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RESIDENTIAL SITE PLAN APPLICATION (townhouses, apts., etc.)

City of Rochester, New Hampshire

Date: 11-17-10 [office use only. fee paid ✓ amount $ 350.00 date paid 11/17/2010

Property information

Tax map #: 131 ; Lot #('s): 62-2 ; Zoning district: R-2

Property address/location: Brock Street

Name of project (if applicable): Marsh View Housing for the Elderly

Size of site: 7.672 acres; overlay zoning district(s)? Conservation Overlay

Property owner

Name (include name of individual): Rochester Family Housing, Inc.

Mailing address: c/o Rochester Housing Authority, 77 Olde Farm Lane, Rochester

Telephone #: 332-4126 Fax #: 332-0039

Applicant/developer (if different from property owner)

Name (include name of individual): Rochester Housing Authority

Mailing address: 77 Olde Farm Lane, Rochester, NH 03867

Telephone #: 332-4126 Fax #: 332-0039

Engineer/designer

Name (include name of individual): Dana C. Lynch, P.E., c/o Civilworks, Inc.

Mailing address: P.O. Box 1166, Dover, NH 03821-1166

Telephone #: 749-0443 Fax #: 749-7348

Email address: civilworksdover@comcast.net Professional license #: 5745

Proposed use

The applicant is not bound by information on bedrooms and ownership arrangement unless that is a condition of approval.

Total number of proposed dwelling units: 12 ; number of existing dwelling units: 0

Proposed bedrooms/unit: 1 ; total number of proposed bedrooms: 12

(continued *Residential Site Plan* application Tax Map: 131 Lot: 62-2)

New building(s)? Yes addition(s)/modifications to existing building(s)? _____

Townhouses/rowhouses: X flats: ____ duplexes: ____ freestanding detached units: ____

Proposed ownership - leasehold: X fee simple conveyance: ____ condominiums: ____

Utility information

City water? yes X no ___; How far is City water from the site? < 50 FT.

City sewer? yes X no ___; How far is City sewer from the site? < 50 FT.

If City water, what are the estimated total daily needs? 2,700* gallons per day
* Using NHDES std. flows
Where will stormwater be discharged? via the on-site wetland to Cocheco River

Other information

parking spaces: existing: 0 total proposed: 17 ; Are there pertinent covenants? ____

Describe existing conditions/use (vacant land?): Vacant land

Check any that are proposed: variance ____; special exception X ; conditional use X

Wetlands: Is any fill proposed? Yes; area to be filled: 7,093 S.F. ; buffer impact? X
(3.3% Total Exist. Wetland)

Proposed *post-development* disposition of site (should total 100%)		
	Square footage	**% overall site**
Building footprint(s) – give for each building	7,000	2%
Parking and vehicle circulation	8,000	2.4%
Planted/landscaped areas (excluding drainage)	14,000	4.2%
Natural/undisturbed areas (excluding wetlands)	93,183	27.9%
Wetlands	212,000	63.5%
Other – drainage structures, outside storage, etc.	N/A	----

Comments

Please feel free to add any comments, additional information, or requests for waivers here:

Please see attached Project Narrative

(continued *Residential Site Plan* application Tax Map: 131 Lot: 62-2)

Submission of application

This application must be signed by the property owner, applicant/developer (if different from property owner), *and/or* the agent.

I(we) hereby submit this Site Plan application to the City of Rochester Planning Board pursuant to the City of Rochester Site Plan Regulations and attest that to the best of my knowledge all of the information on this application form and in the accompanying application materials and documentation is true and accurate. As applicant/developer (if different from property owner)/as agent, I attest that I am duly authorized to act in this capacity.

Signature of property owner: Stacey L Price

Date: 11/16/2010

Signature of applicant/developer: Stacey L Price

Date: 11/16/2010

Signature of agent: _____

Date: _____

Authorization to enter subject property

I hereby authorize members of the Rochester Planning Board, Zoning Board of Adjustment, Conservation Commission, Planning Department, and other pertinent City departments, boards and agencies to enter my property for the purpose of evaluating this application including performing any appropriate inspections during the application phase, review phase, post-approval phase, construction phase, and occupancy phase. This authorization applies specifically to those particular individuals legitimately involved in evaluating, reviewing, or inspecting this specific application/project. It is understood that these individuals must use all reasonable care, courtesy, and diligence when entering the property.

Signature of property owner: Stacey L Price

Date: 11/16/2010

Rochester Housing Authority
List of Abutters
Map 131, Lot 62-2

Tax Map	Lot No.	Owner Name & Address
128	243	David P. & Diane L. Carignan 19 Wilson Street Rochester, NH 03867-3441
131	7	McManus Route 125 LLC 112 Gates Street Portsmouth, NH 03801
131	45	Marilyn Eastman (fka Marilyn J. Cilley) 3 Old Gonic Road Rochester, NH 03867-4416
131	46	Timothy E. & Jeannette I. Duntley 195 Brock Street Rochester, NH 03867-4407
131	47	Raymond & Muriel Trueworthy 193 Brock Street Rochester, NH 03867-4407
131	48	Cynthia & Paul Couture 185 Brock Street Rochester, NH 03867
131	60	Jerome J. & Virigina W. Lachance 164 Brock Street Rochester, NH 03867
131	62	Primax Properties, LLC 1065 East Morehead Street, 4th Floor Charlotte, NC 28204
131	62-1	Norman P. & Stacia R. Vetter Rev. Trust Norman P. & Stacia R. Vetter, Trustees 190 Dry Hill Road Rochester, NH 03867

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Tax Map	Lot No.	Owner Name & Address
132	46 ✓	Jiffy Lube International Facility I Q M S 1398 P.O. Box 4369 Houston, TX 77210-4369
132	47 ✓	185 Charles Street LLC 14 Nature Lane Rochester, NH 03867
Surveyor:		McEneaney Survey Assoc., Inc. P.O. Box 681 Dover, NH 03821-0681
Engineer:		Civilworks, Inc. P.O. Box 1166 Dover, NH 03821-1166
Wetland Scientist:		N.H. Soil Consultants/GZA GeoEnvironemtnal 202 Kent Place Newmarket, NH 03857
Architects:		Davis Goudreau Architects, Inc. 959 Islington Street Portsmouth, NH 03801

CIVILWORKS, INC.
Civil Engineers
Land Surveyors

P.O. Box 1166
Dover, NH 03821-1166

603-749-0443
(Facsimile) 603-749-7348

TECHNICAL MEMORANDUM

To: Michael Behrendt, Planning Director
From: Dana C. Lynch, P.E.
cc: File
Date: November 15, 2010
Re: Trip Generation
Marsh View Housing for the Elderly
Brock Street, Rochester
Our Reference No. 09117

This memorandum is intended to give an overview of the trip generation associated with a proposed 12-unit elderly housing project on Brock Street on a parcel shown as Lot 62-2 on Tax Assessor's Map 131. This project will be age restricted pursuant to Section 42.23(c)(26) of the City of Rochester Zoning Ordinance.

