FIELD PRIOR TO INSTALLING EROSION CONTROL DEVICES AND PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES INCLUDING SITE CLEARING.

27. FILL CONTAINING HAZARDOUS MATERIALS IS FORBIDDEN TO BE USED AS REQUIRED BY THE TOWN OF ACTION ZONING BYLAW.

28. INSTALL FILTER SOCK PRIOR TO COMMENCEMENT OF EARTHWORK OPERATIONS. INSPECT EROSION CONTROLS IMMEDIATELY AFTER EACH STORM, AND REMOVE ACCUMULATED SEDIMENT AS REQUIRED. REPLACE DAMAGED EROSION CONTROLS AS REQUIRED. FILTER SOCK SHALL BE STAGGERED TO ACCOMMODATE FOR ANIMAL PASSAGE THROUGH THE BARRIER.

29. SILT SACKS AND OTHER EROSION AND SEDIMENT CONTROL MEASURES/DEVICES SHALL BE INSPECTED, CLEANED, REPLACED AND/OR REPAIRED DAILY AND AS NECESSARY, AND AFTER EACH SIGNIFICANT RAINFALL.

30. THE CONTRACTOR SHALL FOLLOW THE SPECIAL PRACTICES DESCRIBED IN THE PROJECT DOCUMENTS AND COMPLY WITH THE DIRECTIONS OF THE ENGINEER AND/OR ACTON CONSERVATION COMMISSION AGENT TO ADDRESS EROSION AND SEDIMENTATION CONDITIONS THAT MAY ARISE ON A CASE BY CASE BASIS DURING CONSTRUCTION.

31. STOCKPILES OF EXCAVATED MATERIAL AND AGGREGATE MATERIALS (GRAVEL, SAND, AND STONE) ARE NOT ANTICIPATED TO BE MAINTAINED ON–SITE. IT IS EXPECTED THAT THESE TYPES OF MATERIALS WILL BE DELIVERED ON AN AS–NEEDED BASIS. HOWEVER, IF STOCKPILING IS REQUIRED, THEN SUITABLE EROSION CONTROL MEASURED WILL BE EMPLOYED INCLUDING PERIMETER SILT FENCING.

SITE IMPROVEMENTS SUMMARY

CHARACTERISTIC	LEGAL ZONING REQUIREMENTS	EXISTING CONDITIONS	PROPOSED CONDITIONS
LOT SIZE	N/A	59.79 ACRES	59.79 ACRES
TOTAL LOT COVERAGE (IMPERVIOUS)	N/A	17,374 SQUARE FEET	47,526 SQUARE FEET
% OF LAND IN ANY ZONING DISTRICT WHERE THE PROPOSED USE IS NOT PERMITTED	N/A	0	0
OPEN SPACE	N/A	59.39 ACRES	58.70 ACRES
UNDISTURBED OPEN SPACE	N/A	59.13 ACRES	57.53 ACRES
% WETLANDS	N/A	2.74%*	2.74%*
% FLOOD PLAIN	N/A	< 1%	< 1%
DEVELOPABLE SITE AREA	N/A	57.96 ACRES	57.96 ACRES
MAXIMUM BUILDING HEIGHT	N/A	17	34
PEAK RUNOFF RATES	N/A	2-YR: .08 CFS 10-YR: 1.41 CFS	2-YR: .06 CFS 10-YR: 1.39 CFS
NET FLOOR AREA	N/A	1,760 SF	9,338 CFS
FLOOR AREA RATIO	N/A	1.00	5.31
PARKING SPACES	N/A	3	5

* PERCENTAGE IS BASED ON WETLANDS DELINEATED NEAR AND AROUND PROPOSED PROJECT WORK SITE. REMAINING PROPERTY LIKELY TO HAVE ADDITIONAL WETLANDS.

LEGEND:

EXISTING
100–YEAR FEMA FLOOD ZONE
BORDERING VEGETATED WETLANDS
MEAN ANNUAL HIGH WATER LINE
VERNAL POOL
SHORELINE
25' WETLAND BUFFER
50' WETLAND BUFFER
75' WETLAND BUFFER
100' WETLAND BUFFER
ZONE A 400' BUFFER
WATER MAIN
INTAKE PIPE
DRAIN LINE
SEWER MAIN
GAS MAIN
UNDERGROUND ELECTRIC AND TELEPHONE
EXISTING FENCE
CONTOUR MINOR
CONTOUR MAJOR
TREE LINE
PROPERTY LINE
EASEMENT LINE
ROCK WALL
RIP RAP
WETLAND FLAG
HYDRANT
DRAIN MANHOLE
CATCH BASIN
SEWER MANHOLE
ELECTRIC MANHOLE
HAND HOLE
WATER SHUTOFF
GATE VALVE
LIGHT POLE
BORING LOCATION AND NUMBER
WETLAND FLAG AND NUMBER

