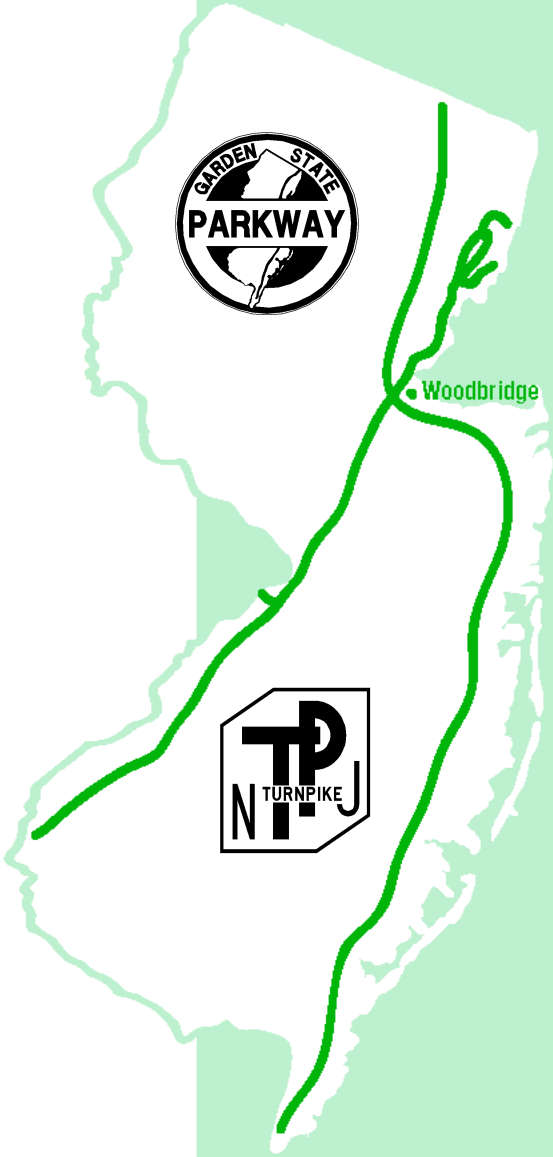
NEW JERSEY TURNPIKE AUTHORITY

GARDEN STATE PARKWAY

NEW JERSEY TURNPIKE



PROCEDURES MANUAL

Table of Contents

Section 1 - POLICIES

1.1. GENERAL

The Authority operates pursuant to applicable New Jersey statutes, Executive Orders as well as policies and regulations that have been adopted by the Authority's Board of Commissioners. These dictate the manner in which the Authority is able to conduct its operations. A partial list of the statutes, Executive Orders and Authority Policies and Regulations is provided below. Please note that this is not a complete list. It is assumed that all parties retained by the Authority will be aware of, observe and comply with all applicable Federal and State laws, Executive Orders and Authority Policies and Regulations that apply to the scope of services listed in the individual agreement.

1.1.1. New Jersey Statutes

1.1.1.1. P.L. 2005, Ch. 51 (N.J.S.A. 19:44A-20.13-20.25), formerly Executive Order 134 (Pay to Play)

In order to safeguard the integrity of State government procurement by imposing restrictions to insulate the award of State contracts from political contributions that pose the risk of improper influence, purchase of access or the appearance thereof, this Executive Order was signed and later passed into law. The restrictions set forth therein apply to all business entities and their principals placing limits on the amount of contributions and on the receipts of same. This will be addressed during the procurement process. The following website contains more detailed information, as well as sample forms that must be completed and submitted:

http://www.nj.gov/treasury/purchase/forms.htm#eo134

1.1.1.2. N.J.A.C. 17:14-5.2 (Small Business Enterprise)

The Authority policy is committed to the employment of small business enterprises (SBE's) in all forms of procurements including the purchase of goods, provision of professional services and award of construction contracts. In general, the overall Authority goal is 25 percent participation. In order to achieve this level, the Authority may set aside contracts for certain material purchases, consulting services and construction projects solely for award to SBE firms. Many Authority contracts provide that the firm serving as the primary provider, if not an SBE, exerts a good faith effort to subcontract at least 25 percent of the contract value to firms that qualify as SBE's as defined by the New Jersey Commerce and Economic Growth Commission and the State Department of the Treasury. This will be addressed during the procurement process. The following website contains additional information:

http://www.state.nj.us/commerce/smbus_overview.shtml

1.1.1.3. Open Public Records Act (OPRA)

Allows access to the Authority's public records as provided by law. The Authority's website contains additional information.

1.1.2. Professional Services Executive Orders

1.1.2.1. P.L. 1997, Ch. 399 Executive Order 26 (Quality Based Selection)

Sets forth the procedures related to professional services contracting. This law provides for quality based selection at fair and reasonable compensation.

1.1.2.2. Executive Order No. 215 of 1989 (Environmental Assessment)

Sets forth the requirements related to the level of environmental documentation needed regarding the design of Authority projects. This Executive Order sets the threshold for triggering compliance as outlined below:

Level 1 Projects with anticipated construction costs in excess of $1 million shall be subject to the preparation of an Environmental Assessment (EA). The EA follow guidelines prepared by the State of New Jersey Department of Environmental Protection ("NJDEP"). Alternatively, environmental assessments prepared to support a "Finding of No Significant Impact" under the National Environmental Policy Act may be substituted for an assessment otherwise required pursuant to NJDEP guidelines; or

Level 2 Projects with construction costs in excess of $5 million and land disturbance in excess of five acres shall be subject to the preparation of an Environmental Impact Statement (EIS). The EIS shall follow guidelines prepared by NJDEP.

The provisions of this Executive Order shall not apply to the following types of projects:

1. Maintenance or repair projects,
2. Facilities or equipment replaced in kind at same location,
3. Renovations or rehabilitation of existing buildings;
4. Expansions or additions of existing buildings provided that the expansion or addition does not increase the building's capacity by more than 25 percent,
5. Projects subject to review pursuant to the provisions of the Coastal Area Facility Review Act or the Municipal Wastewater Treatment Financing Program;

6. Projects which will require a full environmental impact statement pursuant to the National Environmental Policy Act;
7. Projects classified as categorical exclusions pursuant to regulations promulgated in accordance with the National Environmental Policy Act; or
8. Projects involving loans or tax exempt financing to private sector applicants by departments, agencies or authorities of the State of New Jersey.

The following website contains additional information:

http://www.nj.gov/dep/opppc/reports.html

1.1.2.3. Executive Order 172 of 1987 (Public Comment)

Sets forth the requirements under which public hearings must be conducted during all Authority projects. This Executive Order sets the procedures for public participation. The Authority must:

1. Provide adequate public notice to advise that the proposed project unless it is an emergency or routine maintenance project;
2. Provide a forum which allows the Authority to make a public presentation of its plans and which provides those affected with an opportunity to adequately voice their opinions;
3. Respond to recommendations and suggestions in a timely manner;
4. Evaluate and respond to all public comments as an integral part of the project development process.

1.1.3. Authority Board Actions

1.1.3.1. Policy for Construction of Noise Barriers

Sets forth the circumstances under which noise barriers should be considered for construction at the Authority's expense in proximity to the Authority's roadways. In addition, the requirement for determining eligibility for noise barrier consideration, as well as the design criteria to be used for noise barrier construction is identified. The Authority's website contains additional information.

1.2. AGREEMENTS

1.2.1. Policy

The Authority enters into written Agreements with any municipality, county, railroad, utility company or legally constituted authority or agency affected by an Authority project. It will be the responsibility of the Authority's Law Department to prepare a

draft of every Agreement to be utilized by the Authority in their dealings with the other party.

1.2.2. Exhibits

With each Agreement, exhibits that graphically depict the area presented in the Agreement are required and are to be prepared by the Engineer as directed by the Authority's Law Department. An exhibit is generally at a scale of 1" = 200' and should be properly cross-referenced to the Agreement. The exhibit should be detailed enough to adequately describe the information presented in the Agreement. All Exhibits shall be submitted to the Authority's Project Manager on 11" x 17" paper along with an electronic copy in PDF format for future reproduction.

1.3. TRAFFIC

1.3.1. Traffic Permit

A traffic permit must be issued by the Authority prior to any activity being performed by non-Authority employees that impacts vehicular traffic operations or requires heavy-equipment to perform invasive testing. Occupation of the Authority's roadways for any purpose other than travel is not authorized, unless a traffic permit has been issued. The Authority's website contains additional information.

Upon execution of an OPS, the selected Engineer is recommended to submit a completed Traffic Permit, including compliance with insurance requirements, to the Authority's Project Manager for further handling. A copy of the approved permit must be in the possession of those performing the field work.

1.3.2. Roadway, Lane, Shoulder Closing and Slowdowns

Approval from the Authority must be obtained for any traffic restrictions. Requests must be coordinated and submitted to the Authority's Project Manager by noon Monday of the week prior to the requested closing or slowdown. Failure to receive approval will result in appropriate action by the State Police. In addition, coordination is required with the Maintenance Department to determine if the Authority or Engineer is placing the necessary maintenance and protection devices.

1.4. MISCELLANEOUS

1.4.1. Turnpike Roadway Designations

Exhibit 1-1 shows the nomenclature to be used in describing the various roadways along the Turnpike. Designations shall be preceded by word "FROM".

Example: **NSO** = from North to South Outer

Exhibit 1-1 New Jersey Turnpike Roadway Identification

MAINLINE

NS	North to South
SN	South to North
SNO	South to North Outer
SNI	South to North Inner
SNW	South to North Westerly
SNE	South to North Easterly
NSO	North to South Outer
NSI	North to South Inner
NSW	North to South Westerly
NSE	North to South Easterly

SOUTHERN MIXING BOWL

SNO-E	South to North on Outer to Easterly
SNO-W	South to North on Outer to Westerly
SNI-E	South to North on Inner to Easterly
SNI-W	South to North on Inner to Easterly
NSE-O	North to South on Easterly to Outerly
NSW-O	North to South on Westerly to Outerly
NSE-I	North to South on Easterly to Inner
NSW-I	North to South on Westerly to Inner

NORTHERN MIXING BOWL

NS95	North to South Interstate 95
NS80	North to South Interstate 80
SN95	South to North Interstate 95
SN80	South to North Interstate 80
SNE-95	South to North on Easterly to Interstate 95
SNE-80	South to North on Easterly to Interstate 80
SNW-95	South to North on Westerly to Interstate 95
SNW-80	South to North on Westerly to Interstate 80
NS95-E	North to South on Interstate 95 to Easterly
NS80-E	North to South on Interstate 80 to Easterly
NS95-W	North to South on Interstate 95 to Westerly
NS80-W	North to South on Interstate 80 to Westerly

INTERCHANGES

NT	North to Toll
ST	South to Toll
TN	Toll to North
TS	Toll to South
TNO	Toll to North Outer
TNI	Toll to North Inner
TSO	Toll to South Outer
TSI	Toll to South Inner
TNE	Toll to North on Easterly
TSW	Toll to South on Westerly
TNW	Toll to North on Westerly
NIT	North Inner Toll
NOT	North Outer to Toll
NET	North on Easterly to Toll
NWT	North on Westerly to Toll
SOT	South Outer to Toll
SIT	South Inner to Toll
SET	South on Easterly to Toll
SWT	South on Westerly to Toll

ROUTE 95

NS95L	North to South Route 95 Local
NS95X	North to South Route 95 Express
SN95L	South to North Route 95 Local
SN95X	South to North Route 95 Express
NLW	North Local to West
NXW	North Express to West
WNL	West to North Local
WNX	West to North Express
CD	Collector/Distributor
WCD	West to Collector/Distributor
ES	East to South
NLW	North on Local to West
SLW	South on Local to West
SLE	South on Local to East
SLX	South on Local to Express
NLX	North on Local to Express
SLE	South on Local to East
ESL	East to South Local
CSL	Collector to South Local

SERVICE AREAS

SSA	South to Service Area
NSA	North to Service Area
SAN	Service Area to North
SAS	Service Area to South
SASO	Service Area to South Outer
SASI	Service Area to South Inner
SANO	Service Area to North Outer
SANI	Service Area to North Inner
SOSA	South Outer to Service Area
SISA	South Inner to Service Area
NOSA	North Outer to Service Area
NISA	North Inner to Service Area

EXTENSIONS

NH	North to Hudson
SOH	South Outer to Hudson
SIH	South Inner to Hudson
TE	Toll to East
TW	Toll to West
ET	East to Toll
WT	West to Toll
HLT	Hudson to Local and Toll
HXT	Hudson to Express and Toll
HEW	Hudson East to West
HWE	Hudson West to East
HS	Hudson to South
HN	Hudson to North
SH	South to Hudson
PEW	Pennsylvania East to West
PWE	Pennsylvania West to East

INTERCHANGE 11

PST	Parkway from the South to Tolls
PNT	Parkway from the North to Tolls

SPORTS COMPLEX

NWC	North on Westerly to Complex
CNW	Complex to North on Westerly
WC	Westerly to Complex
CW	Complex to Westerly
WX	Westerly to Xanadu
XW	Xanadu to Westerly

1.4.2. Parkway Roadway Designations

Nomenclature used in describing the various ramps along the Garden State Parkway shall include Exit number, direction (SB or NB), exit (X) or entrance (E).

Examples:

17SBX = Exit 17 Southbound Exit Ramp

17SBE = Exit 17 Southbound Entrance Ramp

17NBX = Exit 17 Northbound Exit Ramp

17NBE = Exit 17 Northbound Entrance Ramp

1.4.3. Owner Notification (Notice of Entry)

In advance of any field investigation or similar types of work, including but not limited to survey and borings, on private property, the Authority notifies each affected property

owner by letter, stating the need for entry onto their property. Exhibit 1-2 shows a sample letter that is to be modified for project specific needs. No field work of any kind may commence until the property owners are notified.

It is the Engineer's responsibility to furnish the Authority with a list of owners and their addresses for all properties which may be affected within the project. In some instances when instructed by the Authority, the Engineer will send a letter on behalf of the Authority.

If an owner takes exception to entry onto their property, the Authority will negotiate with the owner in an attempt to meet the needs of both parties prior to taking legal action. During this process, the Engineer shall not enter onto the property in dispute.

Exhibit 1-2 Sample Owner Notification (Notice of Entry)

(to be modified for project-specific needs)

(ON ENGINEER'S LETTERHEAD)

Date:

Owner
(address)

RE: NJ Turnpike Authority
Project Title
Township
County
Block ___, Lot ___

Dear _____:

This letter provides notice that the New Jersey Turnpike Authority through their Consulting Engineers, _____, intends to enter the above described property with drilling contractors at two separate times during the next six months for the purpose of drilling soil borings. During each time, the property will be occupied for a period not expected to exceed one week.

Borings involve drilling small diameter hole(s) with the use of a drilling rig. These borings will yield information regarding soil characteristics and strength and may also be used for the purpose of determining whether there exists soil or groundwater contamination, and if so, the level of such contamination. After drilling is completed, holes will be suitably backfilled to the original ground elevation.

In the event the activity causes permanent damage to your property the Authority will either promptly make suitable repairs or reimburse you for the cost of repairs.

Be advised that the Authority and its employees and agents have statutory authority to enter upon your property during reasonable business hours pursuant to N.J.S.A. 27:23-6. Personnel performing these activities will carry appropriate identification.

Should you have questions concerning this matter, you may contact _____, by letter at the above address or fax at _____.

Very truly yours,

Project Manager

Copy:

Authority Project Manager (NJTA)

Section 2 - ORDER FOR PROFESSIONAL SERVICES REPORTING

2.1. GENERAL

An Order for Professional Services (OPS) is the contract between the Authority and Engineers. OPS issued by the Authority require that invoices be submitted monthly and within 15 Calendar Days after the close of the report period. Invoices must be accompanied by Monthly Progress Reports, or they will not be processed for payment. If the Engineer neglects to submit an invoice for services in any given month, or over a period of months, the firm shall nevertheless be required to submit a Monthly Progress Report as described in this Section. Failure to do so creates a burden on the Authority's staff to properly track costs of services and schedules and it impairs their awareness of any circumstances which may arise that adversely affect both. Consequently, failure to submit Progress Reports each and every month that the assignment is in progress will be considered by the Authority as reflecting poorly on the quality of the Engineer's services and will be a factor in judging the merit of requests for additional compensation. As the nature of each project is different, any requirement identified may be waived at the discretion of the Authority's Project Manager.

2.2. INVOICES

A complete invoice submission includes the following information and documents:

1. A roster identifying staff that provided services during the report period, and the product of their approved hourly wage rate and the number of hours charged
2. A list of all direct expenses (expenses for which the Engineer is allowed to be reimbursed are defined under the terms of the OPS, in the Compensation Section)
3. Copies of individual expense accounts
4. Copies of vendor and subcontractor invoices
5. Copies of subconsultant invoices along with the same substantiating documentation as for the Engineer including Monthly Progress Reports
6. SBE Certificate of Participation Form
7. Monthly Invoice Summary, as shown in Exhibit 2-1
8. Monthly Narrative Progress Report, as shown in Exhibit 2-2
9. Monthly Project Staffing Status Report, as shown in Exhibit 2-3
10. Monthly Design Progress Schedule, as shown in Exhibit 2-4
11. Monthly Permit Status Summary, as shown in Exhibit 2-5

2.2.1. Monthly Progress Reports

It will be the responsibility of the Engineer to submit Monthly Progress Reports to the Authority's Project Manager on the first of every month if not included in an Invoice or as directed by the Authority's Project Manager. Exhibit 2-2 shows a sample Monthly Narrative Progress Report. The Progress Reports shall consist of a written text and a

Design Progress Schedule in the format outlined below. The written text is to follow the items of work shown on the Design Progress Schedule. Every item shown on the Schedule is to be covered in the text, and the order is to be the same each month. In discussing the items of work, the Engineer is to address the progress made during the past month, problems which have been resolved, new or old problems that require answers, the percentage completed for each item of work and for the overall project, work anticipated for the coming month, whether or not the individual items and overall project is on schedule, and if not, what steps are being taken to rectify the situation, and the status of permits required.

2.2.2. Design Progress Schedule

Within two (2) weeks after the Notice to Proceed, the Engineer shall submit to the Authority's Project Manager for approval, the proposed breakdown of individual tasks to be completed during design. This breakdown shall reflect the different discipline types (e.g. Survey/Base Mapping, Utilities, Right of Way, Permits, Alignment, Drainage, Signing, Lighting, Structures, Toll Plaza, etc.), and the estimated duration for each phase. Exhibit 2-4 shows a sample Design Progress Schedule that is to be modified for project specific needs. The appropriate number of copies of the Design Progress Schedule, as directed the Authority's Project Manager, are to be submitted with each Monthly Progress Report.

2.2.3. Permit Status

Exhibit 2-5 shows a sample Permit Status Summary that is to be modified for project specific needs. The appropriate number of copies of the Permit Status Summary, as directed the Authority's Project Manager, are to be submitted with each Monthly Progress Report.

2.3. WAGE RATE APPROVALS

A roster of staff expected to be employed and charge time to the project is to be submitted to the Authority's Project Manager for approval. The internal list shall indicate name, ASCE grade and current rate. Subsequent submissions are required whenever rates for previously identified individuals are adjusted or new staff is added to the project. The roster shall include a complete listing of personnel working on the project including those previously approved. Invoices will not be processed for payment if the wage rates used to arrive at the invoice direct salary cost do not correspond with the approved wage rate list maintained by the Authority's Finance Department. A sample Wage Rate form is shown in Exhibit 2-6.

2.4. BILLINGS

All billings by the Engineer shall be made to the Authority's Project Manager on Engineer's letterhead in the prescribed Invoice format as shown in Exhibit 2-1. All billings from outside agencies such as utility companies, etc. must be signed and approved by the Engineer before submittal to the Authority's Project Manager.

2.5. REQUEST FOR SUPPLEMENTS

OPS contain a caveat concerning the performance of services not included in the scope of the project. It is incumbent upon the Engineer to inform the Authority's Project Manager whenever the firm believes it has been required to perform such 'extra' services and to first secure agreement with the Authority for scope and fee before performing these services. Failure to do so burdens the Engineer with the risk of non-payment for performing unauthorized services. Without an agreed upon scope and fee, the Authority has no means of tracking costs against an estimated maximum amount. In effect, without a ceiling to respect, the Engineer cannot expect to receive a 'blank check' with no accountability for the efficiency of their operations or the cost of services.

Justifying additional compensation for underestimating the effort to perform in-scope services is extremely difficult. If the actual percent complete of each task is accurately reported, the completion of the Monthly Project Status Report spreadsheet (Exhibit 2-3) which accompanies each invoice will forecast an overrun. When the total 'Direct Salaries Status' column reflects a negative quantity, then the budgeted direct salaries and perhaps the total authorized fee are expected to overrun. Here again, timely recognition of this condition is important and the key to avoiding overruns, because with early discovery, the Engineer may have the opportunity to adjust and maximize the efficiency of their operations. Generally, overruns in performing in-scope services can be justified only if it can be shown that the situation has evolved as a result of conditions beyond the control of the Engineer, such as but not limited to: third party actions (or non-actions) of regulatory agencies; unexpected community or public involvement which hinders progress; and, the discovery of unanticipated site conditions. In any event, the Engineer cannot reasonably expect the Authority to compensate dollar for dollar for overruns after the fact (i.e., after the authorized fee is spent). As soon as the Project Status Report indicates a significant (>5 percent) overrun in direct salaries or unanticipated direct expenses, the Engineer must negotiate with the Authority and determine a course of corrective action to avoid an overrun, or alternatively, commit to a firm estimate well before the actual authorized fee is exceeded. In general, no supplement will be considered if the only legitimate reason is that the Engineer originally underestimated the effort required to complete a task.

2.6. CLOSEOUT PROCESS (FINAL INVOICE)

Upon completion of the services identified under the OPS which has been confirmed by the Engineer with the Authority's Project Manager, the last invoice submitted shall be identified as FINAL on both the letter of transmittal and invoice and on the SBE Certificate of Participation form if applicable. The FINAL invoice shall indicate that all work is completed, and no further invoicing of the specified OPS shall be submitted.

Exhibit 2-1 Sample Monthly Invoice Summary

SAMPLE MONTHLY INVOICE SUMMARY

(ON ENGINEER'S LETTERHEAD)

Date:

New Jersey Turnpike Authority
Engineering Department
P.O. Box 5042
Woodbridge, NJ 07095-5042
Attention: (Authority's Project Manager)

OPS No.
OPS Title
Task Number (if applicable)

Invoice Number: (numbered sequentially starting with "1")
Invoice Period: mm/dd/yyyy to mm/dd/yyyy

Total Percent Billed:
Percent of Work Complete: (from Monthly Project Status Report)

	Authorized Fee	**Total Invoiced Through** (invoice date)	**Previously Invoiced**	**Amount Due This Invoice**
Direct Salaries	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
O & P (1.xx)	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
Direct Expenses	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
Sub-Total	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
Subconsultants				
Sub A	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
Sub B	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
Sub C	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
Sub-Total	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx
TOTALS	x,xxx,xxx.xx	x,xxx,xxx.xx	x,xxx,xxx.xx	xx,xxx.xx

Very truly yours,

Project Manager

Exhibit 2-2 Sample Monthly Narrative Progress Report

Date:
OPS No.
OPS Title
Task Number (if applicable)
Invoice Number: (numbered sequentially starting with "1")
Invoice Period: mm/dd/yyyy to mm/dd/yyyy

MONTHLY NARRATIVE PROGRESS REPORT

1. Services Performed During the Invoice Period

Describe services (activities) that were performed for each task comprising the OPS corresponding to the Monthly Progress Report spreadsheet, as for example,

a. Project Management
b. Field Surveys
c. Subsurface Exploration Contract
d. Phase A Plan Preparation

2. Services to be Performed Next Period

In sequence as above

3. Environmental Permits

Describe services (activities) that were performed specifically related to the permit process and identify the target date for completion and obtaining the permit(s). To be included is a list of the various permits (navigation, coast guard, etc.) and grants (tidelands, riparian, etc.) that are required, when the required forms will be submitted, estimated time for approvals from the responsible agencies, and how this is coordinated with the Schedule in order to meet the various phase submissions and more importantly, that delays from unapproved permits will not impair advertisement or construction progress. As the design progresses, the status of these permits is to be covered in the written text as noted above and included in the permit status table.

4. Decisions Required

Identify activities on which progress is affected by the decisions of others. If there has been a lapse in the progress of an activity, identify which department, agency, and person is responsible for not furnishing timely decisions that affect the conduct of the services. If there are no decisions required indicate, 'None Required at this Time'.

5. Schedule Issues

Describe the status of the project progress, identifying which activities, if any, are behind schedule. It is essential that with each invoice, a computer generated bar chart (P3, Surtrak or MS Project) update be

submitted, with the data date corresponding to the invoice date. Target bars should be included in the schedule in order to gauge planned and actual progress on an activity basis. If there is a reason to believe that the submission date of deliverables (a schedule milestone) will be delayed beyond the date originally committed, describe measures that can be taken to recover the original schedule. In the event that a deliverable submission date is likely to be late, the Engineer is responsible to apprise the Authority the moment such event is suspected to occur without waiting for the submission of an invoice progress report.

6. Budget Issues

Describe in detail issues which have arisen to cause or threaten to cause a budget overrun. The Progress Status Report spreadsheet will forecast this event by the display of a negative value for the 'Status' column. Be specific as to the date that the scope was increased or otherwise changed or alternatively, identify the factors beyond the Engineer's control that caused the firm to spend more time than was anticipated to perform in-scope activities. In this regard, it should be noted that the terms of the OPS require the Engineer to provide ample notice and authorization by the Authority before performing services of any type that are likely to result in a budget overrun. As a rule, the Engineer should not expect to be compensated for performing such services by the issuance of an OPS supplement unless the Authority agrees that an increase in authorized fee is warranted. Progress Reports accompanying monthly invoices do not constitute the proper means for first alerting the Authority to budget issues. Early discovery of such instances must be the subject of formal written correspondence between the Engineer and the Authority.

7. Out of Scope Work

Describe those activities which are deemed out of scope along with justification, anticipated schedule and anticipated costs.

Exhibit 2-3 Sample Monthly Project Staffing Status Report

MONTHLY PROJECT STAFFING STATUS REPORT

Date:
OPS No.:
OPS Title:
Invoice No.:
Invoice Period:

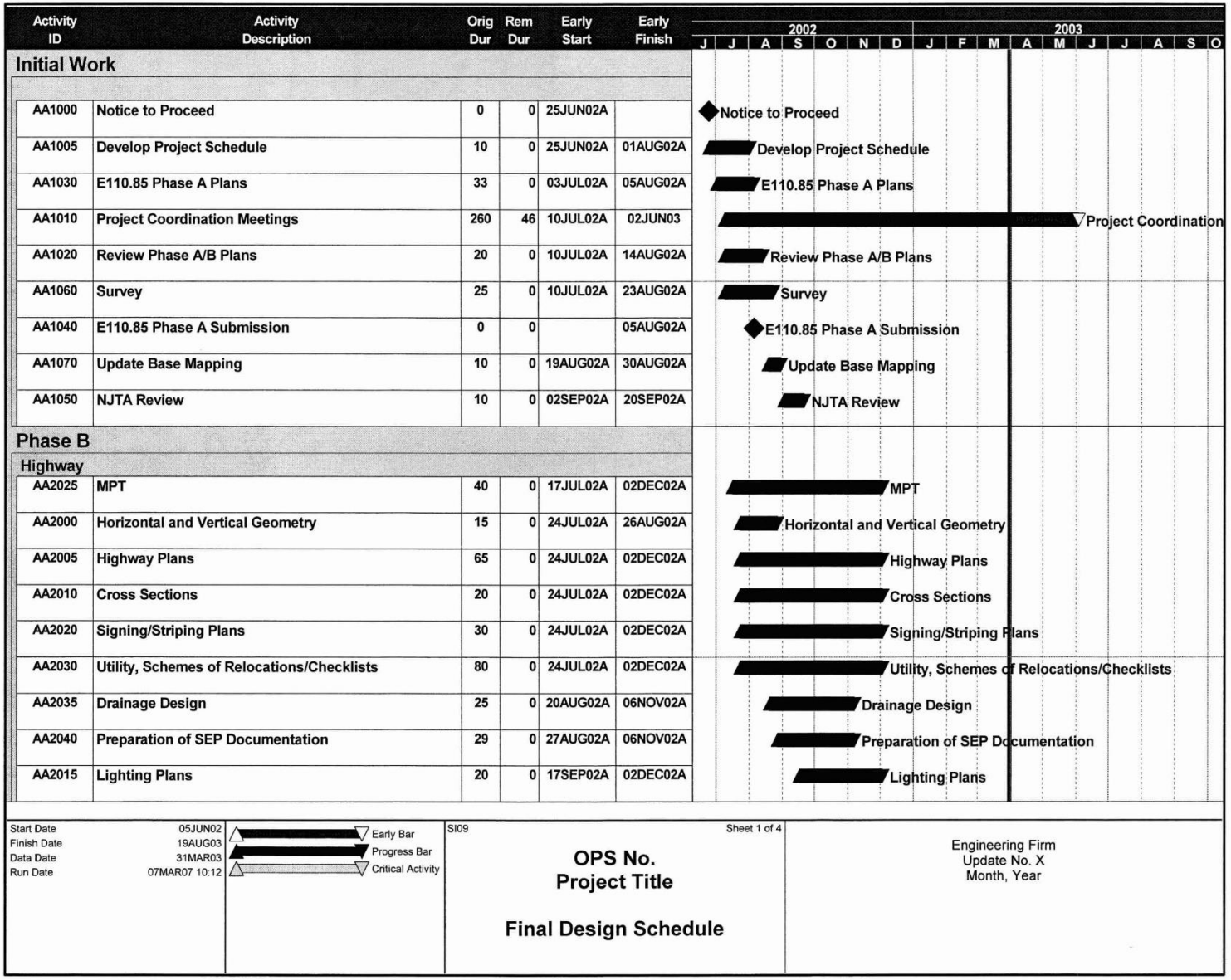
(A) No.	(B)TASK	PERSON-HOURS (C) Budget	(D) Spent	(E) Projected Total	(F) Status	DIRECT SALARIES (G) Budget	(H) Spent	(I) Projected Total	(J) Status	(K) Estimated Percent Complete	(L) Actual Percent Spent
1	Project Management	200	100	200	-	$10,050	$5,025	$10,050	$0	50.0	50.0
2	Field Surveys	800	920	920	(120)	$26,040	$29,946	$29,946	($3,906)	100.0	115.0
3	Subsurface Exploration Contract	650	600	600	50	$18,688	$17,250	$17,250	$1,438	100.0	92.3
4	Phase A Plan Preparation	1,800	600	1,500	300	$58,050	$19,350	$48,375	$9,675	40.0	33.3
	TOTALS	3,450	2,220	3,220	230	$112,828	$71,571	$105,621	$7,207	67.8	63.4

(Negative) status predicts budget overrun
Positive status predicts budget underrun

Note: In addition to a report summarizing the progress of all participants, a spreadsheet report must be submitted individually for the prime and all subconsultants

Notes: Column K is estimated from actual task accomplished
Columns C & G, D & H are actual hour and dollar amounts from cost control systems
Columns E & I = Column D/Column K & Column H/Column K
Columns F & J = Column C - Column E and Column G - Column I
Column L = Column H/Column G

Exhibit 2-4 Sample Design Progress Schedule



Activity ID	Activity Description	Orig Dur	Rem Dur	Early Start	Early Finish
Initial Work					
AA1000	Notice to Proceed	0	0	25JUN02A	
AA1005	Develop Project Schedule	10	0	25JUN02A	01AUG02A
AA1030	E110.85 Phase A Plans	33	0	03JUL02A	05AUG02A
AA1010	Project Coordination Meetings	260	46	10JUL02A	02JUN03
AA1020	Review Phase A/B Plans	20	0	10JUL02A	14AUG02A
AA1060	Survey	25	0	10JUL02A	23AUG02A
AA1040	E110.85 Phase A Submission	0	0		05AUG02A
AA1070	Update Base Mapping	10	0	19AUG02A	30AUG02A
AA1050	NJTA Review	10	0	02SEP02A	20SEP02A
Phase B					
Highway					
AA2025	MPT	40	0	17JUL02A	02DEC02A
AA2000	Horizontal and Vertical Geometry	15	0	24JUL02A	26AUG02A
AA2005	Highway Plans	65	0	24JUL02A	02DEC02A
AA2010	Cross Sections	20	0	24JUL02A	02DEC02A
AA2020	Signing/Striping Plans	30	0	24JUL02A	02DEC02A
AA2030	Utility, Schemes of Relocations/Checklists	80	0	24JUL02A	02DEC02A
AA2035	Drainage Design	25	0	20AUG02A	06NOV02A
AA2040	Preparation of SEP Documentation	29	0	27AUG02A	06NOV02A
AA2015	Lighting Plans	20	0	17SEP02A	02DEC02A

Start Date 05JUN02
Finish Date 19AUG03
Data Date 31MAR03
Run Date 07MAR07 10:12

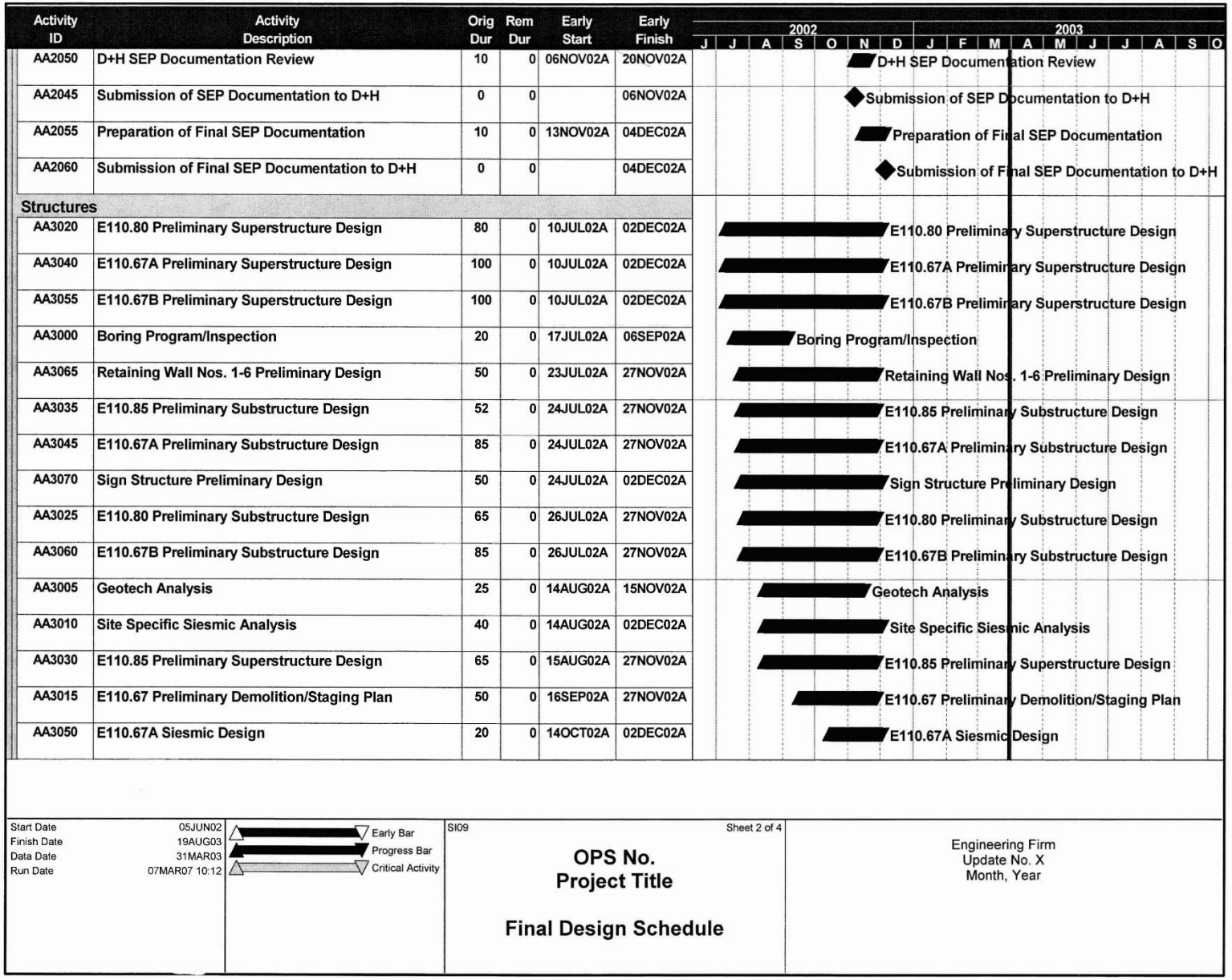
Early Bar
Progress Bar
Critical Activity

SI09 Sheet 1 of 4

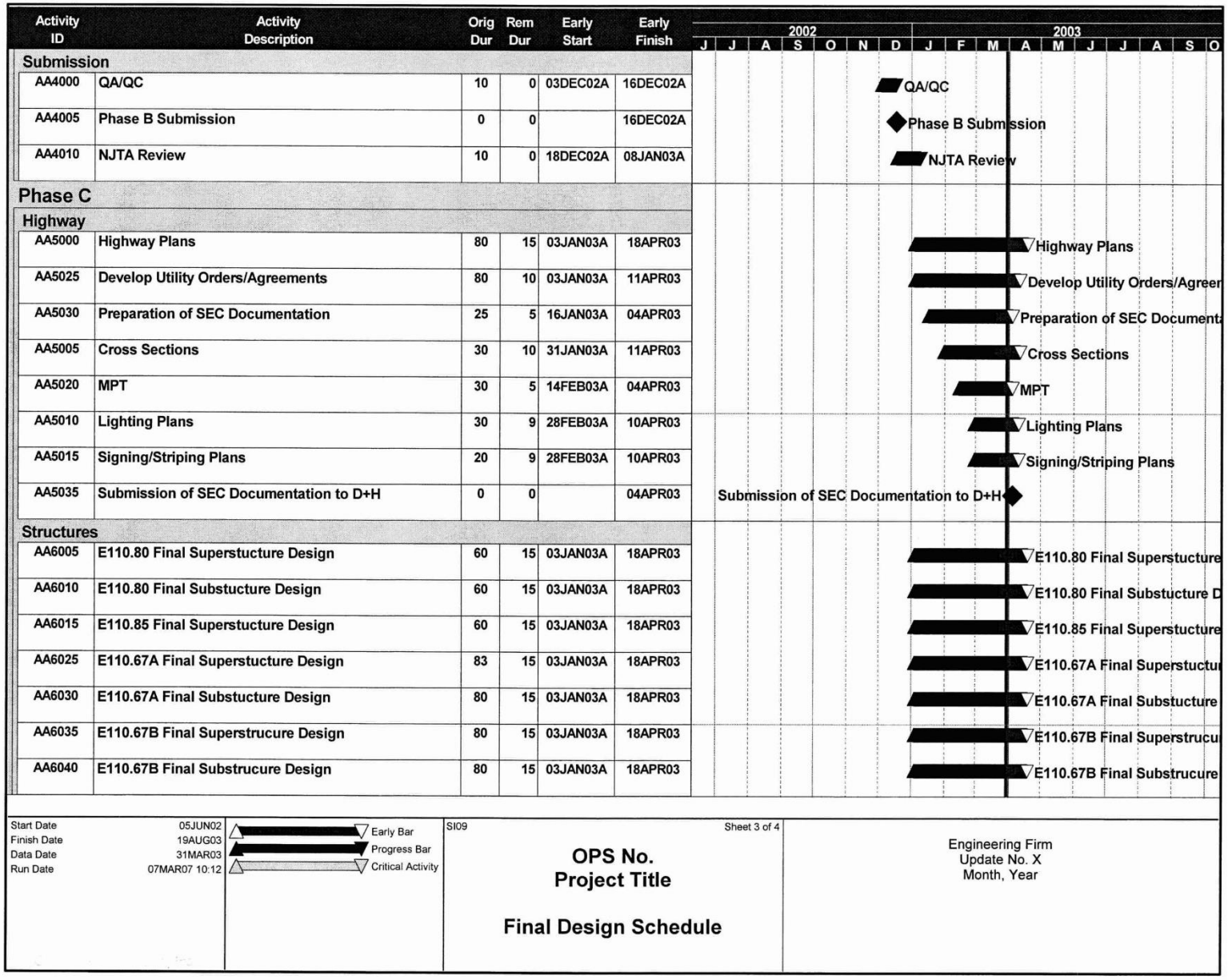
OPS No.
Project Title

Final Design Schedule

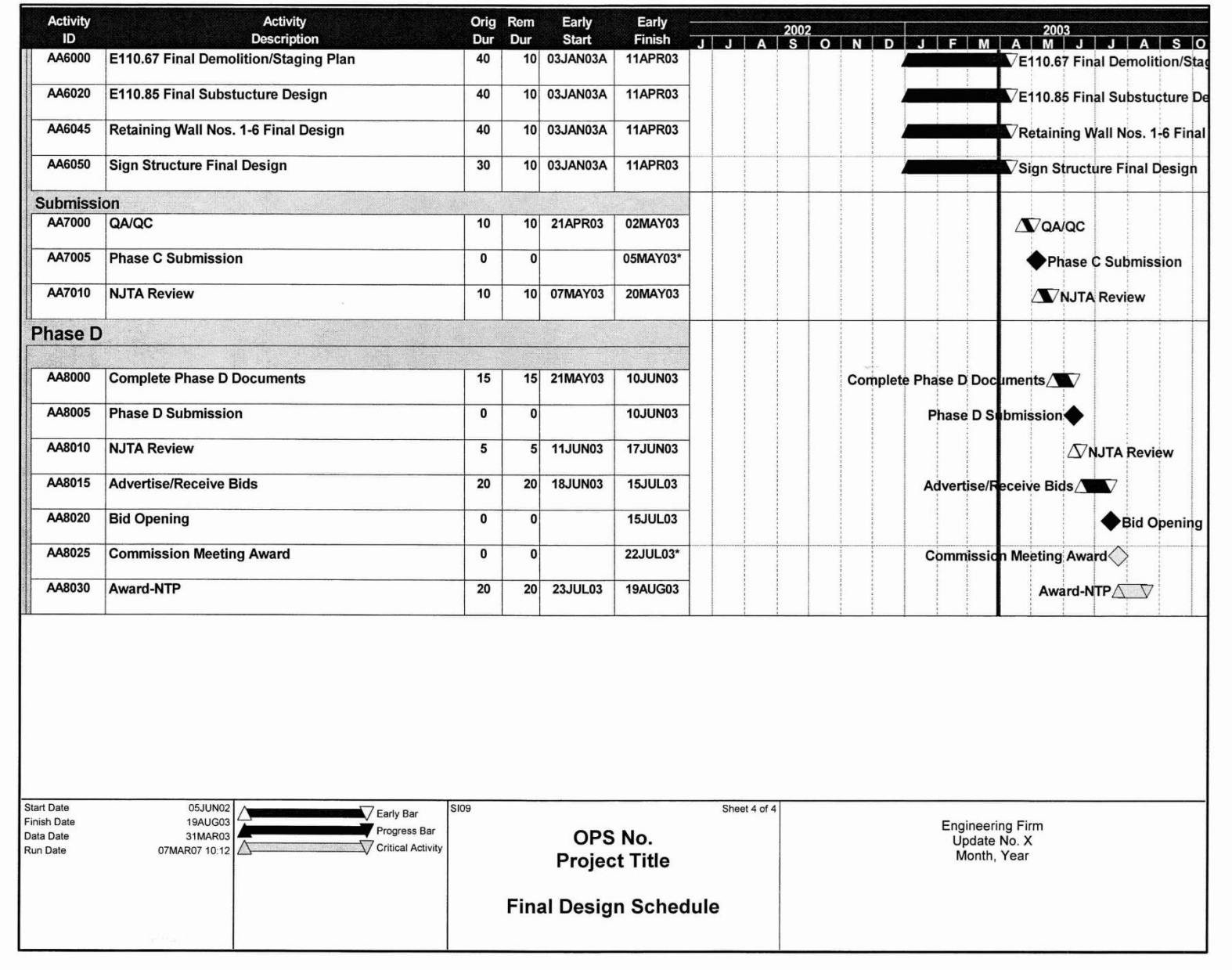
Engineering Firm
Update No. X
Month, Year



Activity ID	Activity Description	Orig Dur	Rem Dur	Early Start	Early Finish
AA2050	D+H SEP Documentation Review	10	0	06NOV02A	20NOV02A
AA2045	Submission of SEP Documentation to D+H	0	0		06NOV02A
AA2055	Preparation of Final SEP Documentation	10	0	13NOV02A	04DEC02A
AA2060	Submission of Final SEP Documentation to D+H	0	0		04DEC02A
Structures					
AA3020	E110.80 Preliminary Superstructure Design	80	0	10JUL02A	02DEC02A
AA3040	E110.67A Preliminary Superstructure Design	100	0	10JUL02A	02DEC02A
AA3055	E110.67B Preliminary Superstructure Design	100	0	10JUL02A	02DEC02A
AA3000	Boring Program/Inspection	20	0	17JUL02A	06SEP02A
AA3065	Retaining Wall Nos. 1-6 Preliminary Design	50	0	23JUL02A	27NOV02A
AA3035	E110.85 Preliminary Substructure Design	52	0	24JUL02A	27NOV02A
AA3045	E110.67A Preliminary Substructure Design	85	0	24JUL02A	27NOV02A
AA3070	Sign Structure Preliminary Design	50	0	24JUL02A	02DEC02A
AA3025	E110.80 Preliminary Substructure Design	65	0	26JUL02A	27NOV02A
AA3060	E110.67B Preliminary Substructure Design	85	0	26JUL02A	27NOV02A
AA3005	Geotech Analysis	25	0	14AUG02A	15NOV02A
AA3010	Site Specific Siesmic Analysis	40	0	14AUG02A	02DEC02A
AA3030	E110.85 Preliminary Superstructure Design	65	0	15AUG02A	27NOV02A
AA3015	E110.67 Preliminary Demolition/Staging Plan	50	0	16SEP02A	27NOV02A
AA3050	E110.67A Siesmic Design	20	0	14OCT02A	02DEC02A



Activity ID	Activity Description	Orig Dur	Rem Dur	Early Start	Early Finish
Submission					
AA4000	QA/QC	10	0	03DEC02A	16DEC02A
AA4005	Phase B Submission	0	0		16DEC02A
AA4010	NJTA Review	10	0	18DEC02A	08JAN03A
Phase C					
Highway					
AA5000	Highway Plans	80	15	03JAN03A	18APR03
AA5025	Develop Utility Orders/Agreements	80	10	03JAN03A	11APR03
AA5030	Preparation of SEC Documentation	25	5	16JAN03A	04APR03
AA5005	Cross Sections	30	10	31JAN03A	11APR03
AA5020	MPT	30	5	14FEB03A	04APR03
AA5010	Lighting Plans	30	9	28FEB03A	10APR03
AA5015	Signing/Striping Plans	20	9	28FEB03A	10APR03
AA5035	Submission of SEC Documentation to D+H	0	0		04APR03
Structures					
AA6005	E110.80 Final Superstucture Design	60	15	03JAN03A	18APR03
AA6010	E110.80 Final Substucture Design	60	15	03JAN03A	18APR03
AA6015	E110.85 Final Superstucture Design	60	15	03JAN03A	18APR03
AA6025	E110.67A Final Superstucture Design	83	15	03JAN03A	18APR03
AA6030	E110.67A Final Substucture Design	80	15	03JAN03A	18APR03
AA6035	E110.67B Final Superstrucure Design	80	15	03JAN03A	18APR03
AA6040	E110.67B Final Substrucure Design	80	15	03JAN03A	18APR03



Activity ID	Activity Description	Orig Dur	Rem Dur	Early Start	Early Finish
AA6000	E110.67 Final Demolition/Staging Plan	40	10	03JAN03A	11APR03
AA6020	E110.85 Final Substucture Design	40	10	03JAN03A	11APR03
AA6045	Retaining Wall Nos. 1-6 Final Design	40	10	03JAN03A	11APR03
AA6050	Sign Structure Final Design	30	10	03JAN03A	11APR03
Submission					
AA7000	QA/QC	10	10	21APR03	02MAY03
AA7005	Phase C Submission	0	0		05MAY03*
AA7010	NJTA Review	10	10	07MAY03	20MAY03
Phase D					
AA8000	Complete Phase D Documents	15	15	21MAY03	10JUN03
AA8005	Phase D Submission	0	0		10JUN03
AA8010	NJTA Review	5	5	11JUN03	17JUN03
AA8015	Advertise/Receive Bids	20	20	18JUN03	15JUL03
AA8020	Bid Opening	0	0		15JUL03
AA8025	Commission Meeting Award	0	0		22JUL03*
AA8030	Award-NTP	20	20	23JUL03	19AUG03

Start Date 05JUN02
Finish Date 19AUG03
Data Date 31MAR03
Run Date 07MAR07 10:12

Early Bar
Progress Bar
Critical Activity

SI09 Sheet 4 of 4

OPS No.
Project Title

Final Design Schedule

Engineering Firm
Update No. X
Month, Year

Exhibit 2-5 Sample Permit Status Summary

(to be modified for project specific needs)

STATUS OF PERMITS OPS NO. PROJECT TITLE	
USACE Section 404 Permit	Initial Permit 93-03440 & 93-03441 issued 12/97 and 1/99 respectively, **Permit (modification) Number 93-03441-1 issued 5/6/02**. The conservation easement was submitted to USACE on 1/31/02. USACE recommended revisions to the Preservation Area map. Additional information provided to NJTA regarding USACE recommendations in June 2003.
NJDEP Stream Encroachment Permit/WQZ/CZM	All input needed by June 1, 2004 (concurrent with Phase B) SEP/WQC/CZM application to be submitted to NJTA on June 15, 2004. SEP/WQC/CZM application to be submitted to NJDEP on July 1, 2004. Permit issuance by November 1, 2004.
EO215 EIS	EIS submitted to NJTA for review on April 8, 2004. Comments from NJTA by April 21, 2004. To be submitted to NJDEP for review on April 30, 2004. Conditional approval by June 30, 2004.

Exhibit 2-6 Sample Wage Rate Approval

(ON ENGINEER'S LETTERHEAD)

Date:

New Jersey Turnpike Authority
Engineering Department
PO Box 5042
Woodbridge, NJ 07095

Attention: (Authority's Project Manager)

Re: Wage Rate Approval
Order for Professional Services No.

Dear _____:

We are submitting, for your approval, the attached rate schedule of _____ employees working on the above referenced project.

Should you have any questions and or comments, please feel free to contact the undersigned.

Very truly yours,

Project Manager

Attachment

RATE SCHEDULE

ORDER FOR PROFESSIONAL SERVICES NO. XXXX
OPS TITLE

NEW JERSEY TURNPIKE AUTHORITY
ACTUAL DIRECT SALARY RATES

ENGINEER - JOB #
Through Date

	Employee Name	Title/Grade	Reqst'd Rate	Effective Date	Previous Rate	**Effective Date**
3	Franklin, Benjamin	Sr. Engineer - Bridge				
7	Grant, Ulyssys	Engineer - Highway				
1	Hamilton, Alexander	Engineer - Bridge				
1	Jackson, Andrew	Technician - Highway				
1	Lincoln, Abraham	Sr. Engineer - Highway				
1	Washington, George	Vice President				

1) Merit Increase 2) Cost of Living Adjustment 3) Promotion 4) New Employee
5) Separation 6) Transfer 7) Other (New to OPS)
8) Name Change

APPROVED:

Authority's Project Manager
Title

Section 3 - SUBMISSION REQUIREMENTS

3.1. GENERAL

A project may be a single construction contract, or it may consist of multiple construction contracts within a project or a Design Section. Generally, all projects have a preliminary and final design. However, if in the Authority's Engineering Department opinion a preliminary design phase is unnecessary, such as a "deck repair project", they may direct that a project proceed directly to the later stages of final design.

In the following pages, the number of sets of plans required for submittal with each phase submittal is given. These are approximate numbers anticipated to be required for complete plan review; however, the Authority's Engineering Department may at times find it necessary to revise the number of sets required for any phase submittal. The Engineer shall confirm the number of sets required with the Authority's Project Manager three (3) weeks prior to each submission.

When a phase review is completed, one (1) or more set(s) of contract documents may be returned to the Engineer, which will reflect the comments of the reviewers noted in red. When the succeeding Phase is submitted, the Engineer is to include these comment sets as part of the submission. Every comment shown on the sets is to be addressed. No comments are to be ignored or dismissed, but they all must be acknowledged with a check mark signifying agreement, or an explanation or answer given. All of the Engineer's responses to the comments are to be green pencil and written directly on the comment set.

Review periods will be established on a project-by-project basis. Generally, the Authority's Engineering Department requires two (2) weeks to review a phase submission, and the Engineer will be permitted a two (2) week period to prepare a rebuttal to the comments.

3.2. COORDINATION WITH OUTSIDE AGENCIES

As part of their work in preparing contract plans, it will be necessary for the Engineer to meet with outside agencies as approved or as directed by the Authority's Engineering Department concerning such matters as the relocation or rearrangement of local roadways, utilities, sewerage works, etc. To keep the Authority's Engineering Department well informed regarding the progress of the plans and the commitments made by both sides during these discussions, the Engineer is to submit to the Authority's Engineering Department four (4) copies of a memorandum of record covering each meeting held with any outside agencies. The memoranda are to contain at least the following:

Agency contacted and the reason for the meeting; the date and location of the meeting; list of persons in attendance with their titles and level of responsibility; topics discussed and solutions reached; criteria used for resolving problems such as: company policy, municipal ordinance, State Board of Health requirement, etc.; areas requiring Authority decisions; problems unresolved; and areas where betterments are involved and the extent to which the outside agency is aware of its participation.

In addition, the Engineer is to submit to the Authority's Engineering Department four (4) copies of all correspondence both to and from these outside agencies in which approvals, concurrences or any commitments are made by either the Engineer or the outside agency. Four (4) copies of correspondence for receipt of transmission of plans, specifications, etc., to or from the Engineer, are also to be sent to the Authority's Engineering Department.

3.3. PRELIMINARY DESIGN

Preliminary design studies are to be developed at either 1" =100' or 1" =200' scale, which will be used to establish preliminary horizontal and vertical alignment, stormwater management characteristics, interchange configurations and local road treatments. During this stage, preliminary cost estimates and tentative maintenance and protection of traffic schemes will be initiated, and an approximate right of way impact identified.

Studies are to be shown on reproducible topographic or aerial photo base maps, as directed by the Authority's Engineering Department and are to be accurately drawn in Computer Aided Design (CAD) software.

Where required or warranted, alternative studies are to be made. The studies may consist of, but need not be limited to, horizontal and vertical alignment shifts, channelization alternatives, alternative interchange configurations and right of way comparisons. In all alternative studies, the presentation is to be similar to the remainder of the project and for each alternative, the Engineer will prepare a cost estimate, a list of advantages and disadvantages and their recommendations.

When the preliminary plans are submitted for review and approval, the submission shall consist of the following:

1. Three (3) sets of prints and a printable document format (PDF) file of the plans and profiles.

A minimum of one (1) set shall be colored, and additional colored sets may be requested by the Authority's Engineering Department, showing the proposed construction in accordance with the following legend:

Water and Waterways .....aqua
Authority Roadways.....yellow mainline, ramps, U-turns, etc.
Authority Shoulders .....brown
Local Roads .....green
Right of Way.....red
Structure Outlines.....black
Slope Lines .....dashed
Cut.....brown
Fill.....green
Parks, Hatched .....green
Mileposts, Outlined.....black

2. Alternatives studied including alignments, environmental concerns, schedule considerations and cost estimates.
3. Project cost estimate and contract breakdown with respective costs.
4. A statement describing the project; any problem areas warranting detailed studies during a subsequent phase; meetings held with various agencies to resolve problems such as

roadway widths, etc.; brief construction sequence; estimated earthwork as to quantity of borrow or waste for the project; environmental and permit concerns and construction coordination with adjacent projects.

5. Typical sections showing lane dimensions, local roadway widths, grading criteria, median treatment, etc.
6. Show the proposed project and the approximate locations of existing utilities in plan with conflicts identified.

3.4. FINAL DESIGN

3.4.1. General

During the preparation of final design documents, interim phase submissions are to be made to the Authority's Engineering Department. These phase submissions are required at various stages in development to allow for review of the material first, for concept, subsequently for specifics and, finally, for completeness. The submissions are defined as follows:

Phase "A" - graphical 1" = 50' or 1" = 30' scale plans - contract documents 35 percent complete. A single submission should cover an entire project or Design Section.

Phase "B" - computed alignment - contract documents 70 percent complete. A separate submission is required for each construction contract within a project or Design Section.

Phase "C" - complete plans, quantities, specifications, schedule and cost estimates - contract documents are 95 percent complete and subject to thorough review by the Authority's Engineering Department. A separate submission is required for each construction contract within a project or Design Section.

Phase "D" – complete plans and specifications revised in accordance with comments resulting from Phase "C" review. The Contract is 100 percent complete and ready for advertisement. A separate submission is required for each construction contract within a project or Design Section.

However, when multiple construction contracts are required within a Design Section, or the environmental permitting encompasses multiple Design Sections, the Phase "A" submittal requirements may be modified at the direction of the Authority's Project Manager, to include more-detailed design. Such elements may include, but are not limited to, computed alignment, recommended foundation type(s), structural GP&E, completed drainage system, etc. In such instances, interim submissions, as directed by the Authority's Project Manager, will be required before the formal Phase "A" submission, which may include the computed alignment, stormwater management impacts, bridge type studies, etc.

In the case of construction contracts involving Architecture / Buildings, Subsection 7.7 of Section 7 - Structures Plan Preparation - of this Manual shall be referred to for modified submission requirements.

All submission documents shall indicate the phase submittal and the date of the submission. The Design Phase schedule shall be maintained in CapEx, and as directed by the Authority's Project Manager. Electronic deliverables shall be uploaded to CapEx where indicated, or as directed by the Authority's Project Manager. Refer to the "CapEx & Specifications Design Guidelines" on the Authority's website for instructions.