Access to the site will be via an existing driveway off Brock Street as allowed by an existing access easement, as documented in Strafford County Registry of Deeds Book 3286, Page 425, across land now or formerly Primax Properties. This driveway currently serves a 7,300 sq. ft. commercial establishment (a.k.a. Advanced Autoparts) pursuant to a City-approved site plan.

Trip generation estimates for the proposed elderly housing use are based on Land Use Code 252, Senior Adult Housing (attached) as contained in the Institute of Transportation Engineers (ITE) Trip Generation handbook. This nationally accepted data source contains information gathered for numerous land uses and projects of various sizes. As described in this document, a trip end is a one-way movement of a vehicle either into or out of a site.

The trip generation estimates for the subject site are as follows (note the adjacent street is Brock Street):

Average Vehicle Trip Ends per Weekday (24 hour period)
3.48 trip ends per unit x 12 units = 42 trip ends
(21 entering / 21 exiting)

Average Vehicle Trip Ends, A.M. Peak Hour of Adjacent St.
0.08 trip ends per unit x 12 units = 1 trip end

Average Vehicle Trip Ends, P.M. Peak Hour of Adjacent St.
0.11 trip ends per unit x 12 units = 1.32 (say 2) trip ends
(1 entering / 1 exiting)

It should be noted that the typical peak hours of a trip generation for elderly housing do not coincide with peak hours of travel on adjacent roadways. For example, the A.M. peak hour of trip generation from similar elderly housing projects occurs sometime between 10 A.M. and 12 A.M. versus the peak hour of traffic on the adjacent roads sometime between 7 A.M. and 9 A.M.

09117
Rec'd 2-8-10

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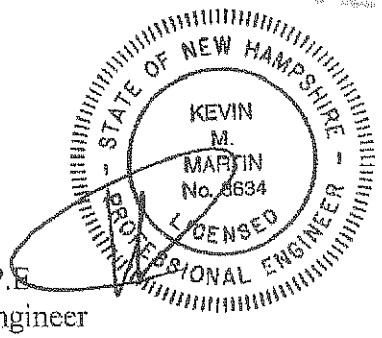
MEMORANDUM



TO: Kelly Davis, AIA
Sumner Davis Architects, Inc.
959 Islington Street
Portsmouth, NH 03801

FROM: John Turner
President

Kevin Martin, P.E.
Geotechnical Engineer

DATE: February 8, 2010

RE: **GEOTECHNICAL SUMMARY REPORT**
ROCHESTER HOUSING AUTHORITY
MARSH VIEW ELDERLY HOUSING
BROCK STREET
ROCHESTER, NEW HAMPSHIRE Project No. 10-GEO-002

This memorandum report presents the findings of a subsurface exploration program and a geotechnical engineering evaluation of the conditions encountered as they relate to foundation design and earthwork construction. The contents of this report are subject to the attached ***Limitations***.

SITE & PROJECT DESCRIPTION

The project site is located off Brock Street in Rochester, NH. The is vacant but appears to have been cleared or used in the past. JTC is not aware of the prior uses or development on the property. The site includes a steep, filled roadway embankment (Brock Street) to the front with gradually sloping terrain in the central and rear portions of the site. The embankment is about ≈13-16 ft in height. The central and rear portions of the site possess less than ≈10 ft of gradual slope change. Site grades "within the limits of construction" vary from about elevation ≈215-194 ft. Shallow wetlands are delineated towards the rear of the site near elevation ≈194-195 ft.

JOHN TURNER CONSULTING, INC.

19 DOVER STREET
DOVER NH 03820
T 603.749.1841 F 603.516.6851

6 CLINTON AVENUE
WESTFIELD MA 01085
T 413.642.0138 F 413.642.0164

15 HOLLY STREET, UNIT 103
SCARBOROUGH ME 04074
T 207.883.7878 F 207.883.3365

The project includes new elderly housing. The building is to consist of a three-level structure about 7,000 ft² in footprint area. The upper floor will be near street grade (elevation ≈217 ft) with the lower floor about 20 ft below street grade (elevation ≈197 ft). The bottom two levels will be partially embedded into the roadway embankment. The lower floor level will be used for vehicular parking, residence storage and mechanical. The middle and upper floors will be used primarily for housing. It is intended to support the building on a partial basement level foundation using conventional spread footings with a concrete floor slab. The lower level will have full height vehicular garage access to the rear. A ≈20 ft foundation wall will be required along Brock Street to accommodate the grade change. Some shallow cuts and fills will be necessary for the project. The purpose of this geotechnical study is to provide an engineering evaluation as it pertains to foundation design and construction.

SUBSURFACE EXPLORATIONS & LABORATORY TESTING

Test Borings

The subsurface exploration program included the advancement of ten (10) test borings within the project limits. The test borings, identified as B1 to B10, were advanced to refusal depths of about ≈1-9 ft below grade (22 ft below street grade) utilizing 2¼ inch solid stem augers. During advancement of the test borings, soil samples were typically retrieved at no greater than 5 ft intervals with a 2 inch diameter split-spoon sampler. Standard Penetration Tests (SPTs) were performed at the sampling intervals in general accordance with ASTM-D1586 (*Standard Method for Penetration Test and Split-Barrel Sampling of Soils*). Field descriptions and penetration resistance of the soils encountered, observed depth to groundwater, depth to apparent bedrock refusal and other pertinent data are contained on the attached *Test Boring Logs*. The test borings were located by referencing site features and are illustrated on the enclosed *Test Boring Location Plan*. The approximate ground elevations were interpolated from the *Topographic Plan*.

We also reviewed the *Test Bore Logs* completed for the adjacent Advanced Auto Parts having been involved with the geotechnical investigation for this development.

Laboratory Testing

Three (3) selected split-spoon samples obtained from the test borings were submitted to our laboratory for sieve analyses, moisture content testing or Atterberg Limits per ASTM Standards. The samples were obtained from varying depths. The purpose of the testing was to assess engineering characteristics for design and to assess the suitability of the site soils for re-use as structural fill on the project. The Atterberg Limits were performed on the cohesive soils to correlate moisture index properties. The test results are attached for review.

SUBGRADE CONDITIONS

The subgrade conditions include a ≈15-20 ft filled embankment slope along Brock Street. The parent soils below the fill or shallow topsoil include unconsolidated alluvium soils which vary in composition and density. The alluvium soils include Sand, silty Sand, sandy Silt, clayey Silt and silty Clay. Shallow Bedrock refusal is also apparent below the site at depths of ≈1-9 ft below grade. A *Subsurface Profile* depicting the subgrade conditions is attached for review.