PROPOSED
3/4" CRUSHED STONE
TREE LINE
ASPHALT
PROCESSED GRAVEL
RIP RAP
FIRE HYDRANT
ROOF DRAIN CLEANOUT
CONCRETE BOLLARD
SEPTIC TANK EFFLUENT
CHAIN LINK FENCE
SEPTIC SYSTEM BUFFER
WATER SERVICE
GAS SERVICE
INTAKE PIPE
RAW WATER PIPING
FINISHED WATER PIPING
STEEL GUARD RAIL
PROPOSED CONTOUR
AIR BURST
SEPTIC TANK
GATE VALVE
DRAIN MANHOLE
CATCH BASIN
LEACHING PIT
WALL MOUNTED FLOOD LIGHT
360° SECURITY CAMERA
FILTER SOCK/HAY BALES
REDI–ROCK BLOCK WALL
FRACTURED LEDGE RETAINING WALL
AREA TO BE DEMOLISHED
LIMIT OF WORK
EVERGREEN TREE
SHRUB
GROUND COVER OR PERENNIAL PLANTING
AREA TO BE MULCHED

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COMMONWEALTH OF MASSACHUSETTS
STEPHEN C. OLSON
CIVIL
No. 39140
REGISTERED PROFESSIONAL ENGINEER
11/16/15

MARK	DATE	DESCRIPTION

Scale	AS SHOWN
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Job No.	200-1501
Designed by	LEU
Drawn by	LEU
Checked by	DNRP
Approved by	SCO

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NAGOG POND WATER TREATMENT PLANT
TOWN OF CONCORD, MASSACHUSETTS

GENERAL NOTES AND LEGEND

FOR PERMITTING
Sheet No.
G-1

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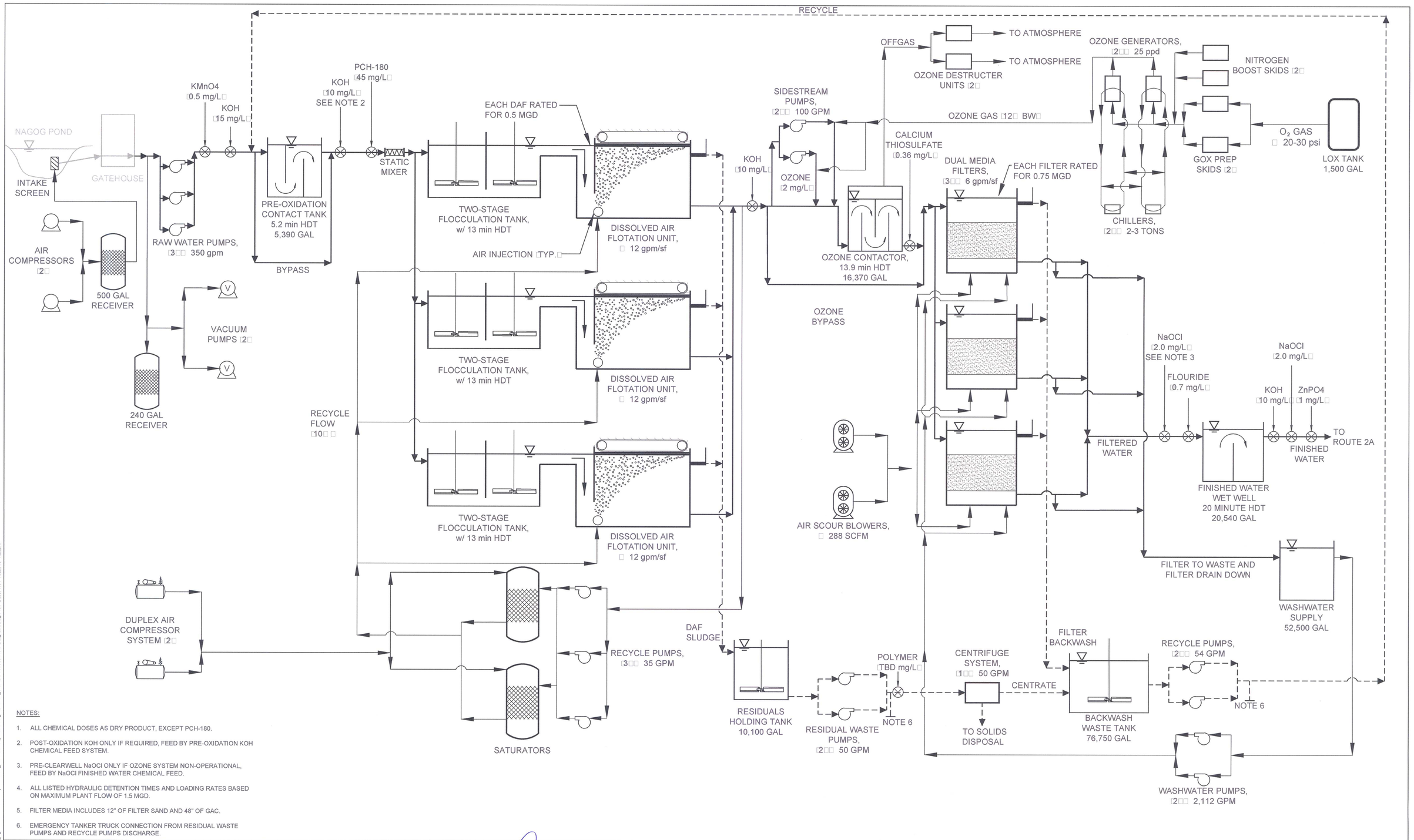