3.4.2. Phase "A" Submission

A Phase "A" submission is a graphical 1" =50' or 1" =30' scale horizontal alignment and graphical 1"=5' vertical and 1"=50' horizontal scale profiles. The minimum information required for a Phase "A" submission is as follows:

1. The submission shall consist of a complete electronic submission in PDF format and six (6) copies of all materials, with three (3) sets of plans colored in accordance with the color scheme noted for Preliminary Plans. One (1) or more sets will be returned to the Engineer with review comments in red, and there may be additional written comments in memorandum format.
2. The Engineer shall submit a Design Element Modification Request (Exhibit 3-6) to the Authority's Engineering Department listing all design elements that do not meet the minimum criteria, if there are any. Except in very specific cases with explicit justification, approval of modified design elements will not be granted. Back up shall be included detailing why a design element shall not be standard, including impacts and costs. If any specific design criteria are not met and appropriate approvals from the Authority's Engineering Department are not received, the submission will be rejected without further or complete review, and a resubmission will be required, at no additional cost to the Authority.
3. The alignment shall be at 1"=50' or 1"=30' scale. If 2' x 3' cut sheets are used, the same information as shown on these sheets is to be reproduced and the cut sheets are to be spliced together to form a manuscript. Large sheets shall be used in interchange areas in an attempt to show the full interchange on the fewest number sheets possible.
4. Alignments shall show all horizontal information, including roadway designations, stationing, station equations, normal pavement dimensions and cross slopes, pavement dimensions at beginning and end of transitions, radii, PC and PT locations, superelevation for each curve, slope line, existing property lines, proposed right of way lines, existing and proposed utility relocations and detours.
5. Profiles shall show roadway designations, structures, stationing, grades, existing ground, proposed ground, minimum vertical clearances, complete vertical curve

information including K values, ramp take-offs superimposed on mainline, mainline superimposed at ramp nose, physical noses, and in loops, the adjacent ramp profiles superimposed in concentric areas, superelevation, superelevation transitions, horizontal curve radii and the design speed. Profiles shall be at a scale of 1"=5' vertical and 1" = 50' horizontal.

6. Typical Sections are required for mainline roadways, ramps, local roads, access roads and any other roadway or parking lot areas. The sections shall include pavement make up, curb types, guide rail treatment, grading criteria, sidewalks, medians, barrier, etc.
7. A completed boring contract and special soils treatment recommendation submitted for approval. See Section 5 - Geotechnical Engineering of this Manual for additional details as well as "Pre-Phase A" requirements.
8. State, County and Municipal agency approval, in writing, as to concurrence with the concept for all affected roadways as to proposed construction, maintenance, protection of traffic, and intent as to participation in betterments.
9. The roadway plans shall show existing property lines and proposed right of way lines and method of setting right of way. The Authority's Project Manager shall be informed of any unique situations or problem areas once identified. Right-of-Way documents required shall be in accordance with Section 9 - Right of Way of this Manual.
10. Conceptual lighting plans and supporting documents prepared in accordance with Design Manual Section "Lighting and Power Distribution Systems".
11. Conceptual ITS plans prepared in accordance with Design Manual Section "ITS and Communications".
12. Show the existing utilities and the proposed project in plan with the utility conflicts identified. See Section 8 - Utility Installations, Relocations and Adjustments of this Manual for additional information.
13. For Contracts with bridge structures, 8½" x 11" structure sketches shall be submitted for review and approval as soon as the necessary information is available (prior to the Phase A submission). See Section 7 - Structures Plan Preparation of this Manual for additional information on this submission.
14. Provide the Authority's Engineering Department with a written confirmation of the structural maintenance jurisdiction.
15. Noise Barrier Report prepared in accordance with Design Manual Section "Structures Design".
16. Toll Plaza buildings typically require an Architect and close coordination with the Engineer. A detailed written list of activities to be completed shall be submitted

identifying responsibilities and who shall complete them. See Design Manual Section "Facility Buildings and Toll Plazas" for more information.

17. Conceptual signing and striping layouts prepared in accordance with Design Manual Section "Signing and Striping".

18. The layout of Maintenance Buildings shall be discussed with the Maintenance Division and recommendations are to be part of this submission. See Design Manual Section "Facility Buildings and Toll Plazas" for more information.

19. Alternatives studied in developing the recommended alignment shall be submitted in sufficient detail, including costs, maintenance and protection of traffic schemes and constructability issues, so that the reason(s) they are not being considered for further development are readily apparent. Alternatives suggested by the Authority's Engineering Department shall be studied by the Engineer in complete detail.

20. Environmental considerations shall be incorporated into the plans such as wetlands, contaminated or hazardous material, earth berms, walls, low profiles, glare/light pollution, water retention/infiltration basins and/or swales, etc. A summary of anticipated environmental permits shall also be provided. See Exhibit 3-7 for a sample table and Exhibit 3-8 for a partial listing of potential permits/approvals.

    Unless already completed in conjunction with the Preliminary Design of the project, in accordance with Design Manual Section "Environmental Engineering", an Environmental Screening Report shall be provided with or prior to the Phase A submission. If applicable, an E.O. 215 Environmental document shall also be provided at this time.

21. Contract cost estimate (to the nearest $100,000), any comparative cost estimates made in connection with alternative studies, approximate earthwork, indicating total yardage, and whether the project is a waste or borrow project.

22. Any changes in the previously submitted cost estimate or construction schedule are to be noted and the reason(s) given.

23. Conceptual construction sequence and schematics for maintenance and protection of traffic during construction for mainline roadways, ramps and local roads. Plans shall show existing and proposed roadways and shall include a brief explanation of construction sequence including any detours.

24. Completed Phase "A" checklist. See Exhibit 3-1 for a sample.

Exhibit 3-1 Phase "A" Checklist

35 Percent Complete 1" = 30' or 1" = 50' Scale Plans

SUBMISSION	SUBMISSION	REMARKS
a. Six (6) Sets of All Material, with Three (3) Sets of Plans Colored and PDF Files		
b. Design Element Modification Request Form		
c. Completed Boring Contract and Special Soil Treatment Recommendations		
d. State, County and Municipal Approval in Writing		
e. Preliminary Right of Way Review		
f. Conceptual Lighting Plans and Supporting Documents		
g. Conceptual ITS Plans*		
h. Proposed Utility Conflicts*		
i. Structure Sketches*		
j. Structural Maintenance Jurisdiction Confirmed		
k. Noise Barrier Report*		
l. Toll Plaza Building Activity Summary*		
m. Conceptual Signing and Striping		
n. Maintenance Building Recommendations*		
o. Summary of Alternatives		
p. List of Environmental Permits / Approvals Anticipated		
q. Environmental Screening Report		
r. Cost Estimate		
s. Construction Sequence		

*IF APPLICABLE

3.4.3. Phase "B" Submission

The Phase "B" submission occurs for each construction contract at the stage of plan development when the horizontal and vertical alignment has been computed but the work has not progressed to the point of computing detailed quantities. These submission requirements may be modified by the Authority's Project Manager to account for project specific needs.

The following information is required at the time a Phase "B" submission is made:

1. Ten (10) half-size sets of printed plans without cross sections (twelve (12) sets if the Contract includes a toll plaza), and one full-size set of plans without cross sections along with a complete electronic submission in PDF format. Additional plans may be required for review by outside entities such as NJDOT, Counties or Municipalities.

2. Three (3) bound copies of the drainage calculations, geotechnical report, roadway lighting design calculations, and any other material deemed pertinent to the project as determined by the Authority's Engineering Department.
3. Complete computed horizontal and vertical alignment based upon the approved Phase "A" submission. This information is to be shown on the final plan sheets. See Section 6 - Roadway Plan Preparation of this Manual for additional information.
4. Two half-size sets of Cross-sections at 50-foot intervals, or grading plans.
5. Final Typical Sections.
6. Maintenance and Protection of Traffic schematics, including a written description and a Traffic Impact Report, if applicable. Details of construction access to the work site shall be included. See Design Manual Section "Traffic Control During Construction" for additional information.
7. Construction Sequence.
8. Detours, including written approval from local jurisdictions. For roadway closures of non-State highways not under Authority jurisdiction in excess of 48 hours, certification reports shall be submitted to the State in accordance with N.J.A.C.16:27-4.2(f), copies of which shall be provided to the Authority.
9. Fencing and construction access treatment.
10. Complete drainage pattern with the major drainage sized. See Design Manual Section "Drainage Design" for additional information.
11. The Engineer's Estimate, and any requested Unit Codes, per the "CapEx & Specifications Design Guidelines."
12. Approximate earthwork quantities together with any special soils treatment including the location and type of sand drains, muck excavation, contaminated or hazardous material, overload, etc.
13. List of Standard Drawings and Reference Drawings to be included.
14. Preliminary construction details.
15. 1" = 30' scale layouts and supporting calculations and documents of signing, ITS and lighting design in accordance with the requirements noted in Design Manual Section "Signing and Striping" and "Lighting and Power Distribution Systems". Include major sign structures and the lighting layout as detailed in "Lighting and Power Distribution Systems".
16. Three (3) sets of prints of the approved reconstruction plan and one (1) copy of letter(s) of approval from affected agencies noting their concurrence in the Engineers' recommendations. Scanned PDF files of the original plans shall be provided.

17. Structural Drawings and Non-Standard Bearing Report (if required) as noted in Section 7 - Structures Plan Preparation of this Manual.
18. Landscaping drawings as noted in Design Manual Section “Landscaping”.
19. Approved utility checklists and schemes with utility owners’ preliminary cost estimates. See Section 8 - Utility Installations, Relocations and Adjustments of this Manual for additional information.
20. Utility services to Authority facilities preliminarily established with utility suppliers.
21. A written description of the contract calling attention to any unusual problems, special treatments, or any area where a change would cause considerable revisions if altered at a future date.
22. Preliminary right of way plans, together with a list of parcels required for contract construction in accordance with Section 9 - Right-of-Way of this Manual. Construction easements, temporary and permanent access roads and utility, drainage or slope easements shall be noted, and a separate written statement included stating the reason for the easements and the proposed method of treatment. See Section 8 - Utility Installations, Relocations and Adjustments and Section 9 - of this Manual for additional information. An incomplete submission must be accompanied by a statement listing the parcels not completed, why they are incomplete and when they will be submitted.
23. Flood Hazard Area, wetlands, soil erosion and all other environmental permit application(s) or navigation permit application forwarded to the Authority’s Engineering Department. Completed summary of permit requirements, (see Exhibit 3-7 for a sample table and Exhibit 3-8 for a partial listing of permits).
24. Riparian grant applications forwarded to the Authority’s Engineering Department.
25. Completed Phase “B” Checklist (see Exhibit 3-2 for a sample).
26. Phase “A” review material with responses to plan sheet comments either in writing or written in green on the plans, and written responses to all written comments.

Exhibit 3-2 Phase "B" Checklist

70 Percent Complete Contract Documents

SUBMISSION	SUBMISSION	REMARKS
a. Ten (10) half-size Sets of Plans without cross sections Twelve (12) Sets if Contract Affects a Toll Plaza). One full-size Set of Plans, without cross sections and a complete set of PDF Files including cross sections.		
b. Three (3) Copies Drainage Calculations		
c. Three (3) Copies Geotechnical Report Noting Special Soils Treatment Including Location and Type of Sand Drains, Muck Excavation and Overload*		
d. Three (3) Copies Roadway Lighting Calculations		
e. Complete Computed Horizontal & Vertical Alignment		
f. Two half-size sets of Cross Sections at 50 Foot Intervals		
g. Final Typical Sections		
h. Maintenance and Protection of Traffic Schematics		
i. Construction Sequence		
j. Detours*		
k. Fencing and Construction Access Treatment*		
l. Complete Drainage Pattern with Major Drainage Sized		
m. Engineer's Estimate per the "CapEx & Specifications Design Guidelines."		
n. Approximate Earthwork Quantities		
o. List of Standard Drawings and Reference Drawings		
p. Preliminary Construction Details		
q. Signing Layouts		
r. Preliminary ITS Drawings		
s. Preliminary Lighting Plans, Calculations and Supporting Documents		
t. Three (3) Sets of Prints of the Plan and One (1) Copy of Letter(s) of Approval of Affected Local Agencies Noting Their Concurrence with the Engineer's Recommendations, and PDF Copies of the Plans*. For roadway closures of non-State highways not under Authority jurisdiction in excess of 48 hours, copies of certification reports submitted to the State in accordance with N.J.A.C.16:2-4.2(f) shall be provided.		
u. Structural Drawings and Non-Standard Bearing Report*		

SUBMISSION	SUBMISSION	REMARKS
v. Landscaping Drawings*		
w. Approved Utility Check Lists and Schemes and utility owners' preliminary cost estimates		
x. Utility Services to Authority Facilities*		
y. Written Description of Contract Calling Attention to: 1. Unusual Problems* 2. Special Treatments* 3. Areas Where Change Would Cause Considerable Revisions*		
z. Approved Right of Way Plans, together with a List of Parcels Required		
aa. Environmental Permit Applications Forwarded to the Authority's Engineering Department, and a Summary of Permit Requirements*		
bb. Remedial Action Workplan* /		
Remedial Investigation Report* /		
Site Investigation Report*		
cc. Riparian Grant Application*		
dd. Phase "A" Review Material with Responses		

*IF APPLICABLE

3.4.4. Phase "C" Submission

3.4.4.1. Pre-Phase "C" Submission Requirements

The Pre-Phase "C" submission shall be submitted at least four (4) weeks prior to the Phase "C" submission deadline, unless otherwise noted, to allow appropriate time to review and include all necessary changes in the Phase "C" submission.

The Pre-Phase "C" submission is to include:

1. Utility Orders forwarded to the Authority's Engineering Department for execution.
2. Construction Railroad Data forms (see the Authority's website for additional information) shall be completed by the Engineer and submitted to the Authority's Engineering Department with the necessary plans and work description immediately after Phase "B" is approved. The Authority's Engineering Department will transmit this information to the railroad, and upon its return from the railroad, notify the Engineer what insurance limits will be required in the contract specifications.
3. Final approvals in writing of State, County and Municipal agencies involved. This includes State approval of the submitted certification

reports for roadway closures of non-state highways not under Authority jurisdiction in excess of 48 hours, per N.J.A.C.16:27-4.2(f).

4. Utility service to Authority facilities finalized in accordance with Section 8 - Utility Installations, Relocations and Adjustments of this Manual.
5. Agreements for jurisdiction and maintenance submitted in accordance with the requirements of 0Policies of this Manual.
6. Pre-Phase "C" lighting and ITS submission in accordance with Design Manual Sections "Lighting and Power Distribution Systems" and "ITS and Communication Systems".
7. Initial submission to DCA, if applicable, in accordance with Design Manual Section "Facility Buildings/Toll Plazas".

3.4.4.2. Phase "C" Submission

A Phase "C" submission is a 95 percent complete contract consisting of plans, Supplementary Specifications, quantity calculations, Engineer's Estimate, and other material deemed appropriate by the Authority's Engineering Department. All items required for the construction, such as right of way, necessary permits and utility orders, have been completed.

The Phase "C" submission is to include:

1. Ten (10) half-size sets of printed plans without cross sections (twelve (12) sets if the contract includes a toll plaza), one full-size set of plans without cross sections, including quantities, pay items and final construction details, along with a complete electronic submission in PDF format. Additional plans may be required for review by outside entities such as NJDOT, Counties or Municipalities.
2. Five (5) sets of completed Supplementary Specifications prepared in accordance with the instructions on the Authority's website, along with a complete electronic submission in PDF format.
3. Two (2) half-size sets of cross sections at 50-foot intervals.
4. Two (2) sets of roadway and structure quantity calculations.
5. Proposed field office location if applicable, and method of access.
6. Utility service to Authority facilities finalized in accordance with Section 8 - Utility Installations, Relocations and Adjustments of this Manual.
7. An Engineer's Estimate, without rounding or contingencies, showing any reimbursable items.

8. Three (3) copies of the Road User Cost calculations prepared in accordance with the Authority's "Road User Cost Manual and Calculation Model", as directed by the Authority's Project Manager.
9. Three (3) copies of the calculations to determine the dollar amount to charge for Liquidated Damages, as directed by the Authority's Project Manager.
10. Completed summary of permit status. See Exhibit 3-7 for a sample table and Exhibit 3-8 for partial listing of permits.
11. Three (3) copies of the Critical Path Method (CPM) Progress schedule for the Construction Activities. See Section 2 - OPS Reporting of this Manual for additional information.
12. Completed Phase "C" Checklist (see Exhibit 3-3 for a sample.)
13. Phase "B" review material with responses to plan sheet comments either in writing or written in green on the plans, and written responses to all written comments.
14. Lighting and electrical calculations, if required. See Design Manual Section "Lighting and Power Distribution Systems".
15. The Engineer's Estimate, and any requested Unit Codes, per the "CapEx & Specifications Design Guidelines."
16. Completed LRFR load rating analyses calculations.
17. A PDF entitled "Phase C Reference Request List", which is a list of reference documents and all reports, as-builts, contract drawings, permits and any other information to be made available during advertising. This list shall be duplicated in Subsection 102.04 of the Supplementary Specifications.
18. Completed Highway Agency Stormwater General Permit Post-Construction Program Design Checklist for Individual Projects form.
19. Contract Specific Materials Acceptance Criteria Matrix.

Exhibit 3-3 Pre-Phase "C" and Phase "C" Checklists

95 Percent Complete Contract Documents

1. PRE-PHASE "C" SUBMISSION	SUBMISSION	REMARKS
a. Utility Orders Forwarded*		
b. Construction Railroad Data Forms*		
c. Final Approvals, in Writing, from Local Agencies*. This includes State approval of the submitted certification reports for roadway closures of non-state highways not under Authority jurisdiction in excess of 48 hours, per N.J.A.C.16:27-4.2(f).		
d. Final Utility Service to Authority Facilities*		
e. Agreements for Jurisdiction and Maintenance*		
f. Pre-Phase "C" Lighting and ITS Submission Submitted and Approved		
g. Initial submission to DCA*		

*IF APPLICABLE

2. PHASE "C" CHECKLIST	SUBMISSION	REMARKS
a. Ten (10) Sets of half-size Contract Plans without cross sections (twelve (12) Sets if Contract affects a Toll Plaza), one full-size set without cross sections and a complete set of PDF Files		
b. Five (5) Sets of Supplementary Specifications and PDF Files		
c. Two (2) half-size sets of Cross Sections at 50-foot intervals		
d. Two (2) Sets of Roadway and Structure Quantity Calculations		
e. Field Office Location and Access*		
f. Utility Service to Authority Facilities Finalized		
g. Detailed Engineer's Estimate, and any requested Unit Codes, per the "CapEx & Specifications Guidelines"		
h. Three (3) Copies Road User Cost Calculations		
i. Three (3) Copies Liquidated Damages Cost Evaluation		
j. Summary of Permit Requirements		
k. Remedial Action Selection Report*		
Remedial Action Workplan*		
l. Three (3) Copies Construction Schedule		
m. Phase "B" Review Material with Responses		
n. List of approved light Standard Vendors as required in accordance with Design Manual Section		

"Structures Design", Subsection "Lighting".		
o. Highway Agency Stormwater General Permit Post-Construction Program Design Checklist for Individual Projects form.		
p. Contract Specific Materials Acceptance Criteria Matrix		

*IF APPLICABLE

3.4.5. Phase "D" Submission

A Phase "D" submission is a 100 percent complete contract consisting of plans, Supplementary Specifications, Engineer's Estimate, and other material deemed appropriate by the Authority's Engineering Department.

The Phase "D" submission is to include:

1. Three (3) half-size bound sets of the Final Design plans, one (1) of which shall have each sheet signed and sealed by the Engineer-of-Record, licensed in the State of New Jersey.
2. One (1) complete set of signed original Mylar drawings. Mylars of Standard and Reference Drawings are not required.
3. One (1) CD labeled "Phase D Final (CADD Contract Deliverable)" containing all electronic files in accordance with the current NJTA CADD Manual entitled "NJTA, New Jersey Turnpike and Garden State Parkway Roadways CADD Standards Manual." This disk must be delivered to the CADD Section for inspection and archival procedures.
4. The following shall be uploaded to CapEx in a single ZIP file named "[Contract No.] Phase D Advertisement Packet", e.g. "T100.034 Phase D Advertisement Packet."
    a. The signed Plans as a multi-page PDF or ZIP of individual TIF files. The plans may be digitally stamped with a signature, or a scan of the original signed plans. The resolution of the plan set shall be a minimum of 300 DPI.
    b. The Supplementary Specifications per the "CapEx & Specifications Design Guidelines."
    c. The Engineer's Estimate per the "CapEx & Specifications Design Guidelines."
    d. All Reference Drawings and/or Reference Material listed in Supplementary Specification Subsection 102.04 shall be submitted according to these guidelines:
        - All files shall be compressed into a single ZIP file and named:
        - [Contract No.]_Reference.zip,
        - e.g. T100.256_Reference.zip.

- If the files were provided by the Authority, the filenames shall not be altered. They should otherwise follow the file naming convention provided for in the CADD Standards Manual.
- Within the ZIP file, the files may be organized into folders labeled with their corresponding Location (i.e., Str. No.).

5. Two (2) bound copies of the Final Design Supplementary Specifications.
6. Three (3) copies of the Critical Path Method (CPM) estimated construction schedule for the Construction Activities. See Section 2 - OPS Reporting for additional information.
7. A completed "Fiber Optic Cable Design Review Certification Form", (see the Authority's website for additional information).
8. Phase "C" review material with responses to plan sheet comments either in writing or written in green on the plans, and written responses to all written comments.
9. Completed Phase "D" Checklist, See Exhibit 3-4 for a sample.
10. Three (3) hard copies and one (1) electronic copy of the Drainage Infrastructure Maintenance Plan, if required.

The letter of transmittal shall indicate status of utility orders, permits, right of way and any other requirements not fully met. When directed by the Authority's Engineering Department, additional sets of plans, as directed by the Authority's Engineering Department, shall be sent to the County and/or Municipal Engineer for their information.

Exhibit 3-4 Phase "D" Checklist

100 Percent Complete Contract Documents Revised in Accordance with Phase "C" Review Comments, and Ready for Advertisement

1. SUBMISSION	SUBMISSION	REMARKS
a. Three (3) half-size Sets of Prints (One (1) Set with Raised Seal on Each Sheet)		
b. One (1) Set Original Mylar Drawings Signed. Standard and Reference Drawings NOT required.		
c. One (1) CD labeled "Phase D Final (CADD Contract Deliverable)" containing the files described in 3.4.5.		
d. One (1) ZIP file named "[Contract No.] Phase D Advertisement Packet" containing the files described in 3.4.5.		
e. Two (2) Bound Copies of Supplementary Specifications		
f. Three (3) Copies Estimated Construction Schedule		
g. Fiber Optic Cable Design Review Certificate		
h. Letter of Transmittal with Status of Utility Orders, Permits, ROW and any Requirements not Fully Met		
i. Phase "C" Review Material with Responses		
j. Drainage Infrastructure Maintenance Plan		
k. Copies of resolutions of support from counties and/or local municipalities for any roadway closures of non-State highways not under Authority jurisdiction in excess of 48 hours.		

3.4.6. Post-Phase "D" Services

3.4.6.1. Addenda

Addenda shall be prepared and submitted per the "CapEx & Specifications Guidelines."

3.4.6.2. Engineer's Estimate

Three (3) hardcopies of the Engineer's Estimate shall be submitted by the time of the bid opening. The Estimate shall be of the following format, a sample of which is shown in Exhibit 3-5:

- It shall be signed by either a Principal of the design firm or the Engineer-of-Record.
- It shall be signed by a Principal of the General Consultant.
- Signatures shall appear on the same page as the total price.

- This statement is to be included: "The foregoing unit prices and lump sum figures represent the fair and reasonable cost of performing the work by contract, including profit."
- Item numbers, unit codes, descriptions, units and quantities shall be exactly as they appear on the Proposal items prepared in CapEx.
- The heading on the estimate shall be identical to the project description shown on the contract Title Sheet.

Exhibit 3-5 Engineer's Estimate

NEW JERSEY TURNPIKE
CONTRACT NO. P/TXXX.XXX
PROJECT DESCRIPTION AS SHOWN ON THE TITLE SHEET OF THE PLANS

ITEM NO.	UNIT CODE	ITEM	UNIT	CONTRACT QUANTITY	UNIT PRICE	TOTAL COST
1	1DO1LAY	CONSTRUCTION LAYOUT	LS	1	--	$31,000.00
2	1D10MOB	MOBILIZATION	LS	1	--	$309,000.00
3	2B01REX	ROADWAY EXCAVATION, EARTH	CY	17,500	$27.00	$472,500.00
4	2B03REX	ROADWAY EXCAVATION, ROCK	CY	8,944	$260.00	$2,325,440.00
5	2B05REX	ROADWAY EXCAVATION, MUCK (IF AND WHERE DIRECTED)	CY	1,700	$36.00	$61,200.00
6	2C01EMB	EMBANKMENT, COMMON	CY	630	$30.00	$18,900.00
7	2C03EMB	EMBANKMENT, GRADE A	CY	4,900	$35.00	$171,500.00
8	N2N01BOL	10-FOOT LONG ROCK BOLT (IF AND WHERE DIRECTED)	EA	5	$3,000.00	$15,000.00
9	N2N02BOL	20-FOOT LONG ROCK BOLT (IF AND WHERE DIRECTED)	EA	5	$5,000.00	$25,000.00
					Total	**$3,429,540.00**

THE FOREGOING UNIT PRICES AND LUMP SUM FIGURES REPRESENT THE FAIR AND REASONABLE COST OF PERFORMING THE WORK BY CONTRACT, INCLUDING PROFIT.

Name of Engineering Company

Principal's Name, P.E.
Principal's Title

Name of General Consulting Engineer

Principal's Name, P.E.
Principal's Title

3.4.6.3. Evaluation of Bid Results

Within one (1) business day of a bid opening, the Engineer shall review all the results and check them for any irregularities, such as an unbalanced bid. The Engineer shall then transmit a formal letter of recommendation as to the award of the contract to the Authority and send a copy to the General Consultant. The General Consultant will review the Engineer's recommendation and either approve or disagree with the Engineer's recommendation.

3.4.6.4. Changes-of-Plan

If during the course of the construction the Resident Engineer determines that a formal change-of-plan is necessary, the Authority's Engineering Department will direct the Engineer to prepare it. The procedures for preparing a change-

of-plan are located in the "CapEx & Specifications Design Guidelines." To prevent costly construction delays, the Engineer shall expeditiously prepare a change-of-plan, as directed by the Authority's Engineering Department.

3.4.6.5. Shop Drawing Review

During the course of construction, the Resident Engineer (Construction Manager or CM) will forward to the Design Engineer (DE), shop drawings and working drawings for review and approval. The DE shall review and return all shop drawings and working drawings to the CM or the Authority, as appropriate, in accordance with Subsection 104.08 of the Specifications and the below provisions. When estimating the level of effort required to perform post-design and construction management services, the DE and CM shall assume that the level of shop drawing and working drawing review, outlined in the below provisions, will be included in their respective scopes of service.

The DE shall review and approve all required shop drawings for permanent features designed by the DE, which are represented within the Contract Documents. Shop drawings are documents furnished by suppliers and/or manufacturers of various materials and equipment, which illustrate how specific portions of the works shall be fabricated. Review of shop drawings is for general compliance with the Contract documents. All reviewed shop drawings shall be stamped by the DE using Stamp A shown in Exhibit 3-9.

The DE shall review and recommend for approval shop drawings and working drawings for permanent features designed by the Contractor, including supporting calculations, which include proprietary design elements which have been provided by the Contractor or the Contractor's vendors including (but not limited to) Mechanically Stabilized Earth (MSE) walls, High Load Multi-Rotational (HLMR) bearings, and modular bridge joint systems. Review of these shop and working drawings is for general conformance with the design concepts and criteria represented within the Contract documents. All reviewed shop and/or working drawings shall be stamped by the DE using Stamp B shown in Exhibit 3-9. Submissions stamped as "Recommended for Approval" shall be returned to the Authority for approval by the Office of the Chief Engineer of the New Jersey Turnpike Authority. Where the Office of the Chief Engineer deems the submitted shop and/or working drawings acceptable, they will be stamped as 'Approved' by an authorized representative of the Chief Engineer using Stamp C as shown in Exhibit 3-9. Approved shop and/or working drawings will then be returned to the CM by the Office of the Chief Engineer for final distribution to the Contractor. Shop and /or working drawings, which are not approved by the Office of the Chief Engineer, will be returned to the DE for further review.

The DE shall also review and recommend for approval all shop and/or working drawings, including supporting calculations, for items of work that were presented in the Contract documents as "conceptual", including temporary works for which the Contractor is required to complete the final design, erection plans, and demolition plans. These shop and/or working drawings, including supporting calculations, must be reviewed to a level where the DE has taken no exceptions to the drawings and supporting calculations before they can be stamped "Recommended for Approval" using Stamp B shown in Exhibit 3-9. Submissions stamped as "Recommended for Approval" shall be returned to the Authority for approval by the Office of the Chief Engineer of the New Jersey Turnpike Authority. Where the Office of the Chief Engineer deems the submitted shop and/or working drawings acceptable, they will be stamped as 'Approved' by an authorized representative of the Chief Engineer using Stamp C as shown in Exhibit 3-9. Approved shop and/or working drawings will then be returned to the CM by the Office of the Chief Engineer for final distribution to the Contractor. Shop and /or working drawings, which are not approved by the Office of the Chief Engineer, will be returned to the DE for further review.

The CM will review and approve Contractor submissions in accordance with a Project Specific Materials Acceptance Review Matrix, which will be developed by the DE during Design and provided to the CM for review and acceptance prior to the Pre-Construction meeting for the contract. The CM will also be responsible for review and approval of shop drawings for all items, which are covered by Authority Standard drawings and do not require explicit design on the part of the contractor. All reviewed shop drawings shall be stamped by the CM using Stamp A shown in Exhibit 3-9.

A sample matrix of DE and CM responsibilities for review of Contractor Submissions has been prepared as the Materials Acceptance Criteria Matrix (Matrix) as shown in Exhibit 3-10. An electronic spreadsheet version of the Matrix (Exhibit 3-10) will be furnished to the DE by the Authority Project Engineer as part of the Project Design kick-off meeting. This matrix is provided as an example and shall be modified by the DE as appropriate based on specific contract requirements and provided with the Design Phase C submission. This Matrix shall be made available for the scoping and procurement of CM services. A Pre-construction handoff meeting shall be scheduled between the DE and CM to review the design aspects of the project and finalize the Matrix. The Matrix will be updated by the DE and provided to the CM prior to the Pre-Construction meeting for the contract. For the purposes of clarity, the 'Reviewer' shown in the matrix is the party responsible (CM or DE) for review of Contractor submitted materials. Where 'CM/DE' is shown, the Construction Manager shall bear primary responsibility for review

of these Contractor submitted materials with assistance and additional review provided by the DE as required for specialty or unusual work features. Where 'DE/CM' is shown, the Design Engineer shall bear primary responsibility for review of these Contractor submitted materials with assistance and additional review provided by the CM as required for features where complex or unusual field performed procedures are to be executed. In any event, where both CM and DE parties are shown in the 'Reviewer' column, both parties shall review the Contractor submitted materials.

3.4.6.6. Requests for Information

During the course of construction, the Resident Engineer may forward to the Engineer a Request for Information (RFI). To prevent costly construction delays, the Engineer shall expeditiously prepare a response to the Resident's question.

3.4.6.7. As-Built Plans

The preparation of As-built plans shall be the responsibility of the Resident Engineer. The Phase "D" submission to the Authority's Engineering Department includes the drawings in individual PDF Files with signature and MicroStation Format, which will be forwarded to the Resident. If necessary, the NJTA Engineer shall forward any changes-of-plan in PDF and MicroStation Format that may have occurred during the course of construction to the Resident Engineer.

As contracts are ready to be finalized for As-built revisions, the Original Title Sheet Mylar with the Design Engineer and Chief Engineer's signatures and a CD of Electronic Files in PDF and MicroStation Format will be transmitted to the Resident Engineer. This can be picked-up at the Authority's reception desk in the lobby when available.

Submission of Final As-built Mylar Drawings and corresponding Electronic Files shall be delivered to Tony Valte, Assistant Project Supervisor with a transmittal containing the following enclosures:

1. One (1) Set of Final As-Built Mylar Drawings sized at 22" X 36" and shall contain the following:
    a. Title Sheet must be the Original Title Sheet as provided with the Design Engineer and Chief Engineer's signature.
    b. Title Sheet must be dated and Stamped "AS-BUILT," signed and dated by the Resident Engineer. The Resident Engineer's Certification Stamp shall state: "I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE THIS CONTRACT HAS BEEN CONSTRUCTED IN CONFORMITY WITH THE

ORIGINAL PLANS, SPECIFICATIONS AND MODIFICATIONS, AS IDENTIFIED HEREIN AS-BUILT."

c. All other sheets must be stamped "AS-BUILT" on top of the TITLE BLOCK or REVISION BOX. Note: The text "AS-BUILT" shall be shown with a bold face font at a one-half inch text height on the Title Sheet above the signatures and above all Title Blocks on all other drawings.

d. The REVISION BOX must have the following information:

- 1st Column (REV.) – shall denote a number inside a triangle to indicate the number of times the sheet was revised.
- 2nd Column (DESCRIPTION) – shall denote either "ADDENDUM NO." "COP NO." or "AS-BUILT"
- 3rd Column (DATE) – shall denote date ADDENDUM, COP OR "AS-BUILT" of sheet completed.
- 4th Column (BY) – shall denote initials of DRAFTER.
- 5th Column (CHK) – shall denote initials of Resident Engineer.

2. One (1) CD of Individual and combined Electronic Files in PDF Version with all required signatures and MicroStation Format. Electronic Files shall contain the same information above.

3. One (1) half-size bound set of As-Built prints and shall contain the same information above.

3.4.6.8. Lighting System

After the lighting system has been constructed, the Engineer shall perform a verification of the lighting installation, to ensure that the lighting has been installed according to the approved design. This procedure is outlined in the Design Manual Section "Lighting and Power Distribution Systems", and will be required before the Authority's Engineering Department issues final acceptance for any lighting system.

3.5. CONSTRUCTABILITY REPORT

3.5.1. Purpose and Intent

A constructability review shall be performed for specific projects with concurrence of the Chief Engineer. The purpose of this review is to verify that subject projects are safely and logistically constructible using means and methods available to the local contractor community. The intent of the review is not to identify the actual means and methods a contractor will use to construct the project, or to identify all means and methods possible to construct the project. The intent is to identify obstacles before a project is

advertised to reduce or prevent delays and unnecessary cost overruns as well as verify that the prepared contract documents are "biddable and buildable" and that the work described in those documents is theoretically capable of being completed as follows:

- Within the time provided for each stage and for the overall Contract
- Using available construction work force, materials, equipment and methods
- Allowing for the physical space necessary for the work and storage, and available site access
- Without affecting the safety of the traveling public and without significantly affecting the flow of traffic (i.e. adhering to operational constraints)
- Without affecting the integrity of the Authority's infrastructure / structures to remain
- Respecting external control factors such as environmental / permit restrictions (i.e. in-water work restrictions), seasonal weather, and coordination, with local road, rail, and utility crossings (where present)
- With due consideration of current or planned projects in the vicinity, as determined by project specific maintenance and protection of traffic (MPT) requirements. For the purposes of the Constructability Report, the limit of consideration is defined in approximate as 3 miles from the outer limits of defined roadway MPT limits visible to the travelling public. This limit may be extended on a project by project basis.

The constructability review shall be completed by qualified construction personnel and shall meet qualifications defined in the OPS RFEOI/RFP. The staff performing the constructability review shall not be members of the design team, i.e. they shall be construction supervision personnel or an independent constructability expert.

A copy of the Final Constructability Report should be provided to the Construction Manager at the Design to Construction handoff meeting.

3.5.2. When to Submit the Report

The constructability review should be initiated coincident with preparation of the Phase "A" submission documents and be advanced as maintenance and protection of traffic is being reviewed. An updated version of the Constructability Report is to be submitted with each phase submission. Comments to the Constructability Report provided by the reviewers are to be addressed with a comment resolution summary document and returned with the phase review comments. Results of the review shall be consolidated in the form of the Constructability Report. The draft Constructability Report shall be submitted no later than four (4) weeks prior to the formal Phase "B" submission so that the Authority may better compare the documents. It is understood that at the Phase "B" level of development, estimates of work durations and costs will not be exact. The

finalized version of the Report shall be submitted coincident with the Phase "D" submission package.

Depending on the type of work being designed, the Constructability Report will follow the general format below, but will vary on the type of construction proposed. The Design Engineer is advised to consult their Authority Project Engineer for specific format requirements prior to assembling the draft report. It is highly recommended that the Design Engineer submit the proposed table of contents for the report to the Authority Project Engineer prior to proceeding with the draft report.

3.5.3. General Report Format

The following format shall be utilized for the Constructability Report:

3.5.3.1. Introduction

Provide a general description of the work including type, location, milepost limits, total anticipated project construction duration, and milepost-to-milepost limits of traffic lane shifts (taper point to taper point or placement of advance signing, whichever is greater) where present with any potential detours or roadway closures.

3.5.3.2. Construction Methods

Describe anticipated methods of construction with respect to protecting adjacent traffic, facilities / roadways underneath, size of equipment to be used, temporary works or erection support placement and staging of components to be erected, and anticipated duration and timeframe of construction activities subdivided by construction stage.

3.5.3.3. Existing Structure Demolition

Describe methods of demolishing major existing structures with respect to protecting adjacent traffic, facilities / roadways underneath, maintaining integrity of structures to remain, size of equipment to be used, behavior changes to the existing structure from partial demolition (if anticipated), placement and staging of both demolition equipment and demolition spoils, and anticipated duration and timeframe of demolition activities subdivided by construction stage.

3.5.3.4. Limits of Traffic Effects

Where existing traffic must be shifted, show in schematic form the severity of the move as a cross section through the work zone. Also list the limits of the traffic effects, i.e. impacts to entrance / exit ramps and toll plazas, and detours or alternate routes, as the outer limits of the project lane shift taper point mile posts. Also, the availability of lane closings to implement shifts shall

be reviewed. The Design Engineer shall review the need for special provisions such as stand-by wrecker service, emergency pull-offs, or special traffic / queue monitoring systems, especially if the length of closing / shift requires such measures and / or the number of lanes are reduced, or shoulders are eliminated during peak travel periods.

The Design Engineer shall also verify with their Authority Project Engineer whether other projects (Authority and non-Authority) are anticipated to be taking place concurrently to the subject project within the vicinity of the work zones, and where force account work in the Contract is to be provided to allow for emergency maintenance of other structures / infrastructure within the limits of the work zones.

The Design Engineer shall identify the improvements to be addressed by the Contract prior to the traffic shift so flow of traffic in the shifted position is maintained for the stage duration (i.e. installation of additional / new safety features, construction of pavement, reconstruction of existing pavement, pavement repairs, welding of inlet grates, etc.).

The Design Engineer shall identify any anticipated detours or High Intensity Construction Cycle (HICC) work as may be required to complete the work or to respect stakeholder limited timeframe accessible work (such as railroads or other facility owners).

3.5.3.5. Specialty Equipment or Water Work

Identify specialty construction equipment as it may be required to construct the project, such as large cranes, barge based work, transport equipment for large or heavy prefabricated bridge components, etc. Where long lead times to obtain specialty equipment may be anticipated or if limited use of specialty equipment is required by adjacent facility owners, the Design Engineer shall adjust the project duration as appropriate.

3.5.3.6. Construction Staging and Storage Areas

Identify lay-down areas for major equipment and components and describe how equipment will access the construction site for supply of labor and materials and for placement of large equipment including temporary construction easements and rights of entry. Need for barges or trestles should be considered for shallow draft water work. Use of schematic representations of the laydown areas and access routes to the construction site is encouraged for the report.

3.5.3.7. Approximate Construction Schedule

Create a baseline schedule that roughly estimates the order of various construction operations and their durations. The schedule should account for mobilization time for the contractor, winter shut-downs for concrete work, black-out periods for environmental concerns or utility work, any external restrictions such as seasonal traffic, water work limits, stakeholder constraints (railroad closures, navigable channel impacts, etc.) and adjacent roadway project work, lead times for complex or specialty construction items and coordination efforts where long lead times are anticipated such as for local agency approvals or DEP/USCG/ACOE/etc. review periods.

The approximate construction schedule need only be submitted with the draft Constructability Report up to the Phase “B” submission. For Phase “C” and Phase “D” submissions, the overall construction schedule is expected to be submitted as a separate item.

Exhibit 3-6 Design Element Modification Request

CONTRACT NO. _____

PHASE _____

DATE _____

DESIGN ELEMENT	DESIGN CRITERIA			APPROXIMATE COST	
	DESIRABLE	MINIMUM	PROPOSED	DESIRABLE	PROPOSED
RAMP RADIUS	235’	150’	180’	$1,250,000	$250,000

* PROVIDE GENERAL LAYOUT SKETCH(S) OR CORRESPONDENCE AS APPROPRIATE

IMPACTS/REASONS:

Providing the desirable radius requires the total acquisition of a small commercial property. Reducing the radius eliminates the total acquisition and only requires a slope easement.

Exhibit 3-7 Summary of Permit Requirements

CONTRACT NO. _____

PHASE _____

DATE _____

AGENCY	TYPE OF PERMIT	REASON FOR PERMIT	STATUS
NJDEP	GENERAL WETLANDS	BRIDGE PIER IMPACTS TRANSITION AREA	PREPARING INITIAL DRAFT FOR REVIEW

Exhibit 3-8 Environmental Permits

FEDERAL

U.S. Coast Guard (Bridge)

USCOE Section 404 (Individual/Nationwide) discharge of fill

USCOE Section 10 (Navigable Waters)

Section 7 (Endangered Species Consultation)

STATE

Coastal Area Facility Review Act

Hazardous Waste Site Investigation

NJDEP Tidal Wetlands

NJDEP Waterfront Development

NJDEP Tidal Conveyance

NJDEP Freshwater Wetlands

NJDEP Flood Hazard/Riparian

NJDEP Water Quality Certificate

OTHERS

Delaware Basin Commission

Meadowland Commission

Pineland Commission

Historic Sites Council

Green Acres/State House Commission

NJ No Net Loss Reforestation Act

State Agricultural Development Commission

Exhibit 3-9 Shop and Working Drawings

Stamp A

SHOP DRAWING REVIEW
CONSULTANT NAME

Review is for general compliance with contract documents. sole responsibility for correctness of dimensions, details, quantities, and safety during fabrication and erection shall remain with the Contractor.

- ☐ No Exceptions Taken
- ☐ Make Corrections Noted
- ☐ Amend and Resubmit
- ☐ Rejected

By _____
Date _____

Stamp B

The Engineer, in accordance with NJTA standards, has reviewed this submission, which the Contractor has developed as the final design of conceptual plans as shown or required in the Contract Documents, or temporary works required to perform the Work described or as required in the Contract Documents, for general compliance with the design concept and criteria.

RECOMMENDED FOR APPROVAL

Date _____
By _____

This does not relieve the Contractor from compliance with the requirements of the Contract Documents.

Stamp C

APPROVED

By _____
Date _____

Office of The
Chief Engineer

Exhibit 3-10 Material Acceptance Criteria Matrix

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Historic District Sign	Each	Historic District Sign											CM
Construction Layout	LS	Control of Work											CM
Mobilization	LS	Control of Work											CM
Progress Schedule (This is a no Bid Item)	LS	Prosecution and Progress											CM
Fuel Price Adjustment (This is a NO BID, Lump Sum item for this contract. The Lump Sum price is $XXX,000. Enter a Unit Price of $XXX,000 as your bid item for this item.)	L.S.	Price Adjustment											CM
Clearing and Grubbing	ACRE	Clearing & Grubbing			x								CM
Sealing of Abandoned Well	Each	Sealing of Abandoned Well											CM
Monitoring Well	Each	Monitoring Well			x								CM
Basin and Swale Excavation	C.Y.	Basin and Swale Excavation											CM
Roadway Excavation, Earth	C.Y.	Roadway Excavation		x							x	x	CM
Roadway Excavation and Embankment	C.Y.	Roadway Excavation		x							x	x	CM
Roadway Excavation, Muck	C.Y.	Roadway Excavation		x							x	x	CM
Stripping Topsoil	C.Y.	Roadway Excavation									x	x	CM
Overload Removal	C.Y.	Roadway Excavation		x							x	x	CM
Deep Benchmarks	L.F.	Deep Benchmarks											CM
Open Standpipe Piezometers	Each	Piezometers											CM
Clay Liner	C.Y.	Embankment	x		x		x				x		CM
Vertical Wick Drain Obstruction Clearance	L.F.	Embankment	x		x		x						CM
Sand Blanket	C.Y.	Embankment	x		x		x				x		CM
#57 Stone Backfill	C.Y.	Embankment	x		x		x				x	x	CM
Geofoam Backfill	C.Y.	Embankment	x		x		x				x	x	CM
Geosynthetic Clay Liner	S.Y.	Embankment	x		x		x				x	x	CM
Embankment, Common	C.Y.	Embankment		x			x				x	x	CM
Embankment, Grade A	C.Y.	Embankment	x		x		x				x	x	CM
Embankment, Grade B	C.Y.	Embankment	x		x		x				x	x	CM
Porous Fill	C.Y.	Embankment	x	x	x						x	x	CM
Embankment, Grade C	C.Y.	Embankment	x		x		x				x	x	CM
Cofferdam	L.S.	Cofferdam					x						DE
Channel Excavation	C.Y.	Channel Excavation					x						CM
Coarse Aggregate Layer	C.Y.	Foundation Excavation	x		x								CM
Foundation Excavation	C.Y.	Foundation Excavation			x								CM
Trench Excavation, Extra Depth	C.Y.	Trench Excavation	x	x	x		x					x	CM
Trench Excavation, Electrical	L.F.	Trench Excavation	x	x	x		x					x	CM
Riprap and Scour Holes	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Slope Protection, 12" Thick, (D50=6")	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Aprons, 18" Thick, (D50=9")	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Ditch Protection, 18" Thick (D50=6")	Ton	Stone for Erosion Control	x	x	x							x	CM
Gabions	C.Y.	Stone for Erosion Control	x	x	x							x	CM
Gabion Mattress Slope Protection, 12" Thick	C.Y.	Stone for Erosion Control	x	x	x							x	CM
Gabion Mattress Ditch Protection, 12" Thick	C.Y.	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Slope Protection, 24" Thick (D50=12")	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Slope Protection, 24" Thick (D50=8")	Ton	Stone for Erosion Control	x	x	x							x	CM

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Riprap Stone Scour Hole, 12" Thick, D50=6"	Ton	Stone for Erosion Control	x	x	x							x	CM
Gabion Mattress Ditch Protection, 18" Thick	C.Y.	Stone for Erosion Control											CM
Riprap Stone Ditch Protection, 18" Thick, D50=9"	Ton	Stone for Erosion Control	x	x	x							x	CM
Sand Layer, 6" Thick	S.Y.	Stone for Erosion Control											CM
Riprap Stone Aprons, 36" Thick, D50=18"	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Aprons, 48" Thick, D50=24"	Ton	Stone for Erosion Control	x	x	x							x	CM
Gabion Mattress Ditch Protection, 24" Thick	C.Y.	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Ditch Protection, 24" Thick, D50=12"	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Slope Protection, 18" Thick, (D50=5")	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Scour Hole, 18" Thick, D50=9"	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Scour Hole, 24" Thick, D50=12"	Ton	Stone for Erosion Control	x	x	x							x	CM
Gabion Mattress Scour Hole, 24" Thick	C.Y.	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Scour Hole, 36" Thick, D50=18"	Ton	Stone for Erosion Control	x	x	x							x	CM
Gabion Mattress 9" x 6' x 9'	Ton	Stone for Erosion Control	x	x	x							x	CM
Stone, Grade B	Ton	Stone for Erosion Control	x	x	x							x	CM
Stone, Grade D	Ton	Stone for Erosion Control	x	x	x							x	CM
Filter Blanket	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Aprons, 12" Thick (D50=6")	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Aprons, 24" Thick (D50=12")	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Ditch Protection, 12" Thick, D50=6"	Ton	Stone for Erosion Control	x	x	x							x	CM
Riprap Stone Aprons, 16" Thick, D50=8"	Ton	Stone for Erosion Control	x	x	x							x	CM
Temporary Slope Drain	L.F.	Temp Soil Erosion & Dust Control	x				x					x	CM
15" Temporary Slope Drain	L.F.	Temp Soil Erosion & Dust Control	x				x					x	CM
18" Temporary Slope Drain	L.F.	Temp Soil Erosion & Dust Control	x				x					x	CM
Heavy Duty Silt Fence, Orange	LF	Temp Soil Erosion & Dust Control	x		x							x	CM
Heavy Duty Silt Fence, Black	LF	Temp Soil Erosion & Dust Control	x		x							x	CM
Storm Sewer Inlet Protection	Each	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Sediment Containment Bags	Each	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Concrete Driveway, 6" Thick	S.Y.	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Turf Reinforcement Matting	S.Y.	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Stone Deck Dam	C.Y.	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Floating Sediment Risers	Each	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Inlet Filter, Type 1	S.Y.	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Inlet Filter, Type 2	Each	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Sediment Control Bags	Each	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Temporary Seeding	S.Y.	Temp Soil Erosion & Dust Control	x		x		x					x	CM
Watering	Thous	Temp Soil Erosion & Dust Control	x			x						x	CM
Temporary Stone, Grade B	Ton	Temp Soil Erosion & Dust Control	x		x							x	CM
Hay Bales	C.Y.	Temp Soil Erosion & Dust Control	x		x							x	CM
Silt Fence	L.F.	Temp Soil Erosion & Dust Control	x		x							x	CM
Floating Turbidity Barriers	LF	Temp Soil Erosion & Dust Control	x		x							x	CM
Inlet Filters	Each	Temp Soil Erosion & Dust Control	x		x							x	CM
Construction Driveway	Ton	Temp Soil Erosion & Dust Control	x		x							x	CM
Demolition of Existing Structures	LS	Demolition of Existing Structures					x						DE
Demolition of Existing Toll Plaza	L.S.	Demolition of Existing Structures					x						DE

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Temporary Orange Plastic Fence	L.F.	Tem.Orange Plastic Fence			x						x		CM
Subbase	CY	Subbase	x	x	x							x	CM
Sawcutting	LF	Sawcutting	x	x	x							x	CM
Stone Columns	LF	Stone Columns				x	x		x			x	DE
Pre-Drilling	LF	Pre-Drilling				x	x		x			x	CM/DE
Vibration and Movement Monitoring	L.S.	Vibration and Movement Monitoring				x	x		x			x	DE/CM
Reno Mattress (Gabion Basket)	C.Y.	Reno Mattress (Gabion Basket)				x	x		x			x	CM
Excavation, Acid Producing Soil	CY	Excavation, Acid Producing Soil				x	x		x			x	CM
Acid-Producing Soils Remediation	SY	Acid-Producing Soils Remediation				x	x		x			x	CM
Disposal of Acid Producing Soil	Ton	Disposal of Acid Producing Soil				x	x		x			x	CM
Testing for Acid Producing Soil Deposits	Each	Testing for Acid Producing Soil Deposits				x	x		x			x	CM
Foundation Excavation for Acid Producing Soils	C.Y.	Foundation Excavation for Acid Producing Soils				x	x		x			x	CM
Testing of Soils for Waste Classification	Each	Testing of Soils for Waste Classification				x	x		x			x	CM
Geotechnical Instrumentation Monitoring	Week	Geotechnical Instrumentation Monitoring				x			x				CM
Vibrating Wire Piezometers	Each	Piezometers				x			x				CM
Trench Excavation, Cut-Off Wall	S.F.	Trench Excavation, Cut-Off Wall				x			x				CM
Exploratory Test Pits	Each	Exploratory Test Pits				x			x				CM
Tile Drain Plugging	Each	Tile Drain Plugging				x			x				CM
Tile Drain Exploration	L.F.	Tile Drain Exploration				x			x				CM
Demolition of Building Lot # X	LS	Demolition of Buildings					x		x				DE
Asbestos Abatement# X	LS	Asbestos Abatement					x		x				DE
Demolition of Building Lot # X	LS	Demolition of Buildings					x		x				DE
Aggregate Base Course, 7" Thick	SY	Aggregate Base Course	x	x	x							x	CM
Asphaltic Base Course 25H64	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Asphaltic Intermediate Course 19H76	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Asphaltic Surface Course 12.5H76	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
HMA Surface Course, Mix I-5	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Hot Mix Asphalt Driveway, 6" Thick	S.Y.	HMA Pavements	x	x	x			x	x		x	x	CM
Hot Mix Asphalt, Driveway, 4" Thick	S.Y.	HMA Pavements	x	x	x			x	x		x	x	CM
Hot Mix Asphalt, Driveway, 12" Thick	S.Y.	HMA Pavements	x	x	x			x	x		x	x	CM
HMA Base Course, Mix I-2	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Superpave Hot Mix Asphalt 25H 64 Base Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Superpave Hot Mix Asphalt 19M 64 Base Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Superpave Hot Mix Asphalt 19H 76 Intermediate Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Asphalt Price Adjustment. (This is a NO-BID, Lump Sum item for this contract. The	Ton	Asphalt Price Adjustment (This is a No-Bid Item)											CM
Superpave Hot Mix Asphalt 12.5H 76 Surface Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Tack Coat	Gallon	HMA Pavements	x		x						x	x	CM
Superpave Hot Mix Asphalt 12.5M64 Surface Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Clean Outside Shoulders	L.F.	Clean Outside Shoulders	x		x						x	x	CM
Superpave Hot Mix Asphalt 19H 64 Intermediate Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Superpave Hot Mix Asphalt 25H 64 Base Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Superpave Hot Mix Asphalt 9.5M 64 Surface Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
Superpave Hot Mix Asphalt 19M76 Base Course	Ton	HMA Pavements	x	x	x			x	x		x	x	CM
HMA Bridge Surfacing	Ton	HMA Pavements	x	x	x			x	x		x	x	CM

October 2015

Page 3 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Membrane Waterproofing	SY	HMA Pavements	x		x						x	x	CM
Asphalt Price Adjustment (This is a NO-BID, Lump Sum item for this contract. The	L.S.	HMA Pavements	x		x						x	x	CM
Berm Surfacing, 3 inches Thick	SY	Shoulder & Berm Surfacing	x		x							x	CM
Berm Surfacing, Crushed Stone, 6" Thick	SY	Shoulder & Berm Surfacing	x		x							x	CM
Concrete Base Course, 8" Thick	S.Y.	Portland Cement Conc Pavement	x	x	x		x	x	x	x		x	CM
Underlayer Preparation	S.Y.		x	x	x		x	x	x	x		x	CM
Bridge Approach Slab	S.Y.	Portland Cement Conc Pavement	x	x	x		x	x	x	x		x	CM
Pavement Removal, 2" Depth	S.Y.	Pavement Removal & Surface Milling				x							CM
Pavement Removal, 3" Depth	S.Y.	Pavement Removal & Surface Milling				x							CM
Pavement Removal, 5" Depth	S.Y.	Pavement Removal & Surface Milling				x							CM
Pavement Removal, 4" Depth	S.Y.	Pavement Removal & Surface Milling				x							CM
Pavement Removal, Varible Depth	S.Y.	Pavement Removal & Surface Milling				x							CM
Surface Milling	S.Y.	Pavement Removal & Surface Milling				x							CM
Surface Milling, 2" Average Depth	S.Y.	Pavement Removal & Surface Milling				x							CM
Surface Milling, 3" Average Depth	SY	Pavement Removal & Surface Milling				x							CM
Milled Rumble Strip	LF	Milled Rumble Strip				x							CM
Concrete Collar	Each	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete In Culvert	CY	Concrete Structures	x	x	x		x	x	x			x	CM
Precast Reinforced Concrete 3-Sided Box Culvert	LF	Concrete Structures	x		x		x	x	x	x		x	DE
Pier Protection Barrier	LF	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete In Pylon Wall	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete In Pile Cap	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete In Wingwalls	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Modular Expansion Joint, 6" Movement	L.F.	Concrete Structures		x		x						x	DE
Strip Seal Expansion Joints, 2" Movement	L.F.	Concrete Structures		x		x						x	CM
Neoprene Strip Seal	L.F.	Concrete Structures		x		x						x	CM
Jeene Seal Expansion Joints, 2" Movement	L.F.	Concrete Structures		x		x						x	CM
Concrete In Wall Facing	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete In Barriers	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete in CIP Collar	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete Core Sampling	Each	Concrete Structures		x		x						x	CM
Concrete in Structure, Headwalls	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Strip Seal Expansion Joint	L.F.	Concrete Structures											CM
Concrete In Substructure Above Footings	CY	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete In Footings	CY	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete in Backwall	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete in Abutment Above Footings	C.Y.	Concrete Structures											CM
Concrete in Coping	C.Y.	Concrete Structures	x	x	x		x	x	x			x	CM
Concrete in Pier Above Footings	C.Y.	Concrete Structures											CM
Reinforcement Steel	Pound	Concrete Structures	x		x		x	x	x	x		x	DE
Concrete in Retaining Walls Above Footings	C.Y.	Concrete Structures											CM/DE
Concrete In Bridge Parapet	CY	Concrete Structures	x	x	x		x	x	x			x	CM/DE
Concrete In Deck Slabs	C.Y.	Concrete Structures											CM
Reinforcement Steel, Epoxy Coated	Pound	Concrete Structures	x		x		x	x	x	x		x	DE
Reinforcement Bar Coupler	Each	Concrete Structures	x		x		x	x	x	x		x	CM