Test boring B10 was completed along Brock Street to review the roadway embankment. Additional test bores could not be safely completed in this area given a gas line and limited shoulder. Nonetheless, the test boring indicates about ≈16 ft of sandy fill. Specifically, the fill consists of a fine to coarse Sand, little gravel, little silt. The fill is typically loose suggesting limited compaction.

The parent soils are likely alluvial deposited soils associated with the nearby Cocheco River. These soils vary considerably in composition from a Sand to a Clay. The Clay soils appears more apparent towards Brock Street. The alluvium soils include Sand, silty Sand, sandy Silt, clayey Silt and silty Clay. For the most part, these soils are fine-grained (silty) and therefore rendered poor-draining, moisture sensitive and frost susceptible. These soils also vary in relative density or relative consistency with the Silt & Clay soils being soft and weak. Most of the Silt & Clay soils appear located in the area of the 20 ft basement wall.

Test boring refusal, presumably bedrock, was encountered at all test locations at depths of ≈1-9 ft (22 ft below Brock Street). The corresponding refusal elevation varies from ≈190-199 ft. Within the building footprint, the bedrock is interpolated to be near elevation ≈192-199 ft. The bedrock possesses a general undulating contour through the property. The ledge appears weathered in the upper ≈1-2 ft having been penetrated with the augers. The *USGS Bedrock Geologic Map of New Hampshire (1997)* indicates bedrock in the area to include grey metapelites and/or thinly bedded schist and granofels. Such rock types are characteristically hard and of sound quality. Some limited recovery of weathered rock indicates a shaley type ledge with mica. The bedrock is expected to impact the project. There were no massive outcrops apparent during our study but the ground was also covered with about one foot of snow.

Groundwater was encountered at very shallow depths of about 1 to 2 ft below grade in the test holes (or near elevation ≈194-200 ft). Several of the test bores were left open 1-2 hours to allow for stabilization. Shallow water is expected given the shallow wetlands that border the site. Perched conditions may also impact the groundwater table given the presence of a hydraulically restrictive silt and clay soils. It should be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time of the measurements.

FOUNDATION SUBGRADE RECOMMENDATIONS

The subgrade conditions are favorable for supporting the proposed building on a conventional spread footing foundation with a concrete floor slab. The foundation support will be impacted by the variable alluvium soils and shallow bedrock. The alluvium is fine-grained and weak in many areas especially in the area of the tall basement wall. Bedrock in the building pad was encountered at elevations of about ≈192-199 ft. The foundation construction is also to extend below the groundwater. For these reasons, we recommend that the footings be designed to bear atop the relatively shallow bedrock. A crushed stone base shall also be used between the footing and bedrock for more uniform conditions and to facilitate necessary dewatering. We recognize that in some areas additional excavation will be necessary to expose the ledge and other areas will require bedrock excavation to achieve BOF grade. It is our opinion that this will provide a more stable foundation pad with adequate bearing especially for the tall basement wall. A ¾-inch minus crushed stone shall be used below all the footings. A minimum 8 inch base shall be used where ledge is shallow and a maximum 36 inches shall be used where the ledge may be deeper. The stone shall be protected from the alluvial soils with a geotextile filter fabric such as Mirafi 140N or equal. The stone base shall extend laterally outward and downward at a 1H:2V splay from the edge of footing or a minimum 6 inches laterally beyond the footing whichever is greater.

The exposed foundation subgrade is expected to consist of the bedrock. Where ledge is encountered in the building pad above design grade, it is recommended that a minimum 8 inch lift of ¾-inch minus crushed stone be placed between the footing and the bedrock surface to provide a more uniform and elastic bearing subgrade. The purpose of the stone base ("cushion base") is to mitigate differential settlements throughout the foundation. Bedrock subgrades should be free of loose soil and rock. Extensively heaved or disturbed over-blast will not be considered a suitable subgrade as potential subsidence may be experienced when loaded. It should also be noted that drill holes at least 6-8 ft in depth are typically necessary in order to remove ledge with explosive blasting. This may generate additional over-blast that will require engineering review. The blasting contractor should understand the concerns associated with the over-blast conditions and provide an appropriate drilling/blast pattern. In general, our experience with similar projects suggests that the overblast may remain below the foundation limits. The condition of the overblast to remain below the foundations will need to be reviewed during construction in this respect. The over-blast to remain will need to be densified and/or compacted prior to the placement of the specified stone base. This may be accomplished with a thin leveling base of one inch minus stone to fill surface irregularities then densification with a minimum one-ton vibratory compactor operating at peak frequency making at least 8-10 passes across the bearing subgrade. Removal of the bedrock with a hoe ram (if feasible) should mitigate bedrock disturbance. The bedrock surface should be relatively level with a slope no greater than ≈15%. The crushed stone below the footings shall be densified with vibratory compaction and exhibit stable conditions. The stone shall be protected from the alluvium with a geotextile filter fabric such as Mirafi 140N or equal.

Temporary and permanent groundwater control will be necessary for the project. Groundwater shall be maintained at least one foot below construction grade until backfilling is complete. The groundwater is expected to be controlled with conventional sumps and pumps. The sumps shall extend 2 ft below foundation grade and be protected with drainage stone and fabric. Multiple sumps may be necessary given the shallow groundwater and silty alluvium. The stone base below the footings should facilitate necessary dewatering and provide a dry/stable base upon which to progress foundation construction. Proper groundwater control and storm water management are necessary to maintain site stability. It is recommended that both temporary and permanent interceptor drains, foundation drains and other means of groundwater control be implemented early in the project. Otherwise, site construction and foundation subgrade stability will be difficult especially during the winter or spring seasons. These drains are expected to flow by gravity to the wetlands or be connected to the storm drain system. The Site Engineer should review these drains. Some "french drains" through the site which discharge to the wetlands should be considered for groundwater control during and post construction. The french drain (or interceptor drain) may consist of a 6 inch PVC-SDR35 perforated pipe fully encased in stone and protected with filter fabric. The drains should be located through the property with slight positive drainage to the wetlands. The drain invert shall be as low as practicable to depress the groundwater and avoid potential freezing. The drain invert shall preferably be at least 3 ft below grade in this regard. The entire trench shall be filled with one-inch drainage stone.

The subgrade should ultimately be stable, dewatered, compact and protected from frost throughout construction. Soils which become softened or disturbed during construction will be rendered unsuitable for structural bearing support. An Engineer from JTC should be scheduled to review the foundation subgrade conditions and preparation during construction.