NOTES:

1. ALL CHEMICAL DOSES AS DRY PRODUCT, EXCEPT PCH-180.
2. POST-OXIDATION KOH ONLY IF REQUIRED, FEED BY PRE-OXIDATION KOH CHEMICAL FEED SYSTEM.
3. PRE-CLEARWELL NaOCl ONLY IF OZONE SYSTEM NON-OPERATIONAL, FEED BY NaOCl FINISHED WATER CHEMICAL FEED.
4. ALL LISTED HYDRAULIC DETENTION TIMES AND LOADING RATES BASED ON MAXIMUM PLANT FLOW OF 1.5 MGD.
5. FILTER MEDIA INCLUDES 12" OF FILTER SAND AND 48" OF GAC.
6. EMERGENCY TANKER TRUCK CONNECTION FROM RESIDUAL WASTE PUMPS AND RECYCLE PUMPS DISCHARGE.

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NAGOG POND WATER TREATMENT PLANT
TOWN OF CONCORD, MASSACHUSETTS

PROCESS FLOW DIAGRAM

FOR PERMITTING

Sheet No. G-2

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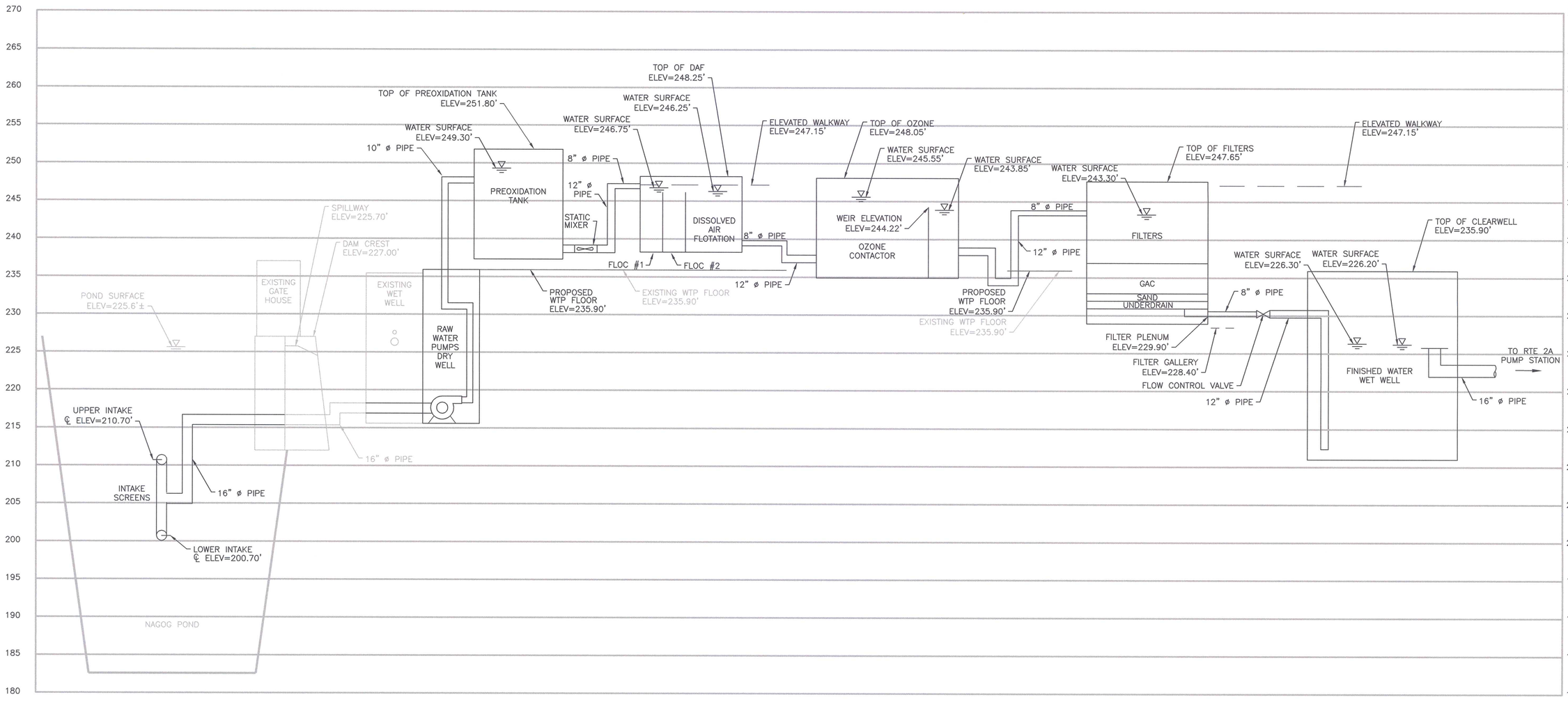

BASIS OF HYDRAULIC PROFILE		
FLOW DESCRIPTION	FLOW (MGD)	NUMBER OF UNITS IN SERVICE
MAXIMUM DESIGN	1.5 1.5 1.5 1.5 1.5	3 – RAW WATER PUMPS 3 – DAF 1 – OZONE CONTACTOR 2 – FILTERS 1 – CLEARWELL

ELEVATIONS BASED ON 1988 NAVD.