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Drill and Grout Reinforcement Bar	Each	Concrete Structures	x		x		x	x	x	x		x	CM
Mechanical Coupler	Each	Concrete Structures	x		x		x					x	CM
Concrete Penetrating Sealer Treatment	SF	Concrete Structures	x	x	x							x	CM
Presstressed Concrete Beams, Type VI	L.F.	Presstressed Concrete Beams, Type VI			x							x	DE
Prestressed Concrete Bulb Tee Beams, 55 Inches Deep	L.F.	Prestressed Concrete Bulb Tee Beams, 55 Inches			x							x	DE
Prestressed Concrete Adjacent Box Beams, 27" X 48"	L.F.	Prestressed Concrete Adjacent Box Beams, 27" X			x							x	DE
HLMR Bearings, 200 Kips to 450 Kips, Type E	Each	Steel Structures			x		x		x	x		x	DE
Shear Connectors	Each	Steel Structures			x		x		x	x		x	DE
Structural Steel	L.S.	Steel Structures			x		x		x	x		x	DE
Structural Steel Deck Joints	L.S.	Steel Structures			x		x		x	x		x	DE
Treated Timber Structures	MFBM	Timber Structures			x		x					x	DE
HP 12 X 53 Test Piles	L.F.	Piles	x	x	x	x	x		x			x	DE
Driving HP 14 X 89 Piles	L.F.	Piles		x			x		x		x		DE
Steel HP 14 X 89 Test Piles	L.F.	Piles	x	x	x	x	x		x			x	DE
Splices For Steel Hp 14 X 89 Piles	Each	Piles	x		x	x	x				x	x	DE
Furnishing HP 14 X 89 Piles	L.F.	Piles	x		x	x	x		x			x	DE
14 Inch Diameter Steel Pipe Test Piles	LF	Piles	x		x	x	x		x			x	DE
Point Reinforcement For 14 Inch Diameter Steel Pipe Piles	Each	Piles	x		x	x	x		x			x	DE
Splices For 14 Inch Diameter Steel Pipe Piles	Each	Piles	x		x	x	x		x			x	DE
Splices For Steel Hp 12 X 53 Piles	Each	Piles	x		x	x	x				x	x	DE
Furnishing 14" Diameter Steel Pipe Piles	LF	Piles			x	x	x		x			x	DE
Driving 14" Diameter Steel Pipe Piles	LF	Piles		x			x		x		x		DE
Driving 16" Cast-In-Place Concrete Piles	L.F.	Piles		x			x		x		x		DE
Splices for 16" Cast-In-Place Concrete Piles	Each	Piles	x		x	x	x				x	x	DE
Furnishing 16" Cast-In-Place Concrete Piles	L.F.	Piles	x		x	x	x		x			x	DE
16" Cast-in-Place Concrete Test Piles	L.F.	Piles	x	x	x	x	x		x			x	DE
Furnishing Equipment for Driving Piles	LS	Piles	x			x	x		x			x	DE
Furnishing and Installing W18 x 86 Piles	LS	Piles	x		x	x	x		x			x	DE
Dynamic Pile Load Tests	Each	Piles				x	x						DE
Protective Pile Coating	L.F.	Piles	x		x						x	x	DE
30" Diameter Steel Pipe Casing	L.F.	Piles	x	x	x	x	x		x			x	DE
Remove Existing Span Sign Structure No.	LS	Sign Support Structures		x			x		x				CM/DE
Fabrication and Delivery of Overhead Butterfly/Cantilever Sign Support Structure Post	Pound	Sign Support Structures	x	x	x		x		x	x			DE
Fabrication and Delivery of Overhead Butterfly/Cantilever Sign Support Structure Truss	Pound	Sign Support Structures	x	x	x		x		x	x			DE
Fabrication and Delivery of Overhead Span Sign Support Structure End Frame	Pound	Sign Support Structures	x	x	x		x		x	x			DE
Fabrication and Delivery of Overhead Span Sign Support Structure Truss	Pound	Sign Support Structures	x	x	x		x		x	x			DE
Concrete Cloumn for Sign Structures	C.Y.	Sign Support Structures	x	x	x		x		x	x			DE
Aluminum Posts for Ground Mounted Signs	Pound	Sign Support Structures	x	x	x		x		x	x			DE
Concrete Foundations for Ground Mounted Signs	C.Y.	Sign Support Structures	x	x	x		x		x	x			DE
Concrete Foundations for Overhead Sign Structures	CY	Sign Support Structures	x	x	x		x	x				x	DE
Concrete in Structures, Pedestals	C.Y.	Sign Support Structures	x	x	x		x		x	x			DE
Install Overhead Butterfly Sign Structure No. X	L.S.	Sign Support Structures				x	x					x	DE

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Install Overhead Cantilever Sign Structure No. X	L.S.	Sign Support Structures				x	x					x	DE
Install Overhead Span Sign Structure No. X	L.S.	Sign Support Structures	x	x	x		x			x			DE
Remove Existing Span Sign Structure No. X	L.S.	Sign Support Structures	x	x	x		x			x			DE
Remove Existing Cantilever Sign Structure No. X	L.S.	Sign Support Structures	x	x	x		x			x			DE
TFE Expansion Bearing, x" X x", Type xx	Each	TFE Expansion Bearing, Type EG	x		x		x		x	x	x	x	DE
Plain Elastomeric Bearing Pad, x" x x"	Each	TFE Expansion Bearings	x		x		x		x	x	x	x	DE
Laminated Elastomeric Bearing Pad, x" x x"	Each	TFE Expansion Bearings	x		x		x		x	x	x	x	DE
Damp-proofing	S.Y.	Miscellaneous			x							x	CM
Waterproofing	S.Y.	Miscellaneous			x							x	CM
Preformed Sheet Membrane Waterproofing	S.Y.	Miscellaneous			x							x	CM
8" Drainage Pipe, (Fiberglass)	L.F.	8" Drainage Pipe, (Fiberglass)			x				x				CM
Inlet Frames and Grates	Each	Inlet Frames and Grates			x				x				CM
Scuppers	Each	Scuppers			x				x				CM
Articulated Concrete Block Mattress	S.Y.	Underbridge Slope Protection	x	x	x		x			x		x	CM
Concrete Slope Protection	SF	Underbridge Slope Protection	x	x	x		x			x		x	CM
Stone Slope Protection	S.Y.	Underbridge Slope Protection	x	x	x		x			x		x	CM
Cut-Off Sheeting	SF	Temporary Sheeting											
Temporary Sheeting	SF	Temporary Sheeting	x		x		x						DE
Temporary Sheeting to Remain in Place	SF	Temporary Sheeting	x		x		x						DE
Protective Coating	S.F.	Permanent Sheeting		x	x	x	x			x		x	CM
Catches	SY	Bridge Deck Rehabilitation			x		x		x		x		DE
Backwall Reconstruction	LF	Bridge Deck Rehabilitation			x		x				x	x	CM
Asphaltic Plug Joint	SF	Bridge Deck Rehabilitation	x		x		x				x	x	CM
Removal of Asphalt Surfacing and Scarify Concrete	S.Y.	Bridge Deck Rehabilitation	x		x		x				x	x	CM
Removal of Existing Surfacing	SY	Bridge Deck Rehabilitation					x		x				CM
Reinforcement Steel, Field Anti - Corrosion Coating	SF	Bridge Deck Rehabilitation	x		x		x		x		x	x	CM
Spall Repair, Type 1	SF	Bridge Deck Rehabilitation					x						CM
Joint Seal Replacement, Type 1	LF	Bridge Deck Rehabilitation	x		x		x				x	x	CM
Parapet Reconstruction Location No. 1	L.F.	Bridge Structural Repair	x		x				x		x	x	CM/DE
Repair Spalled Concrete, Type 1 - Abutment	SF	Bridge Structural Repair										x	CM
Repair Spalled Concrete, Type 1 - Pier	SF	Bridge Structural Repair										x	CM
Substructure Membrane Waterproofing	SF	Bridge Structural Repair	x		x				x		x	x	CM
Reconstruct Bearing Area	Each	Bridge Structural Repair	x		x				x		x	x	CM
Anti-Graffiti Protective Coating	S.F.	Bridge Structural Repair	x		x				x		x	x	CM
Ground Mounted Post, Type A	L.F.	Bridge Structural Repair	x		x				x		x	x	DE
Noise Barrier Foundation	L.F.	Bridge Structural Repair	x		x				x		x	x	DE
Ground Mounted Noise Barrier Panel	S.F.	Bridge Structural Repair	x		x				x		x	x	DE
Remove Existing Ground Mounted Noise Barrier	L.S.	Bridge Structural Repair	x		x				x		x	x	DE
Concrete Penetrating Stain	S.F.	Bridge Structural Repair	x		x				x		x	x	CM
Additional Crushed Stone	C.Y.	Bridge Structural Repair	x		x				x		x	x	CM
MSE Abutment Wall No. X	SF	MSE Walls	x		x	x	x	x	x	x	x	x	DE
MSE Wing Wall No. X	S.F.	MSE Walls	x		x	x	x	x	x	x	x	x	DE
MSE North Abutment	S.F.	MSE Walls	x		x	x	x	x	x	x	x	x	DE
Retaining Wall No. X	CY	MSE Walls	x		x	x	x	x	x	x	x	x	DE
Prefabricated Modular Wall No. X	S.F.	MSE Walls	x		x	x	x	x	x	x	x	x	DE

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Temporary Retaining System	S.F.	MSE Walls	x		x	x	x	x	x	x	x	x	DE
30" Diameter Drilled Shaft	LF	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Demonstration Drilled Shaft, 96-Inch Diameter	Each	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Osterberg Cell Load Test, 96-Inch Diameter Shaft	Each	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Obstructions	L.F.	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Crosshole Sonic Logging (CSL) of Drilled Shaft	Each	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Crosshole Tomography, If and Where Directed	Each	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Concrete Coring at Drilled Shaft, If and Where Directed	L.F.	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Shaft Inspection Device (Mini-SID)	Each	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Drilled Shaft for Sign Structures	L.F.	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
54" Drilled Shaft for Sign Structures	LF	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
30" Diameter Drilled Shafts for Sign Structure	L.F.	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Sonic Caliper Test	Each	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Furnishing Drilled Shaft Drilling Equipment	L.S.	Drilled Shafts for Sign Structure Foundations	x		x		x			x		x	DE
Concrete in Deck Slabs, HPC	C.Y.	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM/DE
Concrete in Headblock, HPC	CY	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM
Concrete in Parapet, HPC	CY	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM/DE
Bridge Approach Slab, HPC	S.Y.	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM
Relief Slab, 18" Thick, HPC	S.Y.	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM
Concrete In Sidewalk, HPC	C.Y.	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM
Sleeper Slab, HPC	C.Y.	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM
Concrete In Median Barrier, HPC	C.Y.	High Performance Concrete (HPC)	x	x	x		x	x		x		x	CM
Bitumen Coating	LF	Bitumen Coating For Steel Piles	x			x	x					x	CM
Salt Storage Structure	L.S.	Salt Storage Structure	x			x	x						CM
Install Overhead Span Variable Message Sign and Variable Speed Limit Sign Support Structure No. X	LS	Overhead Span VMS & VSLS Supports	x		x		x			x		x	CM/DE
Fabrication and Delivery of overhead Span Sign Support Structure, xx'-x" Length	Each	Overhead Span VMS & VSLS Supports	x		x		x			x		x	DE/CM
Timber Lagging	S.Y.	Overhead Span VMS & VSLS Supports	x		x		x			x		x	DE
Precast Concrete Lagging	S.Y.	Overhead Span VMS & VSLS Supports	x		x		x			x		x	DE
Removal of Existing VMS Signs and Structures	L.S.	Overhead Span VMS & VSLS Supports	x		x		x			x		x	CM/DE
Steel Soldier Piles	L.F.	Overhead Span VMS & VSLS Supports	x		x		x			x		x	DE
8-Inch Combination Underdrain	L.F.	Underdrains	x	x	x							x	CM
8" Outlet Pipe	LF	Underdrains	x	x	x							x	CM
10" Pipe Underdrain	L.F.	Underdrains	x	x	x							x	CM
12" High Density Polyethylene Pipe	L.F.	Underdrains	x	x	x							x	CM
12" High Density Polyethylene Elbows	Each	Underdrains	x	x	x							x	CM
12" High Density Polyethylene End Section	Each	Underdrains	x	x	x							x	CM
12" Trench Drain	L.F.	Underdrains	x	x	x							x	CM
Bio-Retention System	S.Y.	Underdrains	x	x	x							x	CM
18 Inch Half Section Corrugated Metal Pipe	L.F.	Underdrains	x	x	x							x	CM
Underdrain, Type X	L.F.	Underdrains	x	x	x							x	CM
12" Bleeder Drain	LF	Storm Drains	x		x						x	x	CM
36" Reinforced Concrete Flared End Section	Each	Storm Drains	x		x						x	x	CM
14"x23" Reinforced Concrete End Sections	Each	Storm Drains	x		x						x	x	CM

October 2015

Page 7 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
42" Reinforced Concrete Culvert Pipe	L.F.	Storm Drains	x		x						x	x	CM
8" Corregated Metal Pipe	L.F.	Storm Drains	x		x						x	x	CM
19" x 30" Horizontal Elliptical Reinforced Concrete Pipe	L.F.	Storm Drains	x		x						x	x	CM
38"X60" Reinforced Concrete Elliptical Pipe	L.F.	Storm Drains	x		x						x	x	CM
48" Corrugated Aluminum Alloy Pipe, Gauge 12	L.F.	Storm Drains	x		x						x	x	CM
29"x45" Reinforced Concrete Elliptical Flared End Sections	Each	Storm Drains	x		x						x	x	CM
36" Corrugated Aluminum Alloy Pipe, Gauge 14	L.F.	Storm Drains	x		x						x	x	CM
Precast Concrete Arch Culvert, 21' Diameter	L.F.	Storm Drains	x		x						x	x	CM
Precast Concrete Culvert, 8' x 11'	L.F.	Storm Drains	x		x						x	x	CM
29"x45" Reinforced Concrete Elliptical Pipe	L.F.	Storm Drains	x		x						x	x	CM
19" x 30" Reinforced Concrete Elliptical Pipe, Class V	L.F.	Storm Drains	x		x						x	x	CM
3" Ductile Iron Pipe	L.F.	Storm Drains	x		x						x	x	CM
43" x 68" Reinforced Concrete Elliptical Pipe, Class V	L.F.	Storm Drains	x		x						x	x	CM
18 Inch Half Section Corrugated Metal Pipe	L.F.	Storm Drains	x		x						x	x	CM
Vertical Drain System	S.Y.	Storm Drains	x		x						x	x	CM
Cleaning Existing Storm Drains	L.F.	Storm Drains				x			x				CM
8" PVC Schedule 80	L.F.	Storm Drains	x		x						x	x	CM
12" Corrugated Metal Flared End Section	Each	Storm Drains	x		x						x	x	CM
12" Ductile Iron Pipe	L.F.	Storm Drains	x		x						x	x	CM
12" Reinforced Concrete Flared End Section	Each	Storm Drains	x		x						x	x	CM
12" High Density Polyethylene Flared End Section	Each	Storm Drains	x		x						x	x	CM
12" Reinforced Concrete Pipe	L.F.	Storm Drains	x		x						x	x	CM
12" Reinforced Concrete Pipe, Class V	L.F.	Storm Drains	x		x						x	x	CM
Cleaning Existing Drainage Structures	Each	Storm Drains				x			x				CM
Clean Existing Drainage System	LF	Storm Drains				x			x				CM
Inlet, Type D1 Modified	Each	Manholes & Inlets	x		x		x			x		x	CM
Outlet Control Structure	Each	Manholes & Inlets			x		x				x	x	CM
Temporary Pipe Plug	Each	Manholes & Inlets	x		x		x					x	CM
Inlet, Type Double D1	Each	Manholes & Inlets	x		x		x			x		x	CM
Inlet, Type D1 (NJDOT)	Unit	Manholes & Inlets	s		s		s			s		s	CM
Manhole, Type MHX	Each	Manholes & Inlets	x		x		x			x		x	CM
Inlet, Type D2-1	Each	Manholes & Inlets	x		x		x			x		x	CM
Reset Existing Casting	Each	Manholes & Inlets	x			x	x						CM
Flow Control Structure	Each	Manholes & Inlets	x		x		x		x	x		x	DE
Drainage Chamber	Each	Manholes & Inlets	x		x		x			x		x	DE
Manhole, Type SP-1	Each	Manholes & Inlets	x		x		x			x		x	CM
Manhole, Type SP-2	Each	Manholes & Inlets	x		x		x			x		x	CM
Reset Frame, Type E with Extension	Each	Manholes & Inlets	x		x	x	x			x		x	CM
Outlet Structure	Each	Manholes & Inlets	x		x		x			x		x	CM
New Inlet Frame & Grate, Type B	Each	Manholes & Inlets	x		x		x			x		x	CM
New Inlet Frame & Grate, Type G-1	Each	Manholes & Inlets	x		x		x		x	x		x	CM
Reconstructed Inlet, Type D2, Using Existing Grate and Frame	Each	Manholes & Inlets	x		x		x			x		x	CM
Incidental Concrete	Each	Manholes & Inlets	x		x		x			x		x	CM
Inlet Converted to Manhole	Each	Manholes & Inlets	x		x		x			x		x	CM
Reconstructed Inlet, Type B1-X1, Using New Grate and Frame	Each	Manholes & Inlets	x		x		x			x		x	CM

October 2015

Page 8 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
New Manhole Frame and Cover	Each	Manholes & Inlets	x		x		x		x	x		x	CM
Repair Inlets	SF	Manholes & Inlets	x		x	x	x		x	x		x	CM
Reset Frame	Each	Manholes & Inlets	x		x	x	x		x	x		x	CM
Temporary Inlet Cap	Each	Manholes & Inlets	x		x		x		x	x		x	CM
Clean Existing Drainage System	LF	Manholes & Inlets				x			x				CM
Fill Abandoned Pipe	CY	Minor Conc Structures & Incidental Conc	x	x	x			x				x	CM
precast Concrete Splash Pad	Each	precast Concrete Splash Pad	x	x	x			x				x	CM
Pipe Support Bridge	L.S.	Pipe Support Bridge	x	x	x			x				x	DE
Mitered Headwall	Each	Mitered Headwall	x	x	x			x				x	CM
Concrete Gutter, 4" Thick	S.Y.	Concrete Gutter, 4" Thick	x	x	x			x				x	CM
Asphalt Concrete Lip Curb	L.F.	Asphalt Conc. Lip Curb and Lip Curb inlets	x	x	x			x				x	CM
Asphalt Concrete lip Curb Inlet	Each	Asphalt Conc. Lip Curb and Lip Curb inlets	x	x	x			x				x	CM
9" x 16" Concrete Verticle Curb (NJDOT)	LF	Concrete Curb	x	x	x			x				x	CM
Concrete Island, 4" Thick	SY	Concrete Curb	x	x	x			x				x	CM
Belgian Block Curb	LF	Concrete Curb	x	x	x			x				x	CM
Concrete Lip Curb	L.F.	Concrete Curb	x	x	x			x				x	CM
Concrete Median Barrier, Protection, Variable Height	LF	Concrete Median Barrier		x	x		x	x		x		x	CM
VMS Equipment Median	Each	Concrete Median Barrier		x	x		x	x		x		x	DE
Concrete Median Barrier Roadway	LF	Concrete Median Barrier		x	x		x	x		x		x	CM
15"x41" Concrete Barrier Curb	L.F.	Concrete Median Barrier		x	x		x	x		x		x	CM
Concrete Median Barrier, Protection	LF	Concrete Median Barrier		x	x		x	x		x		x	CM
Concrete Median Barrier, Type 1	LF	Concrete Median Barrier		x	x		x	x		x		x	CM
Concrete Roadway Barrier With Moment Slab	LF	Concrete Median Barrier		x	x		x	x		x		x	DE/CM
4" Aluminum Tube, Concrete Mounted	LF	Sign Support Structures	x		x		x			x		x	CM
Relocate Existing Ground-Mounted Sign	Each	Sign Panels			x		x				x	x	CM
Removal of Existing Ground-Mounted Sign	Each	Sign Panels			x		x				x	x	CM
Sign Panels	SF	Sign Panels			x		x				x	x	DE
U-Channel Post	LF	Sign Panels			x		x				x	x	CM
Remove Signs	Each	Sign Panels			x		x				x	x	CM
Relocate Sign Panels	Each	Sign Panels			x		x				x	x	CM
Telescoping Guide Rail End Terminal	Each	Guard Rail	x		x		x				x	x	CM
Flared Guide Rail Terminal	Each	Guard Rail	x		x		x				x	x	CM
Offset Bracket	Each	Guard Rail	x		x		x				x	x	CM
Parapet Connection, Type A	Each	Guard Rail	x		x		x				x	x	CM
Parapet Connection, Type B	Each	Guard Rail	x		x		x				x	x	CM
Removal of Beam Guide Rail	LF	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail Post Weldment	Each	Guard Rail	x		x		x				x	x	CM
Safety Walk Connection, Type A	Each	Guard Rail	x		x		x				x	x	CM
Safety Walk Connection, Type B	Each	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail Element	L.F.	Guard Rail	x		x		x				x	x	CM
Tangent Guide Rail Terminal	Each	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail Anchorage	Each	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail Buried End Terminal	Each	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail, Dual-Faced	LF	Guard Rail	x		x		x				x	x	CM

October 2015

Page 9 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Beam Guide Rail	LF	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail, Dual-Faced, Bridge	LF	Guard Rail	x		x		x				x	x	CM
Rub Rail	LF	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail Post	Each	Guard Rail	x		x		x				x	x	CM
Reset Beam Guide Rail with New Post	L.F.	Guard Rail	x		x		x				x	x	CM
Beam Guide Rail Post, 8' Long	Each	Guard Rail	x		x		x				x	x	CM
Reset Beam Guide Rail, Type A	L.F.	Guard Rail	x		x		x				x	x	CM
Chain Link Fence, Type II, 84" High	LF	Fencing	x		x		x				x	x	CM
Vehicular Gate, Type II, 84" High, 12' Wide	Each	Fencing	x		x		x				x	x	CM
Chain Link Fence Gate	Each	Fencing	x		x		x				x	x	CM
Bridge Fencing, Curved Top, 75" High	L.F.	Fencing	x		x		x				x	x	CM
Chain-Link Fence, Aluminum Coated Steel, Bridge, 6'-3" High (NJDOT)	L.F.	Fencing	x		x		x				x	x	CM
Reset Fence	L.F.	Fencing	x		x		x				x	x	CM
Chain Link Fence, Type II, 48" High	L.F.	Fencing	x		x		x				x	x	CM
Vehicular Gate, Type II, 48" High, 12' Wide	Each	Fencing	x		x		x				x	x	CM
Temporary Fencing, 96" High	L.F.	Fencing	x		x		x				x	x	CM
Fence Screening Slats	L.F.	Fencing	x		x		x				x	x	CM
Vehicular Gate, Type II, 84" High, 30' Wide	Each	Fencing	x		x		x				x	x	CM
Pedestrian Gate, Type II, 84" High, 4' Wide	Each	Fencing	x		x		x				x	x	CM
Chain Link Fence, 7' High	L.F.	Fencing	x		x		x				x	x	CM
Median Fencing	L.F.	Fencing	x		x		x				x	x	CM
Temporary Chain Link Fence, Type II, 84" High	L.F.	Fencing	x		x		x				x	x	CM
Concrete Monuments	Each	Concrete Monuments	x		x						x	x	CM
Concrete Driveway Apron, 6" Thick	S.Y.	Sidewalk	x	x	x		x					x	CM
Detectable Warning Surface	S.Y.	Sidewalk	x		x		x					x	CM
Asphalt Concrete Sidewalk, 4" Thick	SY	Sidewalk	x		x		x					x	CM
Concrete Sidewalk, 4" Thick	S.Y.	Sidewalk	x	x	x		x					x	CM
Reconstruct Safetywalk	S.F.	Sidewalk	x		x		x					x	CM
Delineator, Type BA-R	Each	Delineators			x						x	x	CM
Delineator, Type CAS-Y	Each	Delineators			x						x	x	CM
Pavement Striping, White, 12" Wide	L.F.	Pavement Strips & Markings	x		x		x				x	x	CM
Preformed Contrast Marking Tape	L.F.	Pavement Strips & Markings	x		x		x				x	x	CM
Diamond Grinding	L.F.	Pavement Strips & Markings	x		x		x				x	x	CM
Striping and Marking Removal	L.S.	Pavement Strips & Markings	x		x	x	x				x	x	CM
Removal of Pavement Stripes (Hydromilling)	L.F.	Pavement Strips & Markings	x		x						x	x	CM
Horizontal Ramp Gate	Each	Pavement Strips & Markings	x		x		x				x	x	CM
Temporary Pavement Striping	LF	Pavement Strips & Markings	x		x		x				x	x	CM
Traffic Stripes, Long - Life, Epoxy Resin	L.F.	Pavement Strips & Markings	x		x		x				x	x	CM
Traffic Markings, Lines, long - Life, Epoxy Resin	L.F.	Pavement Strips & Markings	x		x		x				x	x	CM
Traffic Markings, Lines, Long - Life, Thermoplastic	L.F.	Pavement Strips & Markings	x		x						x	x	CM
Furnish Field Office, Type A	Unit	Maintain Field Office				x							CM
Maintain Field Office, Type A	Month	Maintain Field Office				x							CM
Remove Field Office Complex	L.S.	Maintain Field Office				x							CM
Maintain Field Office Complex	Month	Maintain Field Office				x							CM
Horizontal Ramp Gate	Each	Horizontal Ramp Gate										x	CM

October 2015

Page 10 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Test Pits	Each	Test Pits										x	CM
Test Pit Extra Depth	L.F.	Test Pits										x	CM
Cleaning Existing Storm Drain, 12" to 48" Diameter	LF	Miscellaneous Drainage				x						x	CM
Clean Existing Storm Drains, 15" to 24" Diameter	L.F.	Miscellaneous Drainage				x						x	CM
Quadguard Impact Attenuator, 9 Bays, 36" Wide	Each	Impact Attenuator				x	x					x	CM
Pressure Grout Approach Slab	Each	Impact Attenuator				x	x					x	CM
Z-Turn Attrnuator	Each	Impact Attenuator				x	x					x	CM
Mile Marker, Type RP	Each	Mile Marker	x		x		x					x	CM
Utility Support Hangers	Each	Utility Support Hangers	x		x		x					x	CM/DE
Raised Pavement Markers	Each	Raised Pavement Markers	x		x		x					x	CM
Raised Pavement Markers, Bi-Directional, Amber Lens	Each	Raised Pavement Markers	x		x		x					x	CM
48 Inch Reinforced Concrete Pipe, Class V Pipe Jacking	LF	Pipe Jacking	x		x		x						CM/DE
30 Inch Steel Pipe Jacking	L.F.	Pipe Jacking	x		x		x						CM/DE
Thermoplastic Rumble Strips	L.F.	Rumble Strips	x		x		x						CM
Stormwater Diversion Chamber	Each	Stormwater Diversion Chamber	x		x		x						CM/DE
Stormwater Treatment Units	Each	Manholes and Inlets	x		x	x	x				x		CM/DE
Temporary Water Facilities	L.S.	Temporary Water Facilities	x		x		x			x		x	CM/DE
2-6" Electric Riser Conduit, Concrete Encased	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Electric Manhole	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6-4" Telephone Conduit Bank	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6-4" Telephone Conduit Bank, Bridge Mounted	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
9-5" Duct, Concrete Encased Ductbank	LF	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
36" Split Steel Casing	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Water Service Connection	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6" Ductile Iron Pipe Sewer Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Manufactured Treatment Devices, Type 1	Each	PS&G Electric Manholes and Conduits	x		x	x	x				x		CM
2-5" Duct, Sand Encased Ductbank	LF	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Reset Water Valve Boxes	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
48" Steel Casing Pipe, Jacking And Tunneling Method	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
26" Steel Casing Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6" Polyvinyl Chloride Sewer Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
8" Ductile Iron Sanitary Sewer Force Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Plastic Gas Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Steel Gas Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Electrical Conduit, 3" Steel	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Concrete Encased 4" Duct Bank	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12"X12"X6" C.I. Junction Box	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
8" Polyvinyl Chloride Sewer Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Water Main Blow Off Assemblies	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Tapping Sleeve and Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Line Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Line Stop	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Manhole, Sanitary Sewer, 5' Diameter	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Sanitary Sewer Air Release And Vacuum Valve Assemblies	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Sanitary Sewer Sampling Valve Assemblies	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Sanitary Sewer Blow Off Valve Assemblies	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Cable Hand Hole	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Utility Relocation, Telephone	L.S.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
6" Line Stop	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
2-4" Telephone Riser Conduit	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
2-4" Telephone Riser Conduit, Concrete Encased	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
1-4" Cable Riser Conduit, Concrete Encased	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Manhole, PSE&G 3-WAY	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
8" PVC Sanitary Pipe	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Reset Gas Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Relocation of JCP&L Electrical Facilities	L.S.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
6-4" Telephone PVC Conduits	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
2-4" Electrical (PSE&G) PVC Conduits	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4-4" Cable TV PVC Conduits (Encased in Concrete)	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4-4" Cable Conduit Bank, Bridge Mounted	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
9-5" Duct, On Structures	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
2-5" Duct, Concrete Encased Ductbank, with Risers	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Ductile Iron Pipe Sewer Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6" Sanitary Sewer Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
16" Steel Casing	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Removal of Sewer Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Sanitary Wastewater Transport and Disposal	L.S.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6" Ductile Iron Water Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
10" Water Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
10" Ductile Iron Water Cap	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Water Service Cap	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Water Hydrant	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Removal of Water Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Gas Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Reset Gas Valve Box	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Gas Service Cap	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Linestop and Tie-In Assistance	Crew	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Fabricate Gas Tie-In Piece	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Removal of Gas Pipe	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Relocate JCP&L Electric Distribution - CHAR	L.S.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
4" Telephone PVC	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
2-4" Telephone Duct Bank, PVC	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
24"x36" Telephone Junction Box	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Removal and Reinstallation of Existing Fiber Cables	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Dry Standpipe	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Relocation of JCP&L Electrical Facilities - Distribution Only	LS	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
Relocation of JCP&L Electrical Facilities - 34.5 KV Transmission Only	LS	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
Relocation of Temporary Verizon Facilities	LS	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM/DE
8" Plastic Gas Line (Under Roadway)	LF	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
8" Temporary Gas Line, On Structure, 8" Temporary Steel Gas Line (On and Off	LF	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
8" Temporary Plastic Gas Line (Under Roadway)	LF	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Water Air Release Assembly	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
2" Water Valve and Blow-Off	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Water Valve and Blow-Off	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
13-4" Telephone Duct Bank, PVC	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6'x12' Telephone Manhole, Rebuild	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Telephone, Swing Conduit	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Manhole, Sanitary Sewer Air Release	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Ductile Iron Water Cap	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Gas Expansion Joint Vault	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Manhole, Sanitary Sewer (4' Diameter)	Unit	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
3-4" Telephone Riser Conduit	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
8" Steel Gas Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Temporary Sanitary Facilities	L.S.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Fire Hydrant Assemblies	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Plastic Gas Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Gas Service Connection	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Ductile Iron Water Pipe Class 54 Water Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Reset Fire Hydrant	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Ductile Iron Water Pipe Class 52 Force Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
4" Water Valve	Each	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
6" Steel Gas Main, On Structures	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
8" Ductile Iron Sanitary Sewer Main	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
12" Ductile Iron Water Pipe, Class 52	L.F.	PS&G Electric Manholes and Conduits	x		x		x			x		x	CM
Lead and Asbestos Survey, Report and Monitoring	Each	Non-Hazardous Material Handling											CM/DE
Sluice gate	Each	Non-Hazardous Material Handling	x		x		x				x	x	CM/DE
Demolition of Buildings (1)	L.S.	Non-Hazardous Material Handling	x		x		x					x	DE/CM
Removal of Asbestos (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $100,000. Enter a Unit Price of $100,000 as your bid for this item.)	Each	Non-Hazardous Material Handling	x		x		x					x	CM/DE
Off-Site Disposal of ID-27 Waste	Ton	Non-Hazardous Material Handling					x		x			x	CM
Environmental Health and Safety Plans	Ton	Environmental Health and Safety Plans			x		x						CM
Removal of Underground Storage Tanks	Each	Removal of Underground Storage Tanks	x		x		x					x	CM/DE
5" Fiberglass Conduit	L.F.	PUBLIC UTILITIES IN STRUCTURES	x		x		x						CM
As-Built Plans	L.S.	Utilities					x						CM
Oil Water Separato	L.S.	Oil Water Separato	x		x		x					x	
Removal of Aboveground Storage Tanks	L.S.	Non-Hazardous Material Handling					x		x			x	CM/DE
4" Fiberglass Conduit, On Structures	L.F.	PUBLIC UTILITIES IN STRUCTURES	x		x		x						CM
Removal of Asbestos (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $20,000. Enter a Unit Price of $20,000 as your bid for this item.)	L.S.	Non-Hazardous Material Handling					x		x			x	CM
Installation of 4" Telephone Conduit, On Structures	L.F.	PUBLIC UTILITIES IN STRUCTURES	x		x		x						CM
Track Removal, Storage, and Tie disposal, Siding (Excluding Grade Crossing)	T.F.	Track Removal, Storage, and Tie disposal, Siding (Excluding Grade Crossing)	x		x		x						CM

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Track Removal, Storage, and Tie disposal, Main Track (Excluding Turnout)	T.F.	Track Removal, Storage, and Tie disposal, Main Track (Excluding Turnout)	x		x	x						CM
Remove and Store Existing No. 10 Turnout	Each	Remove and Store Existing No. 10 Turnout	x		x	x						CM
Remove and Replace Designated Switch Timbers	L.F.	Remove and Replace Designated Switch Timbers	x		x	x						CM
Remove Grade Crossing, Salvage Rail & Tie Plates, Dispose of Ties and Chairrail, Restore Pavement	T.F.	Plates, Dispose of Ties and Chairrail, Restore Pavement	x		x	x						CM
Rebuild Track; Subballast, Ballast, New Ties, Fit Tie Plates, Dispose , Fit Rail, Line and Surface	T.F.	Rebuild Track; Subballast, Ballast, New Ties, Fit Tie Plates, Dispose , Fit Rail, Line and Surface	x		x	x						CM
Reinstall No. 10 Turnout, Subballast, Ballast	Each	Reinstall No. 10 Turnout, Subballast, Ballast	x		x	x						CM
Supply and Install New Grade Crossing, Rail, Ties, Subballast, Ballast, Pavement, Rubber Flangeway	T.F.	Supply and Install New Grade Crossing, Rail, Ties, Subballast, Ballast, Pavement, Rubber Flangeway	x		x	x						CM
Environmental Health and Safety Plans	LS	Environmental Health and Safety				x		x				DE
Lead and Asbestos Survey, Report and Monitoring	L.S.	Underground Storage Tank Removal				x		x				DE
Demolition of Buildings (1)	L.S.	Underground Storage Tank Removal				x		x				DE
Off-Site Disposal of ID-27 Waste	Ton	Underground Storage Tank Removal				x		x			x	DE
Environmental Health and Safety Plans	L.S.	Underground Storage Tank Removal				x		x				DE
Removal of Underground Storage Tank	Each	Underground Storage Tank Removal				x		x				DE
Transite Duct Bank Removal	L.F.	Underground Storage Tank Removal				x		x				DE
Filter Diaphragm	C.Y.	Underground Storage Tank Removal				x		x				CM
Temporary Subgrade Stabilization for Haul Roads, Type 1	S.Y.	Underground Storage Tank Removal				x		x				CM
Temporary Subgrade Stabilization for Haul Roads, Type 2	S.Y.	Underground Storage Tank Removal				x		x				CM
Highway Advisory Radio Sign	Each	Highway Advisory Radio Sign				x		x				CM
Access Gate	L.S.	Access Gate				x		x				CM
Lead and Asbestos Survey, Report and Monitoring (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $XX,000. Enter a Unit Price of $50,000 as your bid for this item.)	L.S.	Lead and Asbestos Survey, Report and Monitoring (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $XX,000. Enter a Unit Price of $XX,000 as your bid for this item.)				x		x				CM
Furnish Track	T.F.	Furnish Track				x		x				CM
Tank Cleaning	Month	Tank Cleaning				x		x				CM
Tank Decontamination	Each	Tank Decontamination				x		x				CM
Tank Draining - Storm System	Each	Tank Draining - Storm System				x		x				CM
Tank Draining - Treatment Facility	Gallon	Tank Draining - Treatment Facility				x		x				CM
Tank Rental	Month	Tank Rental				x		x				CM
Controlled Release Terminals	L.F.	Underground Storage Tank Removal				x		x				DE
Controlled Release Terminal Anchorages	Each	Controlled Release Terminal Anchorages				x		x				CM
Concrete Foundation For Lighting Distribution and Control Panel	Each	Common Electrical Provisions	x		x	x				x	x	DE/CM
Foundation, Type MC	Each	Common Electrical Provisions	x		x	x				x	x	DE/CM
Transformer, Type 45KVA	Each	Common Electrical Provisions	x		x	x				x	x	DE
Enclosed Circuit Breaker	Each	Common Electrical Provisions	x		x	x				x	x	CM

October 2015

Page 14 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Meter and Disconnect Mount	Each	Common Electrical Provisions	x		x		x				x	x	CM
Service Cable Replacement in Kind	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
Temporary Electrical and Lighting Facilities	L.S.	Common Electrical Provisions	x		x		x				x	x	DE/CM
#1/0 A.W.G Ground Wire	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
3" Rigid Metallic Conduit, on Structures	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
3" Rigid Metallic Conduit, Underground	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
3" Rigid Nonmetallic Conduit, PVC-(Schedule 40)	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
#6 A.W.G. Ground Wire	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
#6 A.W.G. Multiple Lighting Cable	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
#6 A.W.G. Service Cable (600V)	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
Remove and Salvage Existing Facilities	LF	Common Electrical Provisions	x		x		x				x	x	CM
Underbridge Lighting Fixture	Each	Roadway Lighting	x		x		x				x		DE
Tunnel Lighting Fixture	Each	Roadway Lighting	x		x		x				x		DE
Load Center Cabinet '206TPK'	Each	Roadway Lighting	x		x		x				x		DE
Lighting Standard Base, Type I	Each	Roadway Lighting	x		x		x				x		DE
Meter Cabinet, Type H, Voltage 240/480V, 200 AMP	Each	Roadway Lighting	x		x		x				x		DE
Tunnel Lighting	L.S.	Roadway Lighting	x		x		x				x		DE
Temporary Lighting Systems	L.S.	Roadway Lighting	x		x		x				x		CM
Current Transformer Cabinet	Each	Roadway Lighting	x		x		x				x		DE
Load Center Cabinet, Type F Modified	Each	Roadway Lighting	x		x		x				x		DE
Load Center, Type J1	Each	Roadway Lighting	x		x		x				x		DE
Concrete Base, Type M	Each	Roadway Lighting	x		x		x				x		DE
Load Center, Type T	Each	Roadway Lighting	x		x		x				x		DE
Meter Cabinet, Type Nonstandard, Voltage 277/480V	Each	Roadway Lighting											DE
Remove And Salvage Existing Facilities	L.S.	Roadway Lighting	x		x	x					x	x	CM
Roadway Lighting Distribution and Control Panel	Each	Roadway Lighting	x		x						x	x	DE
RELOCATE JUNCTION BOX FOUNDATION, TYPE JBF	Each	Roadway Lighting	x		x	x	x				x	x	CM
RELOCATE LIGHTING STANDARD	Each	Roadway Lighting	x		x	x	x				x	x	CM
Lighting Standard, Type L-MG-26	Each	Roadway Lighting	x		x						x	x	DE
Type P4 Luminaire, 400W	Each	Roadway Lighting	x		x		x				x		DE
Illumination For Sign Structure No. XX.XX	L.S.	Roadway Lighting	x		x		x				x		DE
Removal of Emergency Speed Warning and Speed Limit Signs	L.S.	Emergency Speed Warning and Speed Limit Signs				x	x						CM
System Manufacturer Installation and Testing (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $20,000. Enter a Unit Price of $20,000 as your bid for this item.)	L.S.	System Manufacturer Installation and Testing (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $20,000. Enter a Unit Price of $20,000 as your bid for this item.)				x							CM
In-Pavement Wireless Sensor	Each	Wireless Vehicle Detection System				x	x						DE
Wireless Access Point, Pole Mounted	Each	Wireless Vehicle Detection System											DE
Spare Parts	L.S.	Spare Parts				x	x						DE
JCP&L Electrical Service Contract	L.S.	JCP&L Electrical Service Contract				x	x						CM
Varible Message Sign Installation	Each	Varible Messaage Sign Installation				x	x						DM
Varible Speed Limit Sign Installation	Each	Varible Messaage Sign Installation				x	x						DM
System Control Cabinet Installation	Each	Varible Messaage Sign Installation				x	x						DE

October 2015

Page 15 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Electric Service Meter Cabinet	Each	Roadway Lighting	x		x		x				x		CM
Power Equipment on ITSS	Each	Roadway Lighting	x		x		x						DE
Transformer, Type 37.5kVA	Each	Varible Messaage Sign Installation					x						DE
CCTV Camera, ITSS Mounted	Each	CCTV Camera Installation	x		x		x						DE
CCTV Camera, Pole Mounted With Lowering Device	Each	CCTV Camera Installation	x		x		x						DE
Relocation of Highway Advisory Road Sign	L.S.	Common Electrical Provisions	x		x		x				x	x	CM
Wireless Access Point, ITSS Mounted	Each	Wireless Vehicle Detection System					x						DE
2-Way Duct Bank, 4" HDPE Conduits Directional Drilled	L.F.	Common Electrical Provisions	x		x		x				x	x	DE
2-Way Comm Duct Bank, Soil Encased	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
4" HDPE Conduit with Pull Cords	LF	Common Electrical Provisions	x		x		x				x	x	CM
4-Way Duct Bank, 4" HDPE Conduits Directional Drilled	L.F.	Common Electrical Provisions	x		x		x				x	x	DE
Concrete Foundations For Aluminum Light Assemblies	Each	Concrete Foundations For Aluminum Light											CM
2-Way Comm Duct Bank, Concrete Encased	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
4-Way Power/Comm Duct Bank, On Structure	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
Reestablish/Relocate Underground Customer Electric Service	L.S.	Common Electrical Provisions	x		x		x				x	x	CM
Multi-Mode Fiber Optic Cable, 6-Fibers	L.F.	Common Electrical Provisions	x		x		x				x	x	DE
Lighting Standard, Type L-ITS-40	Each	Common Electrical Provisions	x		x		x				x	x	DE
ITS Power Equipment, Pedestal Mounted	Each	Common Electrical Provisions	x		x		x				x	x	DE
ITS Equipment Platform, Type 2	Each	Common Electrical Provisions	x		x		x				x	x	DE
Removal Of Highway Advisory Radio Sign System, Ground Mounted	Each	Common Electrical Provisions	x		x		x				x	x	CM
Radio Antenna Mount	Each	Common Electrical Provisions	x		x		x				x	x	DE
Temporary Electric Facilities, Buried	L.S.	Common Electrical Provisions	x		x		x				x	x	CM
Customer Owned Underground Service - Electric	L.S.	Common Electrical Provisions	x		x		x				x	x	CM
Customer Owned Underground Service - Telephone	L.S.	Common Electrical Provisions	x		x		x				x	x	CM
Hybrid Changeable Message Sign (This is a NO-BID, Lump Sum item for this contract. The unit price is $65,000. Enter a Unit Price of $65,000 as your bid for this item).	L.S.	Common Electrical Provisions	x		x		x				x	x	DE
Hybrid Changeable Message Sign Installation	Each	Common Electrical Provisions	x		x		x				x	x	DE
Image Detection System	L.S.	Common Electrical Provisions	x		x		x				x	x	DE
Advanced Radar Detection	L.S.	Common Electrical Provisions	x		x		x				x	x	DE
End Node Radio Installation	Each	Common Electrical Provisions	x		x		x				x	x	DE
Software Implementation	L.S.	Common Electrical Provisions	x		x		x				x	x	DE
Central Software Hosting / Maintenance	Day	Common Electrical Provisions	x		x		x				x	x	DE
Portable Variable Message Sign	Day	Common Electrical Provisions	x		x		x				x	x	DE
Portable Traffic Detection Sensor	Day	Common Electrical Provisions	x		x		x				x	x	DE
Training and Documentation	L.S.	Common Electrical Provisions	x		x		x				x	x	DE
5-Way Duct Bank, 4" HDPE Conduits, Directional Drilled	L.F.	Common Electrical Provisions	x		x		x				x	x	DE
Transformer, Type 50 kVA	Each	Common Electrical Provisions	x		x		x				x	x	DE
Fiber Optic Duct Bank	L.S.	Common Electrical Provisions	x		x		x				x	x	CM
HAR Sign Beacon Control Equipment	Each	Common Electrical Provisions	x		x		x				x	x	CM
8-5" Electric Duct Bank, PVC	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
Illuminated Sign Relocation	Each	Common Electrical Provisions	x		x		x				x	x	CM
2-4" Telephone Duct Bank, PVC with Risers	L.F.	Common Electrical Provisions	x		x		x				x	x	CM

October 2015

Page 16 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
30"x60" Temporary Telephone Handhole	Each	Common Electrical Provisions	x		x		x				x	x	CM
8-6" Electric Duct Bank on Structure, Fiberglass	L.F.	Common Electrical Provisions	x		x		x				x	x	CM
Landscape Wall	S.F.	TREE WELLS AND TREE WALLS	x		x		x				x	x	CM/DE
Topsoil	SY	Topsoiling	x				x					x	CM
Seeding, Type A	SY	Seeding & Sodding	x		x		x				x	x	CM
Seeding Type W	SY	Restoration of Temporary Wetland Disturbances					x						CM
Mowing	Acre	Seeding & Sodding					x					x	CM
Straw Mulching	S.Y.	Temp Soil Erosion & Dust Control	x		x							x	CM
Watering	MG	Seeding & Sodding					x					x	CM
Planting, Atlantic White Cedar (Chamaecyparis Thyoides)	Each	Planting, Atlantic White Cedar (Chamaecyparis Thyoides)	x	x									CM
Wood Chip Mulching	S.Y.	Wood Chip Mulching	x	x									CM
Abandoned Plant Pits	C.F.	Abandoned Plant Pits	x	x									CM
Soil Stablization Matting	S.Y.	Soil Stablization Matting					x					x	CM
Block Paving	S.Y.	Block Paving					x					x	CM
Gravel Paving	S.Y.	Gravel Paving					x					x	CM
Nonvegetative Surface, Hot Mix Asphalt	S.Y.	Nonvegetative Surfaces	x		x	x					x	x	CM
Herbaceous Wetland Planting, Carex Stricta	Each	Seeding & Sodding	x		x							x	CM
Bedding for Reforestation	S.Y.	Seeding & Sodding	x		x							x	CM
Tree Snags	Each	Seeding & Sodding	x		x							x	CM
Invasive Vegetation Removal	Acre	Seeding & Sodding	x		x							x	CM
Topsoil Amendment	S.Y.	Seeding & Sodding	x		x							x	CM
Leaf Litter	C.Y.	Seeding & Sodding	x		x							x	CM
Concrete Modular Unit Wall	C.Y.	Seeding & Sodding	x		x							x	CM
Block Wall	S.F.	Block Wall	x		x							x	CM/DE
Uniform Traffic Directors (This is a NO-BID, Lump Sum item for this contract. The Lump Sum price is $50,000. Enter a Unit Price of $50,000 as your bid for this item.)	L.S.	Traffic Control Devices		x	x		x	x		x		x	CM
Precast Concrete Curb Construction Barrier	L.F.	Traffic Control Devices		x	x		x	x		x		x	CM
Repair Temporary Impact Attenuators	Barrel	Traffic Control Devices				x			x				CM
Repair Truck Mounted Impact Attenuators	Each	Traffic Control Devices				x			x				CM
Furnishing Temporary Concrete Barrier, Type 4	L.F.	Traffic Control Devices		x	x		x	x		x		x	CM
Flashing Arrow Boards, 4' x 8'	Each	Lane & Shoulder Closings		x	x		x	x		x		x	CM
Placing And Removing Temporary Impact Attenuator, Frangible Module Type A	Each	Lane & Shoulder Closings		x	x		x	x		x		x	CM
Furnishing Sign Stands	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Sign PaneL.S.	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Overlay PaneL.S.	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Traffic Cones	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Flashing Lights	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Batteries	Each	Lane & Shoulder Closings	x		x	x							CM
Placing and Removing Concrete Barrier	L.F.	Lane & Shoulder Closings				x	x		x			x	CM
Temporary Striping	L.F.	Lane & Shoulder Closings				x	x		x			x	CM
Traffic Protection Patrol	M.H.	Lane & Shoulder Closings				x							CM

October 2015

Page 17 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Uniformed Flagman	M.H.	Lane & Shoulder Closings				x							CM
Furnishing Truck with Mounted Attenuator	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Temporary Impact Attenuator	Each	Lane & Shoulder Closings	x		x	x							CM
Furnishing Truck with Mounted Attenuator for Engineer's Use	M.H.	Lane & Shoulder Closings	x		x	x							CM
Placing and Removing Temporary Impact Attenuator	Each	Lane & Shoulder Closings				x	x						CM
Shoulder Closing for Engineer's Use	Each	Lane & Shoulder Closings				x							CM
Modular Guidance System	L.F.	Lane & Shoulder Closings	x		x	x	x					x	CM
Furnishing Traffic protection Devices	L.S.	Lane & Shoulder Closings	x		x	x							CM
Furnish Varible Message Sign	Each	Lane & Shoulder Closings	x		x	x	x					x	CM
Installation, Maintenance and Removal of Breakaway Barricades	Each	Lane & Shoulder Closings	x		x	x	x					x	CM
Maintenance and Protection of Traffic	L.S.	Lane & Shoulder Closings				x	x						CM
Emergency Lane Closure	Each	Lane & Shoulder Closings				x	x						CM
Maintenance and Protection of Traffic on Location No. 1	L.S.	State, County and Local Highways				x	x						CM
Building Architectural Work	L.S.	Building Architectural Work	x		x	x	x					x	DE/CM
Building Plumbing Work	L.S.	Building Plumbing Work	x		x	x	x					x	DE/CM
Building Electric Work	L.S.	Building Electric Work	x		x	x	x					x	DE/CM
Building Mechanical Work	L.S.	Building Mechanical Work	x		x	x	x					x	DE/CM
Building Structural Work	L.S.	Building Structural Work	x		x	x	x					x	DE/CM
I-11 Soil Aggregate	C.Y.	I-11 Soil Aggregate	x		x	x	x					x	CM
Dense-Graded Aggregate Base Course, 6" Thick	S.Y.	Aggregate Base Course	x	x	x							x	CM
Prime Coat	Gallon	HMA Pavements	x		x			x			x	x	CM
Hot Mix Asphalt 9.5H 64 Surface Course	Ton	HMA Pavements	x		x			x			x	x	CM
Hot Mix Asphalt 12.5H 76 Surface Course	Ton	HMA Pavements	x		x			x			x	x	CM
Hot Mix Asphalt 25H 64 Base Course	Ton	HMA Pavements	x		x			x			x	x	CM
Controlled Release Terminal	Unit	Beam Guide Rail	x		x		x					x	CM
Controlled Release Terminal Anchorage	Unit	Beam Guide Rail	x		x		x					x	CM
RPM, Mono-Directional, White Lens	Each	Traffic Stripes	x		x		x				x		CM
Flexible Delineator, Ground Mounted	Unit	Traffic Stripes	x		x		x				x		CM
Guide Sign, Type GA, Breakaway Supports	S.F.	Traffic Stripes	x		x		x				x		CM
Fire Hydrant	Unit	Utilities	x		x		x				x		CM
Reset Fire Hydrant	Unit	Utilities	x		x		x				x		CM
Reset Water Valve Box	Unit	Utilities	x		x		x				x		CM
Reset Gas Valve Box	Unit	Utilities	x		x		x				x		CM
3" Rigid Metallic Conduit	L.F.	Roadway Lighting	x		x		x				x		CM
18" x 36" Junction Boxes	Unit	Roadway Lighting	x		x		x				x		CM
Junction Box Foundation	Each	Roadway Lighting	x		x		x				x		DE
Foundation, Type SFT	Unit	Roadway Lighting	x		x		x				x		DE
Meter Cabinet, Type T	Each	Roadway Lighting	x		x		x				x		CM
Controller, 8 Phase	Unit	Roadway Lighting	x		x		x				x		CM
Traffic Signal Mast Arm, Aluminum	Unit	Roadway Lighting	x		x		x				x		CM
Traffic Signal Mast Arm, Steel	Unit	Roadway Lighting	x		x		x				x		CM
Traffic Signal Cable, 2 Conductor	L.F.	Roadway Lighting	x		x		x				x		CM
Traffic Signal Head	Unit	Roadway Lighting	x		x		x				x		CM
Pedestrian Signal Head	Unit	Roadway Lighting	x		x		x				x		CM
Push Button	Unit	Roadway Lighting	x		x		x				x		CM

October 2015 Page 18 of 19

NJTA Procedures Manual
Exhibit 3-9 Material Acceptance Criteria Matrix

Pay Item Description	Pay Unit	Standard Specification Description	Source	Testing	Division 900 - Conformance	Other Conformance	Shop Drawings	Mix Design	QC Plan	Mill Certifications	Certifications of Compliance	Receiving Tickets	Reviewer (CM or DE)
Image Detector	Unit	Roadway Lighting	x		x		x				x		CM
Temporary Traffic Signal System, Location No. 1	L.S.	Roadway Lighting	x		x		x				x		CM
Controller Turn-On	Unit	Roadway Lighting	x		x		x				x		CM
Uninterruptible Power Source Unit with Controller Cabinet Revisions	Each	Roadway Lighting	x		x		x				x		CM
Lighting Standard Aluminum	Each	Roadway Lighting	x		x		x				x		DE
Luminaire	Unit	Roadway Lighting	x		x	x	x				x		DE
Temporary Highway Lighting System	L.S.	Roadway Lighting	x		x	x	x				x		DE
ITS Conduit, Type A	L.F.	Roadway Lighting	x		x	x	x				x		CM
Junction Box ITS Type A	Each	Roadway Lighting	x		x	x	x				x		CM
Control Center System, Location No.1	L.S.	Roadway Lighting	x		x	x	x				x		DE
Foundation, CSS Type A	Each	Roadway Lighting	x		x	x	x				x		DE
Camera Standard, Type A	Each	Roadway Lighting	x		x	x	x				x		DE
Camera	Each	Roadway Lighting	x		x	x	x				x		DE
Controller, Camera	Each	Roadway Lighting	x		x	x	x				x		DE
Fiber Optic Cable, Type A	L.F.	Roadway Lighting	x		x	x	x				x		DE
Controller CTSS	Unit	Roadway Lighting	x		x	x	x				x		CM
Sign Lighting, Structure No. XX	L.S.	Sign Structures	x		x	x	x				x		DE
Standby Wrecker Service	Hour	Lane & Shoulder Closings	x		x	x							CM

October 2015

Page 19 of 19

Section 4 - DESIGN SURVEYS

4.1. AERIAL PHOTOGRAPHY CRITERIA

4.1.1. Scale of Negatives

The flight height above the average ground elevation or set datum shall be such that the negatives will yield photographic prints on paper or on dimensionally stable polyester-type plastic or scanned images to the scale specified by the Authority's Project Manager. Negatives departing from the intended scale by more than five percent (5%) shall be rejected.

Unless specified otherwise by the Authority's Project Manager, the flight height shall be no more than eight times the value of the intended photography scale. Accordingly, the photography scales and flight heights, together with the corresponding contour intervals, are shown in Exhibit 4-1.

Exhibit 4-1 Photography Scale and Flight Height Guidelines

MAPPING SCALE	CONTOUR INTERVALS	PHOTOGRAPHY SCALE	FLIGHT HEIGHT
1" = 30'	1.0'	1" = 250'	1,500'
1" = 50'	1.0'	1" = 400'	1,800'
1" = 100'	2.0'	1" = 700'	4,200'
1" = 200'	5.0'	1" = 1,600' (max)	9,600' (max)
Nominal focal length of 6".			
Use of digital cameras is permissible, however since digital cameras have various focal lengths, the photography scale shall be maintained.			

4.1.2. Photogrammetric Ground Control

By definition, the horizontal datum is a rectangular plane coordinate system. Unless approved otherwise by the Authority's Project Manager, all horizontal control shall reference the New Jersey State Plane Coordinate System referenced to the North American Datum of 1983 (NAD83) plus the Adjustment Date Tag (1996) (NAD83/96). All horizontal control shall begin and terminate on monuments that are in the National Geodetic Reference Database System (NGRDS). Monuments consist of a numbered point set within the project limits, flush with the ground in areas where they will not be disturbed by normal daily activity. These points can be a 36" x 5/8" re-bar with a bronze or aluminum cap driven in to the ground or precast concrete monuments minimum 36" long 4" square on the top and 5" square on the bottom.

The vertical datum is normal to gravity. Unless approved otherwise by the Authority's Project Manager, all vertical control shall reference the North American Vertical Datum

of 1988 (NAVD 88). All vertical control shall begin and terminate on existing bench marks that are in the National Geodetic Reference Database System (NGRDS). Bench marks are simply a point with a known elevation, typically referenced to a specified National Datum, such as the North American Vertical Datum 1988 (NAVD88) or National Geodetic Vertical Datum (NGVD1929) for older bench marks.

Horizontal control points shall be set up as station points in a closed traverse whenever practicable. If field conditions dictate otherwise, control points shall either be tied to the traverse from two different stations or have the angles and distances for single ties measured at least twice. Each aerial control photograph shall be examined carefully in the field to ensure that the object described in the photograph is indeed the corresponding object in the field. Aerial Photography shall be submitted on CD to the Authority's Engineering Department with the Phase A submission.