FOUNDATION DESIGN RECOMMENDATIONS

The footings are expected to gain bearing support atop a base of crushed stone and indirectly atop bedrock. Footings may be designed using a net allowable bearing capacity of 6 ksf (FS=3). The allowable bearing capacity may be increased to 8 ksf when considering transient loads such as wind or seismic. The bearing capacity is contingent upon the perimeter strip footings and isolated column footings being no less than 2 ft and 3 ft in width respectively. Foundation settlement should be less than ¾ inch with differential settlement less than ½ inch. The settlement should be elastic and occur during construction. The footings should be provided with at least 4 ft of earthen embedment for frost protection. As prior mentioned, the silty alluvium soils are considered frost susceptible. The presence of the groundwater further warrants proper protection from frost.

The subsurface conditions were reviewed with respect to seismic criteria set forth in the *International Building Code (2006)*. Based on the relative density of the site soils, the site is not susceptible to liquefaction (complete loss of shear resistance) in the event of an earthquake. Based on interpretation of the *Building Code* together with the project and site conditions, the *Site Classification* (Table 1613.5.2) is "B" (Rock).

Recommendations for the lateral earth pressure against the unbalanced basement foundation walls and drainage control are outlined on Table 2. Proper drainage behind the unbalanced foundation walls will also be necessary as summarized on Table 2 and as addressed herein.

Structural fill necessary within and below the foundation should conform to the attached *Specifications* (Table 1). The fine-grained alluvium soils should **not** be used for Structural Fill in the building area but rather Common Fill in pavement areas (greater than 24 inches below finish grade). The alluvium soils will be difficult to compact when wet and are unstable. The organic laden soils should be stripped and grubbed to avoid contamination with the site soils. The site soils will need to be compacted within ±2% of optimum moisture content per the Modified Proctor Test and be screened of large stones.

FOUNDATION DRAINAGE

Due to the proposed basement floor level, a foundation drainage system will be required to permanently control high groundwater. The purpose of the drainage system is to prevent uplift (buoyant) and lateral hydrostatic forces against the foundation walls and protect the basement level from groundwater intrusion. An underslab drainage system will also be necessary given the expected groundwater encroachment. Groundwater was encountered near elevation ≈194-200 ft and is expected to be higher during seasonal periods. The LFE is noted to be elevation near 197 ft.

The perimeter drains that encompass the building should not encroach within the *Footing Zone of Influence* defined as that area extending laterally one foot from the edge of footing then outward and downward at a 1H:1V splay. Furthermore, the invert elevation of the drain should be at least 12 inches below the underside of the adjacent floor slab. The drains should consist of minimum 6 inch diameter, perforated PVC-SDR35 drain pipe encased within 12 inches of ¾-inch stone and wrapped with a filter fabric such as Mirafi 180N or equal. To provide drainage along the basement wall, a 24 inch wide vertical lift of *Clean Granular Fill* (Table 1) should be placed directly behind the foundation wall to within 18 inches of finish grade. A prefabricated wall drain such as MiraDrain (Mirafi G100N drainage composite) may also be used for this purpose. The ground surface immediately adjacent to the foundation should be sloped away from the building to allow for positive drainage. It is also recommended that the surficial materials adjacent to the building be relatively impermeable to reduce the volume of precipitation infiltrating into the subsurface. Such impermeable materials include cement concrete, bituminous concrete or a vegetated silty topsoil. The purpose of the low permeable soils or barriers is to mitigate storm water flow towards the basement foundation. Storm flow from Brock Street should also be diverted away from the building via curbing, positive grading, etc.

The underslab drainage system should consist of a minimum 12 inch base of ¾-inch crushed stone placed atop a filter fabric such as Mirafi 180N or equal. The filter fabric should be over-lapped a minimum one foot at intersecting seams. Furthermore, minimum 4 inch perforated, schedule 40 or SDR-35 pipe should be placed at minimum 25 ft intervals with an invert at least 12 inches below the underside of the slab. The perforated drainage pipe should be encased (trenched) in a minimum 6 inches of crushed stone and protected with a geotextile filter fabric similar to the exterior drains. The interior drains should not be located lower than the foundation footings. It is expected that the drains may flow by gravity to a storm drain system or day light if site grading permits. Gravity discharge of the drains should not be impacted by potential surcharges or flood conditions. The Site Engineer should review the discharge of the foundation drains in this regard. It is recommended that a backflow preventer be installed at the outlet of the drains to reduce the impact of surcharges and to impede rodent activity that may clog the drain. The drains should be provided with permanent clean-outs at convenient locations to facilitate access to all sections of the system. Clean-outs should be located at bends and no greater than 125 ft on-center.

The basement foundation should be waterproofed or, at a minimum, damproofed to protect against moisture damage. The basement floor should be damproofed with minimum ten-mil polyethylene with joints lapped 8 inches below the floor slab or with application of bituminous or other approved material to the surface. Damproofing of below grade foundation walls should include the application of a bituminous or other approved material from the top of footing to above ground level. A water-proofing/insulation/drainage board system (ie: Warm-N-Dri or equal) is often used against the basement walls for increased protection against moisture damage especially where the basement level will be used for residential use. Such applications should be specified by others. Below slab foundations (such as elevator pits) should be fitted with continuous waterstops in all construction joints and should be waterproofed as well as structurally designed (buoyant load) to protect against groundwater intrusion. Groundwater relief or drainage is typically not feasible for the depressed elevator pit. An equivalent fluid weight of 90 pcf should be used for the design of the elevator pit as the groundwater will not be controlled in this depressed area.

CONSTRUCTION CONCERNS

Protection of Foundation Subgrade

The footings are expected to gain bearing support atop a base of crushed stone and indirectly the bedrock. This is recommended given the shallow depth of bedrock, the weak alluvium soils and the shallow groundwater. A bedrock supported subgrade should not be impacted the wet, sensitive and poor-draining alluvium. Nonetheless, the alluvium soils will still be present in the building pad and will provide support for construction activities and the concrete floor slab. These soils are considered highly moisture sensitive and will readily become weakened or softened if exposed to wet conditions and construction activities. The moisture sensitivity is associated with the high percentage of fine-grained soil (fine sand/silt/clay) which acts to retain moisture. The presence of the shallow groundwater further impacts the alluvium in this regard. The contractor should

understand these concerns and take precautions to reduce subgrade disturbance. Such precautions may include diverting storm run-off away from construction areas, reducing traffic in sensitive areas, limiting the extent of exposed subgrade especially if inclement weather is forecast, backfilling footings as soon as practicable and maintaining an effective dewatering program. Adequate protection of the bearing subgrade is necessary during construction. The subgrade concerns are more problematic if construction takes place during the winter/spring season or other periods of inclement weather. A protective base of one-inch minus crushed stone should be placed below the footings. The stone base (minimum 8 inch thickness) should facilitate necessary dewatering and provide a dry/stable base upon which to progress foundation construction. The stone base shall be tamped with a plate compactor and exhibit stable and compact conditions.