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NAGOG POND WATER TREATMENT PLANT

TOWN OF CONCORD, MASSACHUSETTS

HYDRAULIC PROFILE

FOR PERMITTING

Sheet No.

G-3

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PLAN
SCALE: 1"=80'

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NAGOG POND WATER TREATMENT PLANT
TOWN OF CONCORD, MASSACHUSETTS

OVERALL EXISTING CONDITIONS PLAN

FOR PERMITTING
Sheet No.
C-1

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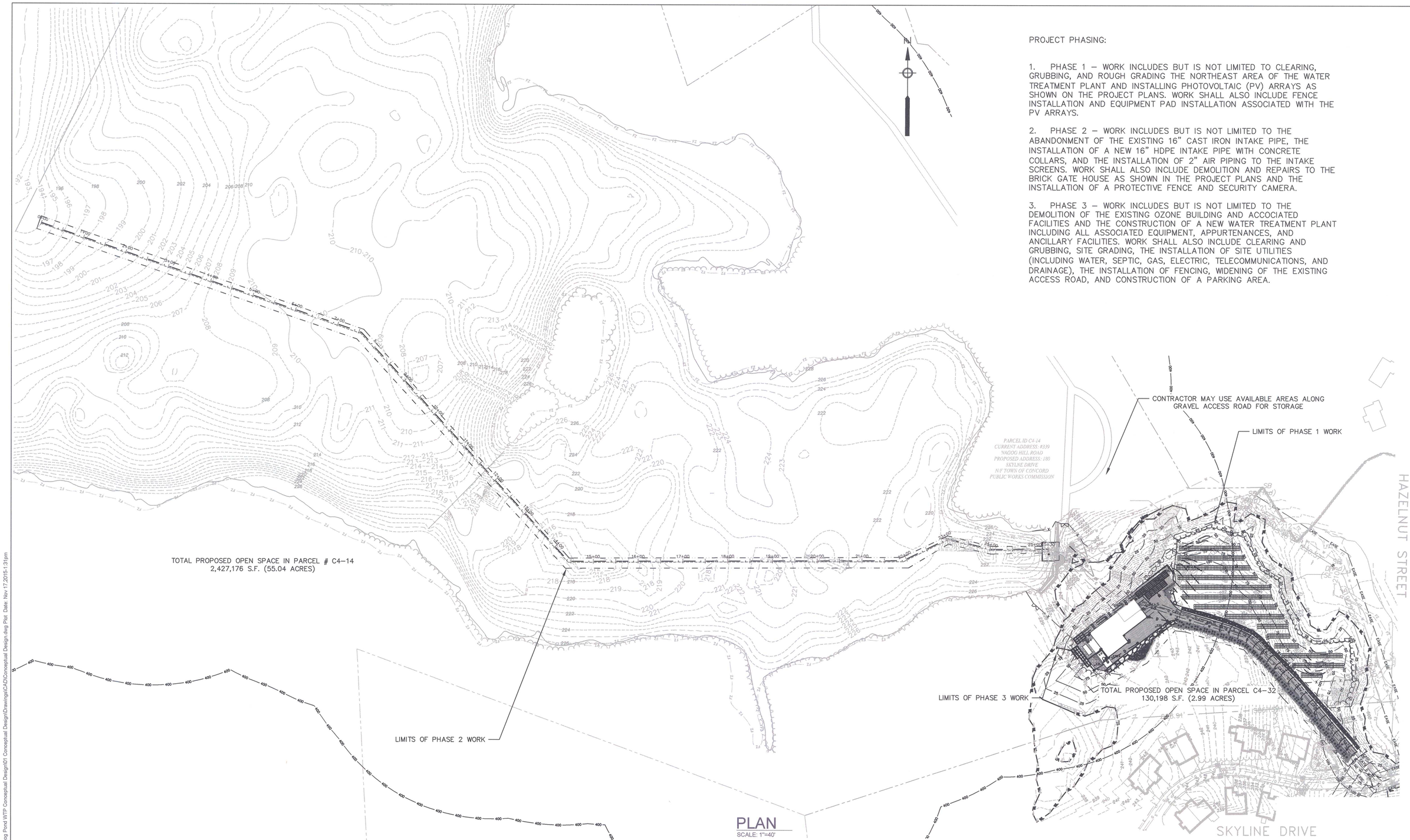
PROJECT PHASING:

1. PHASE 1 – WORK INCLUDES BUT IS NOT LIMITED TO CLEARING, GRUBBING, AND ROUGH GRADING THE NORTHEAST AREA OF THE WATER TREATMENT PLANT AND INSTALLING PHOTOVOLTAIC (PV) ARRAYS AS SHOWN ON THE PROJECT PLANS. WORK SHALL ALSO INCLUDE FENCE INSTALLATION AND EQUIPMENT PAD INSTALLATION ASSOCIATED WITH THE PV ARRAYS.