Vertical control points shall be set up as turning points on differential level runs. Side shots used for photo control points are not acceptable. Global Positioning System (GPS) and trigonometric leveling is acceptable in lieu of differential leveling if field conditions so dictate and approval is received from the Authority's Project Manager. However, all distances shall be measured using electronic distance measuring devices in order to ensure that the accuracies listed in Exhibit 4-2 can be obtained.

When GPS technology is used, in either the Rapid Static Method or Real Time Kinematic (RTK), multiple sessions must be completed on each point using a different constellation configuration, so the mean values of the coordinates and elevations meet the accuracies shown in the attached table.

Exhibit 4-2 Recommended Control Accuracies

MAPPING SCALE	HORIZONTAL	VERTICAL
1" = 30'	0.20'	0.05'
1" = 50'	0.30'	0.05'
1" = 100'	0.50'	0.10'
1" = 200'	1.00'	0.30'
Note:	Standard error, defined as the square root of the sum of the squares of the errors from "n" measurements divided by "n", in position and elevation of each control point shall not exceed the recommended accuracies shown.	

A target is defined as a point painted on the road surface or a cloth placed over an existing monument in the field which can be easily seen on the photo image and located in the field by a survey crew. Its shape shall be in the form of a symmetrical cross with the recommended sizes as shown in Exhibit 4-3.

Targets shall be prepared by painting or printing them on cardboard, muslin or similar cloth, or they shall be constructed of lime placed on the ground, or they shall be painted on the roadway surface. In all cases the cross template shall be used as a guide.

Control points are specific points visible in the photo image having coordinates and elevations to be used for the proper spatial orientation of the photography. These points and can be either pre-targeted (prior to flight) or photo-identifiable points can be selected for use upon viewing existing aerial photographs. Unless otherwise approved by the Authority's Project Manager, targets shall be established in the field so that they are visible in the aerial photography resulting in a permanent photographic record.

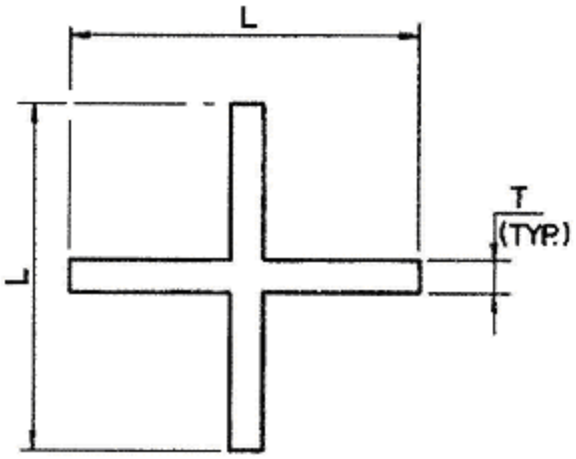
Targets serve to make evident the locations of control points so that the existence and position of each point is easily and accurately discernible when its corresponding image is viewed in an aerial photograph. Targets also pinpoint supplemental control points which enable aerial photographs to be oriented within photogrammetric instruments for use in the stereoscopic compilation of map manuscripts. Additional targets will be provided over existing baseline and right of way monuments or control points. This will permit orienting the maps to plan stationing and plan right of way lines.

Targets shall be placed in the median and shoulder zones of the roadway in question and on flat ground whenever practicable. Steep slopes, sharp ridges and ditches should be avoided. All targets shall be placed on contrasting background so as to be readily distinguishable in aerial photographs.

Each target shall be placed with its center directly over and at the exact elevation of the steel rod or other appropriate manifestation of the control point in question. The target legs should not slope appreciably from the center.

Normally, target spacing shall be at an interval equal to 1.2X the flight height. However, for those Projects where the required flight height is 1200' or less, targets shall be placed so that at least two (2) will appear in the overlap between adjacent photographs. Accordingly, unless otherwise approved by the Authority's Project Manager and as noted above, the guidelines for sizes and center-to-center intervals of targets shown in Exhibit 4-3 are recommended. Black targets are used instead of white targets on concrete road surfaces, sandy soils, etc. where the background of the photo image is lighter, and the darker target will stand out in the image.

Exhibit 4-3 Design Guidelines for Targets



MAPPING SCALE	FLIGHT HEIGHT	MAXIMUM INTERVAL	TARGET LEG WIDTH (WHITE/BLACK)	TARGET LEG LENGTH (WHITE/BLACK)
1" = 30'	1,500'	1,800'	6"/18"	2'/6'
1" = 50'	1,800'	2,100'	6"/18"	3'/9'
1" = 100'	4,200'	5,040'	8"/24"	5'/15'
1" = 200'	9,600' (max)	11,520'	18"/36"	10'/30'

Upon approval by the Authority's Project Manager, photo-identifiable control points may be used in lieu of targeting control points. The use of photo-identifiable control points may be authorized if existing aerial photographs are readily available and if the Project area is urban or suburban in character where such points would exist in abundance.

Photo-identifiable control points shall be established on permanently fixed objects and shall be of sufficient clarity and definition as to provide the same quality and reliability in aerial photographs as targeted control points. Points that are indefinite or not permanent (e.g. bushes, logs; intersections, roadway centerlines or building corners at a large scale; etc.) are not acceptable.

Photo-identifiable control points shall be maintained at the maximum intervals as specified for the placement of new targets with respect to their corresponding flight heights. Such points shall be established in the central zone of the roadway in question and on flat ground whenever practicable. In all other respects, requirements for these points shall correspond to the specifications affecting the layout of targeted control points.

4.1.3. Low Altitude Mapping & Photogrammetry (LAMP)

Use of low altitude techniques to obtain ground elevations is permissible when roadway or lane closings are infeasible. The mapping accuracy shall be 0.1 feet horizontal and 0.04 feet vertical.

4.2. SURVEY CONTROL REPORT REQUIREMENTS

The Survey Control Report shall be submitted to the Authority's Engineering Department in advance of any survey work. The Report shall include the following at a minimum:

1. Introduction
   a. Purpose – Describe the purpose for which the survey was conducted.
   b. Point of Contact – Supply the name, phone number, and mailing address of the contact within the submitting organization. Supply the same information for all organizations that participated in the survey.
   c. Accuracy Standards – Provide the accuracy standards (vertical and horizontal) specified for the project.
   d. Endorsement – Signed and sealed by the Professional Land Surveyor in responsible charge of the project.
2. Location – Indicate the geographic location and scope of the work in general terms.
3. Field Work
   a. Chronology – Give a brief description of the progression of the survey work.
   b. Instrumentation – Describe the make, model and serial number of each instrument used on the project. Provide the most current calibration records of the instruments used on the project.
   c. Deviation from Instructions – Describe any deviation from the procedures and specifications stated in the project instructions.
4. Data Processing Performed – Describe the data processing that was performed. Include tasks such as transferring of data to different storage media, data quality checking, station descriptions, baseline determinations, closure computations, and the following information (if appropriate):
   a. Software Used – Specify all software by program name and version number that was used to acquire, manage, reduce, adjust, and submit field data. If the data was reduced or acquired with different versions of a program, specify which version was used with which block of data.
   b. Rejected Data – Specify any data that was rejected and re-surveyed. This should include the reasons why the data from a particular field session was rejected.
   c. Adjustment – Discuss in detail the type of adjustments performed. Indicate the weighting technique used and stations constrained. Include a list of the adjusted coordinates of all horizontal points and a list of all adjusted bench mark elevations.

d. Closures – Tabulate the results of all loop mis-closure computations performed. Include the baselines used, baseline length, maximum closure in each component, and average closure error in each component. Tabulate closure component error in terms of Cartesian coordinates and in terms of the local terrestrial system. Also, tabulate comparisons of repeat baselines observed indicating baseline length and maximum and average closure for each baseline component. Closures shall be stated in both meters and parts per million.

5. Attachments of Enclosures

6. Cutting or clearing in other areas according to accepted Authority horticultural methods, which are:

   a. Station List – Include a table that lists the station name, coordinates, elevation and station type for all stations surveyed.

   b. Field Sketch – Attach a copy of the project sketch. If there are multiple copies of the sketch showing different data, attach a copy of each. The project sketch shall include all stations occupied during the survey and a border drawn around the edge with grid ticks for latitude and longitude. The sketch will show other stations of the existing network located within or near the work area. Indicate whether any attempt was made to recover these stations. The report and/or recovery notes will indicate why the recovered stations were not surveyed. To indicate a station that was not recovered, use "NR" next to that station's symbol. Survey points will be shown in an inset sketch when they are too closely together to be depicted clearly on the network sketch.

   c. Instructions – Attach a copy of the instructions and/or contract under which this work was performed. Also include any revisions or changes to the instructions or specifications.

   d. Field Logs – Provide original field survey notes and record books.

   e. QA/QC Program Project Task Order Form / Checklists

   f. Paper prints showing all control points (control diagram).

   g. CD containing all information in Microsoft Word for Windows or other format.

4.3. FIELD SURVEY REQUIREMENTS

In advance of any survey work, the Engineer shall prepare a list of property owners in the corridor together with their addresses. An owner notification letter (notice of entry) will be sent to these property owners by the Engineer. Refer to Subsection 1.4.3 of this Manual for more information. No field work of any kind shall be undertaken until the owners are so notified.

In advance of any survey work on other than private property or Authority property, the Engineer shall advise the owner or agency involved (e.g. Municipality, Utility Company, Railroad, etc.) by letter, explaining the work to be performed, the approximate time period during which it is to be accomplished and the personnel and equipment which are to be used. For letters to Municipalities, a copy shall also be sent to the local police department.

In some cases, a railroad may require telephone verification 24 hours before actually commencing work on their property, the execution of a "right of entry" and payment to cover the expenses of railroad employees (e.g. Flagmen) assigned to accompany the survey work.

The legal "right of entry" to make surveys is specified in certain proceedings in N.J. Statutes 46:11, Sec. 1. Also, on December 21, 1971 a new Condemnation Act (N.J. Statutes 27:23 - 6 & 20:3 - 16), became law, thus enabling agents of the Authority to enter upon private property after giving proper notice as defined in the Act. Although the Authority would thus have the legal right to enter upon private property for the purpose of making surveys, the Authority does not wish to impose this law against the will of property owners if such can be avoided. Therefore, the Engineer, in coordination with the Authority's Project Manager, is to make every effort to avoid performing survey work over the objection of a property owner, by rearranging his work accordingly. Should such a rearrangement not be possible, the Engineer is to immediately notify the Authority's Project Manager by letter describing the problem, the alternatives available, and the Engineer's recommended solution. The Authority's Project Manager will then contact the property owner and attempt to resolve the problem.

Before starting any work on Authority property, the Engineer shall submit to the Authority's Operations Department a "Traffic Permit" application, describing in detail the nature and extent of the work to be performed, as well as furnishing the other data required on the Application. The Authority's Operations Department will then issue a "Traffic Permit" authorizing the work and setting forth the conditions under which the work is to be performed. This permit shall be carried by the personnel engaged in the work at all times and shall be shown to State Police and Authority personnel upon request with the provisions of the permit strictly obeyed. Refer to Subsection 1.3.1 of this Manual for more information.

It is essential that all engineering and survey personnel, prior to being assigned to the work, acquire a thorough understanding of the policies, procedures and intent of the Authority with respect to activities involving the general public. The best interests of the Authority must always be given prime consideration, and these are best served when the personnel exhibit a courteous, respectful and cooperative attitude towards the public. Personnel are to be cautioned to exercise discretion in discussing the details of the Project with the public, and they shall be thoroughly briefed in advance as to the extent of the information they can disclose. Should there be any doubt or should questions by the public be beyond those to which personnel are permitted to respond, the person asking should be politely told to refer their question to the Authority's Project Manager.

Before beginning work, all personnel shall be cautioned against causing any damage to public or private property. Should any such damage occur while performing the field survey work, the Engineer shall be considered solely and entirely responsible therefore. In the event any of the Engineer's personnel or vehicles become involved in an accident of any nature during the performance of the work, the Engineer shall fulfill all established requirements related thereto, and in addition shall also promptly advise the Authority's Project Manager in writing of the nature and details of the accident and the subsequent actions taken.

4.4. EXECUTION OF THE SURVEYS

It will be the responsibility of the Engineer to determine the type and detailed extent of survey information that will be required for the Project. Particular attention shall be given to obtaining data for existing structures, drainage, utilities and property corners which may be removed or destroyed during construction and therefore never available again.

All field notes will become part of the permanent record of the work and must be clearly and accurately recorded in such a manner as to be readily interpreted in the future by those not

intimately familiar with the original work. Field information obtained from data collectors shall be transferred onto CD and not disposed of without the written permission of the Authority's Project Manager. Copies of all field notes shall be furnished to the Authority's Project Manager upon request, together with any supplementary legend or other information required making the data completely self-explanatory.

Reproducible small scale (e.g. 1" = 200') Survey Control Maps of the Project area, showing existing monuments, the preliminary alignment of the Project, the proposed control traverse and bench level network and required cutting limits and methods (if applicable) shall be prepared and submitted to the Authority's Engineering Department prior to beginning any survey work.

The Authority cannot stress too strongly the fact that they prefer no cutting of trees, shrubs, bushes, etc. whatsoever. If, however, cutting is absolutely required, then it shall be held to an absolute minimum and good judgment shall be used in selecting the areas to be cut. Preferably any areas where cutting is required, the cutting will be done in areas that will later be cleared for construction; hence, no survey work will be authorized until Survey Control Maps are submitted and approved.

When taking into account the environmental impact factors related to surveying, the Engineer shall consider using one of the three schemes (listed in the order of preference):

1. No cutting or clearing. Provide survey runs along existing roads and/or across already clear areas.
2. Cutting or clearing within proposed construction limits only.
3. Cutting or clearing in other areas according to accepted Authority horticultural methods, which are:
    a. Not to remove or cut trees with a caliper of 3 inches or more measured 1 foot from the ground.
    b. Limbs requiring removal will be cut with either pruning loppers or pruning saw.
    c. Limbs removed that have a diameter of 1 inch or greater, will be painted with an approved tree wound compound.
    d. All cuts are to be cut flush with the bark of the tree.
    e. When removing limbs having a diameter of 2 inches or greater, care should be exercised to prevent tearing the bark from the tree trunk.

After the proposed survey network and Survey Control Maps have been approved by the Authority's Engineering Department, the horizontal and vertical survey control shall be performed. The actual data shall be shown on the Survey Control Maps, in project plan format, and submitted to the Authority's Engineering Department within ten (10) Working Days after completion.

The Engineer shall locate all existing horizontal and vertical control monuments within or nearest to the Project area and shall verify, as necessary, the accuracy of these monuments for their purposes. In case of discrepancies between existing monuments, those with the original highest order of accuracy and showing no apparent disturbance shall govern. Coordinates used to establish beginning point and initial bearing should be noted in the Survey Control Report, together with coordinates for existing monuments found. Also identify the basic elevation used

to establish bench marks, together with elevations of existing bench marks found. Errors of closures for horizontal and vertical control resulting from the Engineer's own work shall be given. If necessary, new ties and descriptions shall be made for existing monuments.

Additional new horizontal and vertical control monuments shall be established as necessary to serve the Project area and shall be situated outside of the construction areas so that they will not be damaged or destroyed by the construction activities. Horizontal control monuments shall be assigned values in the New Jersey State Plane Coordinate System referenced to the North American Datum of 1983 (NAD83) plus the Adjustment Date Tag (1996) (NAD83/96), and vertical control monuments shall be referenced to the North American Vertical Datum of 1988 (NAVD88).

Control point values established by others shall be clearly identified so as not to be accidentally intermixed with the Engineer's newly established values. Comparisons of horizontal and vertical data shall be tabulated showing both newly established and previously existing values.

In the event that the work includes more than one Project, horizontal and vertical control monuments shall be established at or near the Project boundaries and the coordinates and elevations of these common monuments shall be jointly agreed upon between the adjoining Engineers. The Engineer shall advise the Authority's Project Manager of meetings scheduled for this purpose between adjoining Engineers so that a representative of the Authority's Engineering Department can attend.

A primary closed traverse shall be run throughout the general area of the Project and shall incorporate existing and new monuments, as well as adjacent control points on adjoining Projects, if any, into the run. Intermediate traverse points shall be at least semi-permanent, iron pins, and shall be accessible, clearly referenced and designated in the field and properly described on the Survey Control Maps. At least three reference ties to permanent objects shall be made and recorded for each monument and principal traverse point. Horizontal traverse points shall be spaced a maximum of 1,200 feet.

Closed bench level circuits shall be run throughout the entire Project area and shall also be tied into vertical control monuments in adjoining Projects, if any. The bench marks should be set where they will not be disturbed by daily normal activity and at intervals of 600 feet or less in the vicinity of a construction area. These points can be driven monuments or re-bar (3-feet long minimum), plugs or cuts in bridge abutments, brick or concrete walls, solid rock out crops or similar objects that are permanent in character.

All traverses for horizontal control and all bench level circuits for vertical control shall be run to second order accuracy.

The use of GPS to establish ground control is permissible and shall be to second order accuracy (1.5 cm). Calculations sheets shall be included in the Survey Control Report.

In general, horizontal and vertical control points shall be located at positions which will afford the greatest accuracy and access for layout of construction baselines and bench marks and for right of way monuments, but shall be situated in permanent locations, i.e., outside of the limits of construction.

For secondary traverses for construction surveys, closed traverses are generally to be used to locate photogrammetric control points, points in the vicinity of project baselines, right of way monuments, property corners, and control points for existing roads, utilities, railroads, streams, etc.

4.5. TOPOGRAPHIC MAPPING

4.5.1. Infrastructure Items

During the digital mapping process, the features that have been identified in the specifications and are visible or interpretable in the photography will be digitized on their appropriate layer when possible.

4.5.2. Topographic Detail

Using Digital Terrain Modeling Procedures (DTM), breaklines will be collected in 3D when the stereo model is set in any one of our plotting systems. These breaklines will include pavement edges for roads and runways, edge of paved shoulders, curb lines, concrete center lines, tops and toe of slopes, tops and bottoms of ditches, water lines and other features that depict the shape of the ground. Within accuracy requirements, the DTM used to develop the contours shall be generated to represent true elevation above mean sea level and the exact shape of the ground. The contour lines will be shown as solid lines. Contour labels will be provided at (X) intervals in areas of moderate relief and provide labels as necessary for map clarity. Spot elevations will be provided at key points throughout the project limits in areas where the contours are more than 1 inch apart at map scale. These key points will include roadway intersections, along railroads, bridges, ramps, etc. This information will be placed on separate layers within the graphic file for ease of future file management and with the DTM.

4.5.3. Planimetric Detail

The digital file will contain all land use features within the project limits, such as buildings, roads, shoulders, ramps, highway striping, drives, fences, docks, hydrants, poles, parking lots, railroads, rivers, sidewalks, signs, catch basins, trees, etc., visible on or interpretable from the aerial photography. Any feature larger than 20 feet will be outlined to scale. The features shown will be consistent with the detail mapping requirements. These features will all be digitized on a separate CAD layer with the appropriate symbol and line type. Features stored in a CAD file in this manner, will be displayed and interactively edited on color high-resolution monitors and then plotted in various combinations of detail required. Hard copy plots will be prepared showing the planimetric features and submitted to the Authority upon request.

Section 5 - GEOTECHNICAL ENGINEERING

5.1. INTRODUCTION

5.1.1. General

The performance of engineering works (buildings, bridges, embankments, dams, etc.) is affected, to a major degree, by the performance of their foundations. It, therefore, becomes very important that the behavior of the materials on which the foundation is to be placed be investigated very thoroughly. Adequate knowledge of the behavior of the foundation conditions leads to a greater degree of confidence in design with consequent savings in cost.

This Section is to provide all Engineers with an outline of the work and methods expected that relate to geotechnical investigations, preparation of plans and specifications and construction monitoring.

The use of this Section is intended to provide a uniform approach to the geotechnical aspects of Authority projects and the presentation in contract plans and specifications. It also provides an outline of the required documentation of foundation design and related decisions.

5.1.2. Investigation and Design

5.1.2.1. Subsurface Investigation

Knowledge of the subsurface soils is essential for good foundation design. To obtain this information, it is necessary to conduct subsurface investigations. Methods usually utilized include borings (with dry, undisturbed core samples), seismic, electrical resistivity and other geophysical methods.

The subsurface investigation program should be geared toward obtaining all the relevant information without excessive costs. Prior knowledge of the surface conditions and the geology of the area are very helpful in achieving this result. Undisturbed samples should be scheduled so that the behavior of the soils can be studied through laboratory testing.

Site-specific seismic in-situ tests are used as part of a comprehensive geotechnical investigation. Crosshole Seismic Surveys are used as site-specific tests to obtain in-situ properties of soil and rock strata. The survey yields valuable information as to the strength and cohesiveness of the underlying soil and bedrock, information that is critical to any engineering endeavor. Crosshole Seismic Surveys measure the time for horizontally traveling compressional (P) and shear (S) waves to travel from a source hole to a receiver hole.

5.1.2.2. Laboratory Testing

The purpose of the laboratory program is to ascertain the in-situ properties of the soils and to study their behavior under conditions expected in design. It, therefore, is necessary that the Geotechnical Engineer be familiar enough with the project to simulate these conditions during the testing program. It is not the amount of data obtained that leads to a good design, but the accuracy and relevancy of the data.

5.1.2.3. Foundation Recommendations

The end result of the subsurface investigation and laboratory testing programs is a satisfactory and economical foundation. The Geotechnical Engineer must take into consideration all relevant aspects of the structure (e.g. type, function, aesthetics, etc.), and the allowable tolerances within which the structure will function satisfactorily, in arriving at the type of foundation.

The type of study involved in the soils and foundation design depends on the subsurface conditions. A competent foundation soil, such as dense sand, may require minimal effort in arriving at a foundation recommendation, and may permit a simple conventional foundation. On the other hand, a poor foundation soil, such as soft organic clay, will involve very complex soil analyses and foundation treatment.

5.1.3. Responsibility

5.1.3.1. Engineer

If required by the terms of the Order for Professional Services (OPS) with the Authority, the Engineer will prepare Plans and Specifications for a Boring Contract, invite bids from selected Contractors, receive and evaluate the bids and award the Contract after receiving the Authority's approval of the bids. The Engineer will keep a complete record of all quantities, prepare interim and final estimates for payment to the Contractor and, upon completion, provide the Authority's Project Manager with a complete accounting of the Boring Contract, together with an "as-built" set of the Contract Plans showing all the borings taken with their exact locations, and a complete set of boring logs as shown in Exhibit 5-1. Additionally, field boring logs shall be submitted on a weekly basis.

During the boring operations, the Engineer will stake out the location of each boring in the field and obtain ground level elevations at each boring location. As work progresses and information on the subsurface conditions is obtained, the Engineer may wish to take additional borings or rearrange the locations of existing borings to obtain complete information of local problem areas. The

Engineer will staff the job with experienced inspectors who will carefully inspect the work and keep complete logs of all the borings. Upon completion of the Contract, these logs will be incorporated into the construction contract plans. Sample boring log information sheets are shown in Subsection 5.2.3.5 (Exhibit 5-1 and Exhibit 5-2).

The Engineer will prepare or arrange for the preparation of a laboratory testing program, if necessary, to obtain soil characteristics needed for design. The Engineer will select a laboratory to conduct the testing program and will supervise the program to ensure that all the necessary geotechnical data is obtained. If the cost of the testing program is reimbursable to the Engineer, the Authority's approval of the laboratory must also be obtained. The Engineer will keep a complete record of all tests, prepare interim and final estimates for payment to the laboratory, and if required, submit a final accounting to the Authority upon completion of the testing program.

The results of the soil investigation and soil testing programs will be interpreted and analyzed by the Engineer, and these results will be utilized in making the foundation recommendations for structures and earthworks.

5.1.3.2. Authority

If required by the terms of the OPS, the Authority's Engineering Department will review the Boring Contract Plans, Specifications and all proposals for compliance with its standards, prior to the Engineer inviting bids, and will advise the Engineer of changes which are deemed necessary. The Authority's Project Manager will coordinate all work with adjacent projects.

After the bids have been received and checked by the Engineer, the Engineer shall make the award based on the lowest acceptable bid. The Authority's Engineering Department will review the bids together with the Engineer's recommendation and will advise the Engineer whether the award should be made.

The Authority's Engineering Department will review the soil testing program and will decide the acceptability of the laboratory.

The Authority's Engineering Department will review the Engineer's foundation recommendations and any soils design computations or procedures necessary to make the recommendations.

5.2. GEOTECHNICAL INVESTIGATION

The following is a brief outline of the necessary steps in such an investigation and some suggested possible subsurface investigation methods that might be used.

5.2.1. Preliminary Investigation

Prior to beginning the plan layout of the borings, the Geotechnical Engineer shall investigate all possible sources of existing information to inform themselves of the geology of the area and the nature of the soils. References shall include geology maps or papers, existing boring logs and foundations plans, soil and foundation reports, agricultural soil maps, borings made for previous construction nearby and Photogeologic Interpretation reports. Field reconnaissance of the proposed corridor and discussions with local residents may provide invaluable information not found in standard references. The Geologic Map of New Jersey (DGS04-6 Bedrock Geology of New Jersey (Scale 1:100,000)) is available on the NJDEP website (http://www.state.nj.us/dep/njgs/geodata/). In addition, the NJDEP has topographic quadrangle maps available with the bedrock (DGS15-1 Bedrock Geology of New Jersey (Scale 1:24,000)) or surficial geology (DGS10-2 Surficial Geology of New Jersey (Scale 1:24,000)). Preliminary engineering soils information including engineering soil maps, by county, can be obtained from the Rutgers University publications entitled, "Engineering Soil Survey of New Jersey". The United States Department of Agriculture, Soil Conservation Service also publishes soil maps which are useful when evaluating the upper layers of soil.

Normally the next step will be to proceed with the planning of the required additional subsurface investigations needed for design. However, there may be a few cases where additional preliminary information will be necessary for conceptual decisions to be made prior to design. A preliminary test boring program or other type of geophysical or photogeologic investigation should then be developed, approved by the Authority and implemented.

5.2.2. Subsurface Investigation for Design

This subsurface investigation program should provide all the subsurface information necessary for the design, preparation of plans and specifications, and for the construction of the proposed project. This program should include all necessary field in-situ and laboratory undisturbed testing. Appendix A – Sample Boring Specifications contains more information in preparing Boring Specifications.

5.2.2.1. Boring Program

1. Layout

   After having gained a preliminary knowledge of the geology and surface soils in the area, the Geotechnical Engineer should now be in a position to make a boring layout plan that will provide the maximum amount of information at the least possible cost. The size of the project and the type of foundation conditions expected will dictate the size of the investigation program.

The location and spacing of borings have not been standardized; therefore, the Geotechnical Engineer must use their own judgment in determining the location and spacing of the borings for the project. In general, if the subsurface profile is expected to be uniform, the spacing between borings can be large. On the other hand, if erratic soil layers or non-uniform conditions are expected, the spacing is reduced in an attempt to map the non-uniform conditions.

As a guide, it is suggested that the boring layout be separated into: (a) roadways, (b) bridges, (c) Retaining Walls and (d) Sign Structures.

a. Roadways - Roadway borings are generally 3-1/2" cased hole borings spaced approximately 100' to 400' apart along the centerline of roadways, with the smaller spacing used for poor foundation conditions such as deep layers of soft clays or non-uniform conditions where lenses of soft clay are found in layers of sand. Average embankment widths may require only one boring per cross section, while very wide areas such as approaches to toll plazas, etc., may require two or three borings per cross section.

   Larger diameter cased holes (4" or 6") are specified where undisturbed samples are needed for laboratory testing, or where in-situ shear tests are required. This occurs generally in areas of soft clays where undisturbed samples are needed for consolidation, strength or permeability testing.

   In marshes or swamps, continuous sampling borings are specified at closer spacing to delineate the bottom of the organic deposits. In rock cuts, cores are required for the full depth of the cut to determine the type and quality of the rock. The rock cores are generally spaced 200 feet apart.

b. Bridges - At the time the Boring Contract is being prepared, the bridge plans may not be sufficiently advanced to determine the locations of the foundation units. The Geotechnical Engineer, in consultation with the bridge engineer, will need to consider all possible alternative designs and take sufficient borings to cover all possible alternatives. It is better to take a few extra borings at this time rather than to have to get additional borings later. If this condition does arise, it is to be brought to the attention of the Authority's Project Manager at the time the Contract is being reviewed.

   One boring is to be scheduled at each end of a foundation unit to ensure that there is not great variation in the subsurface profile across the length of the unit. Generally, 3-1/2" cased hole borings, with ordinary dry samples, are specified, except in the event where clay layers are encountered. In this case, larger diameter holes are to be scheduled to

obtain undisturbed samples for laboratory testing and special foundation analysis.

c. Retaining Walls - A minimum of two borings are to be scheduled for each retaining wall. For retaining walls more than 100 feet in length, borings shall be spaced every 100 to 200 feet with locations alternating from in front of the wall to behind the wall. For anchored walls, additional borings in the anchorage zone shall be spaced every 100 to 200 feet. For soil-nailed walls, additional borings at a distance of 1.0 to 1.5 times the height of the wall behind the wall shall be spaced at 100 to 200 feet.

   The layout for noise walls, privacy walls, or solid face type fencing shall follow the same layout as for retaining walls.

   The cost of a retaining wall is greatly dependent on the availability of the required type of fill materials. Therefore, investigations shall consider potential borrow sites within the contract limits that meet the requirements for wall select backfill.

d. Sign Structures - A minimum of one boring is to be scheduled per foundation unit.

   The layout for High-Mast Lighting shall follow the same layout as for sign structures.

2. Depth Criteria

   The depth to which borings are to be taken for embankment areas is a function of the embankment height, as well as of the type of foundation soil. If the foundation soil is granular, the borings are generally taken to about 30 to 40 feet in depth or until the standard penetration is 20 blows per 6” or greater, for a minimum thickness of 20 feet, whichever is deeper. For embankments over 20 feet in height, the depth of the borings is increased to about 50 to 60 feet in depth, or until the standard penetration is 20 blows per 6” or greater for a minimum thickness of 20 feet, whichever is deeper. A few borings are to be taken deeper, either to a minimum depth of 100 feet or to rock, to investigate the possible existence of soft clay layers at lower elevations.

   For the case of structure foundations on embankments, the depth of the borings, in granular soil, shall be a minimum of 60 feet or until the standard penetration is 20 blows per 6” or greater for a minimum thickness of 20 feet, whichever is deeper. For the case of structure foundations below existing ground, the above criteria shall apply below the bottom of footing elevation. At least two borings per structure shall be taken to a minimum of 100 feet or

to rock, to investigate the possible existence of soft clay layers at lower elevations.

If the foundation soil is clay or silt, the borings shall be taken to a minimum depth where the proposed imposed stresses do not exceed ten percent of the existing overburden stress. A rough calculation shall be made of the proposed foundation stresses to determine this depth. At least one boring should be taken to rock or deep enough to obtain information for deep foundation design.

For deep foundations in soil, depth of exploration should extend below the anticipated pile or shaft tip elevation a minimum of 20 feet, or a minimum of two times the maximum pile group dimension, whichever is deeper. All borings should extend through unsuitable strata such as unconsolidated fill, peat, highly organic materials, soft fine-grained soils, and loose coarse-grained soils to reach hard or dense materials.

For piles bearing on rock, a minimum of 10 feet of rock core shall be obtained at each exploration point location to verify that the boring has not terminated on a boulder.

For shafts supported on or extending into rock, a minimum of 10 feet of rock core, or a length of rock core equal to at least three times the shaft diameter for isolated shafts or two times the maximum shaft group dimension, or whichever is greater, shall be extended below the anticipated shaft tip elevation to determine the physical characteristics of rock within the zone of foundation influence.

For retaining walls, depth of exploration should extend below where the stress increase due to the estimated foundation load is less than 10 percent of the existing effective overburden stress at that depth and be between 1 to 2 times the wall depth. Exploration depth should be great enough to fully penetrate soft highly compressible soils or soft fine-grained soils and extend into competent material of suitable bearing capacity.

For roadways in cut areas, the borings are taken to a minimum depth of 15 feet below the proposed profile grade. If poor foundation soils are encountered at this depth, the criteria for embankments shall also apply. The ground water level in these areas is very important and shall be carefully measured. It is recommended that observation wells be installed in selected boring holes to permit ground water readings over an extended period of time.

3. Borings

Methods commonly used to advance borings include wash borings, rotary drilling, auger drilling and probes. The Authority recommends the wash boring method, preferably with casing, and the rotary drilling method for drilling mud or hollow stem augers for the full depth of the hole. The use of drilling mud without casing will be allowed only in exceptional circumstances where a continuous and deep clay layer is encountered, and ground water readings are not critical. The approval of the Authority's Engineering Department is required prior to allowing the use of this method. The process of advancing a hole by the wash boring method can be found in most standard soil mechanics references and will not be elaborated upon here.

Bore holes are to be grouted up after completion in accordance with New Jersey Department of Environmental Protection requirements.

4. Sampling

   Type of sampling equipment along with their advantages and disadvantages are fully discussed in most standard references, and the various manufacturers' catalogues.

   The Geotechnical Engineer shall specify, in the Boring Contract, the type of sampling equipment most suitable for recovering the type of materials expected to be encountered. If there is a possibility that a special type of sampling equipment may be needed, this provision should be included in the contract with a minimal proposal quantity, so as to avoid having to negotiate a price for its use during the boring operation.

   Ordinary dry samples for identification purposes shall be obtained by using the split spoon sampler with the standard penetration test on the spoon. Undisturbed samples may be obtained using the thin walled tube sampler, the piston samples or the Dennison sampler. Rock cores are obtained using the swivel type, double tube core barrel or the N&N Drilling Supply Core barrel part no. 39-108. Special types of sampling devices are available for extraordinary conditions and these should be investigated whenever the need arises. The Burmister Method of Soil Identification as outlined in Appendix B - Burmister Soil Identification System shall be used.

   The details governing each type of sampler and the methods for using them to recover samples shall be stated in the Contract Specifications so that the Contractor is fully aware of their responsibilities when submitting their bid. Refer to Boring Inspector's Manual in Appendix C - Boring Inspector's Manual for additional information.

5. Ground Water

Ground water levels shall be measured in each bore hole during the boring program. It is recommended that the ground water level be measured each morning before beginning work in a hole, and twenty-four hours after the hole is completed and the casing withdrawn. At selected locations, especially in cut sections, a perforated plastic pipe, referred to as an observation well, shall be inserted into the hole to keep it open, and the water level measured each day by the Engineer until it stabilizes. The method of installing the observation wells shall be described in the Contract Specifications and a typical detail shown on the Contract Plans. Refer to Appendix A – Sample Boring Specifications - Subsection 2.14 for additional direction on the installation and handling of observation wells.

Also, where there is open, running or intermittent water at potential sites for structures and walls, the water shall be tested for pH, chlorides, sulfates and other aggressive chemical content.

6. In-Situ Shear Tests

   As both strength and sensitivity may be altered during boring, sampling, and handling in the laboratory, it may be necessary, in the case of soft and sensitive clays and silts, to obtain in-situ shear strength values to compare with those obtained from laboratory testing. The in-situ vane shear test has been developed for this purpose and is performed in conjunction with the boring program. The description of the test and the method of evaluating it may be obtained from most standard references. The method of performing the test shall be described in the Contract Specifications.

7. Geophysical Methods

   In some instances, where large areas need to be investigated for specific information, geophysical methods may provide the information more rapidly and at less cost. Examples are the location of the surface of rock under shallow overburden in deep rock cut areas or the location of firm bottom in marshy areas. Most manufacturers now make portable seismic and electrical receptivity instruments that can be used for these purposes. Whenever the need arises for this kind of survey, it is recommended that these methods be given consideration.

8. Crosshole Seismic Tests

   For certain bridge sizes, site-specific seismic in-situ tests shall be performed. They shall be performed in accordance with ASTM D 4428 / D4428 M-00 “Standard Test Methods for Crosshole Seismic Testing.” The three-borehole method shall be used. An inclinometer survey shall be performed in the boreholes prior to performing the test. The size of the borehole to be used shall be coordinated with the testing company to ensure compatibility with

their testing equipment. The Engineer may present other test methods they deem appropriate. The Authority's Engineering Department will review the test and if acceptable will approve its use by the Engineer.

9. Cost Estimate

Each boring program must be accompanied by an Engineer's cost estimate if the cost of the borings is reimbursable, stating the various items proposed, the estimated quantities, the unit cost, and the total amount. In addition to the normal boring items, the Authority includes a separate lump sum item to cover the Contractor's cost for Mobilization. Whenever borings are to be taken on or adjacent to existing Authority roadways, definite procedures must be followed regarding lane or shoulder closings, signing, etc. The Authority also provides a lump sum item, Maintenance and Protection of Traffic, to cover these costs. A contingency amount to cover unusual developments shall also be added into the cost estimate. It is anticipated that most of the work will involve 3-1/2" diameter holes utilizing Standard Penetration Testing.

The following list of Boring Contract Items has been approved by the Authority. (See sample "Scheduled Items of Work" in Appendix A – Sample Boring Specifications). Special Items shall be added as required:

a. 3-1/2" Dia. Cased Hole Borings for Soil Sampling –Linear Feet

b. 4" Dia. Cased Hole Borings for Soil Sampling – Linear Feet

c. 1-1/8" Dia. (AX) Core Borings in Rock – Linear Feet

d. 2-1/8" Dia. (NX) Core Borings in Rock – Linear Feet

e. 1-3/8" Dia. Ordinary Dry Samples - Each

f. 1-7/8" Dia. Undisturbed Dry Samples - Each

g. 2-7/8" Dia. Undisturbed Dry Samples - Each

h. 3-3/8" Dia. Undisturbed Dry Samples - Each

i. 2-13/16" Dia. Undisturbed Dry Samples - Each

j. 2" Dia. In-Place Vane Shear Tests - Each

k. 3" Dia. In-Place Vane Shear Test - Each

l. Observation Wells - Each

m. Mobilization and Demobilization - Lump Sum

n. Maintenance and Protection of Traffic - Lump Sum

5.2.2.2. Testing Program

1. Laboratory Selection

Laboratory undisturbed tests and special exploration methods such as pressuremeter, cone penetrometer, seismic reflection, etc. require special training to perform and therefore will be contracted for on a negotiated basis with an approved contractor. The selection of a laboratory to perform the soil testing involves several factors. When the proposed testing program is extensive and complex, it is necessary to request engineering proposals from two or three reputable laboratories and make the selection based on these engineering proposals. An inspection of the laboratory facilities and an investigation into the availability of the personnel and equipment shall be conducted prior to making the selection. The testing laboratory must provide evidence of AASHTO or ASTM certification.

Most testing programs are not very extensive and do not require complex testing equipment. The selection, therefore, usually can be made on the basis of knowledge of the past performance of the laboratory on similar projects. The Engineer shall always obtain assurance from the potentially acceptable laboratory that the required equipment and personnel will be available during the testing period, thus enabling the completion of the testing program within the allotted time.

After the Engineer has made the tentative selection and has discussed the proposed tests in detail with the laboratory, the Engineer shall obtain a unit price proposal stating the test procedure for each test in detail, and any extra charges involved. With this in hand, the Engineer shall prepare a cost estimate on which the ceiling cost for laboratory testing will be based.

If the cost of the laboratory testing is non-reimbursable, the Engineer shall proceed with the testing program. If, however, the cost of the laboratory testing is reimbursable to the Engineer, a request for approval of the laboratory, the testing program and the estimated cost shall be submitted to the Authority's Project Manager at least one month prior to the date of beginning the testing program. The request shall also include a brief summary of similar projects the laboratory has successfully completed in the past. Upon receipt of the Authority's approval, the Engineer will notify the laboratory to proceed with the testing program. No work shall be done by the laboratory until two weeks after the Authority's formal approval has been obtained.

2. Type of Tests

A list of soil test standards is provided in Appendix D - Laboratory Testing for Soils. It is recommended that this list be adhered to in making up the testing program, except in cases where the need for a special test exists. In this case, the reason for the special test and a detailed test procedure shall be

submitted to the Authority's Project Manager prior to including it in the testing program.

The tests and the testing procedures shall simulate, insofar as is practical, actual conditions that may be encountered during and after construction. In this manner the test results will be expected to be more representative of field conditions.

3. Test Results

   A preliminary summary of the test results shall be submitted to the Authority's Project Manager within two weeks after the completion of the testing program, if required. This summary shall state the types and number of each type of test performed, with the results obtained from each test. Tables and/or plotted information shall accompany this summary.

   Within a month after the completion of the testing program a full report shall be submitted to the Authority's Project Manager. This report shall contain the final results of the testing program, and the resulting soil parameters for use in design. A discussion on the use of these soil parameters in design shall also be included.

4. Cost

   If the cost of the testing program is reimbursable to the Engineer, a complete record of the program cost shall be submitted to the Authority's Project Manager at the conclusion of the testing program. This record shall include the types and number of each type of test performed by the laboratory and the unit price of each type of test. The extension of these numbers, plus any extra costs, comprises the total cost of the program and this total shall be within the ceiling cost previously submitted to the Authority. If an overrun of the ceiling cost is anticipated during the testing program, the Authority's Project Manager shall be notified well in advance and approval obtained before the remaining tests are performed.

5.2.3. Test Boring Contract

Most subsurface investigations for design will involve a significant number of test borings. Normally the test boring work is contracted out on the basis of bids. The Engineer should prepare all proposed test boring contracts in accordance with Design Manual Section "Geotechnical Design".

5.2.3.1. General

The Authority recognizes that a Project may be divided into several construction contracts for ease of construction. However, the Authority prefers that the Engineer prepare one boring contract and one testing

contract for the entire Project. If the Engineer desires to have more than one boring contract and more than one testing contract, written justification shall be provided to the Authority's Project Manager outlining the reason(s) why more than one contract is recommended and the associated benefits to the Authority.

The Boring Contract for the entire Project, unless the Authority directs otherwise, is to be completed to ready-to-advertise status and submitted to the Authority's Project Manager no later than with the Phase "A" submittal for review, as discussed below. Any subsequent revisions to the preliminary plans, due to later phase reviews will be reflected as a Change of Plan to the Boring Contract.

Payment for the boring work completed is to be based on monthly estimates and to be for 90 percent of the contract items completed plus up to 50 percent of the mobilization. The test boring contract is to be between the Engineer and the boring contractor. If it appears that the boring contract cost will exceed the boring contract bid, permission should be obtained prior to exceeding the bid amount.

5.2.3.2. Plans

The Engineer is to submit a preliminary boring location plan either with the 1"=200' scale roadway schematics, or after the 1"=200' scale schematics are approved, but no later than one month prior to the Phase "A" submittal for review by the Authority's Engineering Department. This will be reviewed and returned to the Engineer for preparation of a 1"=30' or 1"=50' scale boring location plan. This boring location plan shall be submitted to the Authority's Project Manager in sufficient time for it to be reviewed by the Authority's Engineering Department and returned to the Engineer before the Phase "A" submittal. The Engineer shall use this 1"=30' or 1"=50' scale boring location plan only for field stake out purposes. This plan shall be accompanied by a list of the borings, showing the station and offset, type and estimated depth of each boring.

Shortly after the Phase "A" submittal, the Authority's Project Manager will notify the Engineer of any changes to be made on the 1"=200' scale boring location plan. After these changes have been made, the Engineer will be notified to invite bids for the Boring Contract. The 1"=200' scale boring location plan shall be part of the Contract documents.

Also submitted with the plans shall be the Engineer's cost estimate and a list of not less than three qualified bidders from who bids are to be invited. The Authority reserves the right to add or delete from this list as it deems to be in its best interest.

5.2.3.3. Specifications

Preliminary specifications for the Boring Contract shall be submitted to the Authority with the 1"=200' scale boring location plans. These specifications shall be as complete as possible to minimize changes in the final submission. A sample guide specification for test boring contracts is provided in Appendix A – Sample Boring Specifications. The proposed test boring contract should be structured so that adjustments in the boring work can be made as the results of the borings are received.

The Authority's Engineering Department will review these specifications and return them to be finalized and resubmitted with the 1"=30' or 1"=50' scale boring location plans, in a form ready for invitation of bids.

5.2.3.4. Contract Award

The Authority's Engineering Department will review the final plans and specifications concurrently with the Phase "A" review, and after having determined that they are in order, the Authority's Project Manager will notify the Engineer to proceed with the invitation of bids from the approved list of bidders. The Engineer will invite bids by sending a complete set of Contract Documents to each of the approved bidders, allowing at least two weeks for the receipt of bids. In the event that Authority action is necessary for awarding the Contract, the date for receipt of bids will be set by the Authority.

Bids will be received by the Engineer at their office and will be publicly opened and read at the date and time set by the Authority. The Authority may arrange to have a representative present at the time of opening of bids. All of the proposal guarantee checks will be held until the Engineer has checked the bids for accuracy and compliance with the Specifications. After the bids are checked, the Engineer will return the proposal guarantee checks to all the bidders except the lowest and second lowest bidders. These will be held until the lowest bidder has executed the contract, at which time the remaining two proposal guarantee checks will be returned.

The Engineer will formally notify the Authority's Project Manager of the results of the bidding and recommend the disposition of the Contract. The Authority will review the results of the bidding and the Engineer's recommendation and decide the action that shall be taken. The Authority's Project Manager will formally notify the Engineer of the action taken, and if favorable, the Engineer will advise the lowest bidder to obtain the documents required to execute the Contract. In no event shall the Contract be executed, or work begun until the mandatory two-week Governor's review period has elapsed.

When the Contract Agreement, the Contract Bond and all the required Insurance Certificates have been submitted by the lowest bidder, properly signed and executed, the Engineer will sign the Contract Agreement and notify the Contractor to proceed with the work. At the same time, the remaining proposal guarantee checks of the lowest and second lowest bidders shall be returned.

5.2.3.5. Inspection

It is the Engineer's responsibility to provide field monitoring of the boring contract. Borings will be staked out in accordance with the contract plans and obtain ground elevations at each location. The ground elevations shall be read to the nearest one-tenth of a foot.

The Engineer shall provide trained and experienced boring inspectors to monitor the boring operations and prepare boring logs. The Boring Inspectors will be under the supervision of a licensed Geotechnical Engineer who will make periodic visits to the project site during the course of the boring work. Each boring rig shall have the full-time attention of one Inspector who will keep a complete record of the entire operations of that rig. In the event that two rigs are close enough for the Inspector to easily walk from one to the other, one Inspector may cover these two rigs. The Inspectors shall make their own measurements of the length of the casing driven into the ground, not relying on the so-called standard length which varies from one piece to the next. They shall measure accurately the depth to the top of each sample, keep a record of the penetration resistance of the sampler or the pressure used to push the thin-walled samplers into the ground, and also record any unusual observations.

The Inspector shall identify the samples recovered with the split spoon sampler and observe the jarring and labeling of representative samples for future identification checking or index testing. The jars shall be kept in a safe place away from open sunlight. The soil description to be used by the Boring Inspectors is the Burmister Soil Identification System (Ref. 2) which is noted in Appendix B - Burmister Soil Identification System. Undisturbed samples shall be properly sealed in accordance with the Specifications, by the driller in the presence of the Inspector, and placed in the required sample tube container. The Inspector shall keep them safely, guarding them against sunlight, impact or vibration, and carefully transport them to the laboratory.

The Inspector shall verify that ground water levels are taken at each hole by the driller. Ground water levels shall be taken each morning before work begins at a hole, on completion of the boring after removal of the casing, and twenty-four hours later.

The Inspector shall assure that all borings are grouted up at the completion of the borings.

A Boring Inspectors Manual is provided in Appendix C - Boring Inspector's Manual. The boring log forms to be used are given in Exhibit 5-1. A sample boring log is given in Exhibit 5-2.

At the conclusion of the boring program, the Engineer shall prepare a revised list of borings showing the "as-built" boring station and offset, actual type and depth of each boring (the Engineer shall maintain a record of boring coordinates). This revised list is to be utilized in locating the borings on the construction contract plans.

The Inspector's field boring logs shall be edited by the Geotechnical Engineer for consistency and completeness. A layout of the boring logs applicable to each construction contract shall be made on standard size sheets and incorporated in the construction plans as reference drawings.

It is the Engineer's responsibility to provide storage for the samples obtained during the boring program. All samples shall be carefully stored so that they are readily available until such time as all borings and testing contracts are completed and all claims satisfactorily settled. When the Engineer no longer has need for the samples and cores, the Authority's Project Manager will be contacted for direction on the disposition of the samples.

5.2.3.6. Environmental Contamination

Environmental investigations will normally precede the geotechnical investigation to determine if contamination is present. It is possible that geotechnical borings installed in areas thought to be uncontaminated may encounter contamination. The Authority's Project Manager shall be immediately notified if environmental contamination is encountered during installation of soil borings. Any testing for and management of contamination within the project site must be performed in accordance with current NJDEP Site Remediation regulations and the NJDEP's Field Sampling Procedures Manual. Refer to the Authority's Design Manual for "Environmental Engineering" requirements.

Exhibit 5-1 Boring Log

ENGINEERING FIRM

BORING NO. BF-1
SHEET NO. 1 OF 2

BORINGS FOR
<PROJECT TITLE, MUNICIPALITY>

(Engineer)

(Contractor)

Contract No. _____ Purpose _____ Structure No. _____
Location _____ ROADWAY _____ STA. _____ OFF. _____

Rig No. 2	Type CME 55	Driller		Helper			
DATE	5/26/05						
TIME STARTED	10:00 AM						
TIME FINISHED	2:30 AM						
WEATHER	50° Cloudy						
DEPTH REACHED	39.0′						

GROUND ELEVATION 593.68 M.L.W. ELEVATION _____
ZERO OF BORING LOG _____ ELEVATION GROUND WATER _____

PAY QUANTITIES										
LINEAL FEET OF BORING					SAMPLES			LIN. FT. OF ROCK CORE		
2-½ in	3 in	4 in			ORD. DRY	UNDIST. DRY		1-3/8	1-5/8"	2-1/8"
ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM

	Unit Weight	Size	Weight of Hammer	Average Fall
Drilling Mud	_____	_____	_____	_____
Ordinary Dry Samples O.D.	2 in	I.D. 1-?	140 lbs	30 in
Undisturbed Samples	Type _____	Length _____	O.D. _____	I.D. ____

GROUND WATER READINGS							
DATE							
TIME							
DEPTH							

GENERAL REMARKS: Boring located @ center of Rte. 46 west bound right lane @ 15± ft. south-southwest of original location.

The subsurface information shown hereon was obtained for NJTA design and estimate purposes. It is made available to authorized users only that may have access to the same information available to the State. It is presented in good faith, but is not intended as a substitute for investigations, interpretation or judgment of such authorized users.

INSPECTOR _____ RESIDENT ENGINEER _____

BORING LOG
<PROJECT TITLE, MUNICIPALITY>

Boring No. BF-1
Sheet No. 2 of 2

CONTRACT NO. ROADWAY STA. OFF.

Elev. (ft)	Blows on Casin	Blows on Spoon For 6-in Penetration		Sample No.	Sample Depth ft	Log 0.0	Material & Remarks
593.68			43	S-1	0.5 - 2		6″ asphalt, Dk. Br. c-f SAND, tr. Silt, Some c-f
		36	100/1″				Gravel Rec.: 9″
591.68		17	11	S-2	2 - 4		Br. c-f SAND, tr. Silt, little c-m Gravel
		20	19				2.5 ft. Auger refusal Rec.: 8″
				C-1	2.5 - 4		Color mix Blue/ Lt. Gr./Pink Cobbles and
							Boulders, Sand Screams
							REC : 36%, RQD : 0%
589.68		50/3″		S-3	4 - 4.3		No Recovery
							Rec.: 0″
				C-2	4 - 9		Color mix Blue/ Lt. Gr./Pink Boulders,
							REC : 36%, RQD : 8%
				C-3	9 - 14		Color mix Blue/ Lt. Gr. Cobbles and Boulders,
							REC : 30%, RQD : 10%
				C-4	14 - 19		Color mix Blue/ Lt. Gr. Cobbles
							REC : 12%, RQD : 0%
				C-5	19 - 24		Color mix Blue/ Lt. Gr./Pink Cobbles
							REC : 32%, RQD : 0%
				C-6	24 - 29		Color mix Blue/White/ Lt. Gr./Pink Cobbles
							REC : 32%, RQD : 0%
				C-7	29 - 34		Color mix Blue/ Lt. Gr./Pink Cobbles and
							Boulders
							REC : 36%, RQD : 0%
				C-8	34 - 39		Color mix Blue/White/ Lt. Gr./Pink Cobbles
							REC : 6%, RQD : 0%
							Hit Sand layer at 36.5
554.68							
						END	End of Boring @ 39.0′

Exhibit 5-2 Sample Boring Log

ENGINEERING FIRM

BORING NO. _____
SHEET NO. 1 OF 2

BORINGS FOR
<PROJECT TITLE, MUNICIPALITY>

_____
(Engineer)

_____
(Contractor)

Contract No. _____ Purpose _____ Structure No. _____
Location _____ ROADWAY _____ STA. _____ OFF. _____

Rig No. _____	Type _____	Driller _____	Helper _____			
DATE						
TIME STARTED						
TIME FINISHED						
WEATHER						
DEPTH REACHED						

GROUND ELEVATION _____ M.L.W. ELEVATION _____
ZERO OF BORING LOG _____ ELEVATION GROUND WATER _____

PAY QUANTITIES										
LINEAL FEET OF BORING					SAMPLES			LIN. FT. OF ROCK CORE		
2-½ in	3 in	4 in			ORD. DRY	UNDIST. DRY		1-3/8	1-5/8"	2-1/8"
ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM

	Unit Weight	Size	Weight of Hammer	Average Fall
Drilling Mud	_____	_____	_____	_____
Ordinary Dry Samples O.D. _____ I.D. _____			_____ lbs	_____ in
Undisturbed Samples Type _____ Length _____ O.D. _____ I.D. ____				

GROUND WATER READINGS							
DATE							
TIME							
DEPTH							

GENERAL REMARKS:

The subsurface information shown hereon was obtained for NJTA design and estimate purposes. It is made available to authorized users only that may have access to the same information available to the State. It is presented in good faith, but is not intended as a substitute for investigations, interpretation or judgment of such authorized users.

INSPECTOR _____ RESIDENT ENGINEER _____

BORING LOG **Boring No. _____**

<PROJECT TITLE, MUNICIPALITY> **Sheet No. 2 of 2**

CONTRACT NO. **ROADWAY** **STA. OFF.**

Elev. (ft)	Blows on Casin	Blows on Spoon For 6-in Penetration		Sample		Log 0.0	Material & Remarks
				No.	Depth ft		
						END	**End of Boring @**

5.2.3.7. Geotechnical Engineering Report

When developing submissions, the Engineer is expected to use objective engineering judgment and avoid performing analyses which proves what is already known or documented.

1. Design Memoranda - Preliminary Engineering

   The purpose of the Design Memoranda is to provide statements and remedies for specific geotechnical issues identified on the project in sufficient detail to enable the preliminary engineering to advance.

   The Scope of Work of the Design Memoranda is as follows:

   Prepare a separate Design Memorandum for each identified issue. Issues may include:

   a. Geotechnical Treatments for Unusual Soils or Geologic Conditions
   b. Preliminary Cut and Fill Slope recommendations
   c. Environmental Mitigation
   d. Other Special Design Treatments

   Design Memoranda deliverables include the following:

   At a minimum, in each Design Memorandum:

   a. State the Geotechnical issue and identify as either Simple or Complex
   b. Provide Geotechnical Recommendations to address the issue
   c. Explain the Alternatives that were considered
   d. Provide a concise technical account (include such items as test borings, analysis, calculations, etc.) that supports the Geotechnical Treatment.

2. Meetings

   Meetings will be held to discuss geotechnical issues, determine which issues warrant design memoranda, review design memoranda and other geotechnical recommendations, and coordinate with the other disciplines on the Design Team.

   The meeting agenda, time, date and place will be made by mutual agreement with the project team consisting of the Authority's Project Manager and the Engineer. Certain meetings will occur during the Preliminary Engineering and include:

   a. Reconnaissance Plan
   b. Drilling (Pre-bid, Startup and other, if needed)

c. Design Memos

d. Other Geotechnical Issues

3. Structure Foundation Geotechnical Engineering Report (SFGER) Submission Guidelines

The purpose and objective of the Structure Foundation Geotechnical Engineering Report is to provide the structure design, the parameters used to develop the design and the basis for the parameters used in the design of the structure.

Structure Foundation Geotechnical Engineering Report

The foundation report submission consists of foundation plans and geotechnical report.

The process from collection of field data to foundation approval can be expedited through the use of three major steps:

a. Collection and submission of data:

Upon completion of the boring and testing programs, submit draft versions of the as-drilled boring location plan, typed engineer's boring logs, and relevant boring profiles. Submit a summary of soil, rock and water testing performed, along with the raw test data. Reference the date of the boring and testing program approval and note any major discrepancies. Also submit other significant subsurface information to be considered during foundation analysis. This information will receive a preliminary QA review for format, content and completeness.

b. Discussion of foundations and analyses to be performed:

After submission of the data and prior to formal evaluation of foundation alternatives, a discussion will be held to review the data. Parties to the discussion will be the Authority‘s Engineering Department and the Engineer. As a result of this discussion, foundation alternatives will be identified for further evaluation, including cost comparisons, as warranted. The requirement for detailed analysis of various foundation alternatives will not be warranted if the outcome is predictable from review of the basic data.