Soils which become softened or disturbed during construction will be rendered unsuitable for structural bearing support. An Engineer from JTC should be scheduled to review the foundation subgrade conditions and preparation during construction.

Groundwater Control

The groundwater table or "ponded" storm water will need to be controlled during construction to complete work in dry conditions. The groundwater table should be continuously maintained at least one foot below construction grade until backfilling is complete or the foundation drainage system is operational. Storm water is also expected to "puddle" within the footing trenches given the low permeability of the alluvium soils and bedrock. The groundwater or puddled storm water are expected to be controlled with conventional filtered sumps and submersible pumps. It is prescribed that a minimum 8 inch base of ¾-inch minus crushed stone (protected with geotextile filter fabric) be placed atop the below the footings to facilitate dewatering and provide a uniform base atop the bedrock. The sumps should be located at least two feet below construction grade and protected (encased) with filter stone. Proper groundwater control and storm water management are necessary for maintaining the competency of the site soils and a stable site.

It would also be prudent to establish perimeter drainage trenches or interceptor trenches (french drains) to collect and divert water away from the building pad and pavement areas. The french drain may consist of a 6 inch PVC-SDR35 perforated pipe fully encased in stone and protected with filter fabric. The drains should be located through the property with slight positive drainage to the wetlands. The drain invert shall be as low as practicable to depress the groundwater and avoid potential freezing. The drain invert shall preferably be at least 3 ft below grade in this regard. The entire trench shall be filled with one-inch drainage stone. There appears to be topographic relief to have gravity flow down towards the lower wetlands. The groundwater table shall be properly controlled prior to the final foundation excavation.

Bedrock Removal

Bedrock excavation should be expected for the foundation and site construction. Based on our general experience in the area, the bedrock is expected to be hard and of sound quality. As such, bedrock removal is expected to require mechanically actuated demolition hammers (hoe ram) or blasting. Based on the explorations, there was about 1-2 ft of weathered ledge.

Given the proximity of existing structures in the area as well as utilities, it is recommended that the contractor take precautions to limit vibrations, air-blast and fly-rock from disturbing adjacent structures as a result of rock excavation. The contractor should perform rock excavation in accordance with the town, state and federal regulations. If blasting is used, it is recommended that a pre-blast and post-blast survey of existing structures/utilities within 250 ft be performed to mitigate potential claims. Seismographs should also be placed adjacent to existing structures and utilities to monitor blast vibrations. Vibrations should be limited to a peak particle velocity of less than 2 inch per second for vibrations having a frequency greater than 30 Hz. Blasting should also be sensitive with respect to fresh concrete. In general, the concrete should achieve at least ⅔ of the design strength prior to being subject to vibrations. The vibrations should also be limited to a peak particle velocity less than 1 inch per second especially for recent wall pours. Blasting should not be permitted within 25 ft of fresh concrete poured within 24 hours. The protection of existing structures/utilities as well as the new foundation construction is ultimately the responsibility of the site/blasting contractor.

Following a ledge blast, the heaved/disturbed over-blast should be fully removed exposing the underlying intact/competent ledge. This is especially important in the building area for support of the spread footing foundation. It may be possible to leave some of the over-blast in-place, however, this will require engineering review (test pits) during construction. Extensively heaved/disturbed over-blast will not be considered a suitable subgrade as potential subsidence may be experienced when loaded. It should also be noted that drill holes at least 6-8 ft in depth are typically necessary in order to remove ledge with explosive blasting. This may generate additional over-blast that will require engineering review. The blasting contractor should understand the concerns associated with the over-blast conditions and provide an appropriate drilling/blast pattern. Removal of the bedrock with a hoe ram (if feasible) should mitigate bedrock disturbance. As previously mentioned, at least 8 inches of ¾-inch stone shall be placed below the footings bearing on bedrock.

CONSTRUCTION MONITORING

It is recommended that a qualified engineer or representative be retained to review earthwork activities such as the preparation of the foundation bearing subgrade and the placement/compaction of Structural Fill. It is recommended that JTC be retained to provide construction monitoring services. This is to observe compliance with the design concepts presented herein.

We trust the contents of this memorandum report are responsive to your needs at this time. Should you have any questions or require additional assistance, please do not hesitate to contact our office.

Enclosures
kmm48/jtc10/rochester.rpt

LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.

3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.

5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by John Turner Consulting, Inc.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of City of Rochester & Sumner Davis Architects, Inc. in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

8. This report has been prepared for this project by John Turner Consulting, Inc. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to geotechnical design considerations.

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TABLE 1

(Page 1 of 2)

Marsh View Elderly Housing
Brock Street
Rochester, New Hampshire

Recommended Soil Gradation & Compaction Specifications

Clean Granular Fill
(Select Gravel Fill)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3 inch	100
3/4 inch	60-90
No. 4	20-70
No. 200	2-8

NOTE: For minimum 24-inch base for exterior concrete slabs exposed to frost
A 12-inch base of ¾ inch crushed stone below basement level floor
Compact to at least 95% relative compaction per ASTM D1557

Structural Fill
(Gravelly SAND, little Silt)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
5 inch	100
3/4 inch	60-100
No. 4	20-85
No. 200	0-10

NOTE: For use as backfill behind unbalanced foundation/retaining walls
A ¾-inch crushed stone shall be used below structural footings
Compact to at least 95% relative compaction per ASTM D1557

TABLE 1
(Page 2 of 2)

Marsh View Elderly Housing
Brock Street
Rochester, New Hampshire

Recommended Soil Gradation & Compaction Specifications

Common Fill
(Silty SAND, little Gravel)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
6-8 inch	100
3/4 inch	60-100
No. 4	20-85
No. 200	0-20

NOTE: For use as roadway embankment fill in deep pavement areas.
Maximum stone size should be ⅔ the maximum lift thickness
Compact to at least 93% relative compaction per ASTM D1557

Clean Granular Fill & Structural Fill placed beneath the foundation should include the *Footing Zone of Influence* which is defined as that area extending laterally one foot from the edge of the footing then outward and downward at a 1H:1V splay. Structural Fill should be placed in loose lifts not exceeding 12 inches for heavy vibratory rollers and 8 inches for vibratory plate compactors. All Structural Fill should be compacted to at least 95 percent of maximum dry density as determined by the Modified Proctor Test (ASTM-D1557). All the Fill should be compacted within ±3% of optimum moisture content. The adequacy of the compaction efforts should be verified by field density testing which is also a requirement of the *Building Code*.