2. PHASE 2 – WORK INCLUDES BUT IS NOT LIMITED TO THE ABANDONMENT OF THE EXISTING 16" CAST IRON INTAKE PIPE, THE INSTALLATION OF A NEW 16" HDPE INTAKE PIPE WITH CONCRETE COLLARS, AND THE INSTALLATION OF 2" AIR PIPING TO THE INTAKE SCREENS. WORK SHALL ALSO INCLUDE DEMOLITION AND REPAIRS TO THE BRICK GATE HOUSE AS SHOWN IN THE PROJECT PLANS AND THE INSTALLATION OF A PROTECTIVE FENCE AND SECURITY CAMERA.

3. PHASE 3 – WORK INCLUDES BUT IS NOT LIMITED TO THE DEMOLITION OF THE EXISTING OZONE BUILDING AND ACCOCIATED FACILITIES AND THE CONSTRUCTION OF A NEW WATER TREATMENT PLANT INCLUDING ALL ASSOCIATED EQUIPMENT, APPURTENANCES, AND ANCILLARY FACILITIES. WORK SHALL ALSO INCLUDE CLEARING AND GRUBBING, SITE GRADING, THE INSTALLATION OF SITE UTILITIES (INCLUDING WATER, SEPTIC, GAS, ELECTRIC, TELECOMMUNICATIONS, AND DRAINAGE), THE INSTALLATION OF FENCING, WIDENING OF THE EXISTING ACCESS ROAD, AND CONSTRUCTION OF A PARKING AREA.



PLAN
SCALE: 1"=40'

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STEPHEN C. OLSON
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No. 39[illegible]
REGISTERED PROFESSIONAL ENGINEER

MARK	DATE	DESCRIPTION

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NAGOG POND WATER TREATMENT PLANT

TOWN OF CONCORD, MASSACHUSETTS

PROJECT PHASING PLAN

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Sheet No.
C-2

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INSET "A": GATE HOUSE AND DAM

SCALE: 1"=20'

PLAN

SCALE: 1"=60'

NOTES:

1. POND, GATEHOUSE, AND DAM ARE WITHIN THE 100 YEAR AE FLOOD ZONE AND THE ZONE A 400' BUFFER.

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NAGOG POND WATER TREATMENT PLANT

TOWN OF CONCORD, MASSACHUSETTS

INTAKE EXISTING CONDITIONS PLAN

FOR PERMITTING

Sheet No.

C-3

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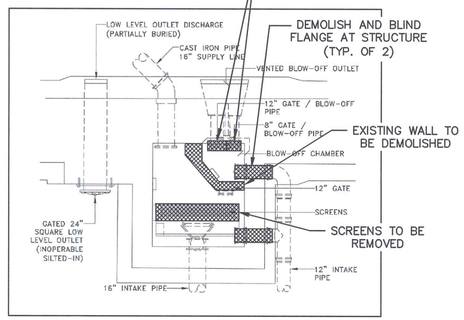
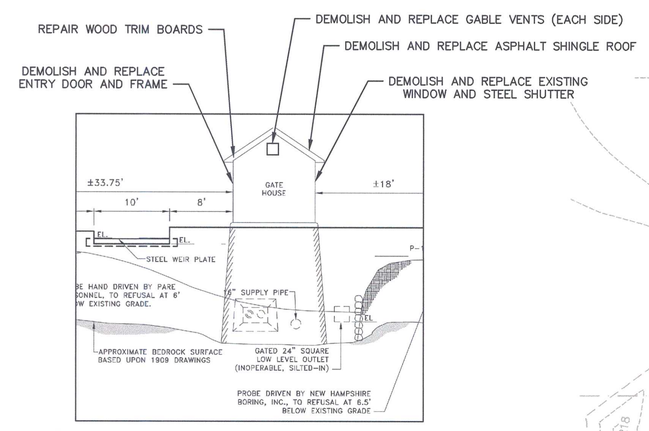


INSET "B": EXISTING GATE HOUSE PLAN (BELOW SLAB)

SCALE: NTS



INSET "C": EXISTING DAM PROFILE (LOOKING UPSTREAM)

SCALE: 1" = 10'

NOTES:

A. REPAIR VISIBLE MASONRY WALL CRACKS.
B. REPAIR DAMAGED EXTERIOR BRICK.
C. COAT MASONRY WALLS WITH PENETRATING SEALER (NSF 61 APPROVED).
D. COAT INTERIOR/EXTERIOR CONCRETE SURFACES WITH PENETRATION CORROSION INHIBITOR (NSF 61 APPROVED).
E. CLEAN ALL MASONRY WITH PROSOCO DEFACE ERASER, OR APPROVED EQUAL.