These further alternative analyses will be summarized in a table or matrix and submitted for concurrence. Informal discussions will arrive at a consensus as to the foundation type(s) and the general substance of the geotechnical foundation recommendations.

c. Draft and final SFGER submission:

At a minimum, the following items should be covered in the report:

i. INTRODUCTION - Include project location, structure description, and site description. This should be a brief overview discussion, of not more than three paragraphs. Provide the general conditions, features, and any relevant items of note.

ii. RECOMMENDATIONS - This is a concise summary of the geotechnical foundation recommendations, including the summary table required shown in Exhibit 5-3, a list of applicable special provisions and construction details, a list of the foundation notes to appear on the bridge plans, and design guidance (including geotechnical parameters) for the structural engineer. Place the table at the front of the text for this chapter; not at the end of the report. In order to expedite the design, use the Authority's Construction Standards and Specifications as a basis for recommendations. Discuss deviations with the Authority's Project Manager prior to making formal revisions. Minimize geotechnical analysis where standardized details and specifications are applicable.

iii. SPECIAL CONCERNS - Provide a paragraph on any special geotechnical concerns identified. This may include stability, settlement, or other concerns.

iv. FOUNDATION ALTERNATIVES - Provide a concise summary of the alternatives considered at each substructure site, and the reasons for selecting or rejecting each alternative. Reference supporting documents, calculations, and meeting minutes where alternatives were discussed. Provide these documents in appendices. Maintain coordination with the Authority's Project Manager during analyses. Perform technical and economic comparisons for the various options considered only when approved. During the analysis and design process, identify the basis for using any value, parameter, or procedure (for example is the value based on test results, reference material and/or engineering judgment). Included shall be a discussion of retaining wall selection. Considerations shall include the selection of wall type, the physical and chemical characteristics of the in-situ soil, ground water, flood and tidal levels at the site. Consideration of alternate/proprietary retaining walls (mechanically stabilized embankment and prefabricated modular walls) shall also be included where applicable.

v. SUBSURACE CONDITIONS AT SUBSTRUCTURE UNITS - This should concisely summarize the engineer's interpretation of the data and understanding of conditions at each substructure. Soil, rock, and water conditions should be addressed. Provide one paragraph for each substructure unit.

vi. SITE EXPLORATION AND TESTING - Provide a two-paragraph summary of the boring and testing program, referencing the boring logs and test results.

vii. APPENDICES - Provide the following appendices to the report:

a) draft special provisions and construction details

b) test boring logs

c) foundation plan

d) laboratory test results

e) subsurface profiles

f) geotechnical analyses

g) cost comparisons (if needed)

h) relevant correspondence

The most important parts of the geotechnical report are the RECOMMENDATIONS and APPENDICES subparts a, b and c. These will be the basis for the preparation of the foundation elements of the structure plans. The report itself should be kept to a minimum by avoiding repetitive text while still providing appropriate documentation to support the recommendations.

The submission can be made in one or two volumes, depending on its overall size. If a two-volume submission is made, include text and Appendices A, B and C in the first volume. The remaining Appendices may be in a second volume.

The foundation report submission will be modified in response to comments on the draft submission. Modifications can be made through submission of individual pages or report sections, for approval. After approval of modifications is received, provide a complete final foundation submission, including a letter.

The deliverable includes the two foundation submission components that include foundation plans and geotechnical report. The deliverable is submitted in a draft and a final document. The draft submission is reviewed, and comments are provided. The final submission addresses the comments and serves as the final Structure Foundation Geotechnical Engineering Report for the structure being addressed in the project.

4. Roadway Geotechnical Engineering Report (RGER) Submission Guidelines

The RGER is intended to present recommendations addressing the subsurface conditions identified in investigations which will impact the design and construction of the roadway and its associated structures.

The process from collection of field data to RGER approval can be expedited through the use of three major steps:

a. Collection and submission of data:

Upon completion of the boring and testing programs, submit draft versions of the as-drilled boring location plan, typed engineer's boring logs, and relevant boring profiles. Submit a summary of soil, rock and water testing performed, along with the raw test data. Reference the date of the boring and testing program approval and note any major discrepancies. Also submit other significant subsurface information to be considered during geotechnical analysis. Include a paragraph that summaries the Geotechnical information and any readily identifiable geotechnical problems or concerns. This information will receive a preliminary QA review for format, content and completeness.

b. Discussion of findings and analyses to be performed:

After submission of the data and prior to formal evaluation of geotechnical results, a discussion will be held to review the data. Parties to the discussion will be the Authority's Engineering Department and the Engineer. As a result of this discussion, geotechnical concerns will be identified for further evaluation. The requirement for detailed analysis of geotechnical information will not be warranted if the outcome is predictable from review of the basic data.

Informal discussions will arrive at a consensus as to the geotechnical concerns and the general substance of the geotechnical recommendations. The Geotechnical Engineer will prepare and distribute minutes of these discussions. These meetings outcome and issues for further analyses will be summarized in a table or matrix and submitted with the meeting minutes.

c. Draft and final RGER submission:

The submission is expected to include the report, geotechnical treatment plan, subsurface profile plans, and details and special provisions for construction.

The report itself should be kept to a minimum by avoiding repetitive text while still providing appropriate documentation to support the recommendations. Incorporate figures and tables within the body of the report, not at the end.

At a minimum, the following items are to be provided in the report:

i. INTRODUCTION – Include project location and description – This should be a brief overview discussion, of not more than three paragraphs. Provide the general conditions, features, and any relevant items of note.

ii. RECOMMENDATIONS – This is a concise summary of the geotechnical recommendations, referencing the Geotechnical Treatment Plan including a list of applicable special provisions and construction details, a list of the construction notes to appear on the plans, and design guidance (including geotechnical parameters) for the engineer. In order to expedite the design, use the Authority's Construction Standards and Specifications as a basis for recommendations. Discuss deviations with the Authority's Project Manager prior to making formal revisions.

ii. The recommendations section shall address, as applicable:

a) Embankment Construction

b) Cut Construction

c) Use of On-Site Materials

d) Transition Zones and Sub grade Construction

e) Pavement Design Parameters

f) Special Treatments Not Listed Above

g) Instrumentation for Construction Control

iii. ANALYSIS OF DATA AND CONCLUSIONS – (prepare this chapter to generally parallel Recommendations as previously outlined on a section-by-section basis.) This is an analysis of the field and laboratory data and assessment of the site conditions, subsurface investigations and laboratory findings. The analysis and interpretation must support the conclusions. Minimize geotechnical analysis where standardized details and specifications are applicable. During the analysis and design process, identify the basis for using any value, parameter, or procedure (for example is the value based on test results, reference material and/or engineering judgment).

iv. The conclusions are to be developed from the analysis. The conclusions shall be concise, specific and supporting of each recommendation. Do not repeat recommendations in this chapter.

v. SOIL, ROCK AN HYDROLOGIC SETTING – Provide a concise, integrated summary of findings of the subsurface investigation, field reconnaissance, test drilling and laboratory testing, as they relate to proposed roadway construction. The section will include:

a) Regional Physiography and Topography

b) Soils -Provide a concise written overview of soil types and identify problem soils

c) Geology - Provide summary table and show key stratigraphic units on Reconnaissance Map

d) Hydrology - Include surface drainage and groundwater

e) Environmental Impacts -include hazardous waste or potentially contaminated media sites; wetlands, streams and water wells; and oil and gas wells

vi. GEOTECHNICAL INVESTIGATIONS - Provide a very brief summary for each boring and testing program conducted for the project. Reference the boring logs and test results.

vii. REFERENCES – Provide documents used to prepare report.

viii. APPENDICES - Provide the following appendices to the report:

a) Geotechnical Treatment Plan

b) Draft Special Provisions and Details

c) Subsurface Profile

d) Plan of borings, notes and reconnaissance mapping

e) Test Boring Records

f) Laboratory Test Results

g) Calculations

h) Relevant Correspondence

Provide unique page numbers for all sheets within each Appendix. Additional Appendices may be provided for photographs or other relevant materials.

For Tables, provide only those tables that are needed during the natural course of design development. Do not develop tables simply to meet any perceived RGER submission requirement.

Organize calculations with a table of contents. Include a cover sheet containing a list of persons whose initials appear on the calculations, with a statement prepared, signed and sealed by a Professional Engineer, registered in the State of New Jersey, that all calculations are checked.

The RGER submission can be made in one or more volumes, depending on its overall size. If a multi-volume submission is made, provide the report text and Appendix A, B, and C as the first volume.

The RGER will be modified in response to comments on the Draft RGER submission. Modifications can be made through submission of individual pages or report sections, for approval. After approval of modifications is received, provide a complete final RGER submission.

5. Additional Meetings

The purpose of the meetings is to discuss the plan review, geotechnical issues and geotechnical recommendations. The objective of the meetings is to establish that the geotechnical recommendations and geotechnical issues have been adequately addressed in the design plans, so the project can be advanced.

Exhibit 5-3 Foundation Recommendation Summary

NEW JERSEY TURNPIKE AUTHORITY

JOHN DOE ASSOCIATES

Consulting Engineers

SECTION NO.		CONTRACT NO.	

STRUCTURE FOUNDATION RECOMMENDATION

Structure No. _____ Job No. _____ By _____ Date _____

Location _____

Roadway _____ Over-Under _____

Lower Roadway. _____ in-on _____ ft. Cut-Fill PG to PG = _____

Foundation Unit	Ref. Boring No.	Boring Elev.	Ground Water Elev. *	Normal Footing Elev.	Recommended Foundations					
					Soil Bearing		Piles/Drilled Shaft			
					Footing Elev.	Design Load	Tip Elev.		Type	Design Load
					ft.	TSF	Est.	Min.		Tons

Remarks: _____

*** Water Elev. - Indicates Water Table except for borings located in water it indicates Mean Low Water for area.**

Design Load - for AASHO Group I Loading. **Form N23-A - Rev. 2007**

5.3. APPENDIX A – SAMPLE BORING SPECIFICATIONS

(ON ENGINEER'S LETTERHEAD)

INVITATION FOR PROPOSALS

CONTRACT NO. _____

Proposals are invited for Contract No. _____ which involves the taking of borings for the _____project name_____of the New Jersey Turnpike Authority in _____ County, New Jersey.

The principal items of work are as follows:

Proposals will be received at the office of _____engineer's_____address _____ until _____time & date_____at which time and place said proposals will be publicly opened and read.

Contract documents may be examined during office hours on or after _____time & date_____ at the office of _____engineer's office_____.

Note: Asterisk denotes location where information concerning the specific project is to be inserted.

BORING CONTRACT NO. C -

* * * * * *

PROPOSAL

To _____engineer_____

The undersigned hereby declares that _____ carefully examined the Invitation for Proposals, Specifications, Plans, Contract Agreement and Contract Bond for the Project named above; that _____ personally inspected the actual location of work; and that _____ will contract to carry out and complete the Project as specified at the price per unit of measure bid for each scheduled item stated in the Scheduled Items of Work to follow.

It is understood that the Total Price stated by the undersigned in the following Scheduled Items of Work is based on the estimated quantities shown for each item of work and will control in awarding the Contract. It is further understood that the quantities stated in said schedule for the various items are estimates only and may be increased or decreased during the progress of the work, as provided in the Specifications.

SCHEDULED ITEMS OF WORK

Item No.	Approximate Quantity	Item with Written Unit Price	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
1	---	Mobilization Lump Sum of _____ _____				
2)		Lin. Ft., 2-1/2" Dia. Cased Holes for Soil Sampling _____ _____ Per Linear Foot				
3)		Lin. Ft., 2-1/2" Dia. Cased Holes for Soil Sampling on water _____ _____ _____ Per Linear Foot				
4)		Lin. Ft., 4" Dia. Cased Holes for Soil Sampling _____ _____ Per Linear Foot				
5)		Each, 1-3/8" Dia. Ordinary Dry Samples _____ _____ Each				
6)		Each, 2-7/8" Dia. Undisturbed Dry Samples _____ _____ Each				

Item No.	Approximate Quantity	Item with Written Unit Price	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
7)		Each, 2” or 3” Dia. In-Place Vane Shear Tests _____ _____ _____ Each				
8)		Lin. Ft., 1-5/8” Dia. Core Borings in Rock _____ Per Linear Foot _____ _____				
9)		Lin. Ft., 2-1/8” Dia. Core Borings in Rock _____ Per Linear Foot _____				
10)		Lin. Ft., Observation Wells _____ Per Linear Foot _____				
11)		Maintenance and Protection of Traffic Lump sum of _____ _____				
			Total Price		$	

Acknowledgement is hereby made of the following Addenda received since the issuance of the Plans and Specifications:

_____

_____

Accompanying this Proposal is a certified check or bid bond made payable to ____engineer___ in the amount of not less than five percent of the Total Price bid, which the undersigned agrees is to be forfeited as liquidated damages, and not as a penalty, if the Contract is awarded to the undersigned and the undersigned shall fail to execute and deliver the Contract Agreement and the Contract Bond and furnish satisfactory evidence of all required insurance coverage, all within the stipulated time; otherwise, the check will be returned to the undersigned.

(an Individual)

The undersigned is (a Partnership) under the laws of the State

(a Corporation)

of _____ having its principal office at _____.

Name of Firm Bidder:

_____

Address of Firm:

_____

_____

Witness or Attest:

_____ Bidder's Signature: _____

Title:

Date Signed: _____, 20__

(Corporate Seal)

BORING CONTRACT NO. _____

* * * * * * * * * *

CONTRACT AGREEMENT

THIS AGREEMENT, made this _____ day of _____ in the year of our Lord Two Thousand and_____ between _____(engineer)_____, party of the first part, hereinafter called the Engineer, _____, party of the second part, hereinafter called the Contractor.

WITNESSETH, that the said Contractor, for and in consideration of the payments hereinafter specified and agreed to be made by the Engineer, hereby covenants and agrees to furnish and deliver all materials necessary, and to perform all the work required to be performed, including all work incidental thereto, for the making of boring for _____ _____ and to complete this Contract in strict and entire conformity with the attached Specifications and accompanying boring location Plans, which said Plans and Specifications and other Contract documents are hereby made a part of this agreement as fully and with the same effect as if the same had been set forth at length in the body of this Agreement.

The Contractor agrees to make payment of all proper charges for labor and materials required in the aforementioned work, and to defend, indemnify and save harmless the Engineer, the New Jersey Turnpike Authority, their officers, employees, agents and servants, and each and every one of them, against and from all suits and costs of every name and description, and from all damages to which the said parties may be put, by reason of injury to the person or property of others resulting from the performance of said work, or through the negligence of the Contractor, or through any improper or defective machinery, implements or appliances used by the Contractor in the aforesaid work, or through any act or omission on the part of the Contractor, or his agent or agents, employees or servants.

It is also agreed and understood that the acceptance of the final payment by the Contractor shall be considered as a release in full of all claims against the Engineer, the New Jersey Turnpike Authority or any of their officers, employees, agents and servants, arising out of, or by reason of, the work done, and materials furnished under this Contract.

In consideration of the premises, the Engineer hereby agrees to pay to the Contractor for the said work, when fully completed, the sum of _____ Dollars and _____ Cents ($_____)

(Estimated), payments to be made at the bid prices specified in the Contractor's Proposal, as provided in the Specifications and upon presentation of the proper certificates of the Engineer and upon the terms set forth in the Specifications. It is understood that the amount to be paid shall be the total based on the unit prices contained in said Proposal and made a part of this Contract, for the work actually done rather than the estimated total Price hereinabove specified which is based upon estimated quantities.

This Contract is to be binding upon the Engineer and his successor or successors, and upon the Contractor and its executors, administrators, successor or successors, and is voidable and may

be terminated by the Engineer if the provisions of the Specifications relative thereto are not complied with.

IN WITNESS WHEREOF, the parties hereto have duly executed this agreement the day and year first above written.

Witness:

(ENGINEER)

_____

By: _____
Title:

CONTRACTOR:

_____
Name of Firm

_____
Address

_____

Witness or Attest:

_____

By: _____
Title:

(Corporate Seal)

BORING CONTRACT NO. _____

* * * * * * * * * * *

CONTRACT BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned, _____ as PRINCIPAL, and _____ a Corporation organized and existing under the laws of the State of _____ and duly authorized to do business in the State of New Jersey, as SURETY, are hereby held and firmly bound unto _____(engineer)_____ their successor or successors, in the penal sum of _____ Dollars and Cents ($_____), for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our hefts, executors, administrators, successors and assigns.

Signed this _____ day of _____, A.D. two thousand and_____

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that whereas the above named Principal is about to enter into a contract with _____engineer_____, their successor or successors, which said contract, for the making of borings for _____ is hereby made a part of this bond as if set forth herein at length.

NOW, THEREFORE, if the said Principal shall well and faithfully do and perform the things agreed by _____ to be done and performed according to the terms of the said Contract, or any changes or modifications therein made as therein provided, and shall pay all lawful claims and judgments of subcontractors, materialmen, laborers, persons, firms or corporations, for labor performed or materials, provisions, or other supplies, or teams, fuels, oils, implements or machinery furnished, used or consumed in the carrying forward, performing or completing of said Contract, we agreeing and assenting that this undertaking shall be for the benefit of any subcontractor, materialmen, laborer, person, firm or corporation having a just claim, or judgment against the Principal, as well as for the obligee herein, and shall defend, indemnify and save harmless the party of the first part mentioned in the Contract aforesaid, the New Jersey Turnpike Authority, their employees, agents and servants, and each and every one of them against and from all suits and costs of every kind and description, and from all damages to which the said parties or any of their officers, agents, or servants may be put by reason of injury to the person or property of others resulting from the performances of said work or through the negligence of said party of the second part to said Contract, or through any improper or defective machinery, implements or appliances used by the said party of the second part in the aforesaid work or through any act or omission on the part of the said party of the second part, or his agents, employees or servants, and shall further defend, indemnify and save harmless the party of the first part mentioned in the Contract aforesaid, the New Jersey Turnpike Authority, their officers, employees, agents and servants, from all suits and actions of any kind or character whatsoever which may be brought or instituted by any subcontractor, materialman or laborer who has performed work or furnished materials in or about the work required to be done pursuant to the said Contract, or by or on account of any claims or amount recovered for any infringement of patent, trademark or copyright; then this obligation shall be void; otherwise, the same shall remain in full force and effect, it being expressly understood and

agreed that the liability of the Surety for any and all claims and judgments hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that no modifications or omissions, or additions in or to the terms of the said Contract, or in or to the Plans or Specifications therefor, shall in anywise affect the obligations of said Surety on its bond.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers the day and year first set forth above.

PRINCIPAL:

(Corporate Seal)

_____
Name of Firm

_____
Address

Witness or Attest:

By: _____

_____
Title:

SURETY:

(Corporate Seal)

_____
Name of Firm

_____
Address

Witness or Attest:

By: _____

_____
Title:

(Contract Title)

BORING CONTRACT NO. C-_____

* * * * * * * *

SPECIFICATIONS

SECTION 1 — GENERAL PROVISIONS

1.1. Definitions

Whenever in this contract the following terms, or pronouns in place of them, are used, their intent and meaning shall be interpreted as follows:

ENGINEER: Designer

INSPECTOR: Authorized representative of the Engineer, assigned to inspection of work and materials.

CONTRACT: The agreement covering the performance of the Project, hereinafter defined, and payments thereof, including the Invitation for Proposals, executed Proposal, executed Contract Agreement, executed Contract Bond, Specifications, Plans, Addenda if issued, and supplementary agreements which may be entered into, all of which documents are to be treated as one instrument as if set forth at length in the form of Contract Agreement.

PROJECT: The entire work to be performed within the limits specified for the Contract.

PLANS: Drawings or reproductions thereof, furnished by the Engineer, pertaining to the Project.

SPECIFICATIONS: This document of Specifications, and any Addenda that may be issued relating thereto.

PROPOSAL: The prepared form furnished by the Engineer, properly filled in and executed and submitted as a bid for the performance of the Project.

BIDDER: An individual, partnership or corporation, acting directly or through a duly authorized representative, legally submitting a Proposal.

CONTRACTOR: Party of the second part to this Contract, acting directly or through agents or employees, and primarily liable for the acceptable performance of the Project and for the payment of all debts pertaining to the Project.

SURETY: The corporate body which is bound with and for the Contractor, and which engages to be responsible for their acceptable performance of the Project and for the payment of all debts pertaining to the Project.

ADDENDA: Written interpretations or revisions of any of the Contract documents mailed or otherwise delivered to Bidders prior to the opening of bids.

AUTHORITY: The New Jersey Turnpike Authority.

1.2. Invitation to Bid

In accordance with the Invitation for Proposals, proposals will be received for the performance of the project, the designation of which is stated in the Invitation for Proposals. Bids are requested on the items stated in the form of Proposal for the Contract. The prices bid shall cover all costs of any nature, incident to and growing out of the work. In explanation, but not in limitation thereof, these costs shall include the cost of all work, labor, material, equipment, transportation and all else necessary to perform and complete the Project in the manner and within the time required, all incidental expenses in connection therewith, and any additional expenses for unforeseen difficulties encountered and for settlement of damages.

Before submitting their Proposal, the Bidder shall be familiar with the Plans, Specifications and other documents that will form parts of the Contract, shall have investigated in detail the site of the Project and shall have made such examination thereof as may be necessary to satisfy himself in regard to the character and amount of work involved. He shall

have satisfied himself also that he can secure the necessary labor and equipment to perform and complete the Project in the manner and within the time required.

1.3. Proposal

Proposals shall be submitted on the form of Proposal attached hereto, properly filled out in ink and executed. The Bidder shall state in the form of Proposal the price per unit of measure, or lump sum price, in figures and words, for each scheduled item of work, for which he will agree to carry out the work, as well as the Total Price for the performance of the Project, as determined by multiplying each estimated quantity by the price per unit of measure bid therefore, and adding together the resulting amounts and any lump sum prices required. For the purpose of comparison of bids received, the Total Price, correctly computed, stated in the Proposal will be considered to be the amount bid for the Contract and award will be made on that Total Price.

Where there is a discrepancy in any item between the unit or lump sum price written in figures and that written in words, the written words will govern.

If, during the tabulation of bids, the Total Price on any Proposal is found to be incorrectly computed, the Engineer reserves the right to make such changes as are necessary in the extended Amounts and Total Price on the basis of the unit and lump sum prices given in words and the Approximate Quantities stated for the scheduled items therein.

Conditions, limitations or provisions attached by the Bidder to the Proposal may cause its rejection; however, the Engineer reserves the right to waive any and all informalities of submitting the Proposal and/or Proposal Guaranty.

When the Proposal is made by an individual, their post office address shall be stated, and they shall sign the Proposal; when made by a partnership, its name and post office address shall be stated, and the Proposal shall be signed by one or more of the partners; when made by a corporation, its name and principal post office address shall be stated, and the Proposal shall be signed by an authorized officer of the corporation. Before award is made to a Bidder not a resident of the State of New Jersey, such Bidder shall designate a proper agent in the State of New Jersey on whom service can be made in the event of litigation.

1.4. Estimate of Quantities

The estimated quantities of the several scheduled items of work involved in the performance of the Project and stated in the form of Proposal are to be used for comparison of Proposals received. The actual quantities may be greater or less than those stated. Payment will be made only for the actual quantity of authorized work done under each scheduled item.

1.5. Proposal Guaranty

Each Proposal must be accompanied by a Proposal Guaranty in the form of a certified check or bid bond, made payable to _____(engineer)_____ in the amount of not less than 5 percent of the Total Price bid.

1.6. Submitting Proposal

The Proposal submitted by a Bidder shall be enclosed in a sealed envelope together with the Proposal Guaranty described above and shall bear on the outside the name and address of the Bidder and the designation of the Project and Contract. If mailed, this envelope shall be inserted in an outer mailing envelope marked, “PROPOSAL” and addressed to the Engineer at_____.

Proposals will be received at the place and until the time stated in the Invitation for Proposals.

1.7. Withdrawing Proposals

A Proposal, after being submitted, may be withdrawn when request therefor is made in writing by the Bidder before the time designated for opening the bids in the Invitation for Proposals.

1.8. Award of Contract

The Contract will be awarded or Proposals rejected within ten days from the date of opening of Proposals.

Award of the Contract, if made, will be to the lowest Bidder whose Proposal complies in all respects with the requirements stated herein.

Award of the Contract will be subject to the approval of the Authority.

The Engineer reserves the right to reject any or all Proposals if the prices are obviously unbalanced, if competition apparently has been suppressed, or if it is deemed advisable to do so in the interests of the Authority.

The award shall not be binding upon the Engineer until the Contract has been executed by the Engineer, nor shall any work be performed on account of the proposed Contract until the Contract Agreement and Contract bond have been fully executed and delivered, together with satisfactory evidence of all required insurance coverage.

1.9. Return of Proposal Guaranties

All certified checks submitted as Proposal Guaranties will be returned immediately after the Proposals have been opened, read and tabulated, except those of the two Bidders who have bid the lowest Total Prices and whose Proposals and other documents submitted therewith comply in all respects with the requirements stated herein. The certified checks submitted as Proposal Guaranties of these Bidders will be returned when the Contract is executed or, if not executed, when the matter has been disposed of by the Engineer, except, however, when the Proposal Guaranty has been forfeited as liquidated damages in accordance with the provisions of the Proposal.

1.10. Contract Bond

The Bidder to whom the Contract has been awarded shall furnish and deliver, within seven (7) calendar days of the date of written notice of award, a Contract Bond, issued by a Surety satisfactory to the Engineer, on the standard form attached hereto.

The bond shall be for a sum of not less than the Total Price bid for the Contract and shall be maintained by the Contractor until the final payment is made, and in the event of insolvency of the Surety, the Contractor shall forthwith furnish and maintain, as above provided, other Surety satisfactory to the Engineer.

1.11. Execution of Contract

The Bidder to whom the Contract is awarded shall, within seven calendar days of the date of written notice of award, execute and deliver to the Engineer the Contract Agreement and Contract Bond and furnish satisfactory evidence of all the required insurance coverage, and proof satisfactory to the Engineer of the authority of the person or persons executing the Contract Agreement and the Contract Bond on behalf of the Bidder. The above documents shall be furnished, executed and delivered before the Contract will be executed by the Engineer.

1.12. Failure to Execute Contract

Failure upon the part of a Bidder, to whom the Contract has been awarded, to execute and deliver the Contract Agreement and the Contract Bond and to furnish satisfactory evidence of all required insurance coverage, in the manner and within the time provided, shall be just cause for annulment of the award. It is understood and agreed by said Bidder that if the award is annulled for the above reasons, the Proposal Guaranty shall, as stated in the Proposal, become the property of the Engineer, not as a penalty but as liquidated damages.

1.13. Subletting and Assigning Contract

The Contractor shall not sell, transfer, assign or otherwise dispose of the Contract to any third party. The Contractor shall not sublet any part of the work to be performed under this Contract without the previous written consent of the Engineer.

1.14. Work to be Performed

It is the intent of this Contract to secure complete, accurate and reliable information on subsoil, rock and foundation conditions, secure proper samples of soils and rock, and obtain ground water elevations, at the locations indicated on the Plans or as directed by the Engineer.

The work under this Contract comprises the performance and completion of the project within the prescribed limits, including the furnishing of all materials, equipment, transportation, labor and all else necessary therefore and incidental thereto, all in accordance with the Plans and Specifications.

1.15. Examination of the Site

It is the obligation of each Bidder to visit the sites of the various borings required to be made under this Contract and ascertain for themselves all the facts concerning the conditions to be encountered in the course of this Project, before preparing and submitting their Proposal.

1.16. Available Information

It is the obligation of each Bidder to make their own investigations of subsurface conditions prior to submitting their Proposal.

The locations of borings taken in _____ in the vicinity of _____ are shown on the Plans. The logs of these borings are available for examination by Bidders at the office of the Engineer at _____.

The above data is offered for the information of prospective Bidders and no representation whatsoever is made as to the nature of the materials and conditions that may be encountered in the boring operations under this Contract. The Bidder shall assume full responsibility for any interpretation he may make of the above data.

The Contractor shall make diligent inquiry as to the availability of records of any other previous borings and excavations, if any, taken in the vicinity of the work. The Contractor shall establish an independent conclusion as to the completeness and accuracy of all available information.

1.17. Working Site

Borings will be required to be taken adjacent to roadways and shoulders in use by the public, adjacent to bridge structures, in marshlands, on railroad property, on private property, and in other areas within the Project limits.

The Contractor shall be responsible for providing access to and from all boring sites.

In advance of the boring contract, the Engineer shall have sent to each property owner, within the proposed right of way, introductory letters apprising the owners that the Authority's personnel and contractors may be performing work on their property. These letters do not constitute a request for a right of entry to the property. It is the responsibility of the Contractor to secure, at their own expense, the owner's permission before entering onto the property. The Contractor shall ascertain from the Engineer whether these letters have been sent before requesting such permission.

The Engineer will provide a list of all known property owners.

Temporary crossings of railroad property will not be permitted without written permission from the railroad company. The Engineer will offer all possible assistance to the Contractor in securing permission to enter upon such private property for their work. The Contractor shall at all times carry out their operations so as not to inconvenience residents at or near the working area. The Contractor shall make clear to all of their personnel the importance of proper public relations.

In gaining access to and from boring sites along roadways, the Contractor shall observe all applicable traffic regulations regarding the movements of their vehicles, equipment and personnel. Vehicles shall travel on roadways only in the direction of normal traffic flow and at no time shall they cross the traffic stream.

Permission to work on the railroad property should be obtained by the Contractor.

The Engineer will provide location plans to submit with the Contractor's application and permit fees where applicable.

The Contractor will be responsible for the securing of wash water supply and for the proper disposition of its discharge at all boring locations.

The location of all stationary and mobile equipment shall be subject to the approval of the Engineer.

The Contractor may occupy during their operations only those portions of public places at the boring locations for which they have obtained the required permission, subject to the approval of the Engineer.

1.18. Jurisdiction and Authority of the State Police

Traffic on Authority facilities is under the direct supervision and control of the New Jersey State Police who will enforce all statutory laws including the Authority's established "Regulations Relating to the Control of Traffic on the New Jersey Turnpike and Garden State Parkway", as they pertain to the Contractor as well as to the traveling public. A copy of the Regulations will be included with the Contract documents; additional copies will be issued upon request. The Contractor shall become familiar with and adhere strictly to the requirements of these Regulations and to the requirements of the Specifications.

If the State Police should observe any hazardous condition connected with or related to the Contractor's operations, or of any violation of the Authority Regulations, they will so notify the Contractor and all work related to such hazardous condition or violation shall immediately be stopped and prompt remedial action shall be taken by the Contractor, to the satisfaction of the Traffic Engineer, before such work is resumed. All cost incurred as a result of discontinuing the work, and of all remedial action required, shall be borne entirely by the Contractor without recourse against the Authority.

1.19. Traffic Permit

The Contractor shall not commence work under this Contract, which would require occupation of or entry upon any Authority facility until he/she has been issued a Traffic Permit.

At least ten working days prior to the time the Contractor intends to occupy any portion of Authority facilities or intends to start any operations affecting Authority Traffic, and from time to time thereafter as directed by the Engineer, the Contractor shall apply for a traffic permit and submit complete details of the methods he/she intends to employ for the safe restriction to the movement of traffic required for their operations. These methods will be reviewed by the Engineer and when satisfactory, approved. Methods not approved will be returned for revision and shall be resubmitted for final review. Approval by the Engineer will be in the form of a Traffic Permit issued to the Contractor by the Traffic Engineer through the Engineer. No operations will be performed by the Contractor within 30 feet of a traveled lane until a Traffic Permit has been issued.

The Contractor's methods submitted for approval shall include complete information, the data and/or sketches covering the following:

1. The nature and location of the work.
2. The proposed obstructions or other hazards to traffic, including all operations within 30 feet of a traveled lane.
3. The length of time during which it is anticipated that hazards or obstructions to traffic will exist.
4. The means proposed by the Contractor for the protection of the public and their own personnel and equipment, including layouts and schedules showing the anticipated lane and shoulder closings, truck protection of traffic, and anticipated dates and rates of work.
5. The names and the day and night telephone numbers of the Contractor's Superintendents assigned to the project.

When work is not progressing in accordance with the Traffic Permit and when directed by the Engineer, the Contractor shall revise the details of their plan of operations and resubmit them for approval. Such revisions, when approved by the Engineer, will form the basis of an Addendum to the Traffic Permit. Work affected by the revisions shall not be undertaken until an Addendum to the Traffic Permit has been issued.

If the approved methods of operations or revisions thereto, submitted by the Contractor for a Traffic Permit are not strictly adhered to by the Contractor, the Engineer shall have the right to revoke the permit, and when so revoked, all work which, in the opinion of the Engineer, will affect the maintenance and protection of traffic, shall be summarily discontinued. The Permit will not be renewed and such work shall not be resumed until the Engineer is assured and satisfied that the Contractor will perform the work in conformity with the approved methods of operations. The Contractor shall have no claim against the Authority or Engineer for losses or delays caused by the revocation of the Permit.

1.20. Maintenance and Protection of Traffic

When any portion of the work under this Contract requires one or more toll lane(s) and/or one or more shoulder of an Authority roadway be closed, such closings shall be made only at the times, to the limits, and in the manner that the movement of traffic by the closings will be at a minimum, and that all traffic moving on portions of the roadway not closed will be able to flow smoothly, and will be protected from all hazards attendant on the Contractor's operations because of the closings, all in accordance with the requirements of the Plans and Specifications.

The Contractor is advised that Authority facilities are in continuous operation 24 hours a day, 7 days a week, and that the work under this Contract has been planned to cause no interference or as little interference to traffic as possible. The Contractor shall, therefore, plan their operations to permit the continuous flow of traffic along the roadways.

It is the intent of the Contract to limit toll lane and shoulder closings to an absolute minimum and that work requiring closings be carried out in an expeditious manner.

The work for maintenance and protection of traffic is a joint Contractor and Authority effort and consists in general of furnishing and/or placing traffic protection devices for closing lanes and shoulders; furnishing personnel immediately and solely employed for the maintenance of the devices and protection of the traveling public; the transportation of devices to and from the site of the Project; placing or installing the devices; moving devices from one position to another as required; all in accordance with the Traffic Permit, the Plans and the General and Special Provisions of the Contract.

No signs except traffic protection signs and traffic direction signs specified or as directed by the Engineer shall be erected by the Contractor or their subcontractors on or near the Authority right of way.

The safety measures outlined and prescribed shall be considered elementary only and not necessarily sufficient in every instance to guarantee the protection of the traveling public. Compliance with the safety measures and precautions prescribed in the Specifications and on the Plans shall not relieve the Contractor of responsibility for taking all necessary measures to protect and safeguard the public, nor relieve him/her of responsibility for the installation of adequate safety measures and for the protection of the traveling public and their own personnel on Authority roadways and premises, shall rest with the Contractor. The cost of safety measures for which payment is not specifically provided under scheduled items in the Proposal, shall be included in the prices bid for the various items scheduled in the Proposal.

1.20.1. Lane and Shoulder Closings

(a). Condition and Situation Requirements

The Contractor's personnel, vehicles or equipment shall not occupy any part of a toll lane, through lane, ramp, or shoulder until the lane or shoulder has been closed.

The Contractor's personnel, vehicles or equipment shall not occupy any area within 30 feet from the outside edge of a shoulder where there is no guardrail until the shoulder has been closed. The storage of materials and equipment will be permitted within the Authority right of way only at specific locations to be designated by the Engineer which shall be not less than 30 feet from outside edge of shoulder or behind guardrail.

Whenever any equipment occupying a shoulder or through lane and not behind barrier curb will be within 3 feet of a traveled lane or will come within three feet when operated (such as a tractor, or a crane swinging), the lane adjacent to the shoulder shall also be closed.

Materials or equipment shall not be stored in a closed lane or shoulder unless protected by barrier curb.

(b). Times for Closings

Because of heavy traffic during morning and evening commuter rush hours, on weekends, over holidays, and during the summer vacation periods (between

Memorial Day and Labor Day) the times or hours when a toll lane or lanes may be closed and work requiring toll lane closings may be performed, are limited.

Toll Lane Closings Permitted. Toll lanes may be closed, and work requiring toll lanes to be closed may be performed only during the times prescribed in the Special Provisions of the Contract.

Shoulder Closings Permitted. Shoulder closings by use of cones, as necessitated by work in progress, will be permitted at any time except that simultaneous closing of both the right and left shoulder of a roadway will not be permitted.

Work requiring the use of barrier curb shall be completed at the earliest time so that prompt removal of the curb can be accomplished.

Emergency Closings. When it becomes necessary, in the opinion of the Chief Engineer, to make prompt repairs to work in progress or to other facilities that are damaged, the lanes will be closed. In such event the Contractor shall provide all the materials and manpower necessary and shall work continuously on a 24 hour per day basis to complete the emergency repairs and again make all lanes available to use by public traffic. Compensation for emergency repairs of damage beyond the Contractor's control will be paid on a cost-plus basis as specified in the New Jersey Turnpike Authority's Standard Specifications or on such other basis as agreed upon by the Contractor and the Engineer. All costs incurred as a result of emergency repairs of damage caused solely by the Contractor's procedures shall be borne entirely by the Contractor.

(c). Number and Length

During permissible lane closing hours, not more than one toll lane in a toll plaza roadway may be closed at any one time in any one work area unless multiple toll lane closings are specifically permitted in the Special Provisions of the Contract.

All shoulder closings shall be of the shortest overall length necessary to protect traffic from a hazardous condition. It is essential that as much shoulder as possible be kept open for use by disabled vehicles.

(d). Methods

Toll lanes and shoulders shall be closed in accordance with the Specifications and with the typical closing procedure and traffic protection devices shown on the New Jersey Turnpike Authority Standard Drawings.

The Contractor shall give the Engineer 48 hours prior notice of the time he/she wishes to place or remove any toll lane closing.

The traffic protection devices (cones and/or pylons) for closing a toll lane or shoulder shall always be set up progressively in the direction of traffic from a truck equipped with not less than two approved six-inch diameter flashing vehicle lights to warn traffic, and with the truck traveling in the lane or shoulder to be closed, after first having stationed a uniformed flagman toward traffic. The protection devices shall always be removed in the reverse order by the truck backing up in the closed toll lane or shoulder after first having stationed a uniformed flagman toward traffic.

The Contractor's personnel shall, while working on foot, wear a sleeveless vest the same as that specified below to be worn by flagmen.

1.20.2. Movement of Contractor's Vehicles, Equipment and Personnel

(a). General

Pedestrians are not allowed on Authority roadways at any time; the Contractor's employees shall not walk across any Authority roadway, nor walk along any Authority roadway except within areas coned off or otherwise closed to the traveling public.

The Contractor shall be responsible for transporting all of their personnel, in accordance with N.J.S.A. 39.4-69-Riding on Part Not Intended for Passengers Prohibited, to and from enclosed or closed-off work areas. Personal vehicles will not be permitted to park anywhere within Authority or private properties except in areas designated by the Engineer. Whenever the Contractor's vehicles operate on any Authority roadway or ramp pavement which is open to traffic, travel shall always be with and not across or against traffic.

Whenever the Contractor intends to transport oversize or slow-moving equipment, or any equipment whose movement may be disruptive to the traveling public, on Authority roadways open to the public, he/she shall first notify the Engineer or their duly authorized representative at least 24 hours in advance of the intended move and the Engineer will establish the time and the route to be taken. At least two approved flashing vehicle lights shall be mounted on all slow-moving vehicles.

Vehicles shall enter and leave work areas in a manner which will not be hazardous to or interfere with traffic. When a flagman is not on duty, during permissible times for lane closings or shoulder closings, automobiles operated solely for the transportation of supervisory personnel, flagmen, or approved inspectors will be allowed access to the work site provided such vehicles are operated in a safe manner.

Vehicles shall not park or stop in roadways or on shoulders except within areas of toll lanes or shoulders coned off or otherwise closed to the traveling public.

Unless otherwise specified the Contractor's vehicles will not be permitted to use Z-turns, median U-turns, grade separated U-turns, or make U-turns across the median or in any Toll Plaza area. Any vehicle making an illegal turn will be subject to a summons by the State Police.

Where, in the opinion of the Engineer, the security of the Authority roadways might become endangered by an operation of the contractor, their subcontractors or suppliers which would permit unauthorized entry to or exit from Authority property, the Contractor shall take immediate measures to restore the security of the Authority right of way.

(b). Vehicle Access to Work Areas

Contractor's vehicles entering or leaving a work area via the Authority roadways shall be operated in a safe manner without creating any hazard or danger to the traveling public. They shall leave and enter the traffic stream at designated points, as shown on the Plans, or as specified herein, or as directed by the Engineer.

Delivery of materials or personnel and movement of vehicles and equipment, into and out of a work area via the Authority roadways shall be made only during the times for closings prescribed above.

Traffic Protection Devices

Whenever the Contractor's work requires closing of any toll lane or shoulder, the Authority will furnish, at no cost to the Contractor certain traffic protection devices required for the Project. These devices will be identified and listed in the Special Provisions of the Contract.

Payment for Work Specified Under this Article

Unless otherwise specified herein and/or in the Special Provisions of the Contract, no specific payment will be made for any work or expense in connection with the maintenance and protection of traffic, but all costs thereof shall be included in the Total Price bid for the Contract, as scheduled in the Proposal.

Railroad Traffic. Attention is hereby directed to the fact that work under this Contract will be performed on the property of and adjacent to the tracks and other facilities of the _____ Railroad Company.

Railroad traffic shall be maintained without interference or interruption at all times. The Contractor shall carry on their work and perform his operations with due regard to the maintenance and protection of railroad property and facilities.

The Contractor shall safeguard the tracks, traffic and appurtenances of the railroad. He/She shall determine and comply with the regulations of the railroad relative to the work and shall keep the tracks clear of obstructions.

Whenever, in the opinion of the railroad, the work may affect the safety of the railroad's facilities and/or the movement of trains, the Contractor shall first submit the manner and method of performing such work to the Chief Engineer of the railroad for their approval, and such work shall not begin without said approval. Any approval by the railroad shall not relieve the Contractor from any responsibility or liability for the acts or omissions of the Contractor, their servants, agents, employees or subcontractors.

If the Contractor desires, in the prosecution of their work, to cross the railroad's right of way at other than an established public crossing, he/she shall make his own arrangements with the railroad for doing so and will bear any expense imposed upon him/her by the railroad for flagging, protection or other costs. Prior to starting work, he/she shall inform the Engineer of the arrangements he/she has made with the railroad in this matter.

Regular operating speed will be maintained by the trains of the railroad, and no slow orders will be issued unless, in the opinion of the railroad, the Contractor's operations adjacent to or over the tracks warrant the issuance of such orders.

The Contractor shall conduct their work and handle their equipment and materials so that no part of any equipment shall foul the operated track without the written permission of the Chief Engineer of the railroad. Any equipment shall be considered to be fouling the track when located in such position that the collapse of same, with or without load, brings the equipment within the fouling limit. The track is considered to be fouled when any object is brought to a point less than 12 feet from the near rail.

Equipment of the Contractor to be used adjacent to tracks shall be in first class condition so as to fully prevent failures that might cause delay in the operation of trains or damage to railroad facilities. Their materials or equipment shall not be placed or stored on railroad property without first obtaining permission from the railroad, and such permission will be on the condition that the railroad company will not be liable for damage to such materials and equipment from any cause. The Contractor may be ordered to remove stored materials and equipment at any time solely at their own expense.

It is hereby understood and agreed that in all matters affecting the safety of railroad traffic, the Chief Engineer of the railroad, or their duly authorized representative, shall have final authority.

The Contractor shall give written notice to the Chief Engineer of the railroad at least ten days prior to the commencement of any work on or adjacent to the railroad's right of way, in order that necessary arrangements may be made by the railroad to properly protect railroad traffic.

The Contractor shall assume liability for any and all damage to their work, employees, servants, equipment and materials caused by railroad traffic or operations.

The Contractor shall keep the tracks adjacent to the boring sites clear of all refuse and debris that may accumulate from their operations and shall leave the railroad property in the condition existing before the start of their operations.

The Contractor shall bear the cost of any approved changes in railroad facilities which are made for their convenience in the conduct of their work.

If deemed necessary by the railroad, an inspector or an engineer may be assigned to the Project during the time the Contractor is performing the work on or adjacent to railroad property. Furthermore, when in the opinion of the railroad, the work may cause a hazard to the safe and continuous operation of trains, the railroad will furnish and place at the site of the work, as it may deem necessary, trainmen, watchmen, flagmen or other protective services and devices during the hours a hazard may occur. The providing of such trainmen, watchmen or flagmen, and the taking of any other precautionary measure shall not release the Contractor or discharge him/her of any responsibility or liability for the acts or omissions of the Contractor, his servants, agents, employees or subcontractors, and such trainmen, watchmen, flagmen or other railroad employees furnished by the railroad shall be considered as employees of the Contractor.

If, during the carrying out of the work covered by this Contract, the tracks or other facilities of the railroad are endangered, the Contractor shall immediately do such work as directed by the Engineer to restore safety, all at the Contractor's own expense, and upon failure of the Contractor to carry out such orders immediately, the railroad company may take whatever steps are necessary to restore safe conditions. The cost and expense to the railroad company of restoring safe conditions or of any damage to the railroad company's trains, tracks or other facilities caused by the Contractors operations, shall be considered a charge against the Contractor and shall be paid for by him/her, or may be deducted from any monies due or that may become due him/her under this Contract.

The cost and expense to the railroad of all inspectors, engineers, track supervisors, conductors, trainmen, watchmen, flagmen or other railroad employees, required and placed at the site of the work by the railroad, shall be paid for by the Contractor. It is a requirement of this Contract that the Contractor shall reimburse the railroad promptly for all cost of such engineering and protective services when bills for the same are presented to the Contractor and final payment to the Contractor under this Contract will not be made until he/she has complied with these provisions.

Bidders shall investigate and determine for themselves:

(a). The number and classifications of railroad employees that the railroad may require, their wage rates and contingent costs and expenses including, but not necessarily limited to, Railroad Retirement Taxes, Unemployment Insurance, vacation allowances, expenses allowed railroad employees in the performance of

their duties and transportation of railroad employees to and from the site of the work.

(b). The costs of conforming to the rules and regulations of the railroad as they may affect the methods and costs of the Contractor's operations. Bidders shall base their bids upon their own conclusions and estimates of the costs of maintaining and protecting railroad facilities and traffic as specified.

If the railroad company should so request, the Contractor shall also enter into a separate agreement with the railroad company for the work to be done on its property, which agreement may embody all of the terms, conditions and requirements relating to the protection of the railroad company and its tenants, and of the operations and property of the railroad, as set forth in this and other Articles of these Specifications.

No separate payment will be made for the maintenance and protection of railroad traffic as herein described and in accordance with the rules and regulations of the railroad, but all costs thereof, including the cost of protective services, shall be included in the prices bid for the various items scheduled in the Proposal.

Marine Traffic. All operations or movement of equipment in the _____ shall be conducted so as not to interfere with free navigation of the waterway. The present navigable widths and depths shall not be impaired, and any falsework, mooring piles, casing pipe or other obstructions placed in the waterway shall be completely removed upon completion of the work or removed down to such depths as may be approved by the regulating Federal and State agencies having jurisdiction of the waterway.

The cost of such maintenance and protection of navigation, including temporary work and its removal which may be required by the regulating Federal and State agencies, shall be included in the prices bid for the various items scheduled in the Proposal.

1.21. Superintendents and Workmen

The Contractor shall attend to the work personally, or through a competent, English-speaking superintendent on the Project, authorized to receive and carry out instructions. The superintendent shall not be a driller attached to any particular boring rig but shall be free to move from boring to boring as necessary. The workmen shall be competent and shall perform their work in a neat and workmanlike manner. Any man not properly qualified for their work or who is doing it in an unsatisfactory manner or contrary to the Specifications or the Engineer's instructions, or who is disorderly, shall be discharged, if so requested by the Engineer, and shall not be employed again on the Project except with the approval of the Engineer. The superintendents and the number of workmen shall be sufficient, in the opinion of the Engineer, to insure the completion of the Project within the time stipulated therefor.

1.22. Equipment

The Contractor shall provide at all times at least four entirely independent drilling rigs and crews.

All plant, equipment and methods to be used shall be approved by the Engineer before the work is begun. However, approval of the equipment shall not be construed as including approval of the performance thereof. Additional equipment shall be provided when ordered by the Engineer in order to perform the work satisfactorily according to the Specifications.

For use in connection with borings in tidal water, the Contractor shall provide, at no additional cost to the Engineer, a suitable tide gage with clearly painted horizontal lines (black on white background) for each tenth of a foot and numerals at every foot mark, and of sufficient length to be clearly visible above high tide when driven firmly into the riverbed near the

shoreline. The Engineer will place the tide gage and will advise the Contractor of the actual elevations to which the numerals have been set.

1.23. Inspection of Work

The work required under this Contract shall be performed under the general monitoring and to the satisfaction of the Engineer. The work will be inspected by the Engineer or their Inspector for strict compliance with the requirements of the Specifications. The Engineer will interpret the Specifications and will decide all questions in connection therewith. Upon request of the Contractor, the Engineer will confirm in writing any oral order, direction or requirement.

No boring shall begin except in the presence of the Engineer or their Inspector. The presence of the Engineer shall not relieve the Contractor or their agents of any responsibility for the proper execution of the work.

The Engineer will keep logs of the borings to determine that the required information is being obtained, keep a record of the work done, and verify that the samples and cores are properly taken, boxed and stored in a suitable place or shipped to the designated location.

1.24. Personal Liability

In carrying out the provisions of the Contract or in exercising any power or authority granted them by their position, there shall be no liability upon the Inspectors or other authorized representatives of the Engineer, either personally or as employees of the Engineer, it being understood that in such matters they act as agents and representatives of the Engineer.

1.25. Damage Claims

The Contractor shall defend, indemnify and save harmless the Engineer, the New Jersey Turnpike Authority, their officers, agents and servants and each and every one of them against and from all suits and costs of every kind and description and from all damages to which the Engineer, the New Jersey Turnpike Authority or any of their officers, agents or servants may be subjected by reason of injury to the person or property of others resulting from the performance of the Project, or through the negligence of the Contractor, or through any improper or defective machinery, implements or appliances used by the Contractor in the Project, or through any act or omission on the part of the Contractor or their agents, employees or servants; and they shall further defend, indemnify and save harmless the Engineer, the New Jersey Turnpike Authority, their officers, agents and servants from all suits, and actions of any kind or character whatsoever which may be brought or instituted by any subcontractor, materialman or laborer who has performed work or furnished materials in or about the Project, or by or on account of any claims or amount recovered for any infringement of patent, trademark or copyright. The cost thereof shall be included in the prices bid for the various scheduled items in the Proposal. So much money due to the Contractor under and by virtue of the Contract as shall be considered necessary by the Engineer, may be retained by the Engineer and held until such suits, actions, claims or amounts shall have been settled, and suitable evidence to that effect furnished to the Engineer.

The Contractor and those personnel who will be working on railroad property may be required to sign releases on forms to be furnished by the railroad, prior to entering upon railroad property.

Any separate agreement with a railroad company which the Contractor may be required to enter for the performance of work on railroad property will provide that the Contractor indemnify and save harmless the railroad company, its tenants, and each and every one of them from or against any loss of life or injury to persons, or loss of or damage to property growing out of or resulting from operations of the Contractor, howsoever such loss, injury or

damage may be caused, and whether or not by reason of negligence of the railroad company or its tenants.

1.26. Laws

The Contractor shall observe and comply with all Federal and State laws and New Jersey Turnpike Authority Regulations and local ordinances that affect those engaged or employed on the Project, the materials or equipment used, or the conduct of the work.

In the hiring of laborers, workmen and mechanics for the performance of work under this Contract or any subcontract hereunder, no Contractor, nor any person acting on behalf of such Contractor or subcontractor, shall, by reason of race, creed or color, discriminate against any person who is qualified and available to perform the work to which the employment relates.

No Contractor, subcontractor, nor any person on their behalf, shall in any manner, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, creed or color. All people employed by the Contractor on this project are subject to the prevailing New Jersey wage rates.

1.27. Drilling Permit

The Contractor shall procure a drilling permit prior to the start of any boring work from the Division of Water Resources, New Jersey Department of Environmental Protection.

1.28. Permits and Licenses

The Contractor shall procure all required permits and licenses, pay all charges and fees therefore, and shall give all notices necessary and incident to the due and lawful prosecution of the Project.

The Contractor shall furnish at their own expense the water supply necessary for carrying out the work and shall secure all permits and licenses required to maintain such supply.

The cost thereof shall be included in the prices bid for the various items scheduled in the Proposal.

1.29. Public Utilities and Property Damage

The Plans indicate the locations of some subsurface structures within the vicinity of the proposed borings. The Contractor shall not proceed with their work at any one boring location until he/she has made diligent inquiry at the office of the Engineer, utilities and private companies and municipal authorities, to determine the existence and exact locations of subsurface structures. The Contractor shall also comply with the State's Underground Facility Protection Act and notify the State's One Call System before performing any work. The Contractor shall exercise extreme care in accurately locating all utilities and in carrying out their operations and shall be solely responsible for any damages caused to utilities and to the facilities affected by such utility damage, whether such utilities are shown on any available plan or not.

The Contractor shall fill all holes caused by their operations and shall take every precaution against injuring paving, utilities, or private or public property, and shall promptly repair, at their own expense and to the satisfaction of the Engineer and the owners, any damage to such paving, utilities and property caused by their operations. This shall also include sodding of any areas where the grass is damaged.

Upon completion of the Contractor's operations at each site, they shall remove their equipment therefore, including pulling all casing and shall clear the area of all debris and restore it to the condition existing before the start of their operations.

1.30. Insurance

Contractor shall provide insurance as set forth in this Paragraph 1.30. With respect to the Authority's Owner Controlled Insurance Program, Contractor shall be considered an "Excluded Party" as defined in the Consultants Order for Professional Services (OPS).

The Contract will not be executed by the Engineer until the Contractor has provided insurance of such character and in such amounts as will provide adequate protection for the Engineer, the Authority, their officers, representatives and employees, and for the Contractor against all liabilities, damages and accidents, and the Contractor shall maintain such insurance or equivalent protection in force during the life of the Contract, except as hereinafter specified.

The Contractor shall furnish the Engineer with satisfactory proof of carriage of the prescribed insurance (as specified herein below); however, the Engineer's approval of insurance furnished by the Contractor, or their failure to disapprove such insurance, shall not relieve the Contractor of full responsibility for liability, damages and accidents as set forth elsewhere herein.

The minimum amounts of insurance to be carried by the Contractor shall be as follows:

(a). Contractor's Bodily Injury and Property Damage Liability Insurance, including Contingent Liability Insurance and Contractual Liability Insurance:

(1) One person in any one accident, $500,000

(2) Two or more persons in any one accident, $1,000,000

(3) Property damage in any one accident, $500,000 with aggregate property damage policy limit of, $1,000,000.

Property damage liability insurance policies shall contain a provision or endorsement providing insurance protection against property damage, including loss of use, caused by explosion and collapse, and against interference with existing underground and overhead pipes, cables, ducts and other such facilities, whether or not such facilities appear on available plans and whether or not accurately located on such plans.

The contractual liability insurance policy shall contain an endorsement attesting to the Contractor's contractual responsibilities to defend, indemnify and save harmless the Engineer, the New Jersey Turnpike Authority, their officers, employees, agents and servants, from all suits, costs and damages, all as more fully set forth in Article 1.25, "Damage Claims', of these Specifications.

(b). Automobile and Truck Liability Insurance (including coverage for Contractor's automotive equipment):

(1) One person in any one accident, $500,000.00

(2) Two or more persons in any one accident, $1,000,000.00

(3) Property damage in any one accident, $500,000.00

(c). Workman Compensation Insurance - Statutory

(d). For all work to be performed on or adjacent to property of the _____ Railroad _____ , the Contractor shall carry the following Railroad Protective Bodily Injury and Property Damage Liability Insurance, reciting as named insured the _____ Railroad its successor or successors:

(1) One person in any one accident, (amount)

(2) Two or more persons in any one accident, (amount)

(3) Property damage in any one accident, (amount) with aggregate property damage policy limit of, (amount)

Policies required under subparagraphs (a) and (d) of this Article shall contain an endorsement evidencing that any damages resulting from an act or omission of watchmen, flagmen or similar employees furnished by the railroad by reason of the operations of the Contractor or their subcontractors, shall be deemed a part of the operations of the Contractor or subcontractors and are covered by insurance under said policies.

The policy required under subparagraph (d) of this Article shall also contain an endorsement in accordance with the provisions of the United States Department of Commerce, Bureau of Public Roads Memorandum issued August 9, 1955.

The Railroad Protective Insurance policy shall also contain an endorsement evidencing that the railroad is protected against any damages arising from injury to officers and employees of the Contractor or subcontractors, and to officers, employees, agents or representatives of the Engineer or the New Jersey Turnpike Authority while on the premises of the railroad.

If any part of the work is sublet, all the above insurance coverage shall also be provided by or on behalf of each subcontractor.

Satisfactory evidence, in triplicate, of all required insurance coverage, including special endorsements, shall be forwarded to the Engineer for approval within seven calendar days after the date of written notice of award of Contract. All insurance coverage must be approved by the Engineer before the Contract will be executed by the Engineer.

As soon as possible after award of Contract, the original of the Railroad Protective Insurance policy, with the necessary endorsement or endorsements attached, shall be furnished in the first instance to the Engineer for review and processing to the railroad company. Such policy shall be approved by the railroad company before the Contractor or subcontractors will be permitted to enter upon railroad right of way.

All policies required above shall include an endorsement requiring ten days prior written notice to the Engineer before any change or cancellation is made effective.

The policy required under subparagraph (d) above shall include an endorsement requiring ten days prior notice to _____ Railroad before any change or cancellation is made effective.

The Railroad Protective Insurance policy shall be maintained until all work on railroad property is completed. All other policies required under this Contract shall be maintained until completion of all work.

As an alternate to the Contractor's furnishing a separate policy for the Railroad Protective Insurance, the railroad company may wish to extend its present protective insurance policy to cover the Contractor's operations on railroad property. If this alternate arrangement is proposed by the railroad company, the Contractor shall comply with this request and shall reimburse the company for the benefit of such extended coverage on the basis of the company's established fees therefore.

No separate payment will be made for the cost of the insurance herein specified but the Contractor shall include the cost of such insurance in the prices bid for the various items scheduled in the Proposal.

1.31. Commencement and Prosecution of Work

The Contractor shall have a complete crew or crews and fully-equipped rig or rigs actually at work upon the site within three calendar days from the date of written notice to proceed.

The Contractor shall notify the Engineer of their intention to start work or to add extra crews and rigs at least two calendar days in advance of such work.