TABLE 2

Marsh View Elderly Housing
Brock Street
Rochester, New Hampshire

Recommended Lateral Earth Pressures & Drainage for Unbalanced Walls

Lateral earth pressures for the structural design and stability analysis of unbalanced foundation walls (basement walls, elevator pits, retaining walls, etc) are provided herein. The following table outlines the recommended lateral earth pressure coefficients and equivalent fluid weights:

WALL CONDITION	LATERAL TRANSLATION (Δ/H)	EARTH PRESSURE COEFFICIENT (K)	EQUIVALENT FLUID WEIGHT (γ_{EFW})
restrained	0	K_o	65 pcf
no restraint	0.002	K_a	40 pcf
no restraint	0.02	K_p (FS=3)	100 pcf

where: Δ = movement at top of wall by tilting or lateral translation
H = height of wall

The above lateral earth pressures are based upon:

1. Rankine earth pressure theory;
2. Retaining wall backfilled with Structural Fill (Table 1);
3. Unit weight of backfill less than 135 pcf
4. No hydrostatic pressures (weeps/perimeter drains);
5. No surcharge loading;
6. A level backfill in front and behind of wall;
7. Dynamic/compaction stresses should be a minimum 200 psf/ft;
8. Top 2 ft should not be considered for passive resistance.
9. Seismic loading shall be applied as required by the *IBC Building Code.*
10. Seismic loads shall be a 15% increase from those values outlined in the Table
11. Use only small plate compactors within 3 ft of the wall
12. The silty alluvium soils should **not** be used for backfill within 3 ft of wall

The lateral resistance of retaining walls should also accommodate surcharge and a sloping backfill, if necessary. Uniformly distributed loads should be superimposed along the face of the wall at a magnitude equal to the surcharge pressure multiplied by the appropriate earth pressure coefficient. Surcharge loads should be considered where they are located within a horizontal distance equivalent to 0.5 times the height of the wall. Anticipated point or line loads situated behind the wall should be evaluated in accordance with linear elastic theory.

For frost and drainage concerns, it is recommended that a 24-inch wide vertical lift of *Clean Granular Fill* (Table 1) or ¾-inch crushed stone be placed directly behind the retaining walls or basement walls. A pre-fabricated wall board drain may also be used for this purpose. The ground surface immediately adjacent to the unbalanced foundation should be sloped away from the building to allow for positive drainage. It is also recommended that the surficial materials adjacent to the building be relatively impermeable to reduce the volume of precipitation infiltrating into the subgrade. Such impermeable materials include Portland cement concrete, bituminous concrete, or a vegetated silty topsoil. Retaining walls should be constructed with weeps installed no greater than 8 ft on-center or be provided with perforated foundation drains. The weeps should be minimum 2 inch diameter holes protected with a filter fabric such as Mirafi 180N or equal to reduce the migration of soil particles.

Unbalanced foundation basement walls around the buildings should have footing drains to control groundwater. The perimeter foundation drain should not encroach within the *Footing Zone of Influence* defined as that area extending laterally 1 ft from the edge of footing then outward and downward at a 1H:1V splay. Furthermore, the invert elevation of the drain should be at least 12 inches below the underside of the adjacent floor slab. The drains should consist of minimum six (6) inch diameter, perforated PVC SDR-35 drain pipe encased within 12 inches of ¾-inch stone and wrapped with a filter fabric such as Mirafi 180N or equal. An underslab drainage system is also necessary for the basement level. The slab drainage shall include a minimum 12 inch base of ¾-inch stone protected with a geotextile fabric. Perforated pipe shall also be used below the basement floor slab with a spacing no greater than 25 ft. The drains should flow by gravity to a storm water system not subject to surcharge ir day light if feasible. The Site Engineer shall review the discharge of the foundation drains. The drains should be provided with permanent clean-outs at convenient locations to facilitate access to all sections of the system. Clean-outs should be located at bends and no greater than 100 ft on-center. If the unbalanced foundation walls can not be drained to alleviate hydrostatic forces, then the lateral earth pressure equivalent fluid weight should be increased to 90 pcf. Such earth pressures should be used for elevator pits, if necessary.

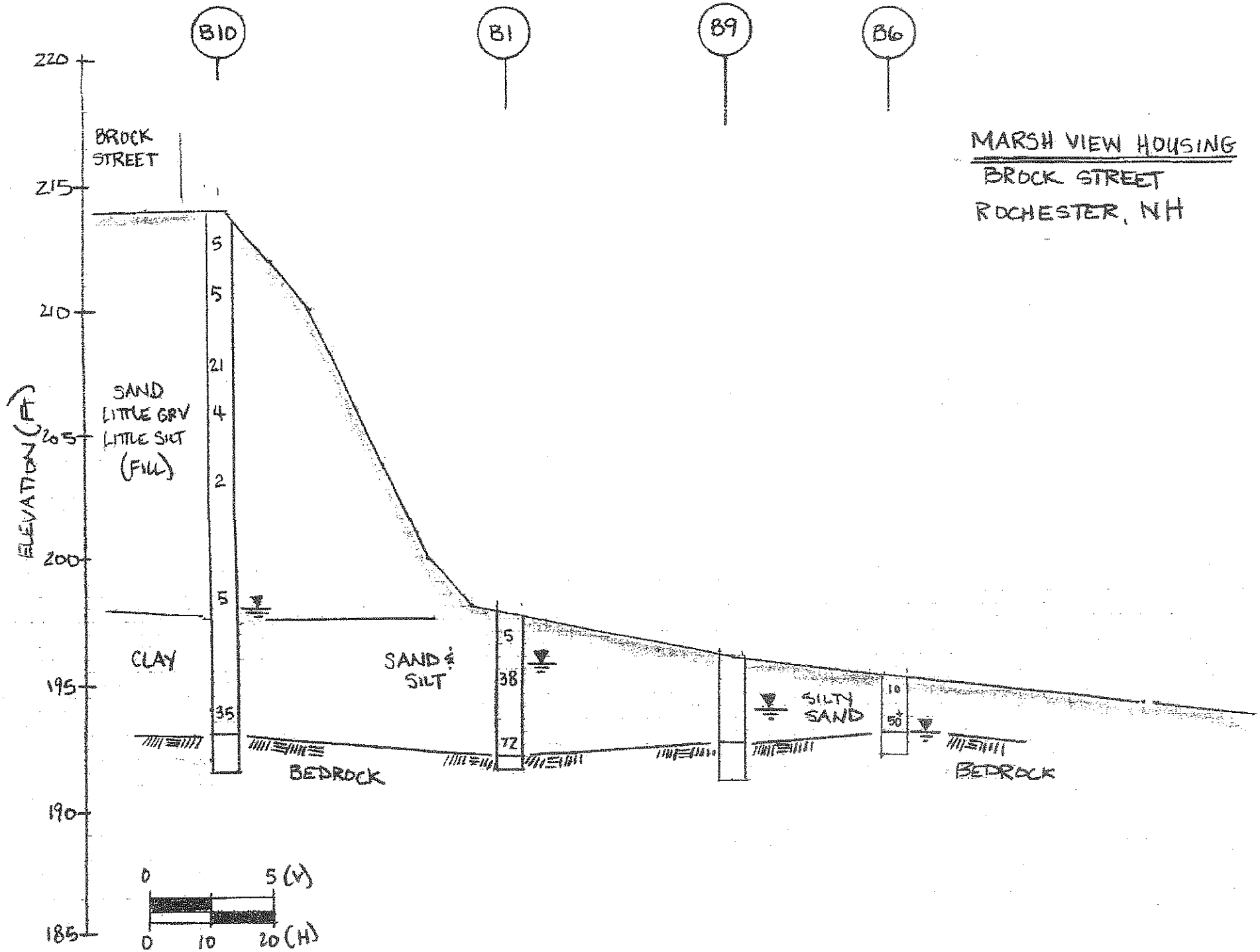
The recommended friction factors to be used for retaining wall design are as follows:

Recommended Friction Factor (f)

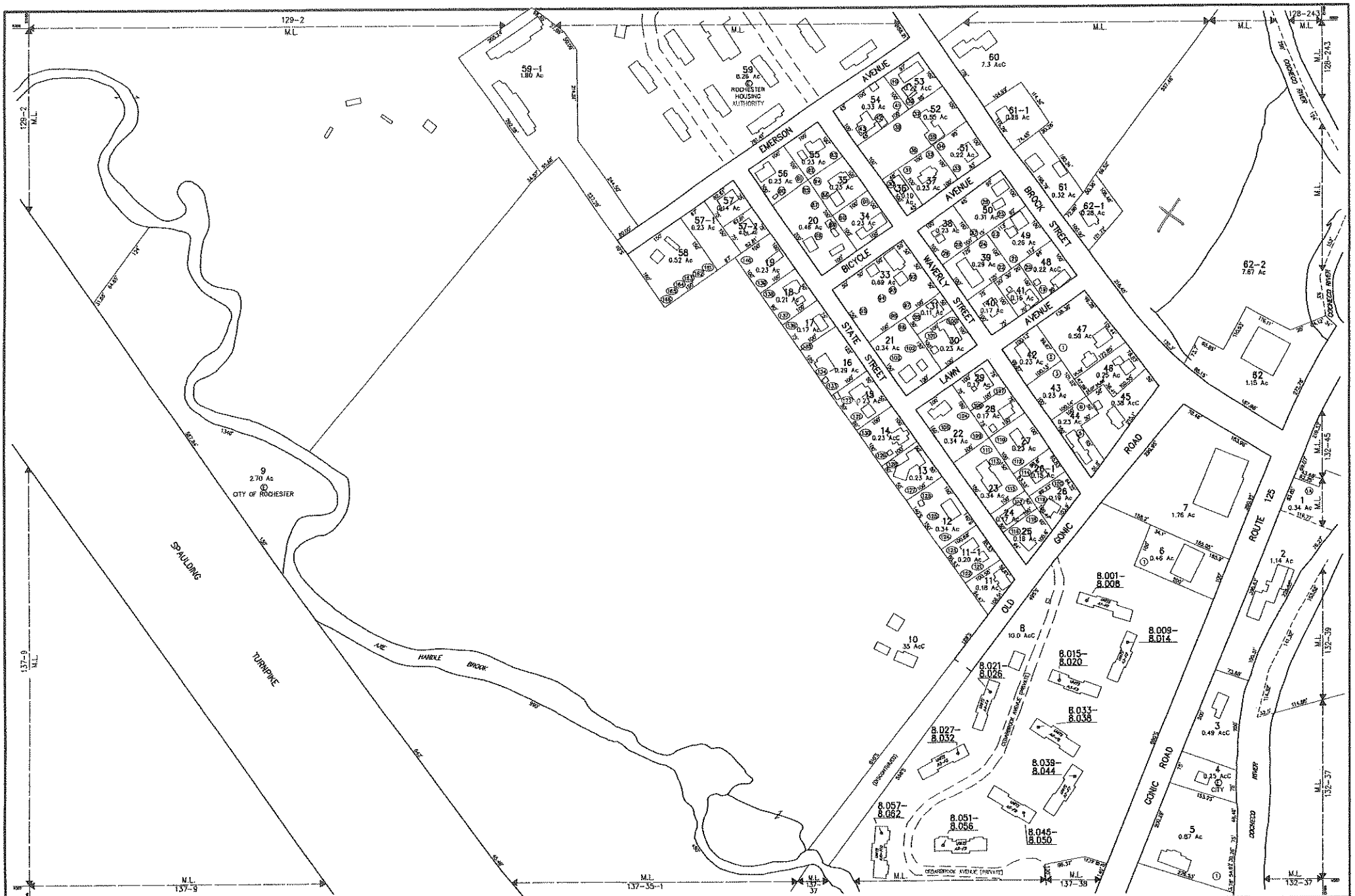
$f = \tan(\delta)$, where δ is the interface friction angle

- Concrete against the following soils

Bedrock/ Crushed Stone	0.55
Structural Fill (Table 1)	0.45
Parent Site Soils (Alluvium)	0.35



MARSH VIEW HOUSING
BROCK STREET
ROCHESTER, NH



THIS MAP IS FOR ASSESSMENT PURPOSES. IT IS NOT VALID FOR LEGAL DESCRIPTION OR CONVEYANCE.

THE HORIZONTAL DATUM IS THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM.

PHOTOGRAPHY DATE: APRIL 28, 1990

COMPLETION DATE: JUNE 30, 1992

PRODUCED IN 1992 BY
CARTOGRAPHIC ASSOC. INC.
PROFESSIONAL CONSULTANTS
MUNICIPAL MAPPING – GIS – PUBLIC WORKS INFORMATION MANAGEMENT
11 PLEASANT STREET, LITTLETON, NEW HAMPSHIRE 03561
(603)444-6768 – (800)322-4540 – FAX (603)444-1385 – WWW.CAI-INFO.COM

LEGEND

AREA SURVEYED . . . . . Ac
AREA CALCULATED . . . . . AcC
RECORD DIMENSION . . . . . 100'
SCALED DIMENSION . . . . . 100'S
MATCH LINE . . . . . M.L.
WATER . . . . . W

EXEMPT PROPERTY . . . . . (1)
SUBDIVISION LOT NO. . . . . (2)
BUILDING . . . . . BLDG
RIGHT OF WAY . . . . . R/W
COMMON OWNERSHIP . . . . . OS
WETLANDS . . . . . W

SCALE 1" = 100'

FEET 50 0 100 200 300

METERS 25 0 25 50 75

REVISED TO : APRIL 1, 2010

PROPERTY MAPS

ROCHESTER

NEW HAMPSHIRE

INDEX DIAGRAM

130 129 128
246 132
137 136

MAP NO. 131

The State of New Hampshire

DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

WETLANDS AND NON-SITE SPECIFIC PERMIT 2010-01347

Permittee:	Rochester Housing Authority 13 Well Sweep Acres Rochester, NH 03867
Project Location:	24 Straws Point Road, Rochester Rochester Tax Map/Lot No. 131 / 62-2
Waterbody:	

NOTE -- CONDITIONS

APPROVAL DATE: 11/04/2010 **EXPIRATION DATE: 11/04/2015**

Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued. This permit shall not be considered valid unless signed as specified below.