NOTES:

1. POND, GATEHOUSE, AND DAM ARE WITHIN THE 100 YEAR AE FLOOD ZONE AND THE ZONE A 400' BUFFER.
2. THE CONTRACTOR SHALL LIMIT CONSTRUCTION STAGING AND PARKING TO STAGING AREA AND GRAVEL ACCESS ROAD.

PLAN

SCALE: 1"=40'

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MARK	DATE	DESCRIPTION

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NAGOG POND WATER TREATMENT PLANT
TOWN OF CONCORD, MASSACHUSETTS

INTAKE DEMOLITION AND EROSION CONTROL PLAN

FOR PERMITTING

Sheet No. C-4

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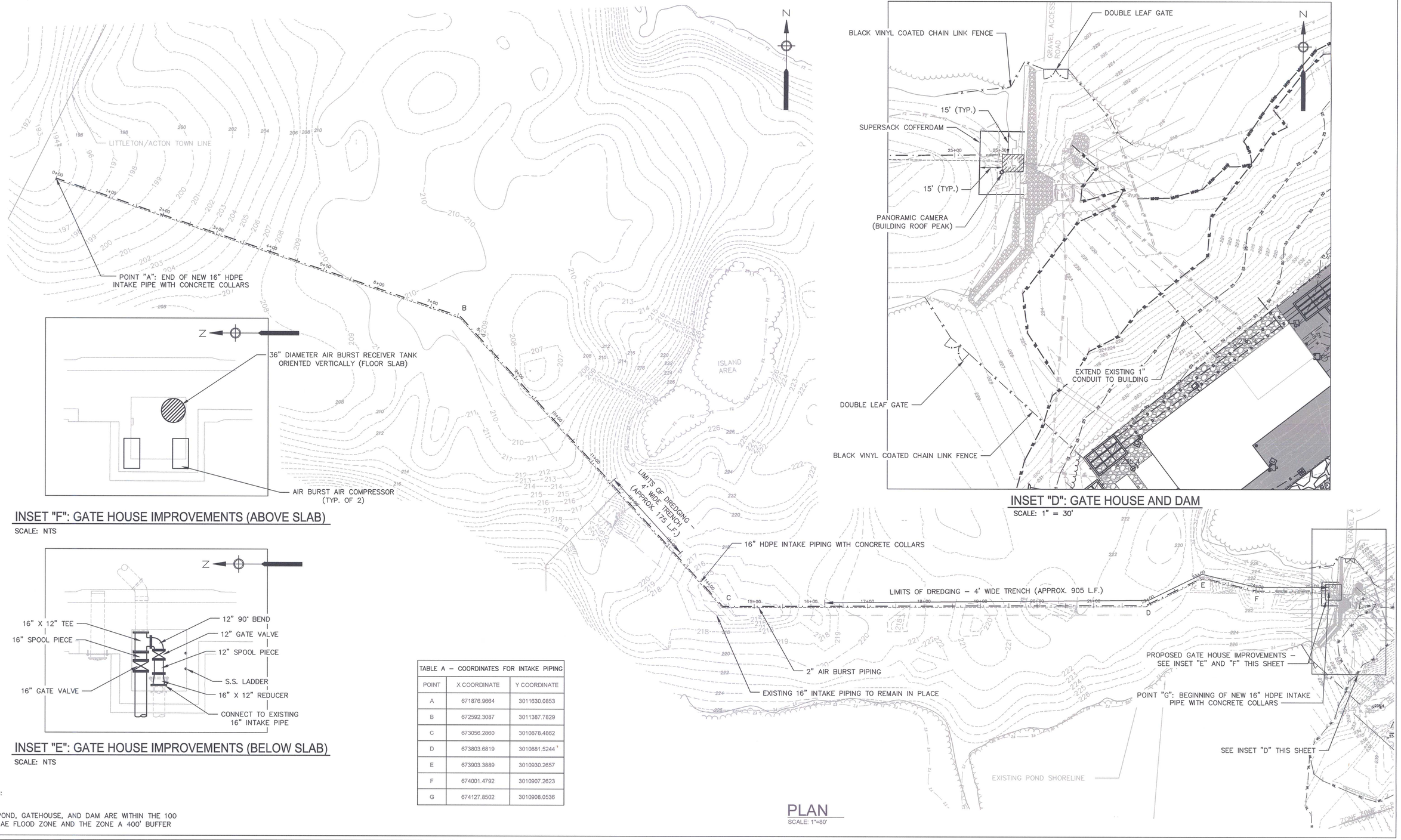

INSET "F": GATE HOUSE IMPROVEMENTS (ABOVE SLAB)
SCALE: NTS

INSET "E": GATE HOUSE IMPROVEMENTS (BELOW SLAB)
SCALE: NTS

INSET "D": GATE HOUSE AND DAM
SCALE: 1" = 30'