The sequence in which the individual borings are to be made shall be as directed by the Engineer. The Engineer reserves the right to order the borings made at such locations and in such sequence as will provide the maximum amount of preliminary information as the work progresses.

The Contractor shall so conduct the work as to give the Engineer every facility to obtain their own records, including ground water level and note every detail of the work and to obtain a correct record of the material passed through.

Each boring shall be sunk and drilled entirely by a single crew.

No drilling shall be done on Sundays, nor before sunrise or after sunset on Mondays to Saturdays, inclusive, except with the express approval of the Engineer.

No materials or plant used in the making of any borings shall be removed until the Engineer has given permission therefore.

1.32. Sealing of Bore Holes

At the completion of each boring or abandoned boring, the holes are to be sealed in accordance with New Jersey Department of Environmental Protection requirements.

For borings located in sanitary landfills, grouting for backfilling will be done from the bottom of the boring up to the top of natural ground. The portion of the boring within the sanitary landfill material is not to be grouted, but just backfilled with drill cuttings or dirt.

1.33. Time of Completion

All boring work in the field shall be completed within ____ calendar days from the date of written notice to proceed.

The last shipment of soil and rock samples and the boring records hereinafter specified shall be delivered to the Engineer within ten calendar days after the completion of all field work.

1.34. Unavoidable Delays

If, for any reason beyond the control of the Contractor, the work be delayed, the Contractor shall have no right to nor shall he/she make any claim whatsoever for damages or additional compensation by reason of the delay, but he/she may, at the discretion of the Engineer, be granted an extension of time.

1.35. Failure to Complete on Time

If the Contractor fails to complete the boring work in the field, fully, entirely and in accordance with the provisions of this Contract, within the time stated above or within such further time as may have been granted in accordance with the provisions of the Contract, then the Contractor shall and hereby does agree to pay to the Engineer for each and every calendar day that he/she is in default on time to complete the boring work in the field, the amount of $_____ , which said amount per day is agreed upon by the parties hereto to be liquidated damages and not a penalty.

The Engineer shall recover such liquidated damages by deducting the amount thereof out of any monies due or that may become due the Contractor and, if said monies be insufficient to cover said damages, then the Contractor or their Surety shall pay the amount due.

1.36. Change of Plans

It is understood and agreed that the Engineer reserves the right to order changes in the amount of work to be done within the general scope of the Contract so as to increase or decrease the quantities given in the Proposal, without change in the original Contract unit prices, provided, however, that such changes do not result in a sum total increase or decrease of more than fifty (50) percent of the original Total Price.

In the event the changes exceed this amount, payment for all work performed up to one hundred fifty (150) percent of the original Total Price (based on original Contract unit prices) will be made at the original Contract unit prices therefore, and payment for all work performed beyond that will be made on the basis of modified unit prices negotiated between the Contractor and the Engineer for that portion of the work.

In the event the changes reduce the total amount of work to less than 50 percent of the original Project (based on original Contract unit prices), payment for all work performed will be made on the basis of modified unit prices negotiated between the Contractor and the Engineer.

If the Contractor and Engineer cannot reach agreement during negotiations for modified unit prices, as provided above, compensation for such work will be determined on the basis of actual cost to which 15 percent will be added.

1.37. Payment

Payment will be made for the actual quantity of authorized work done under each item scheduled in the Proposal at the respective unit prices bid therefore.

Monthly certificates will be prepared by the Engineer showing the approximate quantities of work completed during the month and the value of such work based on Contract unit prices. Partial payments for this work will be made to the Contractor based on the value stated on such certificates, except that 10 percent will be retained by the Engineer as security for the fulfillment of the entire Contract by the Contractor until the completion of the Project.

If at any time there should be evidence of any lien or claim for which, if established, the Engineer, the Authority might become liable and which is chargeable to the Contractor, the Engineer shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify the Engineer, and the Authority against such lien or claim.

When the Project is completed and accepted by the Engineer, including the delivery by the Contractor of the last shipment of soil and rock samples and the prescribed boring records hereinafter specified, a final certificate of cost of the Project will be made by the Engineer, based on the actual quantities of authorized work done under each item scheduled in the Proposal and under supplementary agreements, if any, at the unit price or prices stipulated therein, and when this final certificate is approved, the money due the Contractor for the performance of the Project as determined by said final certificate, after deduction of any previous payments that may have been made as provided above, will be paid the Contractor, provided, however, that before such final payment is made, there shall be no outstanding claims against the Contractor, the Engineer, the New Jersey Turnpike Authority, and all obligations incurred by the Contractor and by their subcontractors in carrying out the Project shall have been satisfied.

Before final payment will be made, the Contractor shall execute and deliver a release in the following form:

"This is to certify that all just liens, claims and demands for labor, materials and rental of equipment, arising out of the prosecution of the work under Boring Contract No. C-_____, are fully satisfied, and that all of the work is fully released from liens, claims and demands, whether just or otherwise.

In consideration of the final payment on said Contract, we hereby release _____(engineer)_____ and the New Jersey Turnpike Authority, their officers, employees, agents and servants, from all claims, demands and liability of whatsoever nature from anything done or furnished or in any manner growing out of the doing of the work under this Contract, including any and all extra or reduction orders issued thereunder and any agreements supplementary thereto."

The above release shall be signed and sealed by an officer or partner representing the Contractor, whose signature and authority to sign shall be certified by a notary public, or in the case of a corporation, by the corporation secretary.

Upon receipt of this release and the satisfying of all other obligations under this Contract, a final payment will be made to the Contractor for the entire work, making deductions for all previous payments.

SECTION 2 - SPECIAL PROVISIONS

2.1. General Description

This Contract comprises the taking of borings _____
_____
_____.

The purpose of the borings is to secure information regarding subsurface conditions which will be used as required for the studies of highway construction and foundations for bridges and other structures involved in _____.

2.2. Plans

The accompanying _____ plan sheets, numbered _____ to _____ inclusive, and entitled "_____", form a part of these Contract documents.

2.3. Types of Borings

This Contract provides for the making of casing borings in material other than rock (including obtaining samples therefrom), performing in-place shear tests of subsoils, taking retractable plug borings in soft soils, and drilling core borings in rock.

Casing borings shall be made in two sizes of casing, namely 2 1/2-inch pipe and 4-inch pipe. In general, 1-3/8 inches of ordinary dry samples and 2 inches undisturbed dry samples will be required in 2 1/2-inch casing borings, and 1-3/8 inches of ordinary dry samples, 3-3/8 inches of undisturbed dry samples and 2- or 3-inch in-place vane shear tests will be required in 4-inch casing borings.

Retractable plug borings shall be capable of retaining continuous soil samples 1 inch in diameter.

Core samples secured from borings in ledge or bedrock shall be 1 5/8- inch diameter generally taken in 2 1/2-inch casing borings.

The Plans indicate the type and size of boring expected to be made at each proposed location; however, the Engineer reserves the right to change the type or size of any boring sufficiently in advance of the start of any operations at each boring location.

2.4. Number and Locations of Borings

The contemplated number and approximate locations of the borings to be taken under this Contract are shown on the Plans. The actual number of borings and the exact location and ground elevation of each boring will be determined by the Engineer. The Engineer will locate all borings in the field for the Contractor.

Since the number, types and sizes of borings are subject to change in the field, the quantities of the various scheduled items of work stated in the Proposal, may be substantially increased or decreased as directed by the Engineer as the work progresses, without change in the unit prices bid by the Contractor for any of the scheduled items in the Proposal, except as provided in Article 1.36 of these Specifications.

2.5. Depth of Borings

All borings are to be carried to the depths ordered by the Engineer. In general, 2 ½-inch casing borings shall be carried into firm bearing material or to rock, and when ordered by the Engineer, the boring continued into rock with 1-inch core borings for a minimum depth of five feet. Four-inch casing borings are to be made primarily to sample all soft or highly compressible

strata and shall generally be carried slightly below the lowest known soft or highly compressible stratum when soil sampling but may be of more shallow depths when driven exclusively for in-place shear testing of the soils.

In general, borings should be carried into rock under structures and under embankments. Borings should be through varved clays.

2.6. Driving of Casings

Casings shall be extra strong steel pipe or flush-coupled casing with nominal inside diameter of 2 ½-inches or 4-inch, as required.

Casings shall be sunk vertically through earth and other materials, including boulders and rock veins, to rock, or if not to rock, to such depth below ground as the Engineer may direct They shall be driven down without washing to the depth at which a sample is to be taken or shear test performed, after which the material shall be cleaned out to the bottom of the casing and the sample or shear test vane driven or pushed below the bottom of the cleaned casing. After sampling and/or shear testing, casing driving shall be resumed.

The use of water for cleaning out the casing between sample elevations will be required. The Contractor shall make suitable arrangements satisfactory to the Engineer and other interested parties, for the procuring and disposition of washwater.

The weight of hammer to be used in driving the casing shall be 300 pounds with a 24-inch height of free fall. The hammer shall be raised by means of a rope having one end wrapped (not more than three loops) around a winch head. A continuous record of the blows per foot required for the driving of the casing shall be kept by the driller except when the casing is being driven exclusively for performing in-place shear tests.

Simultaneous washing and driving of the casing will not be permitted except in the case of difficult driving which in the opinion of the Engineer requires the use of water. Where such use of water is permitted, a record must be kept by the Inspector and the driller of the elevations between which simultaneous washing and driving occurred.

In some cases of very difficult driving, and where the characteristics of the soil are suitable, the Engineer may give permission to discontinue driving the casing and proceed with the boring by means of wash rods with a chopping bit to the elevations at which samples are to be taken. This procedure shall be noted in the Inspector's and driller's boring record. Should there be any indication of the sides of the hole collapsing, thus blocking normal progress of the boring; driving of the casing shall be resumed as described above.

The Contractor must assume the risk of encountering boulders, rock veins or other obstacles and must drive the casing through or past such obstacles, using special devices for shattering boulders if necessary. If the Contractor abandons such boring before adequate information is obtained and starts another boring adjacent to it in preference to driving through or past the obstacle, or because of a shattered or misaligned casing, no payment will be made for the work done on the abandoned boring.

Where approved by the Engineer, blasting with small charges of dynamite will be permitted for the removal of small boulders or other obstructions which cannot be conveniently removed otherwise. Such blasting will be approved by the Engineer only where it is definitely known that there are no subsurface or surface structures in the vicinity that may be affected.

At borings being made exclusively for shear testing, the casing may be eliminated where the entire depth of hole will not exceed 6 feet and provided the hole may be suitably formed by other means and maintained clear at all times.

In certain instances where a 4-inch casing has already been driven to and slightly below soft or unstable strata, the Engineer may order that the boring be continued below the bottom of the 4-inch casing with a 2 1/2-inch casing. In such cases, the 4-inch casing shall first be cleaned out to the bottom of the casing, and the 2 1/2-inch casing inserted therein to the bottom of the hole. Driving of the 2 1/2-inch casing and sampling of materials below the bottom of the 4-inch casing shall then proceed as specified herein for the usual type of casing boring.

If the Contractor elects to use drilling mud as a means of advancing the hole in lieu of driving casing, the Contractor may proceed by this method using a suitable drilling fluid to prevent the collapse of the walls of the hole. The hole shall be maintained of sufficient size to permit proper sampling. The sampling equipment and the method and frequency of sampling shall be as specified below for cased holes. If the Contractor cannot maintain the hole clear and of sufficient size by this method, he/she shall return to the use of cased holes as above described.

The use of Hollow-Stem Auger Casing is considered a satisfactory alternate method for advancing the hole to obtain dry samples, undisturbed samples, and rock cores, in lieu of driving casing, in strata relatively free of cobbles and boulders. The sampling equipment and the method and frequency of sampling shall be as specified below for cased holes. This method of drilling shall be considered satisfactory for undisturbed sample borings provided the inside diameter of the auger stem is of such size as to permit the recovery of 3-inch diameter undisturbed samples.

In the use of this method, cuttings from the auger, relative resistance to penetration and general feel and performance of the drill shall be observed for detection of changes of material encountered. Sampling shall be performed by withdrawing the plug point through the auger stem, inserting the sampling tube through the auger stem, driving or pressing the sample below the auger bit, withdrawing the sampler, replacing the plug point, and advancing the auger to the next sample depth.

2.7. Frequency of Sampling and Testing

Samples shall be taken, and shear tests performed at elevations designated by the Engineer. In the absence of any specific direction, sampling and shear testing shall be governed by the following:

In casing borings, samples shall be taken at every change in soil formation (indicated by an abrupt change in the driving resistance of the casing), and between the elevations of such soil changes, at intervals not exceeding 5 feet. Undisturbed dry samples shall generally be taken in soft strata, ordinary dry samples in firmer material. A sample shall always be taken in the first 5 feet of each boring; samples obtained by means of the casing alone will not be acceptable. In some cases of thinly stratified formations, it may be necessary to take continuous samples in order to establish all the various changes in the soil profile.

In casings driven exclusively for in-place shear testing, samples shall not be taken, but tests shall be made every 15 inches throughout the depth of the soft strata as ordered by the Engineer, beginning at a point approximately 3 feet from the ground surface but at least below any firm overburden.

Where shear tests are ordered by the Engineer in casing borings driven primarily for securing soil samples, they shall generally be taken in pairs 15 inches apart below the bottom of an undisturbed dry sample.

Retractable plug samples shall be taken continuously, generally in 3-foot runs, for the entire depth of the boring, beginning at the ground surface.

Rock cores shall be taken continuously, generally in 5-foot runs, for the depth into rock ordered by the Engineer.

2.8. Ordinary Dry Samples

Ordinary dry samples shall be taken with a split-barrel sampler. In both sizes of casing, the sampler to be used shall have an inside diameter of 1-3/8 inches, an outside diameter of 2 inches, and a length of split tube section of 24 inches. No sampler shall be used that does not contain a ball valve.

Ordinary dry samples shall be obtained by driving the sampler 2 feet into the material below the bottom of the cleaned casing. If a sample is not obtained in these 2 feet of penetration, the sampler shall be driven again for an additional foot of penetration. Should the material be so incohesive that this second attempt fails to secure a sample, a flapper valve shall be inserted in the shoe of the sampler and the sampler driven an additional foot. Should this last procedure fail to secure a sample, an auger or sandtrap shall be used until the required sample is obtained.

Should the Contractor in securing samples fail to provide the proper types of samplers, valves, traps and other special sampling devices, and the samples thus obtained are deemed improper and unsuitable by the Engineer, such samples will not be accepted nor measured for payment.

Samplers shall not be driven more than 3 feet below the bottom of casing. Where continuous sampling is ordered, driving of the casing shall be resumed before the bottom of sampler penetrates beyond this 3-foot limit.

A record of the number of blows required to drive the sampler for each 6 inches of penetration will be kept by the driller. A description of the sample obtained for each foot of penetration will also be recorded by the driller, but only material from the last foot of penetration, unless otherwise directed by the Engineer, shall be preserved in a jar as specified below. To facilitate determination of the relative resistances of the various strata, the sampler shall always be driven with a 140-pound hammer with a height of free fall of 30 inches. The hammer shall be raised by means of a rope having one end wrapped (not more than three loops) around a winch head.

All ordinary dry samples, immediately upon removal from the sampler, shall be placed and tightly sealed in wide-mouthed, clear glass jars about 5 inches in height and 2-1/4 inches minimum opening, with screw caps. Each sample shall be of sufficient size to fill the jar and shall be placed in the jar carefully and in its correct position so as to represent as nearly as possible its natural condition. Each jar shall be clearly labeled showing the name of the Project, boring number, sample number, elevations between which the sample was taken, number of blows on sampler for each 6 inches, and classification of material. The boring number and sample number shall also be marked on each jar cap.

If two or more materials are encountered in a sampler, separate jars shall be used for each material. The letters “A”, “B”, etc., shall be added to the sample number on each such jar to designate the different materials.

The Contractor shall provide the sample containers keeping a sufficient supply on hand to prevent any delay in the work. He shall carefully preserve these samples and deliver them to the Engineer as hereinafter specified.

2.9. Undisturbed Dry samples

Undisturbed dry samples will be required at selected locations in strata of soft clay, organic silt, meadow mat and other highly compressible materials. The object of these samples

is to obtain specimens of the soil formation which have been subjected to a minimum of disturbance and which represent as truly as may be obtained the actual condition of the soil in its natural state.

In silts and soft clays free from obstructions and containing little or no granular material, the thin-wall "Shelby tube" sampler shall be used. Where the material is too soft to be recovered with the "Shelby tube" sampler, the stationary piston type sampler shall be used. For both types of samplers, the tube shall be at least 24 inches long and shall have an inside diameter of 2-7/8 inches.

When ready to take an undisturbed dry sample, all loose and disturbed material shall be removed by washing to the bottom of the casing except that final cleaning of a four-inch casing shall be done with an M.P.F.M. clean-out jet auger having an outside diameter of 3" (NN Drilling Supply's Part No. 71789 or approved equal). Cleaning out with the auger shall be done in such a manner that the soil immediately below the bottom of casing shall be as nearly undisturbed as possible.

The sampler shall then be lowered slowly to the bottom of the casing, and pressed either manually or by hydraulic jack, if necessary, into the soil a distance sufficient to fill the sampler to within three or four inches of its capacity. In no case shall the sampler be driven with a hammer; however, the sampler may be forced downward under the weight of the hammer. The sampler shall be pushed or jacked downward into the soil at a rate of 20 or 25 inches in approximately five seconds, as this is about the rate at which water can be vented through the ball valve without creating excessive pressure on the top of the sample.

When using the piston type sampler, the sampler, with the piston set flush with the cutting edge at the bottom, shall be carefully lowered to rest on the soil at the bottom of the cleaned casing. The rod supporting the piston shall then be clamped to the top of the casing so as to be immovable, after which the sampling tube shall be forced down as previously described to the proper depth. Then, the two rods shall be locked together at the top and the entire assembly slowly withdrawn from the hole.

After the sampler (either type) has been carefully removed from the hole, the tube section containing the soil sample shall be detached. The ends of the sample shall be carefully squared up not less than one-half inch back of each end, and the end spaces of the tube shall be completely filled with hot "Petrowax A", as manufactured by the Gulf Oil Company, or approved equal. The tubes shall then be closed at both ends with snug fitting metal or plastic caps which shall be secured in place with masking tape, after which the ends of the tube shall be dipped in hot "Petrowax A", or approved equal, to provide airtight seals.

Samplers shall not be pressed more than three feet below the bottom of casing. Where continuous sampling is ordered, driving of the casing shall be resumed before the bottom of the sampler penetrates beyond this three-foot limit.

Undisturbed dry samples shall be clearly labeled showing the name of the Project, boring number, sample number, depths between which the sample was taken and the top of the sample tube. Special care shall be taken to indicate the top end of the sample tube.

The Contractor shall provide the sample tube containers. He shall carefully preserve these samples and deliver them to the Inspector as hereinafter specified. Extreme care must be taken in handling undisturbed samples to avoid shock or jarring which may affect the character of the sample.

2.10. In-Place Vane Shear Tests

Vane shear tests shall be performed directly in strata of soft soils encountered in boring operations in order to determine the shearing resistances of various saturated fine-grained material.

The test consists basically of sinking a four-bladed vane in the undisturbed soil beneath a casing and rotating the vane through the soil by means of a turning apparatus mounted on the top of casing above ground. The torsional force required to rotate the vane and cause a cylindrical surface in the soil to fail, is read on a gage attached to the turning mechanism; which readings can be converted to shearing resistance.

Vanes shall be of two sizes; two inches in diameter by four inches in length and three inches in diameter by six inches in length. Unless specifically directed by the Engineer to use the two-inch diameter vane; the three-inch diameter vane shall be used for shear testing.

The calibrated torque assembly for rotating the vane and measuring the turning force shall be equal to NN Drilling Supply's Part No. 10136, complete with base plate. A conversion chart shall be provided to enable the Inspector or driller to convert the gage readings to shear strength.

The vane shall be connected to the torque assembly by means of coupled rods. Whenever a casing is being used, at least one ball bearing guide shall be mounted on the rod shaft to fit snugly against the inside of the casing. The casing may be eliminated when the depth of hole does not exceed six feet.

When ready to perform a shear test, the casing shall be washed clean to the bottom of the casing. The vane and rod shaft shall be inserted in the casing until the vane reaches the bottom of the casing. If the test is being performed in a boring being made primarily for soil sampling, the test will generally be ordered after the securing of the undisturbed dry sample; in these instances, the vane is to be lowered to the deepest point penetrated by the sampler.

The vane shall then be slowly pressed, not driven, into the undisturbed soil beneath the bottom of the hole for a distance of 15 inches.

The torque assembly shall be mounted on the rod shaft and casing and braced against any possible accidental rotation of the casing or assembly during the test.

The crank shall be turned slightly to remove any slack or play, and the initial gage reading recorded. The crank shall then be turned at a uniform rate corresponding to a one-degree rotation of the vane in ten seconds. Gage readings shall be recorded by the driller every five degrees of vane rotation, and also at the point of maximum torque. The crank shall continue to be turned (and not stopped) while taking the readings. Vane rotation and gage readings shall continue until the second reading beyond the maximum reading (to ensure that the maximum is not a false peak of resistance) is taken. For each reading, the driller shall record the angle of rotation, the gage reading and the converted value of shear strength. Each data sheet shall be identified as to Project, boring number, station, offset, ground line elevation, vane size, and elevation of the bottom of the vane at time of shear test.

A second shear test may be performed directly below the first test without advancing the casing. The vane shall be pressed into the undisturbed soil for another distance of 15 inches and the operation repeated. Before a third test is performed, the casing shall be driven to the bottom of vane penetration and all materials therein removed by washing, in order that the vane should not project below the cleaned casing for a distance greater than 30 inches. Where tests are made directly below the elevation reached by an undisturbed dry sampler, the vane may be sunk below such elevation a maximum distance of 30 inches.

Each sample tube shall be labeled to indicate the Project, boring number, station, offset, ground line elevation, the sample run from which it was obtained, and its proper location within each run, by numbering the tubes consecutively starting from the top of each sample run. After capping avoid excessive exposure to sunshine or freezing temperatures, excessive vibrations, shock or other adverse conditions.

2.11. Core Borings in Rock

The drilling shall be done with standard core drilling machinery of the rotary type with either screw or hydraulic feed, actuated by an internal combustion engine and equipped with a double-tube core barrel and a diamond bit, capable of producing cores with a minimum diameter of 1-5/8 inches or 2-1/8 inches.

Before starting the core bit in the hole, a chopping bit shall be used to break up all disintegrated rock and the casing seated firmly on hard rock by driving and washing out.

The core bit shall be started in the hole and drilled for a maximum depth of 5 feet. The drill shall then be withdrawn, and the core removed from the barrel, labeled and stored as hereinafter specified. Drilling shall be continued in runs not exceeding 5 feet until the total depth required by the Engineer has been reached. If the core bit should become blocked by a piece of broken core, the barrel shall be retrieved and cleaned before continuing the drilling.

The Contractor shall exercise due care to obtain satisfactory cores from all materials of a character that would ordinarily produce satisfactory rock cores under the operation of a standard type of core drill.

It is important that the percentage of recovery of the cores shall be as large as possible and the Contractor shall regulate the speed of their drill and remove the core as frequently as directed in order to maintain a maximum percentage of recovery, special care being taken where the character of rock being penetrated is uncertain. If the appliances on any machine are not such as will give, in the opinion of the Engineer, a reasonable amount of core recovery, the Contractor shall furnish such appliances or equipment as will be satisfactory.

2.12. Packing and Delivery of Samples

Ordinary dry samples are to be packed in pasteboard cartons with the sample jars in upright position. The two adjacent sides of each box shall be clearly marked with the name of the Project, boring number, and sample numbers contained.

Undisturbed dry samples are to be carefully packed in wooden boxes, with each sample surrounded by soft packing to prevent vibration in delivery. Each box shall be clearly marked with the name of the Project, boring number, and sample numbers contained.

The rock samples shall be placed in wooden boxes in the order in which they were taken. These boxes shall be about 4 or 5 feet long, containing only one layer, capable of holding approximately 25 feet of core, and substantially made of one-half inch lumber. Each box shall have a hinged lid with hasp and staple for locking and carrying handles at the ends. Each row of cores shall be separated from the adjacent row by a one-quarter inch wood strip. Cores from each run shall be separated from those of the next run by a wooden block nailed into place. If cores from more than one boring are placed in the same box, two wooden blocks shall be nailed between adjacent borings. On each of these two blocks, the boring number referring to the adjacent cores shall be marked. The lid of each box shall be clearly marked with the name of the Project, boring number(s), the run numbers, and the elevations between which each run contained therein was taken. Cores secured from drilling boulders shall be marked and placed in core boxes. No core drilling shall begin without having core boxes at hand at the boring site.

Upon the completion of each boring, all undisturbed dry samples and retractable plug samples, properly boxed, shall be furnished to the Inspector at the site.

Upon completion of all borings, all ordinary dry samples and rock samples, properly boxed, shall be delivered to _____.

No separate payment will be made for the packing and delivery of samples as specified, but the cost thereof shall be included in the prices bid for the various scheduled items in the Proposal.

2.13. Boring Records

During the progress of each boring, the Contractor shall keep a continuous and accurate log of the materials encountered and a complete record of the operations involved, which shall include at least the following data:

General

Project Name

Date

Engineer, Contractor and Inspector

Location and identifying number and type of boring and reference to survey data.

Ground elevation or bed of waterway or marsh water, at boring. Elevation of ground water table or surface of waterway or marsh water at the beginning of boring operations (if visible), each morning before starting work while the boring is in progress, at the completion of the boring, and 24 hours after the boring is completed.

Casing Borings (primarily for soil sampling)

Diameter and description of casing (when used).

Weight and drop of hammer and number of blows used to drive the casing to each successive foot of elevation.

Elevation of top of each different material penetrated.

Depth or elevation of the bottom of sampler at start of driving or pushing for each sample.

Depth of elevation to which the sampler was driven or pressed.

Elevation of bottom of boring.

Weight and drop of hammer and number of blows used to drive the ordinary dry sampler for each 6 inches of sample.

Length of sample obtained.

Distance from the bottom of the sampler to the lower end of the sample, when the sampler is not filled to the bottom, and any other circumstances of obtaining the sample.

Stratum represented by the sample.

Soil represented by the sample.

Soil shall be described in accordance with the following classifications:

a. Kind: Topsoil, fill, loam, silt, clay, sand, gravel, etc.

b. Color: Light, dark, blue, red, etc.

c. Moisture: Dry, moist, wet, very wet, etc.

d. Consistency: Soft, loose, medium, compact, stiff, hard, etc.

In-Place Vane Shear Tests

Diameter and length of vane used.

Elevation of bottom of vane at time of test.

Angle of rotation, gage reading of torque, and converted shear strength for each reading of each test.

Core Borings

Elevation of bottom of casing when seated on bedrock.

Type of core drill, including size of core.

Length of core recovered for each length drilled, with resulting percentage of recovery.

Elevation of each change in type of bedrock.

Elevation of bottom of hole.

Rate at which each section was cored in minutes per foot.

The bedrock shall be described in accordance with the following classifications:

a. Type: Shale, schist, slate, limestone, granite, sandstone, etc.

b. Condition: Broken, fissured, laminated, solid, etc.

c. Hardness: Soft, medium, hard, very hard, etc.

The driller's logs of all borings, containing the information specified above, shall be transferred onto the Contractor's standard log forms, at least 8½" x 11". The necessary data shall be recorded on the forms in ink or pencil or may be typewritten.

No separate payment will be made for preparing such boring records, but the cost thereof shall be included in the prices bid for the various items scheduled in the Proposal.

2.14. Observation Wells

Observation wells, consisting of plastic pipe, shall be installed in borings designated by the Engineer. Borings in which observation wells are to be installed will be determined as the work proceeds. Notice to install an observation well will be given prior to time of completion of the selected borings. The well shall be installed immediately after completion of the boring.

Pipe for observation wells shall be rigid plastic or PVC, Schedule 40 minimum, 1¼" I.D., as approved by the Engineer. The installation shall be protected in a manner acceptable to the Engineer, so that water and debris cannot enter the boring hole or the plastic pipe from the surface. Surface seal details are shown at the end of these Specifications in Diagram 1.

The plastic pipe shall be drilled with two 1/8-inch diameter perforations 1 foot 0 inch on centers for the full length of the tubing. The holes in the pipe shall be drilled methods which will produce an inside wall, free from all obstructions which would interfere with the observation of the water level. The pipe is to be made of straight sections, connected with external couplings and shall be of sufficient strength to prevent pipe twisting, kinking, or collapsing. The perforated

plastic shall be installed before the casing is withdrawn and shall extend to the depth directed by the Engineer. The installation shall be protected in such a manner, acceptable to the Engineer, so water and debris cannot enter the boring hole or the plastic pipe from the surface. The ground water elevation at these wells is to be measured by the Engineer 24 hours after installation and daily thereafter until the ground water elevation has stabilized or as determined by the Engineer. The bottom of the pipe shall be closed by a suitable plastic or rubber plug, or cap. The assembled pipe shall be lowered into the cased boring, and the casing withdrawn from the hole. The pipe shall be kept centered in the boring while the casing is withdrawn.

2.15. Measurement and Payment

Payment for Mobilization will be made at the lump sum price bid for the item MOBILIZATION in the Proposal, which price shall include the cost of mobilizing equipment, materials and personnel for the Project, setting up and dismantling at each boring site, transporting between sites, demobilization upon completion of all field work, all materials, labor, equipment and all else necessary therefor, and all other work in connection therewith and incidental thereto.

The quantities of various sizes of Cased Holes for Soil Sampling for which payment will be made, will be the total depth of each size of this type of boring actually made primarily for soil sampling, either by the use of casing or by drilling mud, and accepted by the Engineer, measured from the surface of existing ground or Mean Low Water in waterways, whichever is higher, to the bottom of the hole, or to ledge or bedrock, determined from the measurements taken by the Engineer, which measurements shall be accepted by the Contractor as final and conclusive. When the casing is not driven to rock, the bottom of the hole shall include the depth of the last soil sample obtained below the casing. Bedrock shall be considered as ledge rock in places into which casing cannot be driven because of its degree of hardness. Rock so disintegrated or decayed that casing can be driven into it, shall not be considered as rock.

Where the driving of a 4-inch casing is ordered discontinued and the boring is continued with a 2 1/2-inch casing below, the quantity of 4-inch Diameter Cased Holes for Soil Sampling to be measured for payment at that location will be the length extending from the surface of existing ground or Mean Low Water in waterways, whichever is higher, to the bottom of the 4-inch casing, and the quantity of 2 1/2-inch Diameter Cased Holes for Soil Sampling at that location will be the length extending from the bottom of the 4-inch casing to the bottom of the hole. No separate payment will be made for furnishing, placing and removing the length of 2 1/2-inch casing within the 4-inch casing, but the cost thereof shall be included in the prices bid for the various items scheduled in the Proposal.

Payment for the various sizes of Cased Holes for Soil Sampling will be made for the quantity of each size as above determined, measured in linear feet, at the prices per linear foot bid for the Items 2-1/2” DIA. CASED HOLES FOR SOIL SAMPLING and 4” DIA. CASED HOLES FOR SOIL SAMPLING in the Proposal, which prices shall include the cost of locating utilities, furnishing and sinking the casing, removing and disposing of the casing after the boring is completed, the use of drilling mud if approved by the Authority, filling the holes, all labor, materials, tools, equipment and all else necessary therefore, and all other work in connection therewith and incidental thereto, exclusive of sampling.

The quantities of Ordinary Dry Samples and of Undisturbed Dry Samples, for which payment will be made, will be the total number of each type and size of sample actually obtained, accepted by the Engineer, and delivered in accordance with the Specifications. In the case of continuous sampling, each 2-foot sample obtained will be measured as an individual sample.

Payment for Ordinary Dry Samples and for Undisturbed Dry Samples will be made for the quantity of each type and size as above determined at the prices each bid for the Items 1-3/8" DIA. ORDINARY DRY SAMPLES, 2" DIA. ORDINARY DRY SAMPLES and 3-3/8" DIA. UNDISTURBED DRY SAMPLES, respectively, in the Proposal, which prices shall include the cost of taking the samples, furnishing jars, tube containers, cartons and boxes, delivering the samples, all labor, materials, tools, equipment and all else necessary therefore, and all other work in connection therewith and incidental thereto.

The quantity of 2-inch or 3-inch Diameter In-Place Vane Shear Tests for which payment will be made, will be the total number of tests actually performed and accepted, using either size of vane.

Payment for 2-inch or 3-inch Dia. In-Place vane Shear Tests will be made for the quantity as above determined at the price each bid for the Item 2" or 3" DIA. IN-PLACE VANE SHEAR TESTS in the Proposal, which price shall include the cost of sinking the vane shaft, rotating the vane, recording the gage readings, converting the readings to shear strengths, all materials, labor, equipment and all else necessary therefore, and all other work in connection therewith and incidental thereto.

The quantity of 1-inch Dia. Retractable Plug borings with Samples for which payment will be made, will be the total depth of this type of boring actually made, and accepted by the Engineer, measured from the surface of existing ground or Mean Low Water in waterways, whichever is higher, to the bottom of the hole, determined from the measurements taken by the Engineer, which measurements shall be accepted by the Contractor as final and conclusive.

Payment for 1-inch Dia. Retractable Plug Borings with Samples will be made for the quantity as above determined, measured in linear feet, at the price per linear foot bid for the item 1" DIA. RETRACTABLE PLUG BORINGS with samples in the Proposal, which price shall include the cost of furnishing the equipment, advancing the sampler, securing the samples, delivering the samples in sample tubes, all labor, material, tools, equipment and all else necessary therefore, and all other work in connection therewith or incidental thereto.

The quantities of 1 5/8-inch and 2 1/8-inch Diameter Core Borings in Rock for which payment will be made, will be the total depth of each type actually drilled in ledge or bedrock, measured from the bottom of casing to the bottom of the hole, and the total depth drilled through boulders and rock veins 6 inches or more in thickness, provided the casing is driven below the bottom depth of such boulders and rock veins.

Payment for 1 5/8-inch and 2 1/8-inch Diameter Core Borings in Rock will be made for the quantity as above determined, measured in linear feet, at the price per linear foot of each type bid for the Items 1-5/8" DIA. CORE BORINGS IN ROCK and 2 1/8 DIA. CORE BORINGS IN ROCK in the Proposal, which prices shall include the cost of providing the proper equipment, securing the rock core samples, furnishing the core boxes, delivering the samples, all materials, labor, equipment and all else necessary therefore, and all other work in connection therewith and incidental thereto.

The quantity of observation wells for which payment will be made will be the total length of observation well casing measured from the cap to the tip of each installed in accordance with the plans and specifications and accepted by the Engineer.

Payment for observation wells will be made for the quantity as above determined, measured in linear feet, at the price bid for the item OBSERVATION WELLS in the Proposal, which price shall include the cost of all the materials, the installing of the observation well, placing the backfill, seals, labor, equipment and all else necessary therefore, and all other work

in connection therewith and incidental thereto except for the drilling of the hole into which the piezometer or observation well is to be placed.

There shall be no duplication of payment for footage of Cased Holes for Soil Sampling and Core Borings in Rock.

No payment for sinking casing and taking samples therefrom will be made if the boring hole is abandoned or lost before completion, unless and solely to the extent that the Engineer believes that the sinking of the casing and taking of samples are of sufficient benefit to warrant payment for such work at scheduled prices.

The Contractor is hereby advised that final payment under this Contract will not be made until the boring records have been completed and delivered, together with all remaining soil and rock samples, to the Engineer as specified elsewhere herein.

NEW JERSEY TURNPIKE AUTHORITY *CONSULTANT*	MONITORING WELL INSTALLATION LOG
PROJECT/LOCATION:	
PROJECT NO.:	BORING NO.:
GEOLOGIST/ENGINEER:	COMPLETION DATE:
DRILLING CONTRACTOR:	DRILLING METHOD:
DRILLER:	DEVELOPMENT METHOD:

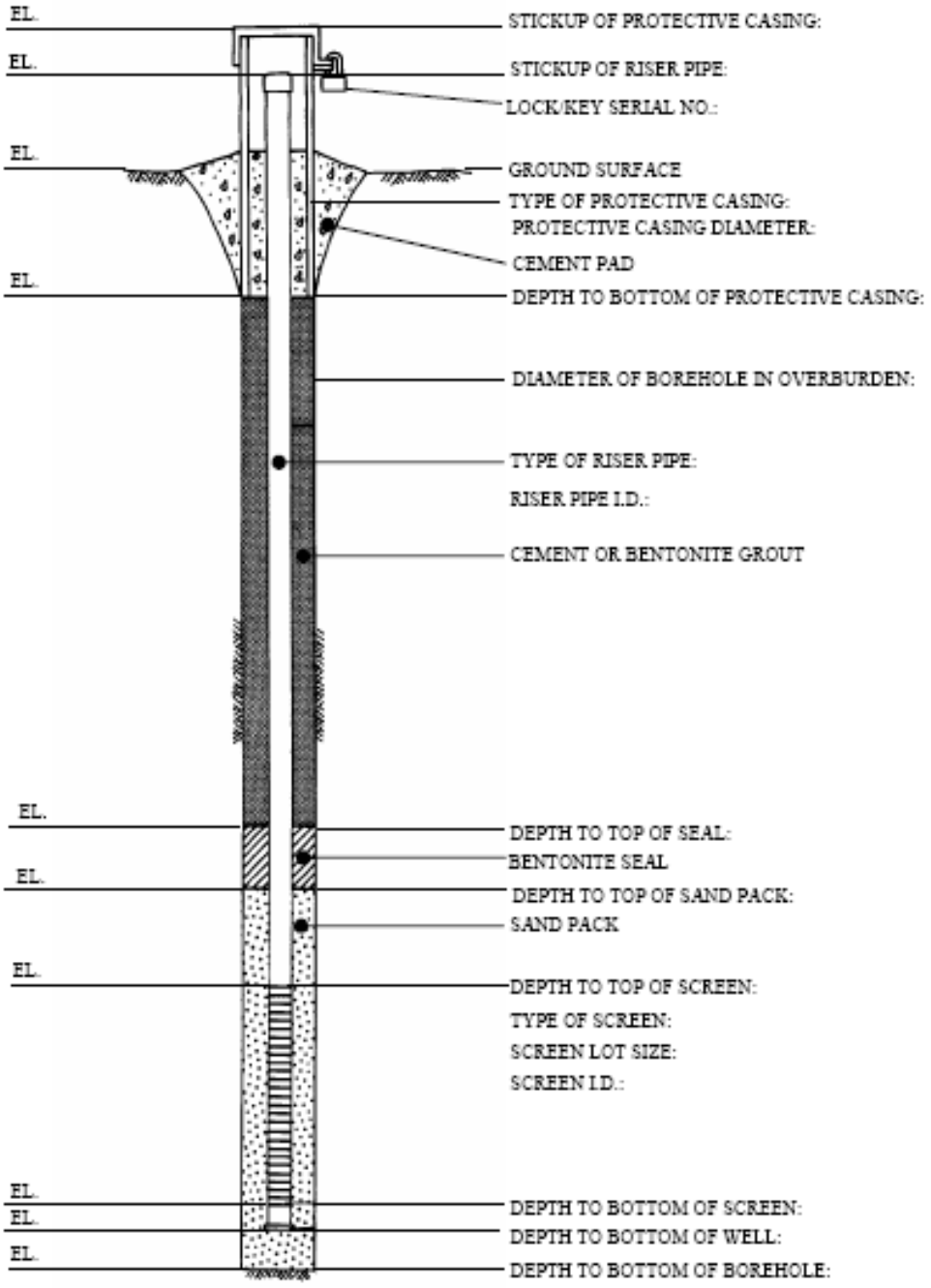


DIAGRAM NO.1: GROUNDWATER MONITORING WELL INSTALLATION DETAIL

5.4. APPENDIX B - BURMISTER SOIL IDENTIFICATION SYSTEM

BURMISTER SOIL IDENTIFICATION SYSTEM

IDENTIFICATION OF SOILS

A. Object

In all soil work, an important factor is to be able to recognize the soil materials that are being used, and to be able to accurately describe them. Included herein is the Burmister System for identification of soils that is to be used by the Engineer. It provides a concise and accurate description of the soil yet is simple enough to determine the soil components by visual identification.

This system provides a description of the granular materials, Silt, Sand and Gravel, that is based upon particle size. The description of cohesive soils is based upon the plasticity. The criteria for soil identification using this system are noted later with examples.

B. Burmister Soil Identification System

Following in outline form, are the criteria for the identification of soils. Figure B1 summarizes this system and Figure B2 shows the standard semi-log graph used for graphic presentation of soils identifications. The plot gives the Percentage Finer by Weight vs. Grain Size in Millimeters. Beneath the graph are the particle size limits of the soil components used for the identification system.

1. Particle Size Limits for Soil Components.

   (a) Cobbles and Boulders - Greater than 3-inch diameter (76.2MM)

   (b) Gravel - 3-inch diameter (76.2MM) to No. 10 sieve (2.0MM)

   (c) Sand - No. 10 Sieve (2.0MM) to No. 200 Sieve (0.074MM)

   (d) Silt - Material passing the No. 200 Sieve (0.074MM) of a non-plastic nature

   (e) Clay - Material passing the No. 200 Sieve (0.074MM) of plastic nature

   (f) (f) Miscellaneous - Materials such as mica, shells, organic silt, peat, decomposed bedrock in place, etc. These materials are described per se, without regard to grain size.

2. Particle Size Limits for Granular Soil Functions.

   The above-mentioned constituents in Categories b, c and d are further sub-divided into coarse, medium and fine components.

   Following is a list of the component parts of the above-mentioned constituents and their size limits:

   (a) Gravel - Coarse - Less than 3 inches (76.2MM) Greater than 1 inch (25.4MM)

   Medium - Less than 1 inch (25.4MM) Greater than 3/8 inch (9.52MM)

   Fine - Less than 3/8 inch (9.52MM) Greater than No. 10 Sieve (2.0MM)

   (b) Sand - Coarse - Less than No. 10 Sieve (2.0MM) Greater than No. 30 Sieve (0.59MM)

Medium- Less than No. 30 Sieve (0.59MM) Greater than 60 Sieve (0.25MM)

Fine - Less than No. 60 Sieve (0.59MM) Greater than No. 200 Sieve (0.074MM)

(c) Silt - Coarse - Material passing the No. 200 Sieve that is free draining in character

Fine - Material passing the No. 200 Sieve that is slow draining in character

The predominant fraction of any constituent can be noted by a plus sign. For example:

Mainly coarse Gravel = “Coarse + to fine Gravel” or

Mainly fine Sand = “Medium to fine + Sand”

3. Quantitative Description of Granular Components.

Soils that are essentially granular in character are identified by the classification system outlined above and are described on this basis and by the percentages by weight of each component part. Descriptive adjectives therefore precede the name of the soil component, which cover a rather narrow range of percentages of that component, by weight. Following is a list of descriptive adjectives and the percentage range of the total soil sample that they represent.

a. Not described	Less than 1%
b. Trace	1-10%
c. Little	10-20%
d. Some	30-35%
e. And	35-50%

4. Description of Granular Soil.

The major constituent of the soil sample is written in upper case letters. The minor components are written, along with their descriptive adjectives in lower case letters. Commas separate the various components. The color of the soil precedes the description.

Example: A soil sample is composed of the following percentages by weight of the various components.

Gravel (Medium and Fine only)	25%
Sand (Coarse, Medium & Fine Combined)	70%
Silt (Coarse & Fine Combined)	5%

The soil color is brown.

The written description of the soil is as follows:

“Brown coarse to fine SAND, some medium to fine Gravel, trace Silt”

5. Description of Cohesive Soil.

For soils that are essentially cohesive in character, the clay-silt fraction is described on the basis of plasticity, since silt and clay in intimate combination cannot be easily separated. The soil is described then, on the basis of its plasticity index, which is a function of the types of clay minerals present, and of the clay-silt ratio. Following is a list of terms used to describe the clay-silt fraction of a soil, along with its range of plasticity indices.

Description	Plasticity Index
Silt	0
Clayey Silt	1 -5
Silt & Clay	5 -10
Clay & Silt	10-20
Silty Clay	20 - 40
Clay	Greater than 40
Organic Clayey Silt,	An organic soil,
Organic Silt & Clay, etc.	usually black in color.

The description, based on plasticity index, is the same as for ordinary clays and silts.

Example: A soil sample contains the following percentage by weight of these soil components:

Gray Gravel	15%	(fine Gravel only)
Gray Sand	30%	(all components)
Gray Silt-Clay	50%	(Plasticity Index of 15)
Shell Material	5%	

The above soil sample is described as follows:

"Gray CLAY & SILT, some coarse to fine Sand, little fine Gravel, trace Shells."

6. Shorthand - For Field Use Only

Symbol	Word
C	Clay
$	Silt
S	Sand
G	Gravel
O$	Organic Silt
c	Coarse
m	Medium
f	Fine

t	Trace
1	Little
s	Some
a	And

C. Visual Identification of Soils.

To facilitate visual identifications of soils in the field, the following methods are recommended. The use of these methods will provide easy and accurate identifications of soils with a little practice.

The best approach is to identify each sample by following a series of steps, as outlined below:

1. Color

   Determine the color or colors if the sample is mottled.

2. Gravel Content

   Determine the percent of the total sample that is gravel by separating out the gravel and estimating by eye. Allowance should be made for fine gravel that was missed when picking over the sample.

3. Gravel Gradation

   The size of the largest piece of gravel should be determined. Use an average dimension, not the maximum dimension. Estimate by eye the predominant size. If there is a predominant size, note with a plus sign as shown in Section 2.

4. Sand Content

   After separating the gravel, take a pinch of the remaining soil and rub it between the fingers and thumb. The presence of coarse and medium sand can be noted by a gritty feeling. By rubbing in the palm of the hand with a finger, the soil can be dried. The sand grains can then be distinguished and the percentage of sand in the Sand-Silt-Clay portion of the sample noted. This percentage should be corrected for the whole sample, to include the gravel, as illustrated below.

Gravel separated out	30%
Remaining Sand-Silt-Clay portion of sample	70%
Sand content of Sand-Silt-Clay portion of sample	50%
Sand content of whole sample = 50 x 70	35%

5. Sand Gradation

   By drying a pinch of the sample in the palm of the hand as previously noted, the gradation of the sample can be determined. An easy way to distinguish between fine Sand and Silt is that the individual grains of the Sand can be distinguished by eye whereas the individual grains of Silt cannot.

6. Silt-Clay Content

Moisten a 1/2-inch diameter ball made from the Sand-Silt-Clay portion of the sample. Shake this ball in the palm of the hand and notice if moisture appears on the surface of the ball. If moisture appears, no clay is present; if no moisture appears, there is clay in the sample. If moisture appears on the surface of the ball, gently squeeze the ball between the forefinger and the thumb till the moisture disappears, then release. If moisture reappears, the sample is coarse Silt; if no moisture appears or appears very slowly the sample is coarse and fine Silt.

For soils that contain both Silt and Clay, or Clay only, the plasticity index can be estimated by a rather simple test. A 1/2-inch diameter ball of the soil is made. The consistency or strength of the ball is brought to that of modeling clay by drying or adding moisture to the ball of soil. A piece of the ball is then rolled into a thread on a flat surface, and the diameter at which the thread crumbles indicates the Clay-Silt content, as noted below:

Thread Diameter	Plasticity Index	Identification
¼”	0	SILT
¼”	1- 5	Clayey SILT
1/8”	5-10	SILT & CLAY
1/16”	10 - 20	CLAY & SILT
1/32”	20 - 40	Silty CLAY
1/64”	40	CLAY

It is helpful to have a 1/2-inch diameter ball of modeling clay available when performing the test. By squeezing the clay in one hand, and the soil in the other with the index finger and thumb, a good check on the consistency can be made by comparison.

7. Another test to help determine the soil plasticity is the resistance of a piece of dried soil to crushing by finger pressure. A soil specimen is molded to the consistency of putty, adding water if necessary. The moist pat of soil is allowed to dry (in oven, sun, or air) and is then crumbled between the fingers. Soils with slight dry strength crumble readily with very little finger pressure. Silt soils have almost no dry strength. Organic soils and clayey silt soils of low plasticity have slight dry strength. Soils of medium dry strength require considerable finger pressure to powder the sample. Silt and clay and clay and silt soils exhibit medium dry strength. Soils with high dry strength can be broken but cannot be powdered by finger pressure. High dry strength is indicative of silty clay or clay soils as well as some organic clays of high plasticity.

   An additional aid in classifying soil types that consist of various components of sand, silt and clay is the sedimentation test in a glass jar or test tube. The various percentages of the components are estimated from the sedimentation test which is performed as follows:

   A small quantity of soil is placed in the bottom one-half or one-quarter of a test tube or jar such that it is compact without any large air spaces. The height of sample is then noted. A supply of water is then added to the test tube and the test tube is vigorously shaken until the soil sample is entirely in

suspension. All sand particles should settle out of the suspension within 30 seconds after the shaking has stopped. The silt particles will settle out of the suspension within 30 minutes after the shaking has stopped. The relative depth of sand and silt to the original depth of sample will provide for an estimate of the percentage of sand and silt in the total sample. The clay will still be all in suspension at the end of 30 minutes and it may take up to 24 hours for all the clay to settle out. Therefore, there is no advantage in performing the test more than 30 minutes.

FIGURE B1
BURMISTER SOIL IDENTIFICATION METHOD

BURMISTER SOIL IDENTIFICATION METHOD

1. SOIL MATERIAL — Composition, Gradation, and Plasticity Characteristics

a) Soil Components and Soil Fractions

Sieve	3"	1"	3/8"	No. 10	No. 30	No. 60	No. 200	
				2 mm			0.076 mm	0.02 mm
Granular Component Fractions	GRAVEL			SAND			SILT	
	coarse	medium	fine	coarse	medium	fine	coarse	fine
Clay Soil Components							CLAY-SOIL Defined and Named on a Plasticity Basis	

b) Identifying Terms for Granular Soils
Composition and Proportion Terms for Components

Component		Proportion Terms	Defining Range of Percentages
Principal Components- GRAVEL, SAND, SILT (all Uppercase)			50% or more
Minor Components-	Gravel	and	35 to 50%
	Sand	some	20 to 35%
	Silt	little	10 to 20%
		trace	1 to 10%

Gradation Terms for Granular Soils		ORGANIC SOILS
coarse to fine	all fractions more than 10%	Plasticity Basis, as
coarse to medium	fine less than 10%	
medium to fine	coarse less than 10%	Organic SILT, H. PI
medium	coarse and fine less than 10%	
fine	coarse and medium less than 10%	Organic SILT, L. PI

PLUS or MINUS signs used to indicate upper or lower limits.

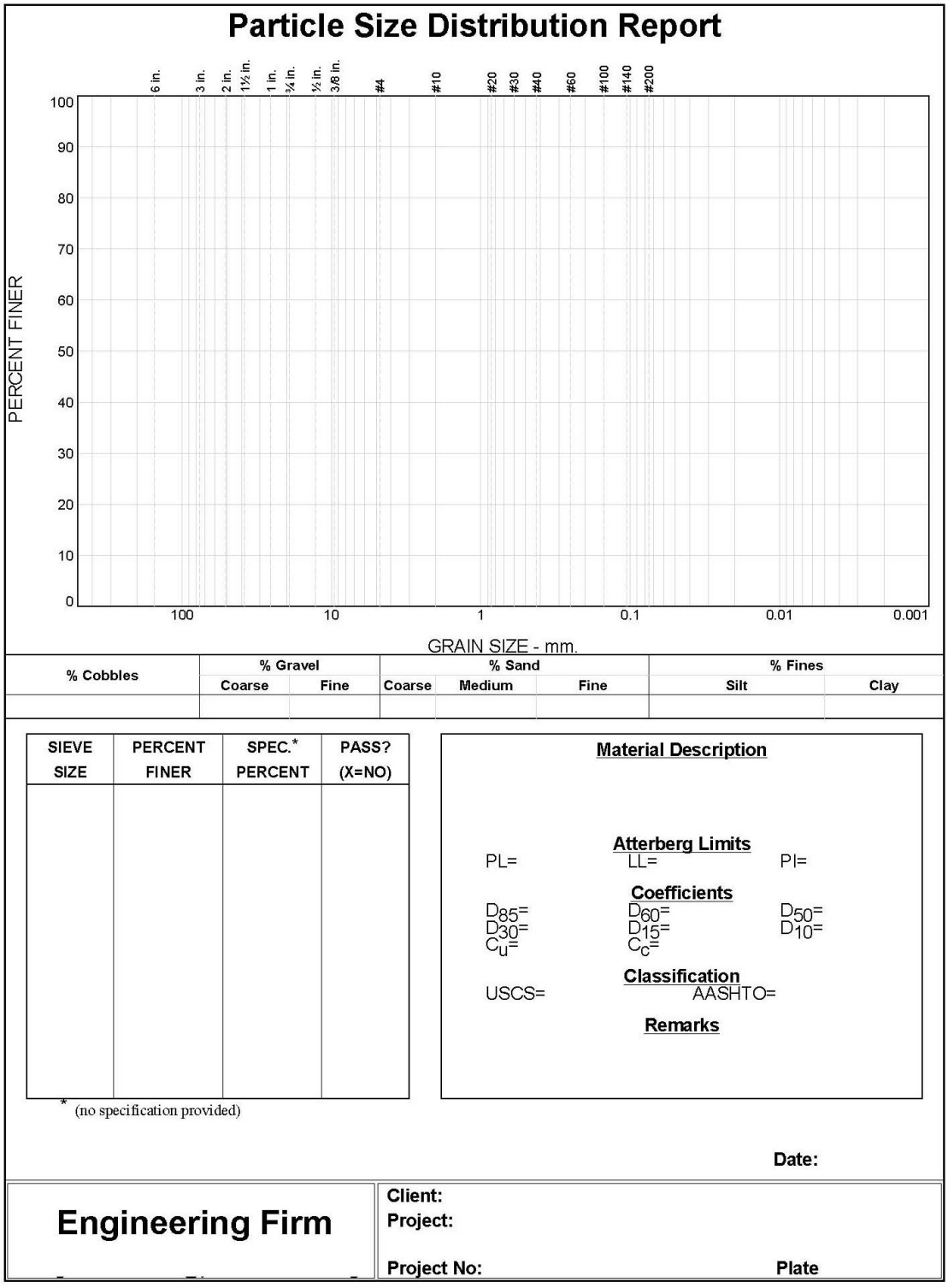
c) Identifying Terms for CLAY SOILS. Plasticity Basis for Combined Silt and Clay Components, Expressing the Relative Dominance of Clay

Overall Plasticity	Plasticity Index	Principal Component	Minor Component
Non-Plastic	0	SILT	Silt
Slight	1 to 5	Clayey SILT	Clayey Silt
Low	5 to 10	SILT & CLAY	Silt & Clay
Medium	10 to 20	CLAY & SILT	Clay & Silt
High	20 to 40	Silty CLAY	
Very High	more than 40	CLAY	

Example: Soil 60% coarse to fine Sand, 25% medium to fine Gravel, 15% Clayey Silt and color-brown.
Identification: Br. coarse to fine SAND, some medium to fine Gravel, little Clayey Silt.

References: 1) D. M. Burmister, "Principles and Techniques of Soil Identification" 29th Highway Research Board Proceedings, 1949.
2) "Identification and Classification of Soils – An appraisal and Statement of Principles", ASTM Special Technical Publication No. 113, 1951.

FIGURE B2
STANDARD SEMI-LOG GRAPH



5.5. APPENDIX C - BORING INSPECTOR'S MANUAL

BORING INSPECTOR'S MANUAL

INTRODUCTION

This publication provides a guide to boring inspection, preparation of boring logs, sample preservation and compilation of boring contract records. Soil identification is covered in Appendix B and should be utilized in the preparation of boring logs.

ORGANIZATION

All borings are to be performed under the supervision of a Boring Inspector located in the field with the boring equipment. The Boring Inspector is to be under the supervision of a Geotechnical Engineer who will make periodic visits to the boring work.

Prior to initiating any field exploration, the Boring Inspectors and the Drilling Superintendent must be thoroughly briefed relative to anticipated subsurface conditions, boring locations, boring numbering, boring depth criteria, sampling procedures, boring access and other provisions required of the field exploration. Such information and instruction shall be covered in the boring contract plans and specifications and by a meeting with the Geotechnical Engineer.

The Geotechnical Engineer shall be contacted by telephone daily, or as directed, during the course of the investigation. These reports are to document conditions encountered and to check on possible changes in the boring program and sampling procedures. No boring rig should be allowed to demobilize or otherwise leave the site without the Geotechnical Engineer's knowledge. In the event that the Geotechnical Engineer is unavailable for a decision, which cannot he made by the Boring Inspector, then the person next in command above the Geotechnical Engineer who is associated with the project should be consulted.

BORING RECORDS

The boring log is the basis for every foundation analysis and it is, therefore, important that a complete and accurate record of all aspects of the subsurface exploration be maintained. The following items should be carefully observed and recorded on the field boring log.

1. Dates and times of beginning and completion of work.
2. Identifying number and location of test boring.
3. Ground surface and elevation at the boring and source of reference.
4. Diameter and description of casing.
5. Total length of each size of casing.
6. Length of casing extending below ground surface at the completion of the boring.
7. Weight, number of blows, and the length of drop of hammer used to drive the casing each successive foot.
8. Water level observation with remarks on possible tidal variations. (All measurements from original ground surface.)
9. Depth to top of each different material penetrated.
10. Depth to the bottom of sampler at start of driving for each sample and depth to which the sampler was driven.
11. Sampler type and dimensions.

12. Weight of hammer and the length of drop used to drive the split spoon sampler and the number of blows required to drive the sampler, measured in 6-inch intervals, throughout its full depth of penetration.
13. Methods and forces used to push sampler tube when not driven.
14. Length of sample recovered.
15. Loss or gain of drilling fluid or mud.
16. Any sudden dropping of drill rods or other abnormal behavior.
17. An accurate record of any change in the original boring location.
18. Identification of the subsoils and bedrock including color, moisture, structure, condition, etc.
19. Type of drilling operation used to advance hole.
20. Comparative resistance to drilling.
21. Any loss of drilling water or drilling mud.