PERMIT DESCRIPTION: Dredge and fill 7,093 square feet of isolated, disturbed wet meadow wetland for construction of a multi-unit elderly housing development and associated stormwater management structures.

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with plans by Civilworks Engineers dated 11/11/2009, as received by the NH Department of Environmental Services (DES) on 5/24/2010, and per materials received from GZA GeoEnvironmental Inc. dated 9/22/2010 as received on 9/23/2010.
2. This permit is contingent on approval by the DES Alteration of Terrain Bureau.
3. There shall be no further alteration of wetlands for lot development, driveways, culverts, or for septic setback.
4. Orange construction fencing shall be placed at the limits of construction to prevent accidental encroachment on wetlands.
5. Appropriate siltation/erosion/turbidity controls shall be in place prior to construction, shall be maintained during construction, and remain in place until the area is stabilized. Silt fence(s) must be removed once the area is stabilized.
6. Within three days of final grading, all exposed soil areas shall be stabilized by seeding and mulching during the growing season, or if not within the growing season, by mulching with tack or netting and pinning on slopes steeper than 3:1.
7. Where construction activities have been temporarily suspended within the growing season, all exposed soil areas shall be stabilized within 14 days by seeding and mulching.
8. Where construction activities have been temporarily suspended outside the growing season, all exposed areas shall be stabilized within 14 days by mulching and tack. Slopes steeper than 3:1 shall be stabilized by matting and pinning.
9. Silt fencing must be removed once the area is stabilized.
10. The contractor responsible for completion of the work shall utilize techniques described in the New Hampshire Stormwater Manual, Volume 3, Erosion and Sediment Controls During Construction (December 2008).

GENERAL CONDITIONS THAT APPLY TO ALL DES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits, and/or consult with other agencies as may be required (including US EPA, US Army Corps of Engineers, NH Department of Transportation, NH Division of Historical Resources (NH Department of Cultural Resources), NHDES-Alteration of Terrain, etc.);
5. Transfer of this permit to a new owner shall require notification to and approval by DES;
6. This permit shall not be extended beyond the current expiration date.
7. This project has been screened for potential impacts to **known** occurrences of rare species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have received only cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.
8. Review enclosed sheet for status of the US Army Corps of Engineers' federal wetlands permit.

APPROVED: _____

Dori Wiggin, East Region Supervisor
DES Wetlands Bureau

BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

OWNER'S SIGNATURE (required)

CONTRACTOR'S SIGNATURE (required)

RECEIVED
NOV 17 2010
Planning Dept.

The State of New Hampshire

DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

NOTICE TO RECIPIENTS OF MINOR IMPACT N.H. WETLANDS PERMITS

Your permit was approved by the New Hampshire Wetlands Bureau as a minor impact project, and your project will be reviewed by the U.S. Army Corps. of Engineers for possible approval under the Army Corps New Hampshire State Programmatic General Permit - SPGP. The Army Corps will notify you within thirty (30) days if they will require additional information or an individual federal permit application.

If you do not hear from the Army Corps within thirty (30) days, and your project meets the conditions of the SPGP (attached), your project will automatically be approved under the SPGP. You should contact the Army Corps, at 1-800-343-4789, if your project does not meet the conditions of the SPGP.

NO WORK SHOULD BE DONE WITHOUT AUTHORIZATION FROM THE ARMY CORPS UNLESS THIRTY (30) DAYS HAVE PASSED AFTER N.H. WETLANDS BUREAU APPROVAL. AND ALL CONDITIONS OF THE SPGP ARE MET.

THESE APPROVALS DO NOT RELIEVE YOU FROM OBTAINING ANY NECESSARY LOCAL PERMITS THAT MAY BE REQUIRED BY YOUR TOWN.

IF YOU HAVE ANY QUESTIONS, PLEASE FEEL FREE TO GIVE US A CALL AT 603-271-2147

****

THIS NOTICE WAS SENT WITH MINOR IMPACT PERMIT #2010-1347 ON 11/4/10 BY DTW

CC: U.S. ARMY CORPS. OF ENGINEERS

The State of New Hampshire

DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

November 04, 2010

Rochester Housing Authority
13 Well Sweep Acres
Rochester, NH 03867

RE: NHDES Wetlands File # 2010-01347 Rochester Housing Authority - Brock St. - Rochester Tax Map/Lot # 131 / 62-2

Dear Rochester Housing Authority:

Attached please find Wetlands Permit # 2010-01347 to Dredge and fill 7,093 square feet of isolated, disturbed wet meadow wetland for construction of a multi-unit elderly housing development and associated stormwater management structures.

The decision to approve this application was based on the following findings:

1. This is a minor impact project per Administrative Rule Env-Wt 303.03(h), projects involving less than 20,000 square feet of alteration in the aggregate of non-tidal wetlands.
2. The need for the proposed impacts has been demonstrated by the applicant per Env-Wt 302.01. 3. The applicant has provided evidence which demonstrates that this proposal is the alternative with the least adverse impact to areas and environments under the department's jurisdiction per Env-Wt 302.03. The development is confined to the disturbed area adjacent to a City street, away from the larger wetland area and the Cocheco River, and has incorporated low impact development techniques into its design.
4. The applicant has demonstrated by plan and example that each factor listed in Env-Wt 302.04(a) Requirements for Application Evaluation, has been considered in the design of the project. There were no species of concern reported by the NH Natural Heritage Bureau as occurring in the project vicinity.
5. The Rochester Conservation Commission did not report.
6. The Cocheco River LAC was notified by certified mail and did not report.

Any party may apply for reconsideration with respect to any matter determined in this action within 30 days from the date of this letter. A motion for reconsideration must specify all grounds upon which future appeals may be based, and should include information not available to DES when the decision was made. DES may grant reconsideration if, in its opinion, good reason is provided in the motion.

Your permit must be signed, and a copy must be posted in a prominent location on site during construction. If you have any questions, please contact the Pease District Office at (603) 559-1507.

Sincerely,

Dori Wiggin
East Region Supervisor
DES Wetlands Bureau

cc: Rochester Conservation Commission
Rochester Municipal Clerk
GZA