PLAN
SCALE: 1"=80'

TABLE A – COORDINATES FOR INTAKE PIPING

POINT	X COORDINATE	Y COORDINATE
A	671876.9664	3011630.0853
B	672592.3087	3011387.7829
C	673056.2860	3010878.4862
D	673803.6819	3010881.5244
E	673903.3889	3010930.2657
F	674001.4792	3010907.2623
G	674127.8502	3010908.0536

NOTES:

1. POND, GATEHOUSE, AND DAM ARE WITHIN THE 100 YEAR AE FLOOD ZONE AND THE ZONE A 400' BUFFER

Drawing file: I:\Concord.200\200-1501 Nagog Pond WTP Conceptual Design\01 Conceptual Design\Drawings\CAD\Conceptual Design.dwg Plot Date: Nov 17,2015-11:44am

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LIN ASSOCIATES, INC.
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DiMarinisi & Wolfe
ARCHITECTS • URBAN DESIGNERS
BOSTON, MASSACHUSETTS

COMMONWEALTH OF MASSACHUSETTS
STEPHEN C. OLSON
CIVIL
No. 39143
REGISTERED PROFESSIONAL ENGINEER
11/16/15

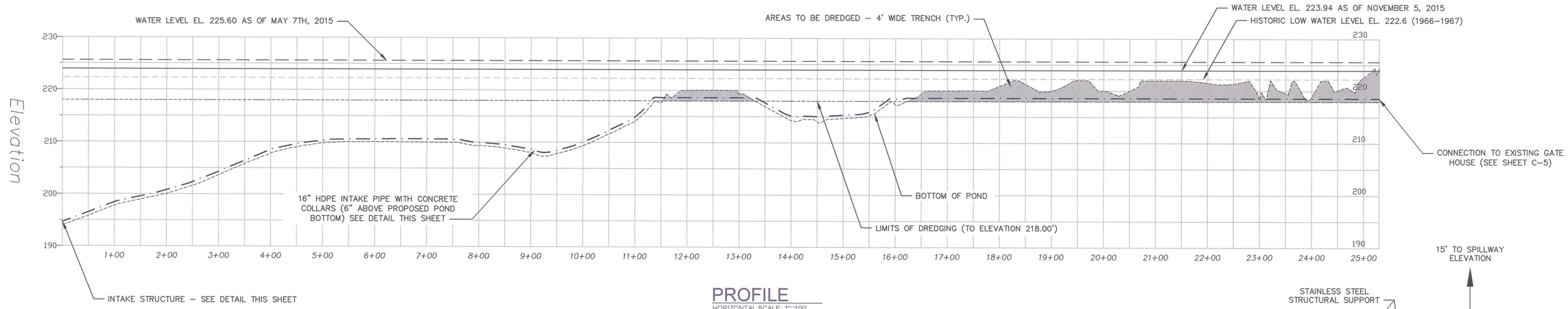
MARK	DATE	DESCRIPTION

Scale	1" = 80'
Date	NOVEMBER 2015
Job No.	200-1501
Designed by	ZFK/DNRP
Drawn by	LEU
Checked by	DNRP
Approved by	SCO

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

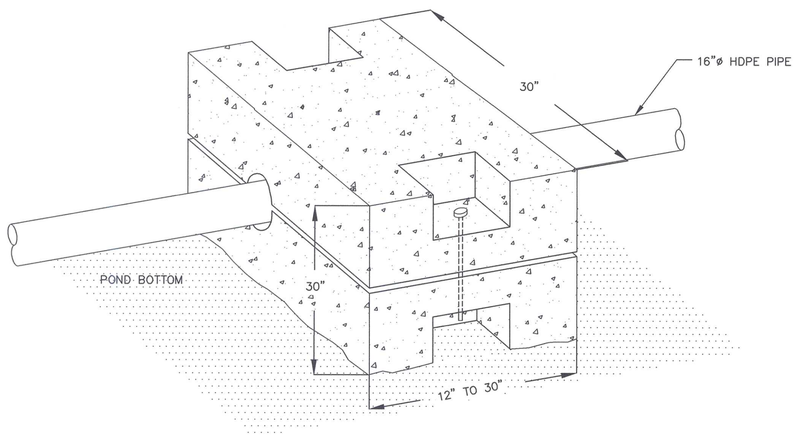
NAGOG POND WATER TREATMENT PLANT
TOWN OF CONCORD, MASSACHUSETTS
INTAKE LAYOUT PLAN

FOR PERMITTING
Sheet No.
C-5



PROFILE

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"=4'