On the field boring log form all data on the drilling and sampling should be noted along with the identification of the soil samples obtained and soil strata changes. It is best to include too much information rather than too little. A sample boring log is attached that provides guidance, (see Figure C1). The Geotechnical Engineer should be consulted to be sure sufficient information is provided on the boring logs.

In addition to the proceeding, it is important that a site reconnaissance be made. Any conditions which may affect design considerations or construction should be noted and logged into the Daily Field Inspection Report and verbally reported to the Geotechnical Engineer. Examples might be: the presence of buildings or old foundations left over from demolition; man made or sanitary landfills; indications of sinkholes, depressions or open caves; existing rock outcrops; surface drainage; etc. Careful documentation throughout the field operations is critical.

Daily Field Inspection Reports should include, in chronological order, the following:

1. Job number, name, location, date, weather conditions, client, owner and contractor representatives.
2. Arrival and departure of all personnel involved.
3. Record all delay and down-times, their causes and eventual conclusion.
4. Summaries of any discussions, conversations and meetings relevant to the project work including any instructions and change orders.
5. Summarize all work, progress for the day. Include, whenever possible, a location diagram of work areas for that day.
6. Record all contacts made, the names of the parties contacted, and who they represent.
7. Tabulate daily pertinent data such as water level readings, boring footage (rock and soil), and footage for observation well installation, etc.
8. Document all equipment used and maintain an accurate record of all expenses incurred.

A sample of a Daily Field Inspectors Report (Subsurface Exploration Report) is attached for guidance; see Figure C2.

Following is a list of necessary equipment and supplies to be used by the Boring Inspector.

1. Clip board.
2. Boring plans and Specifications
3. Boring log forms.
4. Daily report and other type of forms.
5. 6-foot Folding Engineers ruler.
6. Pocket knife.
7. Optional equipment:

   100-foot Measuring tape

   Pocket penetrometer

   Hand level

   Flagging tape

   Indelible black ink marker pen

Conversations with local residents may provide additional useful historical data relevant to the site. However, extreme caution should be used when discussing a client's project with outsiders. If questioned only state the general nature of the project. Any extra information provided may be misconstrued or misused in such a manner so as to create adverse publicity. For this reason, discussions and information pertaining to the project should not be given to anyone except the client's authorized representative.

Generally, the driller should be the man best able to detect changes in strata and drilling résistance during the course of drilling. There should, therefore, be a close liaison between the driller and the Boring Inspector at all times. Where changes in strata are indicated by the driller in between scheduled sampling intervals, samples should be taken at the strata change wherever such is feasible.

There are a number of abbreviations and terms that are useful in preparing boring logs that may be utilized. Abbreviations for soil identifications should only be used when lack of space prohibits their being written out in full

STANDARD ABBREVIATIONS

Soil Identification			
Gravel	G	Silty Clay	$yC
Sand	S	Clay	C
Silt	$	Peat	Pt
Clayey Silt	Cy$	fine	f
Silt & Clay	$&C	medium	m
Clay & Silt	C&$	coarse	c
Color			
light gray	LtGr	tan	Tn
gray	Gr	yellow	Yl

dark gray	DkGr	green	Grn
black	Bk	blue	Bl
brown	Br	red	Rd
Samplers			
Split spoon	SS	Diamond core size	BX, NX
Shelby Tube	ST	Torvane	Tv
Piston Sampler	PS	Field Vane	Fv
Denison Sampler	DS	Pocket penetrometer	Pp
Modifications			
organic	org	seam, seams	sm, sms
calcareous	calc	streaks	stks
ferrous	fer	nodules	nod
lignitic	lig	laminated	lam
very	v	slickensided	sls
slightly	sl	interbedded	intbdd
at	@	intermixed	intmx
with	w/		

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided - surfaces that are slick and glossy in appearance or polished.

Fissured - an extensive crack or cracks.

Sensitive - pertaining to cohesive soils that are subject to appreciable loss of strength when remolded.

Varved - alternating think layers of silt (or fine sand) and clay.

Laminated - composed of thin layers and texture, 1 cm or less, in thickness.

Interlayered - composed of alternate layers of different soil types.

Parting - a very thin layer one or two grains thick.

Calcareous - containing appreciable quantities of calcium carbonate.

DRY SAMPLE BORINGS

The borings are to be advanced using ordinary boring techniques. Cased holes shall use driven casings not less than 2W in diameter to the extent needed to maintain an open hole without loss of ground. Cleaning out the hole, where casing is used, or advancing the hole, if casing is not needed, shall not be done by washing through a sampling spoon or open-ended drill rod unless prior approval is obtained from the Resident Geotechnical Engineer. The use of rotary drilling techniques with weighted drilling mud, hollow stem augers or other methods to advance and maintain a stabilized hole may be permitted depending upon field conditions and the design of

the drilling program. Any changes in the drilling program should have the approval of the Resident Geotechnical Engineer. Casing, where used, shall be driven down without washing in stages of not more than five feet, after which the material shall be cleaned out to the depth of the bottom of the casing. At every change in soil formation and at vertical intervals not to exceed five feet, hole advancement should be stopped, the loose material should be removed from the hole and an ordinary dry sample of the material should be taken. These samples should be taken in accordance with the provisions of the Standard Penetration Test. The samples should be removed from the hole in an unwashed condition in such a manner as to provide a true sample of the soil formation from which they are recovered. Requirements of the Standard Penetration Test (ASTM D1586) specifications for the sampler and guidelines for soil sampling are as follows:

1. A two-inch O.D. split-barrel sampler similar to Ackers' Sampler No. 22017-9 may be used, provided a Ml I.D, open spilt-barrel at least 26-inches long is incorporated in the sampler. The beveled edge of the drive should be maintained in good condition and if excessively worn, should be reshaped to the satisfaction of the Engineer. The drive shoe of the sampler should be replaced, if damaged, in such a manner as to cause projections within the interior surface of the shoe.

2. Under no circumstances should samples be recovered by driving the casing as a sampling barrel. All samples should be obtained by driving the split barrel sampler in undisturbed ground beneath the bottom of the casing. Samples should be recovered at every change in soil formation and at vertical intervals not to exceed 5 feet.

3. After cleaning the hole of all loose material, the sampling barrel should be driven by a free-falling drop weight weighing 140 pounds and falling 30 inches. The sampler should be driven using Standard A rods connected between the sampler and drive head unless use of other equipment is approved by the project engineer.

4. In all soils requiring less than 100 blows per foot of penetration, the sampling barrel should be driven 24 inches with the number of blows for each 6 inches of penetration observed and recorded.

5. In extremely hard materials requiring over 100 blows per foot, the blows for smaller amounts of penetration may be observed and recorded with special note of the amount of penetration actually obtained. Refusal may be considered to be greater than 100 blows per 2 to 3 inches.

6. When a casing is used, particular care should be taken to remove all soil to the bottom of the casing before sampling. Particular care also must be exercised to maintain the hole full of water during all operations preceding sampling, such as during removal of wash pipe and wash bit and assembly and insertion of sampling barrel. The driller should provide positive inflow of water at the top of the casing during removal of drill rods or wash pipe.

Immediately upon removal from the hole the split barrel sampler should be split open to provide for visual inspection of the intact sample by the Boring Inspector. Samples should then be tightly sealed in screw-top glass jars or bottles at least 3-1/2 inches high, approximately 1-1/2 inch inside diameter at the mouth, and with inside diameter of the jar no more than ¼-inch larger than that at the mouth. The jars shall be provided with metal screw caps containing a rubber or waxed-paper gasket. Each sample container shall be labeled to show plainly the project number, the boring number, the depth at which the sample was taken, and the number of blows for penetration of the sampler for each 6 inches of penetration should be noted in the correct location on the boring log. Samples shall be placed in the jars in the condition in which they are

removed from the split barrel sampler without squeezing, mashing or otherwise excessively distorting the sample. The driller shall, at their expense, provide such containers, keeping a sufficient supply on hand to prevent any delay in the work. Samples which have been recovered and preserved should be numbered consecutively; i.e. S1, S2, etc. If the sample from the split barrel is divided into subsamples because of material change, then the sample designation number will be followed by a letter designation assigned alphabetically from top to bottom; i.e. S1A, S1B, etc. If no sample is recovered it will be designated by an "NR" and no sample number assigned. No jar need be placed in the jar box to show N position. The outer portion of the recovered soil samples should be scraped free of drilling mud for more accurate identification.

CONTINUOUS SAMPLING

Continuous sampling in certain borings or through certain soil strata may be requested by the Resident Geotechnical Engineer based upon information disclosed by the borings. Continuous sampling shall mean the securing of successive samples in sampling devices without intervening drilling or washing except for cleanout operations, as specified.

UNDISTURBED SAMPLE BORINGS

At the request of the Resident Geotechnical Engineer, or their representative, the driller may be required to take samples in a three-inch O.D. open-type "Shelby" tube undisturbed sample with sample tubes 30 inches long and provided with a positive ball check valve in its head. For obtaining undisturbed samples, the casing shall be at least 3½" in diameter. Undisturbed samples are normally required in soft clay or organic soils. Such samples shall be obtained by pushing or jacking the sampler into undisturbed soil at the bottom of the hole. Wherever possible, the equipment for advancing the sampler shall measure the force required to penetrate the soil. The Boring Inspector shall record the force required to penetrate the soil. The Boring Inspector shall record this force, depth of penetration and length of sample recovered. These samples shall be sealed in the tubes in which they are obtained and carefully labeled to show location and depth of sample (i.e.: S1, S2, ST3, S4). When there are problems with obtaining undisturbed samples using Shelby tubes, then undisturbed soil samples shall be recovered by means of special piston- type samplers.

When ready to take Shelby or piston-type samples, all loose and disturbed materials shall be removed to the bottom of the casing or of the open hole. This final cleaning should be accomplished with a device in which washwater is fully deflected in an upward direction. No washing with downward directed jets should be permitted within four inches of the intended top of the undisturbed sample unless otherwise directed by the Resident Geotechnical Engineer or their representative. Cleaning out of the last four inches of the intended top of the sample should be accomplished with shield jet auger such as a "Clean-Out Jet Auger", (Ackers Catalogue 320396 for 3" pipe or 320397 for 4" pipe), or equivalent device subject to the approval of the project engineer. Cleaning out should be done in such a manner that the soil immediately below the bottom of the casing is as nearly undisturbed as possible. The sampling device connected to the drilling rod should then be lowered slowly to the bottom of the hole and the sampler forced into the soil for a distance of not less than 24 inches or more than 27 inches.

In the operation of securing the undisturbed samples, the samplers should be forced into the soil at a rate of four to five inches per second. The samplers should be pushed or jacked downward, and not to be driven unless the character of the soil is such that driving with the hammer is absolutely necessary and is approved by the project engineer.

The sampler with its contained soil sample should be rotated, and then carefully removed from the hole. The thin-walled tube containing the sample should be detached from the driving head.

A portion of the undisturbed sample should always be carefully removed from both ends of a tube (a minimum of ½" thickness) and squared and preserved whether the sample is sealed in the tube or extruded in the field and preserved in cartons. The removed samples from the top and tip of the tube should then be described on the boring log. At the request of the Resident Geotechnical Engineer, it may be necessary to perform Pocket Penetrometer and field Torvane tests on the bottom of the recovered undisturbed sample. It may, however, be necessary, if requested by the Resident Geotechnical Engineer, to extrude the samples in the field and preserve them in quart cartons; when samples are handled in this manner, extra time and care must be taken.

If the soil sample is not extruded, the ends of the tube are wiped clean and the end spaces filled with hot paraffin or hot melted beeswax. The ends of the tube should then be sealed with snug-fitting metal or plastic caps and secured in place with friction tape, after which the ends of the tube should be dipped in hot paraffin/beeswax to provide airtight seals.

Undisturbed soil samples should be clearly and permanently marked on the tube to show the project contract number, the number of the hole, the sample number, the depth from which the sample was taken, the measured recovery, and the top and bottom of the tube, and any other information which may be helpful in determining subsurface conditions. Whenever possible, a measurement of the force required to push the undisturbed sampler tube into the soil should be obtained and recorded.

Undisturbed samples, designated by a "U" and "Shelby Tubes" designated by "ST" should be numbered according to their occurrence in the boring sequence: i.e., S1, S2, U3, S4, ST5, S6, S6A, etc. Undisturbed samples should be handled and transported in a cushioned rack with the top of the sample always upright. It should be delivered to the laboratory with extreme care in order to minimize disturbance effects which may render laboratory test results useless.

During the winter months, precautions must be taken to prevent undisturbed samples from freezing during handling and shipping; if allowed to freeze, the samples will be worthless for strength or consolidation testing.

Tubes for undisturbed samples are to be provided by the driller, and should be of steel, seamless brass or hard aluminum. Sample tubes should have a machine-prepared sharp cutting edge with a flat bevel to the outside wall of the tube. The cutting edge shall be drawn in to provide an inside clearance beyond the cutting edge of 0.015"± - 0.005".

When recovery of samples by use of Shelby tubes is poor, then undisturbed soil samples are to be recovered by means of a thin-wall piston-type sampling device, similar to Acker's No. 22041-7 in which piston rods extend to the ground surface, or a self-contained hydraulically-operated piston sampler, such as the "Osterberg" sampler, or a casing-actuated piston sampler, such as the "Hong" sampler. The sampler selected should be designed to utilize sample tubes with a three-inch outside diameter. When samplers, utilizing piston rods extending to the ground surface, are used, positive locking of the piston rods with respect to the surface of the ground must be provided to prevent upward or downward motion of the piston during the advance of the sampling tube and the piston rods must be positively locked to the drill pipe at the surface during removal of the sampler for the depth to which it penetrated undisturbed soil. If the piston rods are locked to the mast of a truck-mounted drill rig, the rig should be blocked and anchored to the ground in such a manner as to prevent motion of the rig during the sampling operations.

If specifically approved in advance by the Resident Geotechnical Engineer, samples may be recovered in hard soils by an open-type, thin-wall sampling device, similar to Acker's No. 22012-14 or No. 22058-4.

In very soft soils, a weighted drilling mud may be required, whether or not casing is used, in order to maintain a pressure on the soil as nearly equal as possible to that existing before the drilling operations.

Under certain conditions, continuous sampling with three-inch diameter "Shelby" tubes may be required in cohesionless materials encountered in 3 ½" undisturbed sample borings.

BORING TERMINATION

In general, a specific completion depth, or depth criterion should be assigned to each boring location for the design of the drilling program. Unless otherwise instructed by the Resident Geotechnical Engineer, it is expected that the design completion depth will be adhered to. Because the sample depths are generally at five-foot intervals and the completion depths are generally in multiples of five feet (i.e. 25, 30, 40, 65 feet, etc.), the last sample should begin before and terminate at the design completion depth. Similarly, with rock coring, the last run does not have to be a complete five-foot run but may be stopped early at the design completion depth.

There are occasions when borings might not be terminated at the designated completion depths. Such occasions might be:

1. The boring is in soft clays or organic silts or some compressible stratum;
2. Sampling blow counts have been decreasing significantly or are very low to begin with (i.e. fewer than 10 to 20 blows per foot);
3. A void is encountered just before or at the design completion depth;
4. Unanticipated subsurface conditions have been encountered;
5. Minimum criteria for terminating a boring as established by the Resident Geotechnical Engineer have not been met (i.e. blow count, core recovery, R.Q.D., particular stratum, etc.)

Before proceeding further with the boring, the Boring Inspector should consult with the Resident Geotechnical Engineer for further instructions. If the Resident Geotechnical Engineer is unavailable, then consult the person next above in the chain of command, such as another engineer, the project manager or principal-in-charge.

ABANDONED BORINGS

Borings should not be abandoned before reaching the final depth ordered except with the approval of the Geotechnical Engineer or their representative. No payment will be made for borings abandoned by reason of an accident or negligence attributable to the driller.

Borings abandoned before reaching the required depth, due to an obstruction or other reasonable cause not permitting completion of the boring by standard procedures, shall be replaced by a supplementary boring adjacent to the original one and carried to the required depth. Penetration to the bottom depth of the abandoned boring may be made by any means selected by the driller and approved by the Boring Inspector unless payment is being rendered for the overlapped portion of the bore hole, in which case standard drilling procedures should be used. Samples to be taken in the supplementary boring should commence from the last sampling elevation at which the original boring was abandoned in the manner specified for the original boring. This will establish a sampling continuity between the two borings.

Only under special circumstances when the bore hole is abandoned for reasons acceptable to the Geotechnical Engineer, or their representative, will payment be made as stated in the

Contract, provided that the driller presents soil samples and records as specified and a report documenting the obstruction which necessitated terminating and relocating of the boring.

GROUNDWATER LEVEL OBSERVATIONS

Groundwater levels should be recorded when first encountered during drilling, at the start of work each morning for borings in progress and at the completion of each boring. Groundwater levels should also be recorded at the end of the field exploration project. The date and approximated time after boring completion should also be recorded for each water level reading. All water level observations should be summarized on the boring logs in the spaces provided. Observations should be made of ground water levels at the start of each day and in all completed holes. Any unusual water conditions and gain or loss of water in boring operations should be recorded completely in the boring logs. Whenever required by the Geotechnical Engineer, bore holes should be bailed for observations of groundwater conditions. When the open hole drilling method is used, and natural or commercial drilling mud utilized to stabilize the hole, the hole may have to be flushed thoroughly with clean water at the completion of the boring for the purpose of observing groundwater levels.

Groundwater level observations can be made in an open hole by filling the hole with clean water to a point above the natural groundwater level and observing the drop in the level of water in the hole. This may be followed by bailing the hole to a point below the natural groundwater level and observing the rise in the level of water in the hole. All individual measurements of the water level in holes should state the time elapsed since the last filling or bailing of the hole.

INSTALLATION OF STAND-PIPE OBSERVATION WELLS

Stand-pipe observation wells provide long term ground water observation and are often required by the Contract plans and specifications. Upon reaching the completion depth of a boring it may be part of the drilling program that an observation well be installed. In borings advanced with casing or hollow-stem augers, the well pipe, usually 1-inch to 2-inch diameter PVC pipe, may be inserted with its screen tip into the casing or hollow stem augers prior to their being withdrawn. If no screen is provided, the bottom pipe end should be sealed with a cap and a series of slots may be drilled or sawed to create the screen tip. In the event that the grain size gradation of the stratum into which the well tip screen has been placed, is finer than the screen opening size, then the screen should be packed with graded granular material to avoid plugging of the screen. Once the well has been installed, it should be backflushed with clean water to clear the screen. Upon removal of casing or augers and completion of backfilling, it may be desirable to again backflush by applying a slightly increased hydrostatic pressure and monitoring its drop to assure the screen is still open. When drilling with mud, those borings which require observation wells should be drilled with biodegradable mud if possible. If no biodegradable mud is available, then the hole should be thoroughly backflushed after the pipe and screen have been installed and tested, after backfilling. When non-biodegradable muds are used, boring wall permeability may be obstructed and may result in unreliable water level readings. No observation well installed using a non-biodegradable mud should be accepted unless the driller demonstrates that the well is in working order or unless directed by the Geotechnical Engineer.

CLEAN UP

Upon completion of the work the driller should remove their rigs, all equipment, unused material and soil removed from the holes and leave the site in a clean condition satisfactory to the owner and Consulting Engineer.

The driller should cut off, below ground surface, or remove all casing. All holes remaining inside buildings or in public roadways should be plugged at the top with concrete. All bore holes must be filled in or plugged before leaving a job unless otherwise directed by the Boring Inspector.

Drilling mud shall be hosed off or disposed of beyond developed areas wherever feasible and in a legal and environmentally approved manner.

ROCK CORING AND FIELD LOGGING

In general, when a blow count of 100/3" or greater has been recorded and it has been determined that bedrock has been encountered, and not a boulder or very dense soils, then it may be feasible to core. The decision to core is not to be determined by the results of the Standard Penetration Test alone but may be used as an indication that coring is possible. Knowledge of local geologic conditions, known or anticipated, and soil samples recovered, must be considered in any decision as to whether to begin coring. Once the driller is set up to core, the Boring Inspector should document the following information on the boring log:

1. Type of core barrel, diameter (ID), drill bit type and condition (which should be good);
2. Note any circulating fluid losses, depth and time of occurrence and any actions or reasons resulting in loss of core;
3. The starting and completion depth (to the nearest tenth of a foot) of each run, with no core run length to exceed 5.0 feet unless approved by the Geotechnical Engineer;
4. The core run designation (i.e. C, C2, etc.) and the recovery;
5. The type of rock recovered, color, the core recovery, R.Q.D. (Rock Quality Designation) and any other related information.

In addition to the above, the Boring Inspector should insure that:

1. Casing has been driven to and sealed into bedrock;
2. Coring equipment used is of a type that would maintain continuous contact between the core bit and the rock being drilled.

Each core should be packed in well-constructed wooden boxes, provided by the boring contractor at their expense, with dividing strips to hold the cores in position and in the order in which they were recovered from each hole. Core boxes should be marked on the inside and the outside with the project job number, recovery, R.Q.D., and the depths from which the cores were recovered so that they may be easily identified. Wooden blocks should be placed in the box to separate the core runs and should be marked to identify the core depth. When the core recovered is fragmented, all pieces of a size less than the core diameter should be put in plastic bags and placed in the core box in its appropriate position within that core run.

FIGURE C1
BORING LOG

ENGINEERING FIRM

BORING NO. BF-1
SHEET NO. 1 OF 2

BORINGS FOR
<PROJECT TITLE, MUNICIPALITY>

(Engineer)

(Contractor)

Contract No. _____ Purpose _____ Structure No. _____
Location _____ ROADWAY _____ STA. _____ OFF. _____

Rig No. 2	Type CME 55	Driller		Helper			
DATE	5/26/05						
TIME STARTED	10:00 AM						
TIME FINISHED	2:30 AM						
WEATHER	50° Cloudy						
DEPTH REACHED	39.0'						

GROUND ELEVATION 593.68 M.L.W. ELEVATION _____
ZERO OF BORING LOG _____ ELEVATION GROUND WATER _____

PAY QUANTITIES										
LINEAL FEET OF BORING					SAMPLES			LIN. FT. OF ROCK CORE		
2-½ in	3 in	4 in			ORD. DRY	UNDIST. DRY		1-3/8	1-5/8"	2-1/8"
ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM	ITEM

	Unit Weight	Size	Weight of Hammer	Average Fall
Drilling Mud	_____	_____	_____	_____
Ordinary Dry Samples O.D. 2 in	I.D. 1-?		140 lbs	30 in
Undisturbed Samples	Type _____	Length _____	O.D. _____	I.D. _____

GROUND WATER READINGS							
DATE							
TIME							
DEPTH							

GENERAL REMARKS: Boring located @ center of Rte. 46 west bound right lane @ 15± ft. south-southwest of original location.

The subsurface information shown hereon was obtained for NJTA design and estimate purposes. It is made available to authorized users only that may have access to the same information available to the State. It is presented in good faith, but is not intended as a substitute for investigations, interpretation or judgment of such authorized users.

INSPECTOR _____ RESIDENT ENGINEER _____

BORING LOG
<PROJECT TITLE, MUNICIPALITY>

Boring No. BF-1
Sheet No. 2 of 2

CONTRACT NO. ROADWAY STA. OFF.

Elev. (ft)	Blows on Casin	Blows on Spoon For 6-in Penetration		Sample No.	Sample Depth ft	Lo 0.	Material & Remarks
593.68			43	S-1	0.5 - 2		6" asphalt, Dk. Br. c-f SAND, tr. Silt, Some c-
		36	100/1"				Gravel Rec.:
591.68		17	11	S-2	2 - 4		Br. c-f SAND, tr. Silt, little c-m Gravel
		20	19				2.5 ft. Auger refusal Rec.:
				C-1	2.5 - 4		Color mix Blue/ Lt. Gr./Pink Cobbles and
							Boulders, Sand Screams
							REC : 36%, RQD : 0%
589.68		50/3"		S-3	4 - 4.3		No Recovery
							Rec.:
				C-2	4 - 9		Color mix Blue/ Lt. Gr./Pink Boulders,
							REC : 36%, RQD : 8%
				C-3	9 - 14		Color mix Blue/ Lt. Gr. Cobbles and Boulders,
							REC : 30%, RQD : 10%
				C-4	14 - 19		Color mix Blue/ Lt. Gr. Cobbles
							REC : 12%, RQD : 0%
				C-5	19 - 24		Color mix Blue/ Lt. Gr./Pink Cobbles
							REC : 32%, RQD : 0%
				C-6	24 - 29		Color mix Blue/White/ Lt. Gr./Pink Cobbles
							REC : 32%, RQD : 0%
				C-7	29 - 34		Color mix Blue/ Lt. Gr./Pink Cobbles and
							Boulders
							REC : 36%, RQD : 0%
				C-8	34 - 39		Color mix Blue/White/ Lt. Gr./Pink Cobbles
							REC : 6%, RQD : 0%
							Hit Sand layer at 36.5
554.68							
						EN D	End of Boring @ 39.0'

FIGURE C2
DAILY FIELD INSPECTORS REPORT

ONSULTANT	**SUBSURFACE EXPLORATION REPORT**	Date	Day
		Report No.	Page

Project _____ Job No. _____

Exploration Contractor _____

Weather _____

EQUIPMENT ON JOB

DRILL RIG				WATER AND/OR EQUIPMENT TRUCK			
NO.	TYPE	MAKE	CONDITION	MAKE	CONDITION	PUMP AVAIL.	WINCH AVAIL.
1							
2							
3							

BORING INFORMATION

BORING NO.	DATE STARTED	IN PROGRESS	DATE COMPLETED	TOTAL DEPTH	GROUND ELEV.	ZERO LOG ELEV.	CASING (C) OR MUD (M)	SAMPLES TAKEN			
								JAR	BAG	UNDIST.	ROCK CORE

Visitors			Representing	

REMARKS _____

Received by		Date		Witness

5.6. APPENDIX D - LABORATORY TESTING FOR SOILS

LABORATORY TESTING FOR SOILS

	Tests	Reference
I.	Identification Tests:	
A.	Mechanical Analysis	
1.	Sieve Analysis (with grain size curve)	ASTM D 422
2.	Percent passing #200 Sieve	ASTM D 1140
3.	Hydrometer Analysis including Specific Gravity (with grain size curve)	ASTM D 422
B.	Index Properties	
1.	Preparation of Sample for Testing: Wet Preparation	ASTM D 2217
2.	Liquid Limit - with flow curve	ASTM D 4318
3.	Plastic Limit	ASTM D 4318
4.	Shrinkage Limit	ASTM D 427
C.	Specific Gravity	ASTM D 854
D.	Water Content Determination	ASTM D 2216
E.	Maximum & Minimum Density of Granular Soil (Dry State)	ASTM D 4253 / ASTM D 4254
F.	Visual identification and classification of Jar Samples	Ref. D.1
G.	Visual identification and log of undisturbed tube samples - including opening of tubes	Ref. D.1
H.	Natural Dry Density and Water Content Determination of Shelby Tube Samples	Ref. D.2
II.	Permeability Tests:	
A.	Permeability of granular Soils (Constant Head)	ASTM D 2434
B.	Permeability of undisturbed sample in 2.5-inch Dia. consolidation apparatus with a maximum pore water back pressure of 60 psi, reporting permeability (K20), natural water content and dry density.	Ref. D.2
III.	Strength Tests:	
A.	Unconfined compression test on undisturbed soil sample, including maximum stress and strain at failure, visual identification, initial water content, dry density, stress-strain curve and failure sketch. Minimum rate of strain 1% per minute.	ASTM D 2166
B.	Direct Shear Test (Consolidated-Quick) on undisturbed soil sample for each normal load, including trimming, visual identification and consolidation of sample, initial and final water contents, dry density and stress-strain curve. Rate of shear one-half percent per minute.	ASTM D 3080 and Ref. D.2

C. Triaxial Compression Test for 2.8-inch Dia. or 1.4-inch Dia. undisturbed or remolded soil sample.

1. Unconsolidated-Undrained for each lateral pressure including visual identification initial water content, dry density, stress-strain curve and failure sketch. Minimum rate of strain 1 percent per minute. — ASTM D 2850

2. Consolidated-Undrained for each lateral pressure at maximum of 24-hour consolidation, with or without back pressure including visual identification, initial and final water contents, dry density, stress - strain curve and failure sketch. Minimum rate of strain 1 percent per minute. — ASTM D 2850/ Ref. D.3

3. Consolidated Drained for each lateral pressure at maximum of 24-hour consolidation, with or without back pressure including visual identification, initial and final water contents, dry density, stress- strain curve and failure sketch. Minimum rate of strain 1 percent per minute. — Ref. D.3

D. Test Method for Consolidated Undrained Direct Simple Shear Testing of Cohesive Soils. — ASTM D 6528

IV. Consolidation Tests:

A. Consolidation test for 2.5-inch and not less than 0.75-inch high sample on undisturbed sample. For one load cycle each load increment imposed for a maximum of 24 hours, and unloading to zero, including preparation, initial and final water contents, dry density, void ratio/log pressure curve or unit strain/log pressure curve. — ASTM D 2435 and Ref. D.4

B. Each unloading/reloading cycle consisting of two decrements and two increments. — Ref. D.4

C. For each additional day required for consolidation to define secondary consolidation. — Ref. D.4

D. For permeability test — Ref. D.4

V. Compaction Test:

A. Moisture/Density Relations of Soils using 10-pound Rammer and 18-inch Drop including sample preparation and moisture density curve (modified Proctor). — ASTM D 1557 / AASHTO T180

B. Standard Method of Test for California Bearing Ratio (CBR) with Stress Penetration Curve (cylinder soaked up to 3 days) including required sample preparation and compaction either — ASTM D 1883 / AASHTO T193

(a) or (b) above. Moisture Density relations determined by ASTM D 1557/AASHTO T-180.

VI. pH Test:

A.	Test Method for pH of Soils	ASTM D 4972
B.	Test Method for pH of Peat Materials	ASTM D 2976

VII. Organic Content Test:

A.	Test Method for Organic Content of Peat Samples by Dry Mass	ASTM D 1997

VIII. Tests on Rock Samples:

A.	Test for Triaxial Compressive Strength of Undrained Rock Core Specimens without Pore Pressure Measurements (Method A)	ASTM D 7012
B.	Elastic Moduli of Undrained Rock Core Specimens in Triaxial Compression without Pore Pressure Measurements Specimens (Method B)	ASTM D 7012
C.	Test Method for Unconfined Compressive Strength Testing of Intact Rock Core Specimens (Method C)	ASTM D 7012
D.	Test for Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression (Method D)	ASTM D 7012
E.	Determination of the Point Load Strength Index of Rock	ASTM D 5731

REFERENCES

D.1 Burmister, D. M. PRINCIPLES AND TECHNIQUES OF SOIL IDENTIFICATION. Proceedings Highway Research Board: Dec. 1949.

D.2 Lambe, T. W. SOIL TESTING FOR ENGINEERS. John Wiley and Sons: 1951.

D.3 Bishol, A. W. and Henkel, D. J. THE MEASUREMENT OF SOIL PROPERTIES IN THE TRIAXIAL TEST. 2nd Ed. Edward Arnold Ltd.

D.4 Burmister, D. M. THE APPLICATION OF CONTROLLED TEST METHODS IN CONSOLIDATION TESTING. ASTM Symposium of Consolidation Testing of Soils, Special Technical Publication No. 126: 1951.

Section 6 - ROADWAY PLAN PREPARATION

6.1. GENERAL

The following are guidelines for the preparation of contract plans. These instructions are intended to insure that uniform level of engineering (design) information is presented and arranged in a consistent format. Plans will be reviewed by the Authority at various interim stages of completion as discussed below.

Plans shall contain all essential and other required data presented in a manner consistent with good engineering practice. The amount of detail included shall be that necessary and sufficient to allow a bidder to quickly and properly assess and evaluate the work to be done.

All final contract plans shall be prepared on mylar material 0.003 inch to 0.004 inch thick. The overall sheet size, edge-to-edge, shall be 22 inches x 36 inches and shall be 21 inches x 33 ½ inches inside of borders as detailed in Exhibit 6-1.

The title box shall be in the lower right-hand corner of the sheet and shall be of the size shown in Exhibit 6-1. The wording in the title box shall be as shown in Exhibit 6-2 depending upon the particular project involved. The name of the roadway shall be the road on which the work is being performed.

On all plan sheets, except where noted otherwise in this Manual, the minimum size lettering to be used shall have a base height of equal to 0.12 feet. As the plans may be reduced to half size, this is the minimum size lettering which will produce a clear, legible text after reduction. Similarly, a bar scale should appear on all sheets where a reduction in sheet size will affect the scale of the drawing.

Symbols and line weights shall be as shown in the Standard Legend in the Sample Plans. In the preparation of plans, the use of drafting aides, such as tape or rub-ons, will not be allowed. The Authority will not accept as an original tracing any sheet with aids attached to it. Nor will the Authority accept any sheet that is poorly reproduced.

Reference is made to the Sample Plans as a supplement to contract plan sheet content and format that is described in this Manual.

Exhibit 6-1 Typical Sheet Layout

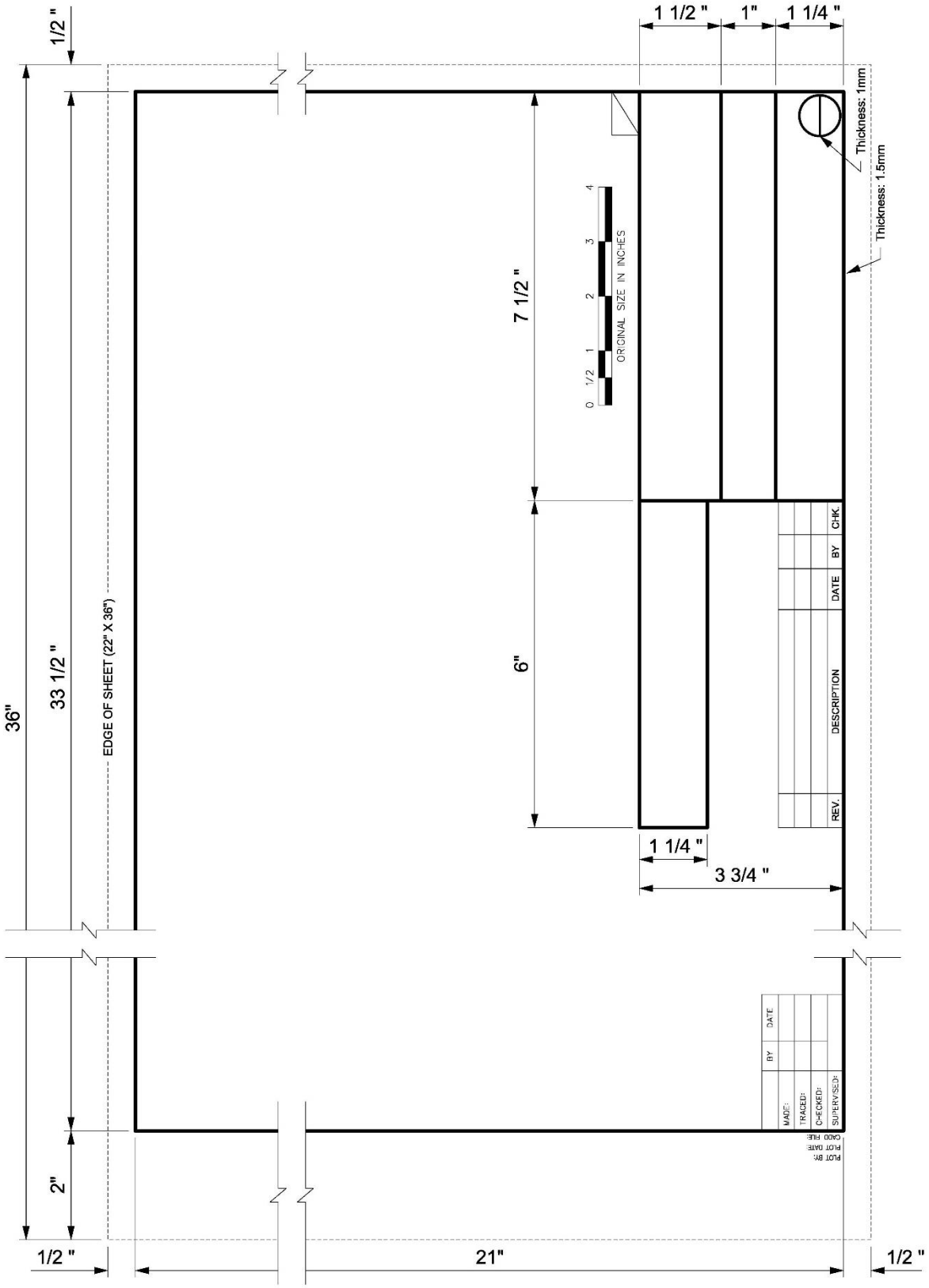
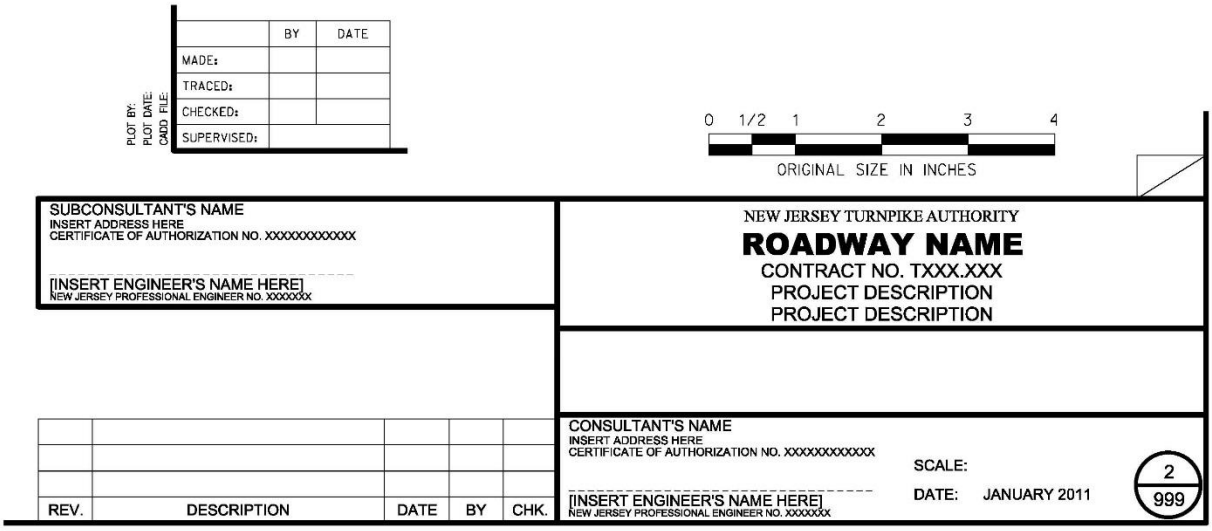


Exhibit 6-2 Typical Title Box



6.2. PRELIMINARY PLANS

Preliminary plans are to be drawn at a scale of either 1" = 100' or 1" = 200'. The plans are to be presented on maps showing all topography or aerial photomosaics as directed by the Authority's Engineering Department. The work shall be prepared on bond material.

Profiles are to be drawn at a 10 to 1 ratio with the horizontal scale the same as the plan scale. The sizes of the sheets are to be 2 feet wide and are to be between 3 and 6 feet long.

The following information is to be shown:

6.2.1. Preliminary Plan Sheets

1. Title box
2. Roadway designations and outside roadway widths
3. Radii with PC, PT and PCC locations
4. Stationing at 100-foot intervals and mileposts
5. Approximate proposed right of way and existing property lines
6. Slope lines
7. Local street names
8. Municipal boundaries and names
9. Horizontal limits of work
10. Typical sections
11. Structure outlines

12. Approximate retaining wall locations
13. Limits of local road relocations
14. Major stream relocations
15. Major utility relocations
16. Major bodies of water
17. Parks

6.2.2. Preliminary Profile Sheets

1. Title box
2. Roadway designations
3. Existing ground using a dashed line
4. Datum, horizontal and vertical scales and stationing
5. Gradients to nearest 0.1 percent using a solid line
6. Existing and proposed structure locations and major waterway openings
7. Existing subsurface utilities to the extent known
8. Minimum vertical clearances at structures
9. Vertical Curve data including PVI, PVC, PVT, curve length, low/high points, e and K values
10. Location and size of horizontal radii
11. Superelevation and transition locations
12. Superimposed profiles from adjacent ramps or roadways at noses or concentric areas
13. Nose locations

6.3. PHASE "A" PLANS

Phase "A" plans are to be either 1"=30' or 1"= 50' scale showing existing topography and depicting the entire project, plus 500 feet beyond the proposed longitudinal limit of work.

The following information shall be included with Phase "A" Submission documents:

6.3.1. Phase "A" Plan Sheets

1. Title box.
2. Base maps to be topographic maps showing as much of the surrounding area as possible.
3. Proposed roadway designations.

4. Typical roadway widths and transition widths.
5. Stationing, station equations, baseline and profile line designations
6. Radii with PC, PT and PCC callouts.
7. Pavement cross slopes, maximum superelevation and location.
8. Slope lines, dashed.
9. Proposed right of way with set dimensions and existing property lines, as well as all easements required for construction, drainage, utilities and slopes.
10. Typical sections showing horizontal dimensions, pavement make-up, curb and sidewalk types, guard rail treatment, pavement cross slopes, right of way dimensions where applicable, grading criteria, superelevation treatment, and profile line for all roadways in contract.
11. Environmental considerations such as earth berms, walls, detention basins, etc.
12. Horizontal limits of work.
13. Approximate location of all utilities and their proposed treatment.
14. Alternatives considered and presented in detail similar to recommended alignment.
15. Construction Sequence at either 1" = 100' or 1" = 200' scale showing existing roadways, proposed roadways and brief explanation of construction sequence, including detours.
16. Temporary and permanent access roads.

6.3.2. Phase "A" Profile Sheets

1. Title box.
2. Base shall be paper material with a 2-foot width and between 3 and 6 feet long as necessary.
3. Scale to be 1" = 50' horizontal and 1" = 5' vertical, showing datum, stationing and roadway designations.
4. Existing ground dashed and profile line solid with gradients to nearest 0.1 percent
5. Vertical curve data including PVI, PVC, PVT, curve length, low/high points, e and K values
6. Location and size of horizontal radii
7. Superelevation, superelevation transitions and design speed
8. Nose locations
9. Superimposed adjacent or concentric roadways and at noses of ramps

10. Existing and proposed utilities
11. Existing and proposed drainage facilities
12. Structures with minimum critical clearance locations

6.4. CONTRACT PLAN FORMAT (PHASES "B" THROUGH "D")

Contract drawings shall be numbered consecutively and in the following order:

1. Title Sheet
2. General Legend Sheet
3. Table of Quantities
4. Plan Reference & Boring Location Sheet
5. Tie Sheet
6. Alignment Data Sheet
7. Maintenance and Protection of Traffic Plans
8. Detour Plans
9. Jurisdictional Limit Map
10. Typical Sections
11. Construction Plans
12. Utility Construction Plans
13. Drainage and Grading Plans
14. Drainage Tabulation Sheets
15. Soil Erosion and Sediment Control Plans
16. Landscape Plans
17. Profiles
18. Signing and Striping Plans
19. Lighting Plans (see Design Manual Section "Lighting and Power Distribution Systems")
20. ITS Plans (see Design Manual Section "ITS and Communication Systems")
21. Construction Details
22. Key to Cross Sections & Earthwork Summary
23. Cross Sections
24. Structural Plans
25. Standard Drawings
26. Reference Drawings

6.5. CONTRACT PLAN CONTENT (PHASES "B" THROUGH "D")

The following is a brief description of the information to be shown on the finalized contract drawings:

6.5.1. Title Sheet

1. Title of Project, Contract Number, Authority Commissioners, Location.
2. Location Plan at suitable scale to adequately locate the project.
3. Index of Sheets in upper right-hand corner. Nomenclature on Index of Sheets shall match the nomenclature on Title Box of the drawings.
4. Signature lines in lower right-hand corner; all final mylar Title Sheets must be signed by the Engineer's project manager or a principal officer. In some instances, as directed by the Authority's project manager, the final mylar Title Sheet may also be signed by the Authority's project manager.
5. Standard Drawings used in this contract in upper left-hand corner. If necessary, the list of Standard Drawings can be put on a separate sheet.
6. Reference Drawings from other contracts which are applicable to this contract along the left sheet edge. If necessary, the list of Reference Drawings can be put on a separate sheet.
7. Utility companies associated with this contract in the lower left-hand corner.

6.5.2. General Legend Sheet

1. Title box.
2. Standard Authority legend with special symbols for this contract - left side of sheet.
3. General Notes - right side of sheet.
4. Earthwork Summary either here or on first Grading Plan. If cross-sections are used, Summary to be on Key to Cross Sections. See Key to Cross Section description for Summary content and format.

6.5.3. Table of Quantities

1. Title box.
2. Column headings of Item Number, Authority Standard Item Number, Item Description, unit of measurement, Estimated Quantity from The Plans, If and Where Directed Quantity, Total Contract Quantity and As-Built Quantity.
3. Item descriptions to be completely spelled out, no abbreviations.
4. Items to be consecutively numbered and in the same order as they appear in the Specifications.

6.5.4. Plan Reference & Boring Location Sheet

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.
3. 1"=100' or 1"=200' scale plans showing existing and proposed roadways with designations.
4. Baselines with stationing every 100 feet and labeling at every 500-foot station.
5. Plan sheet outlines with separate plan sheet numbers shown, starting with Sheet 1. These will not be drawing numbers in the contract set but will reference to the plan sheets within separate groups of plans.
6. Borings with identification.
7. Show project limits and contract limits.
8. If used as baseline tie sheet also, give traverse bearings and distances from PI to PI; offset from traverse to proposed baseline, if 90 degrees give distance from PI to offset point; if not, give bearing and distance. Clearly identify baseline point being tied down.

6.5.5. Tie Sheet

1. Title box.
2. Field ties of traverse points shown on Plan Reference Sheet.
3. Label all points, including a description, such as rebar, stake, nail, etc.
4. Tie to be of size to be easily read and located. Need not be to scale.
5. Coordinates of all points and bearings and distances between points if these cannot be clearly shown on Plan Reference Sheet.
6. Sketches orientated to north arrow to aid in locating points.
7. Bench Mark elevations and descriptions.
8. State Plane Coordinate System.

6.5.6. Alignment Data Sheet

Tabulation to show the following information for all survey baseline data, alignment data and alignment curves in the contract.

1. Title box.
2. Survey Baseline Data including point number; bearing, to nearest 0.1 second; station, to nearest 0.01 foot; coordinates, to nearest 0.001 foot; and elevations, to nearest 0.01 foot.

3. Alignment Data including point type and station, to nearest 0.01 foot; station and offset to survey baseline, to nearest 0.01 foot; and coordinates, to the nearest 0.001 foot.
4. Curve Data including curve number (assign letter prefix to appropriate baseline if necessary), delta angle (Δ), to nearest 0.1-foot, radius (R), tangent (T) and arc (L) lengths, to nearest 0.01 foot; Center of Curve and PI coordinates, to the nearest 0.001 foot; and Plan Sheet number(s) on which the curve is found.

6.5.7. Maintenance and Protection of Traffic Plans

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.
3. 1"=100' or 1"=200' scale plans showing existing and proposed roadways with designations.
4. Clearly show work to be performed in each Stage. Work may be subdivided into more detailed Phases for clarity, for maintenance of traffic, or for reasons particular to the contract (such as earthwork balance or other special situations).
5. If more than one Stage is used, succeeding Stages shall show work constructed under previous Stage. Shading can be used to indicate various stages of construction.
6. Show traffic pattern during the various Stages and Phases, including construction signing.
7. Written description of work to be performed including when and how traffic patterns are changed. Include notes indicating duration limits if critical to the project.
8. Contract limits and adjacent or overlapping contracts.
9. Identify areas where contract coordination is required, if applicable.

6.5.8. Detour Plans

Detour Plans are required when traffic is routed over temporary roadways or existing roadways temporarily. Detours that involve Authority roadways and ramps must be reviewed and approved by the appropriate Authority Operations Department. Detours that involve local roads must be reviewed and approved by the appropriate agency(s) with jurisdiction. For detours involving roadway closures of non-State highways not under Authority jurisdiction in excess of 48 hours, formal State approval with local county and/or municipality resolution is required. The following information is to be shown:

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.

3. Complete computed horizontal and vertical alignment. The vertical alignment may be shown either as described in Subsection 6.5.17 or by showing spot elevations at 25-foot station intervals.
4. The highway or grading plan sheets can be used as a base. Show existing and proposed roadways in the area and clearly show what roadways the detour will connect. Existing regulatory signs and traffic signals shall be shown.
5. Scale to be appropriate to show detail necessary for construction.
6. Typical section and pavement if not shown on Typical Section Sheets.
7. Curve data coordinates, bearings and pavement widths.
8. Temporary drainage required.
9. Notes concerning staging.
10. Locations of traffic control devices.
11. Construction, access and/or detour roads will not cross any waterways without prior approval of the agency having jurisdiction. Provision for protecting waterways is to be covered either in the plans with details or by requiring the contractor to provide details.
12. Traffic stripes.
13. If necessary, state that Uniformed Police Directors will be required.

6.5.9. Jurisdictional Limit Map

Jurisdictional Limit Maps may be necessary if a project overlaps an area outside of the Authority's Right-of-Way, such as at an interchange, and future maintenance responsibilities must be specified and agreed upon. While sometimes Jurisdictional Limit Maps are included in a set of bidding plans, they are typically a separate document, and they are only to be prepared at the express direction of the Authority.

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and / or right side of the sheet.
3. 1" = 100' (or 1" = 200' if approved by the Authority's Engineering Department) scale plans showing the completed construction in accordance with the symbols shown in Standard Legend. No contours are to be shown on Jurisdictional Limit Maps.
4. Names of roadways.
5. Show proposed baselines and indicate and label 100-foot Stations.
6. Show final Right-of-Way and property lines.
7. Include a legend of shading to indicate under whose jurisdiction various areas and appurtenances will be maintained by.

8. Shade in the appropriate areas to indicate under whose jurisdiction various areas and appurtenances will be maintained by.
9. In addition to shading, it may be necessary to include notes to clarify jurisdictional issues, such as snow plowing.
10. Label match lines by station and matching plan sheet number.

6.5.10. Typical Sections

1. Title box.
2. Scale shall adequately show all typical section details.
3. Detail various existing and proposed pavement sections and details.
4. Show existing and proposed typical lane, shoulder and berm dimensions and cross slopes for all roadways.
5. Show typical grading criteria and median grading treatments.
6. For mainline roadways and ramps, show normal and superelevated sections.
7. Show special sections such as pavement widening details.
8. Show special earthwork details such as method of determining lateral limits of muck excavation - designate pay limits.
9. Show topsoil, seeding, berm surfacing and guide rail locations.
10. Show pavement details for access roads, parking lots, etc.
11. Show rock cut details and pay limits, if applicable.
12. Show typical locations for curb, lip curb, barrier curb, medians, underdrains, inlets and manholes, if applicable.
13. Show acceleration and deceleration lane treatments.
14. For mainline roadways and ramps, show existing and proposed right of way lines.
15. For all local roads, show overall right of way dimensions.

6.5.11. Construction Plans

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.
3. 1"=30' (or 1"=50' if approved by the Authority's Engineering Department) scale plans showing existing planimetry in accordance with symbols shown in Standard Legend. No contours are to be shown on Construction Plans.

4. Show 500 feet of planimetric coverage beyond the beginning and end of the contract.
5. Existing drainage shall be indicated including inverts and types of drains. Existing streams, brooks, ditches, etc. are to be indicated including direction of flow and name of waterway (local name in parenthesis if applicable).
6. Existing roadways showing name and type of pavement and dimensions.
7. Horizontal alignment showing typical roadway dimensions at each edge of the sheet for each roadway shown, including dimensions needed to define transition areas.
8. Curve numbers shown, PC, PT, FCC stations shown, ties (station and offset) at beginning and end of variable pavement sections. Station in direction of traffic on single direction roadways.
9. Show baseline (existing and proposed), proposed right of way lines, bearings and station equations, indicate and label 100-foot stations.
10. Show all proposed and existing right of way lines, existing property lines, easements, etc. outside proposed right of way.
11. Pavement, curb, sidewalk, guide rail and approach slabs. Give limits of various pavement types.
12. Show borings by symbol and boring number.
13. Using Standard Legend, show existing and proposed utilities, treatment of existing utilities, if utility work by others, indicate by whom (Public Service, NJ American Water, etc.) and show Utility Work Order Number.
14. Show both existing and proposed overhead and underground power, telephone and communication wires.
15. Show baseline and ROW monuments by using Standard Legend symbols. Baseline monuments are to be placed at all PC, PCC’s, PT’s, etc. and at other locations to provide a maximum spacing of 500 feet. Right of way monuments are to be placed every 1,000 feet and at angle points in the proposed right of way line that do not coincide with existing property lines. Stations and offsets to right of way monuments to nearest 0.01 foot clearly showing the baseline to which monuments are referenced. Each baseline monument to have coordinates to nearest 0.01 foot.
16. Show type and location of proposed fence and type and location of vehicular gates, if applicable.
17. Label match lines by station and matching Plan sheet number.
18. If detours are involved, reference to detour sheet to be shown on appropriate plan sheet.
19. For special treatments, make cross reference to appropriate sheets.

20. If applicable, show horizontal limits of muck excavation, overload, sand drains, etc.

6.5.12. Utility Construction Plans

Utility Construction Plans are to be introduced into a contract where complex and/or extensive utility work is to be done within the contract limits and the work cannot be adequately shown on the Plans.

Generally, this condition will most usually occur in the Toll Plaza areas, but the use of these sheets is not restricted to those areas.

Profiles will be required for complicated or unusual utility installations such as extra depth water mains, sanitary sewers with tight clearances, etc. The format is to be similar to that of the roadway profiles described under Subsection 6.5.17.

If this work is to be done by the Contractor, clearly specify if the materials will be furnished by the Contractor or the utility. If inspections are to be performed by the utility, specify the lead time required to schedule said inspection, and the appropriate contact person information.

The Utility Construction Plans shall show all utility work to be performed, whether by the Contractor or by various utility companies. The following information is to be shown:

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.
3. Scale to be no smaller than 1" = 30'.
4. Existing topography and proposed items of construction.
5. Existing and proposed utilities, both underground and aerial, including main lines and service connections. All utilities shown in accordance with the Standard Legend.
6. Work to be performed by a Utility Company is to be noted by Utility Work Order Number and the name of the Company.
7. Show schedule of conduits as to size, location, use, when to be installed, and who does the work.
8. Utility installation details.
9. List of Utility Companies and their responsibility, e.g. "Primary Electric Service - Public Service Electric and Gas Co."
10. Coordination required with other contracts, or responsibility clearly defined if contract limits overlap.

6.5.13. Drainage and Grading Plans

Although cross sections are required, contouring may still be required to show intent for areas such as interchange infield grading, grading at ramp merges, water quality basins, etc.

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.
3. Drainage and Grading Plans shall be to the same scale (1"=30' or 1"=50') and cover the same area as the Construction Plans.
4. The title of the sheet shall contain a number that is to be the same as the Plan sheet number, i.e. Construction Plan No. 10 covers the same area as Drainage and Grading Plan 10.
5. Same planimetry as shown on the Construction Plan sheets with the addition of 1-foot existing contour lines.
6. Existing and proposed utilities in accordance with Standard Legend.
7. Proposed and existing roadways with proper designations.
8. Stationing, bearings, PC, PT and PCC's labeled, 100-foot stations labeled, right of way shown and labeled.
9. All existing and proposed drainage with flow arrows. Drafting to differentiate features by using Standard Legend symbols for inlets, manholes, etc. Show all inverts, grate elevations, pipe sizes and lengths for existing and proposed, ditches (type), rip—rap, type of existing and proposed pipe and length of proposed pipe between structures (inlets, manholes, etc.), underdrains.
10. All roadway and shoulder cross slopes.
11. Spot elevations at 25-foot intervals in areas where grades deviate from typical sections.
12. In areas involving complicated drainage patterns or grading, where showing pipe sizes, lengths and elevations would tend to clutter the plans, Drainage and Grading Plans may be separated or Drainage Tabulation Sheets may be used, but only with Authority's Engineering Department approval. With the use of Drainage Tabulation Sheets, all drainage structures, flared end sections, headwalls, etc. are to be assigned structure numbers for cross-referencing the Drainage and Grading Plans and Drainage Tabulation Sheets.
13. Generally, if cross sections are not included in the contract plans, one-foot contours are to be shown for all pavement and slope areas. However, for relatively flat pavement areas, contours at 0.1, 0.2 or 0.5-foot intervals may be required to

adequately define the pavement surface. For uniformly graded slopes, only the 5-foot contours need be shown. One-foot contours are required in variable areas, flat areas and for meeting existing contours.

14. Muck Excavation, overload, sand drain, etc. limits shown with appropriate symbols and labeled.
15. Earthwork Summary on first Grading Plan if not shown on Key to Cross Sections sheet. For contracts with cross sections, Summary to be on Key to Cross Sections - See Key to Cross Sections description for Summary content.

In an effort to keep the pavements properly drained, the Authority prefers to provide a swale at pavement gore areas. This swale is graded to intercept sheet flow across the pavement gore areas, either ramp or mainline, and direct the water towards the physical nose. Inlets are installed at the physical nose to collect this water.

The following should be shown when pavement gores areas are included:

1. Spot elevations at 25-foot intervals for edges of thru pavement adjacent to gore areas.
2. Spot elevations and horizontal location of swale.