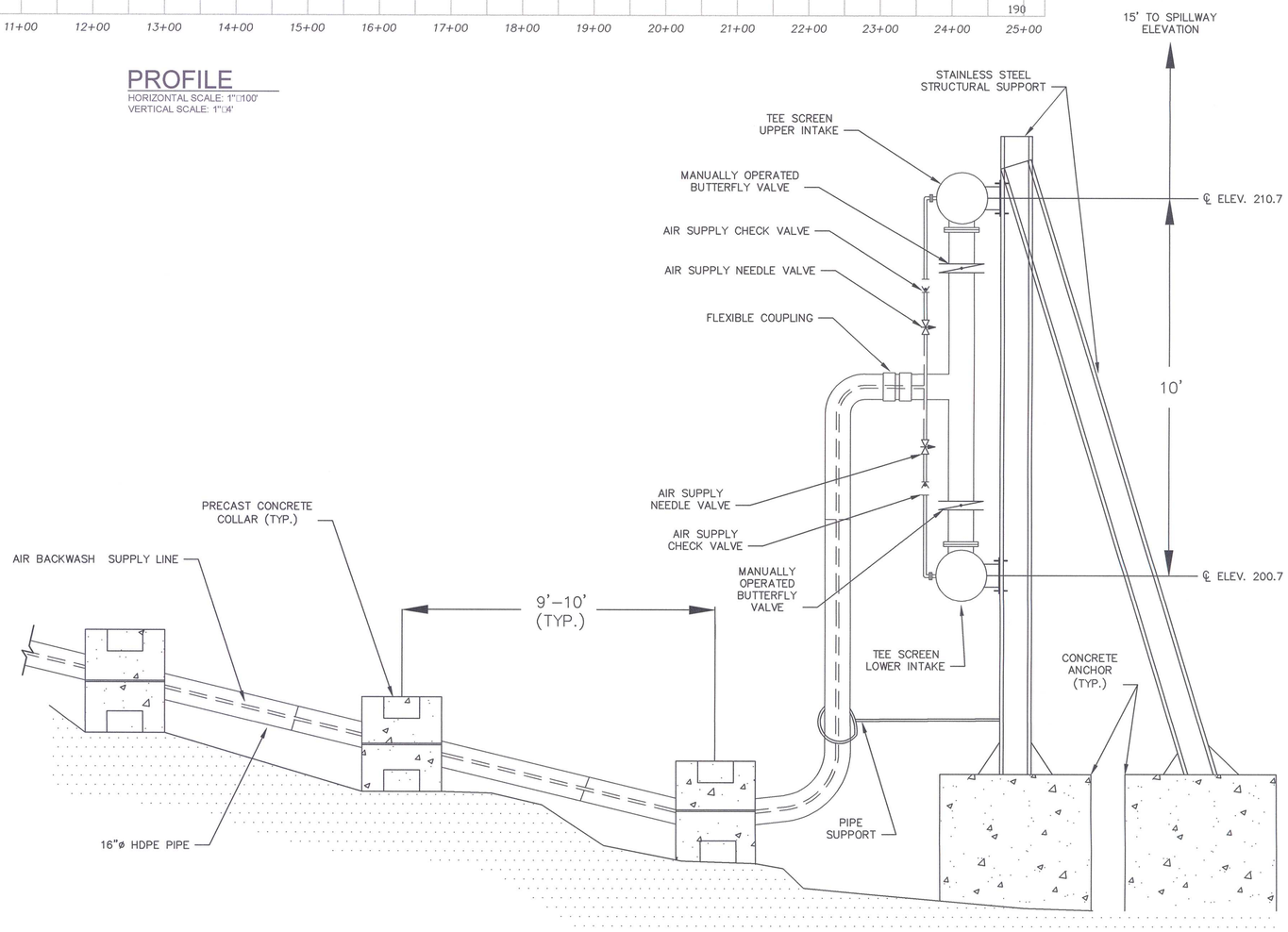


PROPOSED PRECAST CONCRETE COLLAR

SCALE: N.T.S.

NOTES:

1. FLEXIBLE COUPLINGS OR EXPANSION LOOPS SHALL BE PROVIDED ALONG HDPE PIPE ALIGNMENT.
2. PROVIDE FLEXIBLE CONNECTOR AT HDPE CONNECTION TO INTAKE SCREENS.
3. AIR BURST PIPING SHALL BE SUPPORTED FROM CONCRETE COLLARS.



INTAKE SCREEN DETAIL

SCALE: N.T.S.

Drawing file: I:\Concord.200\200-1501 Nagog Pond WTP Conceptual Design\01 Conceptual Design\Drawings\CAD\Conceptual Design.dwg Plot Date: Nov 17,2015-11:44am

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BOSTON, MASSACHUSETTS

COMMONWEALTH OF MASSACHUSETTS
STEPHEN C. OLSEN
CIVIL
No. 39433
REGISTERED PROFESSIONAL ENGINEER
11/16/15

MARK	DATE	DESCRIPTION

Scale	AS SHOWN
Date	NOVEMBER 2015
Job No.	200-1501
Designed by	ZFK/DNRP
Drawn by	LEU
Checked by	DNRP
Approved by	SCO

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

NAGOG POND WATER TREATMENT PLANT
TOWN OF CONCORD, MASSACHUSETTS
INTAKE LAYOUT PROFILE AND DETAILS

FOR PERMITTING
Sheet No.
C-6