6.5.14. Drainage Tabulation Sheets

Drainage Tabulation Sheets are to be used only when the showing of inverts, pipe sizes and lengths, inlet types, etc. on the Drainage and Grading Plans would produce a cluttered and illegible sheet and then only with Authority's Engineering Department approval. If used, Drainage Tabulation Sheets are to be prepared for each Drainage and Grading Plan. The Tabulation is to show the following:

1. Title box.
2. Drainage structure number conforming to number shown on the Grading Plans.
3. Baseline station and offset.
4. Invert and top of grate elevations.
5. Type of structure i.e., Inlet Type D-1, Manhole Type M-1, etc.
6. Flared end sections with size and number of each.
7. Size, length and type of pipe between drainage structures.
8. A column for remarks.
9. The above are to be the column headings on the sheet, which will then allow the various entries to be tabulated in the appropriate columns.

10. The bottom line is to be headed “Sheet Totals” for totaling the various items of work. The final Tabulation sheet shall have a “Contract Totals” line for summarizing the item totals for the contract.

6.5.15. Soil Erosion and Sediment Control Plans

1. Title box.
2. North arrow with sheet arranged so that the north arrow generally faces toward the top and/or right side of the sheet.
3. Erosion control devices

6.5.16. Landscape Plans

For Landscape Plans format and content, see Design Manual Section “Landscaping".

6.5.17. Profiles

Profiles are required for all roadways and are required for major underground utility relocations. Profile coverage shall extend 500 feet beyond the contract limits.

1. Title box.
2. Existing ground shown in dashed line and labeled.
3. Proposed profile grade shown in solid line and labeled, e.g. “P.G.L. Ramp ST”. Gradients shown to nearest 0.01 percent with a + or - to indicate rising or falling grade with respect to direction of increasing stationing.
4. 50-foot horizontal and five-foot vertical scales. Show 100-foot stations and datum elevation.
5. At every 50 feet of stationing, show vertical risers to stop, at either existing ground or profile line, whichever is higher.
6. Give proposed pavement elevations to nearest 0.01 foot and existing pavement elevations to nearest 0.1 foot at 50-foot intervals. In transition areas, give all variable edge elevations. Elevations to be written parallel to vertical risers with proposed to the right and existing to the left.
7. Clearly label profile with roadway designation.
8. Show PVI, PVC, PVT, curve length, low/high points, e and K values
9. Show structure either on profile or graphically above PGL. If on profile show footings.
10. If applicable, show pay limits of muck excavation and approximate elevation of firm bottom. Show upper limit of muck excavation backfill.

11. Show all drainage and utilities greater than 36” in diameter crossing the profile line by graphical plot and identify utility and label size of pipe. Show major drainage parallel to roadway if critical.
12. Show station equations.
13. Across the top of the of the plan sheet, indicate the horizontal geometry as to whether the alignment is tangent, curved right, curved left, the PC, PCC and PT locations, and the curve radius.
14. Across the top of the plan sheet, indicate if the profile has a normal crown, or if it is superelevated right or left. Show the stations where superelevation transitions occur.

6.5.18. Signing and Striping Plans

For Signing and Striping Plans format and content, see Design Manual Section “Signing and Striping”.

6.5.19. Lighting Plans

For Lighting Plans format and content, see Design Manual Section “Lighting and Power Distribution Systems”.

6.5.20. ITS Plans

For ITS Plans format and content, see Design Manual Section “ITS and Communications Systems”.

6.5.21. Construction Details

The construction details are to cover any items of construction not covered in the Standard Drawings. The drawings may have several scales and the scale for a particular detail shall be chosen so that the work can be clearly shown. Details are to include the following:

1. Title box.
2. Clearly defined pay limits and the work covered in the pay item.
3. Type of materials to be used and their location.
4. Typical, plan, elevation and section details as required.
5. Designations conforming to pay items in the proposal.
6. Appropriate notes concerning details, methods of construction, and location.

6.5.22. Key to Cross Sections & Earthwork Summary

The purpose of the Key to Cross Section sheet(s) is to show where the cross sections were taken, what baselines were used and the location of cross section match lines. The following should be shown:

1. Title box.
2. Scale either 1"=100' or 1"=200'.
3. Existing and proposed roadways with right of way lines and roadway designations.
4. Baselines used for cross sections with stations labeled every 500 feet.
5. Location of individual Cross Section sheet limits shown.
6. Cross Section match lines clearly shown and labeled.
7. Legend for cross sections as follows:

C = Excavation ..... Sq. Ft.

F = Embankment ..... Sq. Ft.

SF = Stripping in Fill ..... Lin. Ft.

SC = Stripping in Cut ..... Lin. Ft.

CE = Channel Excavation ..... Sq. Ft.

ME = Unsuitable or muck excavation ..... Sq. Ft.

P = Porous Fill ..... Sq. Ft.

TS = Topsoil ..... Lin. Ft.

8. Earthwork Summary

On contracts involving earthwork, an Earthwork Summary is to be shown in the plans. For contracts with only Grading Plans, the Summary is to be shown on the first Grading Plan. For contracts with cross sections, the Summary shall be shown on the first Key to Cross Section sheet. The Summary shall contain at least the following:

Excavation

a. Roadway Excavation from cross sections and/or grading plans.
b. Deductions for stripping, pavement excavation, etc.
c. Additional quantities for topsoiling.
d. Show total volume Roadway Excavation Earth.
e. List other excavation quantities, such as channel excavation, muck excavation, rock excavation, etc.

Embankment

a. Embankment from cross sections and/or grading plans.

b. Deduct volumes for topsoil.

c. Add volumes for stripping, pavement excavation in fill areas, etc.

d. Show embankment required.

e. List other embankment quantities, such as Grade A, Grade B, porous fill, etc.

Summary

a. Show mathematical difference between the excavation and embankment.

b. Indicate whether the contract is a surplus or borrow job.

6.5.23. Cross Sections

Cross sections are to be included in the contract plans unless otherwise directed by the Authority’s Engineering Department. The format and data required for cross sections is to be as follows:

1. Title box.
2. Sheets to be same size as Plan Sheets with a 1” base grid and 10 divisions per inch. Sheets are to have the same border dimensions as the plan sheets.
3. The title and revision boxes are to be in the lower right-hand corner, with no grid in this area.
4. The horizontal and vertical scales are to be 1”=10’.
5. The title box is to give the roadway designation and station to station limits for the sections that appear on the individual sheets.
6. All earthwork from original ground to final grading or template lines.
7. All structures and retaining walls, including their footings.
8. At profile line, show existing and proposed elevations.
9. Limits of muck excavation and limits of Special Subgrade Material, Grade B backfill.
10. Limits of channel excavation for channels or ditches, which may be parallel to the roadway, but far enough removed from the normal roadway work area not to be considered as roadway excavation.
11. Separate sections for major drainage channels, which would not ordinarily be shown on Roadway Cross Sections.
12. Stripping limits for cut and fill conditions.
13. Continuous Cross Section baseline for each sheet, i.e. no offsets or jogs. Station for each section.

14. Section quantities tabulation, preferably on right side of sheet next to the section.

15. Section match lines indicated.

16. Cross sections are to be shown at 50-foot intervals.

6.5.24. Structural Plans

For Structural Plans and Details format and content, see Section 7 - Structures Plan Preparation of this Manual.

6.5.25. Standard Drawings

The Authority's Standard Drawings required for each contract will be furnished by the Authority's Engineering Department. Absolutely no changes or additions of any kind are to be made to the Standard Drawings.

Any New Jersey Department of Transportation Standard Drawings needed for a project must be both obtained and numbered by the Engineer.

Each Standard Drawing which is to be included in the plans will be given a number, and an individual original copy of each Standard Drawing will be included in each original set of contract drawings. The Standard Drawings will be numbered starting with the first number after the last construction contract drawing. They are to be listed alphabetically, according to Standard Drawing title, when arranged for assignment of sheet number.

In the margin directly under the Standard Drawing title box, space is provided to fill in the contract number, the individual sheet number and the total number of sheets in the contract. It will be the Engineer's responsibility to give the Authority's Engineering Department ample notification of which Standard Drawings will be required for each contract, so that the Authority's Engineering Department will have time to prepare original copies of the necessary drawings.

6.5.26. Reference Drawings

Reference Drawings are any sheets, which will aid the Contractor, whether they are from a previous contract, a concurrent contract or from a future contract. Absolutely no changes are to be made to any reference drawings.

Following the list of Standard Drawings, a separate listing is to be shown on the title sheet of Reference Drawings. These Reference Drawings will also receive a sheet number and become part of the contract. They will receive sheet numbers after the last Standard Drawing number has been assigned. All boring logs are to be included as Reference Drawings and are to appear in the contract at the very end of the "Reference Drawings". All reference drawings are to have the words "Reference Drawing" inked immediately adjacent to the title box with lettering to have a base height of equal to

0.35 feet. In the margin below the title box, the contract number, individual sheet number and total number of sheets in the contract are to be added.

If Reference Drawings are required from another contract prepared by the same Engineer, it will be their responsibility to furnish reproduced original copies of such drawings for all contracts to which they apply.

Should the Reference Drawings be from a contract prepared by another Engineer, the Authority's Engineering Department will furnish reproduced original copies of such drawings, provided the Engineer has advised the contract number(s) and sheet description(s) that are required. It will be the Engineer's responsibility to give the Authority's Engineering Department ample notification of which Reference Drawings will be required for each contract so that the Authority's Engineering Department will have time to prepare copies of such sheets.

Thus, there will be three basic divisions to any set of construction contract drawings. The first division will be the construction drawings prepared for the individual contract. The second division will include all of the Standard Drawings applicable to that particular contract, arranged in alphabetical sequence and given sheet numbers. The third division will include all Reference Drawings, including the boring logs. All of the sheets of the various divisions will be given sheet numbers in numerical order starting with Sheet No. 1 of the construction plans and ending with that number which constitutes the last of the Reference Drawings. There shall be a complete set of original or reproduced original drawings for each construction contract.

6.6. LOCAL ROAD SIGNING AND PAVEMENT MARKING

These drawings should apply only to signing and pavement marking for local roads, which are relocated, widened, extended or affected as part of an Authority contract and shall be included in the Contract Signing and Striping Plans. For signing and striping, see Design Manual Section "Signing and Striping".

1. Maintenance and Protection of Local Road Traffic:

Maintenance and protection of local road traffic shall be provided in accordance with the procedures set forth in the "Manual on Uniform Traffic Control Devices for Streets and Highways" (MUTCD) as published by the Federal Highway Administration. The details for this maintenance and protection of local road traffic need not be shown on the plans if the contract documents can refer to the MUTCD for the pertinent requirements. If not, then appropriate details shall be included in the plans. If necessary, state that Uniformed Police Directors will be required. The Supplementary Specifications shall describe the work required and a lump sum item shall be provided in the Proposal to cover the cost of this work.

2. Permanent Construction of Traffic Control Devices on Local Roads:

Where local roads are relocated and/or reconstructed, it will generally become necessary to replace the existing traffic control devices and perhaps install new devices, including pavement striping where applicable.

The New Jersey Department of Transportation, Bureau of Traffic Engineering, exercises significant control over signing and pavement marking on both county and local roads; that intersect or are operationally influenced by a State highway; and related items installed under Authority contracts will require Department approval. Such Department approval, together with their subsequent inspection after installation, legalizes the signing and pavement marking. This legalization is essential for the protection of the Authority. For traffic control devices on a local road that impacts State highways, procedures pursuant to the provisions of N.J.A.C.16:27-4.2(c) shall be followed.

For each instance involving local road traffic control devices, the Engineer is to contact the municipal and county engineers to determine who is responsible for such installations and who submits them for approval by the Department. In most cases, it will be found that local municipality and/or county resolutions are a necessary part of the submittal.

Submittals to the Department for approval are always made by either the municipality or county.

Following the Engineer's design of the traffic control devices, the layouts are to be submitted to the local agency having jurisdiction for review and comments. The agency should be asked at that time about the legal status of all existing traffic control devices, which are proposed for replacement. If it cannot be absolutely determined that an existing device has been previously legalized by the Department, it is to be assumed that it is not legal, and that traffic control device shall be included with those being submitted to the Department for approval. In some cases, it may be more convenient to seek approval of all traffic control devices for a particular area, whether previously approved or not, especially if they are all shown on the same layout. Under no circumstances can existing illegal traffic control devices be reinstalled by the Authority's Engineering Department without prior approval by the Department.

Care should be taken during design to avoid including control devices which are not needed, and which would not ordinarily be installed by a local agency, since approval of all devices involves a perpetual responsibility for maintenance of these facilities, including regular repainting of pavement markings.

Every effort should be made to combine as many traffic control installations within a common jurisdiction agency as possible in order to minimize the required number of resolutions and submittals to the Department.

After the local agency has agreed to the proposed layout, the Engineer is responsible for assisting the local agency in the preparation of the submittal wherever possible by providing necessary plans, reports, etc.

Department approval and an adopted resolution must be obtained before the Authority can finalize the contract.

Section 7 - STRUCTURES PLAN PREPARATION

7.1. GENERAL

The following are guidelines for the preparation of contract plans for new construction and major reconstruction of bridges and other structures (not including sign bridges). These instructions are intended to insure that uniform level of engineering (design) information is presented and arranged in a consistent format. Plans will be reviewed by the Authority's Engineering Department at various interim stages of completion as discussed below.

7.2. BRIDGE IDENTIFICATION

Structure Numbers for bridges, sign structures, and culverts shall be assigned by the Authority's Engineering Department to the Engineer.

7.3. CONTENT AND FORMAT

Plans shall contain all essential and other required data presented in a manner consistent with good engineering practice. The amount of detail included shall be that necessary and sufficient to allow a bidder to quickly and properly assess and evaluate the work to be done and the Contractor to interpret the Plans with facility and correctly prepare shop details and/or construct each structural component. Specifications require the Contractor to prepare and submit complete shop details of reinforcement bars and structural steelwork for review before proceeding with fabrication. Other working drawings are required from the Contractor for temporary constructions and facilities, which are his responsibility to design (jacking operations, cofferdams, bracing for excavations, forms, etc.) and submit for review. As these drawings and designs will be based on information presented in the Plans, incomplete or vague details will only hinder progress by requiring a multitude of submittals.

The typical arrangement of drawings comprising the set of structural plans within a Contract which may or may not include related roadway design is given below along with a description of information to be furnished (but not necessarily limited to) on each.

7.3.1. Key Plan to Structures

A key plan is required upon which each structure site is identified within the Section limits. Ordinarily drawn to a scale of 1"=200', this plan is similar to the Plan Reference drawing given in roadway design plans. Information shown shall include all existing and new construction, stationing at intervals of 500 feet, and grid references. If space permits, the index of drawings for all included structures should be given on this sheet.

7.3.2. General Plan and Elevation

This drawing should be prepared using the approved Preliminary Design Plan as a base. (See Sample Plans) The scale shall preferably be not less than 1"=16', but in no case less than 1"=30'. Where applicable, the following data is to be furnished:

1. Computed stations of abutment bearing lines and pier centerlines; other mathematics and stations to define the computed geometry of roadways in the area of the bridge.
2. Vertical alignment of the supported roadway covering the length of the bridge; profiles of transitioning edges are to be included.
3. Location and dimension of minimum clearances.
4. Existing and proposed ground lines (in elevation).
5. Toes and tops of embankment slopes (in plan).
6. Bottom of footing and berm elevations.
7. Location of proposed and future (by other contracts) electrical and lighting facilities.
8. Proposed bridge and adjacent roadway drainage facilities.
9. Bearing types (General types; specific types are to be shown on Framing Plans).
10. Approach slab limits.
11. Temporary facilities, such as sheeting, and detour structures, which are required and are therefore pay items.
12. Permanent sheeting limits.
13. Pertinent existing planimetric features including the location of underground facilities and utilities, and proposed and future improvements, all of which may have affected the planning and location of the structure.
14. Existing and proposed utilities identified as to type and size.
15. Boring locations identified and shown on the plan by symbols and numbers.
16. Deck joint types and sizes.
17. General Notes.
18. Table of Estimated Quantities.

If nowhere else provided for in the Plans, an index of drawings should be included on the sheet.

7.3.3. Substructure Details

Typically, these plans are arranged as follows:

1. Plans and Elevations of Abutments
2. Special views and sections of abutments
3. Plans and Elevations of Piers
4. Special views and sections of Piers

Since bar lists are not given, it is generally sufficient to show bar patterns in elevation views and shapes in sectional views. However, special supplementary sections are often necessary to clearly indicate bar shape and placement in corners and other obscure areas. These views are required when detailing abutments. Dimensions for positioning bars beneath bearing areas are to be given in the plans to avoid conflicts with anchor bolt placement.

Where necessary, bearing pedestal reinforcement details must be shown.

Plan and Elevation views should generally be drawn to a 1/4-inch scale; preferably, the scale should not be less than 3/16 inch. The scale of sectional views shall be large enough to show a scaled representation of bar placement and shape. These views are commonly drawn to 1/2 inch or 3/4-inch scale.

7.3.4. Superstructure Details

Generally, these plans are arranged as follows:

1. Framing Plans and Stringer (Girder) Details
2. Cross Sections
3. Miscellaneous Details, as required

No hard and fast rule can be set for determining the amount of information, which can be presented on any one sheet, since this depends somewhat on the complexity of the structure's framing.

The required information to be grouped on or near the drawing containing the Framing Plan includes:

1. Stringer (Girder) Elevations and Schedules
2. Camber Diagrams and Tabulations
3. Shear Stud Spacing Tabulation
4. Stiffener Details
5. Splice (Shop and Field) Details

Fabrication and Erection Notes: As a minimum for steel bridges, the following are to be included:

1. Welding shall conform to current AASHTO / AWS D1.5 with NJTA Amendments (where appropriate, the note shall be expanded to include the AASHTO / AWS D1.5 Section regarding Fracture Critical Members).
2. Joint designations given in the Plans conform to current AASHTO / AWS D1.5 Code
3. Welding and NDT symbols conform with AWS A2.4-.79.

4. All material identified on the Plans with the notation (T) are Main Load Carrying Member Components Subject to Tensile stress.

Cross section drawings include size and placement of deck reinforcement. Information to be grouped on or near this sheet should include:

1. Partial plan views showing placement of special reinforcement in acute corners of skewed deck slabs.
2. Details relating to the use of permanent steel bridge deck forms.
3. Diaphragm details
4. Lateral bracing details

Miscellaneous Detail sheets include details for non-standard deck and expansion joints, special bearings and drainage.

The scale of framing plans should generally be not less than 1"=20'; however, very simple, square framing may be shown clearly at a scale of 1"=30'. Cross section scales should be either 3/8 inch or 1/2 inch. The scale of detail views will depend on the actual size of the detail and the degrees that the view would be cluttered by dimensions, material notes, welding symbols, etc.

7.3.5. Retaining Walls and Noisewalls

7.3.5.1. Retaining Walls and Noisewalls

For contracts with long walls or many walls, design information may be conveniently presented in a panel-by-panel tabulation. Panels should be identified numerically on the General Plan and Elevation and referred to in the tabulation. Similarly, various types of wall sections, reinforcement patterns, pile plans, etc. should be detailed once and identified for use in the tabulation. The tabulation also indicates footing dimensions for each panel, panel end point elevations and footing elevations.

Details such as the placement and arrangement of non-stress reinforcement on wall stems, key construction, porous fill placement, and joint construction are common to all panels and would be presented once in a contract set of plans.

7.3.5.2. Alternate Walls

Alternate walls are defined as walls, often proprietary, such as Mechanically Stabilized Earth Walls (MSE) and Prefabricated Modular Walls (PM), other than conventional walls (cantilever, gravity, piling and crib walls), deemed appropriate for construction at a given site and bid competitively.

Engineers shall consider the use of proprietary retaining wall systems at select project locations. Proprietary retaining wall systems, Mechanically Stabilized Earth Walls (MSE) and Prefabricated Modular Walls, are generally considered to be more cost effective

and provide a reduced time for construction than standard cast-in-place reinforced concrete cantilever retaining wall system.

Alternate walls shall be presented in the Common Structure Volume (CSV) format. Common Structure Volume is defined in the NJTA Design Manual. Designers shall consult with suppliers of wall systems listed in the NJTA Qualified Products List (QPL), develop the CSV to encompass all proprietary alternate wall systems applicable to each site and list applicable wall systems in the contract specifications. Only wall systems participating in design consultation may be included in the contract specifications.

Develop the General Plan and Elevation to include the CSV, right of way, utilities, noise walls, lighting, drainage, staged construction, and other pertinent information. Elevations should show original and final ground lines, minimum foundation elevations and mean high and low water, where appropriate. Cross sections should show limits of CSV, wall batters, pay limits and all pertinent information.

Magnitudes, locations and directions of external loads due to bridges, overhead signs and lighting, noise walls, traffic and other surcharges should be shown on the plans.

Architectural requirements should be identified.

7.3.6. Culverts

Because of their limited plan area, culvert General Plans should be drawn to as large a scale as may be practical, preferably 1/8”=1’; scale shall not be less than 1”=20’.

7.3.7. Standard Drawings

The Standard Drawings required for each contract will be furnished by the Authority. Absolutely no changes or additions of any kind are to be made to the Standard Drawings.

Each Standard Drawing which is to be included in the plans will be given a number, and an individual original copy of each Standard Drawing will be included in each original set of contract drawings. The Standard Drawings will be numbered starting with the first number after the last construction contract drawing. They are to be listed alphabetically, according to Standard Drawing title, when arranged for assignment of sheet number.

In the margin directly under the Standard Drawing title box, space is provided to fill in the contract number, the individual sheet number and the total number of sheets in the contract. It will be the Engineer’s responsibility to give the Authority’s Engineering Department ample notification of which Standard Drawings will be required for each contract, so that the Authority’s Engineering Department will have time to prepare original copies of the necessary drawings.

Details or dimensions, which are exceptions to the Standard Drawings, are to be shown on the Plans of the particular structure.

7.3.8. Reference Drawings

Reference Drawings are any sheets, which will aid the Contractor, whether they are from a previous contract, a concurrent contract or from a future contract. Absolutely no changes are to be made to any reference drawings.

Following the list of Standard Drawings, a separate listing is to be shown on the title sheet as Reference Drawings. These Reference Drawings will also receive a sheet number and become part of the contract. They will receive sheet numbers after the last Standard Drawing number has been assigned. All boring logs are to be included as Reference Drawings and are to appear in the contract at the end of the "Reference Drawings" division. All reference drawings are to have the words "Reference Drawing" inked immediately adjacent to the title box with lettering to have a base height of equal to 0.35 feet. In the margin below the title box, the contract number, individual sheet number and total number of sheets in the contract are to be added.

If Reference Drawings are required from another contract prepared by the same Engineer, it will be their responsibility to furnish reproduced original copies of such drawings for all contracts to which they apply.

Should the Reference Drawings be from a contract prepared by another Engineer, the Authority's Engineering Department will furnish reproduced original copies of such drawings, provided the Engineer has advised the contract number(s) and sheet description(s) that are required. It will be the Engineer's responsibility to give the Authority's Engineering Department ample notification of which Reference Drawings will be required for each contract so that the Authority's Engineering Department will have time to prepare copies of such sheets.

Thus, there will be three basic divisions to any set of construction contract drawings. The first division will be the construction drawings prepared for the individual contract. The second division will include all of the Standard Drawings applicable to that particular contract, arranged in alphabetical sequence and given sheet numbers. The third division will include all Reference Drawings, including the boring logs. All of the sheets of the various divisions will be given sheet numbers in numerical order starting with Sheet No. 1 of the construction plans and ending with that number which constitutes the last of the Reference Drawings. There shall be a complete set of original or reproduced original drawings for each construction contract.

On contracts involving the construction of structures only, at least one 30-scale roadway plan should be included as a reference drawing, showing at least 500 feet beyond the structure. As a minimum, this could be the planimetric base for the area.

7.4. DETAILING PRACTICE

7.4.1. Superstructure Details

7.4.1.1. Welded Joint Design and Detailing

Welded joint design detailing shall comply with the latest edition of the AASHTO/AWS D1.5 Bridge Welding Code. Information provided on contract plans shall conform to Subsection 2.1 of the same text. Finish grinding, where required, shall be shown on the welding symbol in the contract plans. Contract plans shall show PJP or CJP requirements for all groove welds. It is not necessary for the contract plans to detail the specific joint designation for the welding procedure, however, the specific joint designation is required for all welding symbols placed on working or shop drawings.

Fracture Critical Members shall be designated as "FCM" on the contract plans in accordance with Section 12 of the latest AASHTO/AWS D1.5 code. Specific reference is made within this section for the definition of fracture critical member and guidelines related to member identification. A note shall be added to the structural steel plans that fracture critical members and/or member components shall be subject to the provisions of the current Edition of the AASHTO/AWS D1.5 Bridge Welding Code, Section 12.

7.4.1.2. Splices

Permissible locations of field and shop splices should be given on the Framing Plan or Stringer Elevations. Splices should be fully detailed.

7.4.1.3. Cambers

For simple spans cambers are to be given at stringer half or quarter points; a closer interval may be warranted for continuous spans. In order to provide information for the correct setting of forms and reinforcement, the individual cambers comprising the total value shall be given (i.e., camber for deflection due to steel dead load, camber for deflection due to concrete dead load, camber required for vertical curve). Ordinarily, stringers shall not be cambered for sag vertical curves; the slab haunch shall be varied, and the stringer flange maintained on a vertical tangent, under full dead loads.

7.4.1.4. Temperature

All details affected by thermal movements shall be designed for a reference temperature of 68°F. Temperature ranges for design are given elsewhere.

7.4.1.5. Clearances

Unless a greater distance is required by consideration of expansion and live load movements, the ends of fascia stringers should be no more than 2 inches apart at piers

and within 2 inches of backwalls at abutments. It is customary to detail stringers so that ends will be vertical under full dead load.

7.4.1.6. Deck Joints

Transverse deck joints on new bridges and bridge deck rehabilitation projects shall typically consist of preformed elastomeric strip sealer compression seals. Strip seal joint systems are preferred. Construction details are shown on Standard Drawing No. BR-13 and BR-14.

If compression seals are utilized, a 4-inches wide x 4.75 inches deep compression joint sealer shall be placed in all joints.

During the design of the deck joints for curved or complex bridges, engineers shall consult with deck joint manufacturers for recommendations.

For combinations of span and skew outside the range of applicability of the compression seal or a strip seal, a modular system of multiple elastic sealers shall be used. Special details must be included in the Plans for these joint systems.

Systems using a bolted anchorage are not to be used on bridges carrying Authority traffic.

Open deck joints and tooth-type expansion dams are to be avoided wherever possible and should only be considered after sealed systems capable of large movements have been determined to be unsuitable or considerably more costly. In such economy comparisons, the cost of drainage facilities necessary to carry runoff from the deck surface away from the bridge substructure and into the roadway drainage network must be included.

The type and size of each joint proposed for use shall be indicated on the Preliminary Design Plan. Preliminary review will judge suitability of the recommended joint type.

7.4.1.7. Bridge Drainage

Storm sewer inlet details, shown on Standard Drawing BR-2A and 2B shall be typically utilized. For bridge projects where these details cannot be utilized due to superstructure type or other conflicts, the required modifications and / or additional details shall be shown on the Contract Plans.

7.4.2. Substructure Details

7.4.2.1. Joints

Typical details for construction, contraction and expansion joints are illustrated on the Exhibits in Design Manual Section “Structures Design”.

7.4.2.2. Bearing Surfaces

Tops of piers and abutments shall be sloped along their length in order to minimize the height of concrete bearing pads. When the height exceeds 4 inches, pads shall be reinforced. Bridge seats shall be sloped transversely, and pier tops crowned to provide for runoff. Substructure waterproofing membrane shall be applied to the tops of piers and bridge seats, including all sides of pads. The membrane shall not be required on piers when the deck is continuous (no deck joints).

7.4.2.3. Dampproofing

The rear face of all earth retaining structures shall be dampproofed from the top of footing to ground level.

7.4.3. Miscellaneous Details

7.4.3.1. Underbridge Slope Protection

For overcrossing of the Turnpike or Parkway roadways, underbridge slope protection consists of concrete slope protection or stone slope protection. Construction details are shown in Standard Drawings BR-5 and BR-8. Where the New Jersey Turnpike or Garden State Parkway roadway section approaching the crossing is in cut, the slope normal to the abutment face shall be 2:1, otherwise a slope of 1.5:1 shall be used to determine the structure length and abutment heights.

Where the Turnpike or Parkway crosses local roads or State highways, the type of underbridge slope protection will be specified by the agency having jurisdiction. Usually, a concrete pavement slope protection will be required for these locations, and details will be those of, or approved by, that agency.

7.4.3.2. Drainage Behind Walls and Abutments

Earth retained by walls and abutments shall be drained by the use of porous fill, perforated corrugated metal pipe underdrains, and in some cases, weepholes. Generally, underdrains should connect or discharge into the roadway drainage system.

7.4.3.3. Utility Supports

Utilities shall be supported by steelwork which frames into main members. Supports, which rely on deck inserts or drilled in expansion anchors, shall not be used.

7.4.4. General

Idealized views should be avoided. Few members in a structure are ever framed normally or have surfaces horizontal in all directions. Sectional views should point up variations; dimensions of a member should not be given in other than true views.

Standard Drawings have been developed which detail several often-used items. From time to time, these drawings will be amended, voided or added to. Their use will provide economy in detailing; however, total reliance on them to describe all conditions where the item may be applied may be misleading. Often, severe skews or steep grades may require that supplementary details be shown in order to clearly define connections, framing, and member shape. In developing these details, the designer may be alerted to potential problems, which might otherwise be overlooked.

7.5. REVIEW SUBMISSION FOR NEW BRIDGE CONSTRUCTION AND MAJOR BRIDGE RECONSTRUCTION

7.5.1. Structure Sketches (Phase A)

For Contracts with bridge and retaining wall structures, 8½" x 11" structure/wall sketches shall be submitted for review and approval as soon as the necessary information is available and prior to the Phase A submission. These sketches shall include information on the structure cross-sections showing lane widths, shoulder widths, cross-slopes (if known), CSV, etc. A sketch with all pertinent vertical and lateral clearance parameters shall also be shown.

7.5.2. Preliminary Design Plan and Report (Pre-Phase B)

A preliminary design plan shall be submitted for each new structure and wall within the construction contract. At this stage, the proposed structural support system (span arrangement, superstructure and substructure type, wall type and configuration, foundation design) is submitted for review. The approved preliminary plan forms the basis for final design and plan preparation. A brief report summarizing the designer's studies of alternate structure and wall types with corresponding cost estimates shall be presented at the time the preliminary design plan is submitted for review. The report shall present documentation in support of the designer's recommendation, including consultations with vendors regarding proprietary walls, as presented in the preliminary plan.

The submission shall not be made before geotechnical information is available (i.e. borings have been taken and logs analyzed) to assess the influence of foundation conditions on structure arrangement, type selection, backfill requirements, etc. Preliminary plans will not be accepted for review without accompanying soils data and formulated recommendations for foundation types (Foundation Recommendation Report). SFGER shall be included in Pre-Phase B Submission.

It is expected that for certain types of bridges and walls, namely, long viaducts and complex flyover bridges and proprietary walls, there will be discussions and reviews between the Authority and the designer and the designer and wall vendors during the preparation of the preliminary plan.

It is intended that the approved preliminary design plan and elevation, with minor alteration, serve as the final General Plan and Elevation drawing. The preliminary design plan and elevation shall also include the following information:

1. A typical section view illustrating the superstructure cross section and the form of the substructure (deck details, girder depth, spacing, etc.)/wall cross section and the limits of select backfill, retained backfill, common structure volume and wall appurtenances such as drainage, attachments, etc.
2. Design Notes
3. Seismic Design Criteria.
4. Foundation Design Criteria, (allowable soil bearing pressures, ultimate loads on pile or drilled shaft foundations) along with estimated bottom of footing elevations and/or minimum and estimated pile tip or drilled shaft elevations.
5. Computed minimum horizontal and vertical clearances at critical points.
6. Existing and proposed ground lines (in elevation).
7. Permanent sheeting limits.
8. Available information regarding existing features or proposed improvements, such as underground facilities and utilities, which may have affected the planning and location of the structure.
9. A preliminary cost estimate arrived at by applying estimated current unit prices to approximate quantities of major items, with allowances for items not measured and contingencies.

The Preliminary Design Plan and Report shall be submitted at least four (4) weeks prior to the Phase B submission deadline as part of the pre-Phase B Submission, unless otherwise noted, to allow appropriate time to review and include all necessary changes in the Phase B submission. Phase B submission will not be accepted for review prior to the approval of the preliminary design plan for all bridges and walls in the construction contract.

7.5.3. Phase B Submission

The Phase B submission would be made at that point when the plans have reached a stage of approximately 70 percent completion. When the entire Contract includes roadway construction, this submission is to be coincident with the Phase B submission of the roadway plans.

Primarily, the Phase B plans will be reviewed for presentation of information, drafting technique, and the overall development into final plans of the approved preliminary plan submission. At this time, computed geometry should be available, the General Plan and Elevation Drawing completed and partial details of most other sheets comprising

the set of plans for each structure available for an interim stage review. Details, to the extent that they have been completed, will be scrutinized and where appropriate, commented on. Final quantities are not required.

Where standard fully bonded elastomeric or approved HLMR type bearings are not selected for use on a bridge structure in lieu of a different bearing of unapproved type or manufacture, the designer shall submit a Non-Standard Bearing Report which explains the designer's rationale used for selecting the bearing based on performance and cost criteria. This document need not be longer than absolutely required to justify the designer's selection and shall include a sketch or catalog cut of the selected bearing. Elastomeric bearings with sliding surfaces, while permitted in Authority Specifications and Standard Drawings, shall also be justified in the Non-Standard Bearing Report.

Any questionable detail, revision of which would involve considerable reworking at a later date, should be submitted at this time for consideration.

7.5.4. Phase C Submission

Plans for the entire Contract, at the time of the Phase C submission, are to be complete in every respect to the extent that, barring comments arising from a final review; they could be used to advertise the work without further alternation. To be considered as a Phase C submission, final Specifications must accompany the Plans.

7.5.5. Submission Requirements

Requirements relating to data transmission for each review phase are enumerated in Section 3 - Submission Requirements of this Manual.

7.6. REVIEW SUBMISSION FOR BRIDGE REPAIR CONTRACTS

The Authority has four (4) separate plan submissions based upon the amount of design and plan preparation completed. Generally, for repair contracts, the scope of work in the OPS sets the limit of work as to the allowed construction costs and grouping of structures to be repaired. The Phase A submission for Bridge Repair Contracts shall be comprised of a report that includes the following at a minimum:

- Executive Summary of Contract (OPS) Bridges
- Bridge Condition Rating
- Repair Recommendations
- Estimated Construction Cost Estimates
- Summary of Field Conditions
- Bridge Priority Lists

7.6.1. Phase B Submission

The Phase B submission is made at the point when the plans and specifications have reached a stage of approximately 70% completion. The general plan of every affected structure shall be completed and major items of work (deck replacement areas, etc.) indicated.

Primarily, the Phase B plans will be reviewed for presentation of information, drafting technique, and the overall development into final plans of the approved preliminary plan submission. At this time, the General Plan Drawing is completed, and partial details of other sheets are available for an interim stage review. Details, to the extent that they have been completed, will be scrutinized and where appropriate, commented on.

Any questionable detail, revision of which would involve considerable reworking at a later date, should be submitted at this time for consideration.

A rough cost estimate shall be submitted at this time using major items of work with a contingency for the minor items of work. This estimate should be compared with the construction budget for the Contract.

7.6.2. Phase C Submission

Plans for the entire Contract, at the time of the Phase C submission, are to be completed in every respect to the extent that, barring comments arising from a final review, they could be used to advertise the work without further alteration. To be considered as a Phase C submission, final Specifications must accompany the Plans.

A detailed cost estimate shall be submitted at this time for review.

7.6.3. Phase D Submission

Phase D submission consists of the submission of the final Mylar plan sheets and the Specifications for the Contract.

When directed by the Authority, sets of the final Contract Documents shall be submitted to various agencies affected by the Contract.

The Engineer's Estimate shall be prepared and submitted at this time as detailed in the "CapEx & Specifications Design Guidelines."

The number of plans and specifications to be submitted to the Authority For the various submissions shall be per Section 3 - Submission Requirements of this Manual.

7.7. REVIEW SUBMISSION FOR ARCHITECTURE / BUILDINGS

In general, architectural work shall conform to the American Institute of Architects (AIA) Handbook of Professional Practice.

7.7.1. Plan Preparation

It is critical that Phase A (30% Design) provide programming, schematic design and design development documentation. Phase A shall be broken down into two (2) parts.

7.7.1.1. Phase A

Part 1 - Programming and Schematic Design (15% Design)

The written program documents the Authority's requirements for the project. It also facilitates a mutual understanding between the Authority and the project team regarding the scope and limitations of services to be provided. Programming and schematic design should be presented with sufficient information to allow a reviewer full understanding of the main design concepts and orientation. Schematic design studies are prepared to define the concepts to be developed in detail in later design phases. Drawings or sketches are most commonly used to describe the design along with narratives describing the project. Renderings, models, and photographs may also be used to augment drawings and narratives. Systems concepts (usually written descriptions of structural, mechanical, electrical, environmental, equipment requirements, etc., should be presented in sufficient detail to facilitate an understanding by the Authority and other team members of concepts being proposed. During this phase, the Architect shall prepare a written design criteria document and review all applicable codes.

Part 2 – Design Development (30% Design)

The purpose of the design development phase is to refine concepts developed during the schematic phase. The objectives are to establish compatibility of all project components so that final contract documents may be developed efficiently with minimal changes. The Architect shall integrate design requirements from the work of all consultants, complete review of aesthetic impact of each element or system within project, establish, and conform to design priorities according to project construction budget.

7.7.1.2. Phase B, C and D – Construction Documents (60%, 90% and 100% Design)

The construction documents phase includes the preparation of final contract drawings necessary to advertise for bids and construct the project. Preparation of final documents should evolve smoothly when the design development phase has been effectively developed. The construction documents should convey precise and clear information in a concise way, using standard format and presentation for all disciplines. Each discipline prepares separate sheets, placing an index on the coversheet or the second sheet in the set.

All consultants are to produce their plans following the same format, scale and drawing position as the architectural drawings. Consultants work should be coordinated with the Architect's work.

7.7.2. Specifications Preparation

Specifications for buildings shall follow the AIA Masterspec format for both general conditions and technical specification sections. Typically, building specific general conditions that are not covered by the Authority's Standard Specifications shall be included in the project-specific Supplementary Specifications, included but not limited to items such as Shop Drawing and Sample submittal requirements.

Section 8 - UTILITY INSTALLATIONS, RELOCATIONS AND ADJUSTMENTS

8.1. INTRODUCTION

Established herein are the general guidelines of the Authority's policy and procedures to be followed when the relocation of existing utilities is required due to Authority construction projects.

Utilities are defined as all public, private and Authority owned facilities constructed for the purpose of conveying, transporting (by other than vehicular means) or transmitting passengers, energy, wastes, products or communications between the source or origin and the point of purchase, receipt, discharge or destination. These utilities include railroads, facilities for water, gas, electric, telephone, cable communications, and fire alarm services, and facilities for sanitary sewage, storm drainage (other than Authority owned) and industrial product transmission. Specifically excluded from this definition of utilities are Authority lighting circuits beyond the load center, utilities inside an Authority's building lines, and E-ZPass Fiber Optic Communications facilities in toll lanes and between toll lanes and the associated toll plaza utility building.

8.2. UTILITY ORIENTATION AND CONSTRUCTION POLICY

8.2.1. Utility Alignment

Utility facilities, underground or overhead, within the Authority's right of way, other than those owned, operated or used by the Authority will not be allowed to be oriented parallel or diagonal to the Authority's right of way without the advance approval of the Authority's Engineering Department.

Right-angle utility crossings of the Authority's right of way will normally be considered by the Authority when the services offered by the utility cannot be provided by economically feasible alternate means.

In accordance with the provisions of the Authority's hurricane preparedness plan, consideration must be given to the elimination of aerial facilities crossing over Authority roadways and ramps to preserve the integrity of roadway operations. The Authority's first preference for relocation of existing aerial crossings is to relocate the utility underground. If that is not feasible, aerial crossings may be relocated within underdeck conduits on bridges carrying local roads over Authority roads with Authority approval. If neither underground or underdeck installation is feasible, aerial crossings shall be supported on structures consisting of steel construction located outside of the Authority's right of way. Aerial crossings of Authority roadways shall be located as far away from overhead structures (local roadway bridges, sign structures, etc.) as feasible to avoid potential conflict with future reconstruction. The use of non-steel supports for aerial crossings will be considered for approval by the Authority on a case by case basis. If and when it is necessary to reduce span lengths across excessively wide sections of

roadway, the use of additional supports within the Authority's right of way will also be considered on a case by case basis. The utility owner shall be responsible for substantiating non-compliance with the above relocation preferences, to the Authority's satisfaction, in all cases to be considered for approval.

OSHA and High Proximity Act regulations and One-Call requirements shall be met.

High voltage transmission crossings shall provide minimum vertical clearance as per the requirements of the individual utility owner, but in no case is the vertical clearance to be less than 30 feet over roadways and shoulders. Minimum clearances (both vertical and lateral) for communication lines and overhead power lines of any voltage shall in no case be less than the standards prescribed by the National Electric Safety Code (NESC). The Engineer shall provide the Authority with documentation for the clearance and the concurrence of the utility owner in each case. Structures carrying Authority roadways over or under Authority ramps shall not be used to support utilities, other than those required for Authority purposes.

Pipelines conveying gas at greater than 60 psi design pressure will not be permitted to cross over Authority roadways. Pipelines conveying gas at design pressure of 60 psi or less will be permitted to cross over Authority roadways provided they are sleeved within a casing pipe. No pipes carrying liquids ("wet lines"), other than bridge drainage piping, will be allowed in or on structures over Authority roadways. All underground pipelines operating under pressure shall be cased or otherwise protected under Authority roadways and ramps. On a case by case basis, the Authority may waive the casing pipe requirements under roadways and ramps as noted in Exhibit 8-1.

Conduits with power or communications lines crossing under or bridging over Authority roadways typically do not require casing. On a case by case basis, the Authority may require casing or other protection of these conduit installations. All underground casings shall be installed in accordance with the provisions of Exhibit 8-1.

Existing utilities will be permitted to be relocated onto a new structure over Authority roadways if the existing structure carrying the utilities is to be removed / replaced. New utilities will be permitted to be carried by structures carrying local roads over Authority roadways only if the utility company has determined to the Authority's satisfaction and approval that installing the utilities underground is not feasible.

Gravity flow pipelines need not be cased under Authority roadways, provided that no erosive, corrosive or caustic conditions or stability problems exist which would predictably limit the life of the pipe. Under doubtful circumstances, such pipelines should be sleeved within a casing pipe or concrete encased, whichever is more economical and appropriate. Future enlargement of the cased gravity flow pipeline should be considered when determining the size of the casing pipe.

Casings are not required for pipelines of any type passing under paved public parking lots at Authority service areas, toll buildings, and maintenance facilities.

All utility crossings shall be arranged such that required points of access, such as manholes and poles, are outside the Authority's right of way. This policy may be modified with specific Authority approval where unusual conditions make such arrangements unrealistic.

Criteria for railroad and other such major utility alignments shall be established for each specific case by the Authority's Engineering Department, except for clearances and other geometric requirements which are set forth under Design Manual Sections for "Geometric Design".

8.2.2. Construction Methods

When an Authority construction project requires relocation of an existing utility crossing, the Authority's preference is to construct the necessary relocation as a part of the roadway contract. For utility owners that agree to this arrangement, the Authority's Engineer shall prepare the necessary plans and specifications for the work, in cooperation with the utility company, and incorporate the work in the principal contract. Specific written approval of the plans and specifications is required from the utility owner, prior to advertising. If the utility owner insists on performing the required utility relocation work themselves, the utility owner's plans are to be included in the Authority's contract documents as reference material for work "by others".

With the Authority's Engineering Department approval, the utility company may furnish all or part of the necessary construction materials for the utility relocation to be installed by the Authority's contractor (or subcontractor approved by the utility owner, as required by the owner). This is provided that such procedure will significantly expedite construction and/or result in cost savings and that the utility company shall ensure timely delivery. In such cases, the Engineer shall include a list and delivery schedule of the materials to be supplied in the contract documents as well as in the Utility Check List. The contract documents and the Utility Check List shall also indicate that it is the utility owner's responsibility to review and approve the contractor's material submissions as needed.

The Authority may consider authorizing the utility owner to order materials in advance of the formal execution of the Utility Order when Authority construction schedules and potential materials delivery delays make it mandatory to do so. No such orders shall be placed without specific written authorization by the Authority's Engineering Department.

The Engineer and the utility owner shall design for construction sequencing and maintenance and protection of traffic as necessary.

8.2.3. Materials

Casing pipe material and size shall conform to the requirements of Exhibit 8-1 for the applicable installation method used.

When steel pipe casings are used, sacrificial anodes and a corrosion-resistant coating will be required, if resistivity readings indicate. Sacrificial anodes shall be installed with accessible test leads to allow periodic voltage readings to be made which will determine when anodes require replacement. The Utility Order shall include a clause under which the utility owner agrees to replace degenerated anodes as a requirement of their routine maintenance procedure.

Pipeline casing diameters shall be chosen to accommodate the carrier pipe and standoffs as well as any potential future expansion of the carrier pipe in accordance with Exhibit 8-1.

Casings, pipelines or ducts installed in open cut within the Authority's right of way shall be constructed using excavation and backfilling methods conforming to Authority specification requirements for underground pipelines.

Buried Carrier Pipelines shall be steel, ductile iron, concrete pipe, or high-density polyethylene (HDPE) at the utility owner's option and after due consideration of the chemical characteristics of the soil at each site. The Authority's Engineering Department concurrence with the pipe material selected is required.

Carrier pipelines on structures shall be steel pipe. All supporting hangers and pipe shall conform to the Authority's Standard Specifications (or to utility company's standard practices, whichever is more stringent). All such pipelines shall be located to the interior of fascia stringers and shall not hang below the bottom flanges of stringers or girders, preferably 6 inches above the bottom flange for future catch systems. Utility supports shall generally be attached to the superstructure steel.

Utility owners normally require steel pipelines on structures to be paint-coated. Along the Turnpike, the Authority requires such pipelines to be fabricated from ASTM A-588 steel and be unpainted or coated in a permanent and maintenance-free manner. However, utility owner policy has not, in the past, permitted this alternative. On structures with ASTM A-588 (unpainted steel) superstructures, such pipelines may be the only painted items. Accordingly, the Engineer shall anticipate this condition when such work is included in Authority contracts. All pipeline painting shall be performed off the structure and before installation, except touch-up at the joints. Along the Garden State Parkway, painting of steel pipelines on structures shall conform to the current painting specifications.

Electric and telephone duct and cable installations shall generally conform to the respective utility company's practice with regard to materials and structural design (latest company standards should be checked). This design shall be modified for adequacy and form. Utility company owned underground ducts within the Authority's right of way may require concrete encasement or casing pipe, if requested by either the Authority or the utility owner on a case by case basis.

Authority owned communications, telephone and electrical ducts and cable shall conform to materials and construction requirements established under Design Manual Sections "Lighting and Power Distribution Systems" and "ITS and Communications Systems".

8.2.4. Easements and Access

If Authority improvements require relocation of utilities outside of existing right of way, the Authority may acquire right of way or easements to relocate such utilities; however, that is to be determined on a case by case basis. Generally, such easements would be of a width equal to adjacent existing easements or of a width adequate for common maintenance access, if no existing easements are established. This applies to utilities which will cross perpendicular or run parallel to the Authority's right of way but not in public road right of way, Authority property or a previously established utility easement. This also applies to projects with local road improvements which require utility relocations along or crossing local roads.

If the approved utility relocation alignment is such that ingress or egress through the Authority's right of way is required for routine maintenance, such access will be allowed, subject to the terms established by the Authority and as described in the Authority's License to Cross. The Authority's website contains additional information.

The Authority has extensive Utility Installation Permits (former New Jersey Highway Authority) and Licenses to Cross for utilities within its right-of-way. The consultant is to request the agreements within the project limits and proceed with the terms established in the agreements regarding facility relocation, should they exist. These documents are available through the Engineering Department Design Liaison.

8.2.5. Costs and Betterments

When expansion of existing Authority facilities requires the relocation of utilities previously affected by the original Authority facility, all Authority policies with regard to financial participation are subject to the terms of any crossing license or occupancy agreement issued for the original installation. The Authority prefers to include utility relocations in its contracts, therefore, for utility relocations which are to be paid for by the utility owner as required by a previously issued crossing license or occupancy agreement, the Engineer shall obtain an authorizing letter from the utility owner to allow the Authority to include the utility relocations in its contract and to reimburse the Authority for the costs.

All cost participating arrangements shall be set forth in detail in the Utility Order covering the work, or by other written authorization initiated by the Authority. No reimbursement by the Authority will be made for utility owner costs or expenses not specifically and formally authorized.

The Authority will reimburse the utility owner for authorized costs following the approval of billing. The final billing must be submitted to the Authority's representative, the Resident Engineer, within 90 days after completion of the work and no billings will be accepted beyond 120 days after the completion of the work. The Resident Engineer must approve and sign invoices before forwarding to the Authority.

No reimbursement for utility owner expenditures in excess of the amount authorized will be made by the Authority without a duly executed Supplemental Utility Order specifically justifying the need for additional expenditures. This supplemental authorization is to be made prior to the expenditure of additional monies and must include all additional monies necessary to complete all work.

If the Authority agrees to relocate a utility for an owner at Authority expense, the Authority will bear the cost of such work directly. The cost of any utility relocation work done under an Authority contract, which is determined to be a betterment by the Authority, shall be reimbursed to the Authority by the utility owner to pay the cost of the betterment.

Betterments are defined as those costs for utility relocation construction which result in increased function, capacity or the potential therefore, and/or increased value of the relocated system over that previously in existence in the system which are being replaced. Exceptions to this definition are as follows:

1. If the utility owner has formally adopted minimum utility size criteria which he routinely used to replace-in-kind small existing sizes in his own work, such substitution on Authority projects will not be considered, of itself, a betterment.
2. If the utility owner has formally adopted the use of a new material which he routinely uses to replace-in-kind existing materials in his own work, such substitution on Authority projects will not be considered, of itself, a betterment.
3. Pipeline casings which are required by the Authority for its own interest to be larger than would otherwise be required will not, in themselves, be considered betterments.

Betterment cost allocation procedures are covered under Subsection 8.2.8.3.

8.2.6. Relocation of Authority Owned Utilities

The Authority owns and maintains various sanitary sewer, water, power and communications systems connecting Authority facilities to facilities owned and maintained by various utility companies and communications carriers.

Buried conduit facilities support the Authority's voice, video, and data communications via buried fiber optic communications backbone and lateral cable/conduit to interconnect components of the Authority's network throughout both roadways.

Telephone and electrical service connections to Authority owned facilities are normally constructed, owned, and maintained by the utility company. Any underground ducting and manholes for such services within Authority right of way are constructed, owned, and maintained by the Authority.

The Authority owns right-of-way, conduit and fiber optic cable as part of the E-Z Pass system and communications network which consists of a backbone system along both the Parkway and Turnpike roadways, as well as laterals from the backbone to various Authority-owned facilities. The conduit and cable may be maintained by the Authority or an outside utility agency. Relocations and protection of facilities which are not maintained by the Authority are subject to a Utility Order.

The Authority also owns and maintains other conduits and ducts along the Parkway roadway generally known as the PTAT System, which is located along the northbound Parkway lanes between Milepost 36 and Milepost 128. The Authority leases some of these conduits and ducts to telecommunication companies which install, own and maintain cable. Relocations of affected facilities shall be arranged with the lease designated utility owner by the Engineer as a negotiated "No Cost" Utility Order.

Within roadway toll plazas and other Authority-owned facilities, all power, communication, sanitary sewer, water, and other utility services are provided and maintained by outside utility companies. New installations, relocations, and protection of these facilities do not require a Utility Order; however, the Engineer shall be responsible for coordinating such work with the utility owner. The design requirements for the Engineer are outlined in Design Manual Section "Facility Buildings/Toll Plazas".

All Authority contracts in the area of existing Authority-owned utilities shall include provisions for the relocation or protection of these utilities as required by the work. Mark-outs and phone call notification may be required as determined by the contract.

Relocations of affected existing telephone and electric services shall be arranged with the utility owner by the Authority's Engineer. Necessary duct and manhole construction shall be included in an Authority construction contract. The procedures for arranging the relocation of existing services are the same as those for establishing new services and are set forth under Subsection 8.2.8.

The Authority leases several locations along both roadways to cell tower operators. Special consideration is to be taken by the Engineer when working with utilities in and around these sites to ensure that the terms and conditions of the cell tower lease holder agreements are not violated.

8.2.7. Provision for New Authority Owned Utilities

All Authority contracts shall provide for any necessary new construction of Authority owned utilities. All arrangements for these services and also for utility owned services shall be made by the Engineer, subject to the review of the Authority.

Procedures in this regard are set forth under Subsection 8.2.8.

8.2.8. Administrative Procedures

8.2.8.1. Authorizing Documents, Content and Procedures

1. Utility Order

The Utility Order is the formal document through which the Authority and utility owner agree to the terms under which utility relocations, ordering of materials and/or inspection are to be performed. This document consists of the order proper and associated schedules and exhibits which are appended to the Utility Order. The Authority's website contains additional information.

The schedules and exhibits set forth the complete details of the work and the costs.

Schedules include the utility owner's estimates of the cost of the work, betterment computations and other necessary tabulations. Exhibits are the associated plans illustrating the work and correspondence outlining details and special considerations related to the work. As a minimum, there shall be one schedule which is the utility owner's cost and construction time estimate and two exhibits which are Exhibit A, Utility Check List and Exhibit B, the Scheme of Accommodation with an inset vicinity map. The Authority's website contains additional information.

The Scheme of Accommodation shall consist of a plan(s) at a suitable scale and sheet size that minimizes the number of plans yet clearly depicts the existing utilities and the utility relocations with all designations, sizes and types of material, existing and proposed, clearly labeled. Any associated right of way requirements shall be depicted. The Authority prefers 8.5" x 11" or 11" x 17" sheet size, if feasible. The color legend shall be:

red – existing facilities to be removed or abandoned

green – proposed relocated facilities

yellow – temporary facilities

blue – betterment facilities

Color does not have to be provided, if other means such as line style, symbols, callouts and/or shading clearly convey the scheme. The work shall be numbered in the order in which it is to be performed. The same numbers shall appear in the Check List. Critical cross sections of proposed utilities may be necessary to confirm horizontal and vertical clearances.

Other exhibits may include the utility owner's plans on which the estimate was based. All schedules and exhibits shall be labeled alphabetically

(SCHEDULE A, B, C, EXHIBIT A, B, C), folded as necessary and appended to the Utility Order. The upper right corner of each page of each attachment shall have the schedule or exhibit designation, the Utility Order number, and the page number of that attachment except for plans, which shall have that information above the title box. The Authority's website contains additional information.

The Utility Order cost, which is entered on the first page of the order proper, represents the maximum cost the Authority will pay for the work included in the Order. Where betterments are a part of the work, this figure represents the total cost of the work less the cost of betterments.

Separate Utility Orders are required for each utility owner affected by any one construction contract. Where several independent relocations of the utilities of any one owner in any one contract are widely separated geographically within a construction contract or are separated in time because of construction sequences, separate Utility Orders covering each area or each phase of the work may be prepared.

Where utility relocations require close coordination with the Authority's contractor, construction access on the Authority's right of way, or where unusual cost participation concepts are present, all aspects of these considerations shall be spelled out in detail through written correspondence until concurrence on all points is obtained. All such pertinent correspondence shall be included as an exhibit in the Utility Order. The Engineer shall include the details of coordination in the Construction Contract.

Utility Orders are not required for utility relocations to be performed under an Authority construction contract. However, any Authority reimbursement for inspection by the utility owner of the Authority's work in relocating the utilities must be authorized by a Utility Order. In this case, the schedule sets forth hourly inspection rates and the total estimated inspection cost, and the check list and scheme show the work to be performed under an Authority construction contract.

Authorizing letters from the utility owner approving the Authority's plans and specifications for relocation work to be included in the Authority construction contract, and agreeing to pay for any resulting betterments, are required by the Authority prior to advertisement of the construction contract.

The Engineer's procedure in preparing Utility Orders is as follows:

a. Early in the preliminary design studies, contact and preferably meet with all utility owners within the project area. The Authority's website contains additional information regarding the initial contact letter.

Furnish the utility companies with a 1"=100' or 1"=200' scale map, with or without alignment, and request the utility companies to show the type, size, material and age of their facility and its approximate location. All municipalities and privately-owned utilities in the area must be contacted. During the initial contacts with utility owners, the Engineer shall ascertain the requirements of each utility owner with respect to the type of right of way or easement property descriptions needed. Should metes and bounds descriptions be required, the Engineer shall accordingly arrange for the necessary surveys and descriptions.

In order to assure the Authority that all utilities have been contacted, (public, municipal, private, etc.) the Engineer is to furnish copies of their contact letters and the utility's responses either acknowledging their facility or stating that they have no facilities within the project limits.

The Engineer shall show the proposed project and the approximate locations of existing utilities in plan with conflicts identified.

b. Early in Phase "A", if there was no Preliminary Design, the Engineer shall make the initial contact as described above. Present information provided by the utility owners on preliminary 1"=30' or 1"=50' scale plans. Supplement and verify the information through field surveys and investigations. Send the plans to the utility owners for verification.

   The Engineer shall maintain a Utility Status Schedule to be presented at intervals determined by the Authority project engineer on a project by project basis. The Authority's website contains additional information.

   Upon return of the verification plans by the utility owners, update the plans. Show the existing utilities and the proposed project, and identify the utility conflicts for Phase "A". Verify the accuracy of as-built data with test holes as required. Test hole data shall correspond to the project survey baseline control.

c. Early in Phase "B", the Engineer is to meet with the utility owners and mutually agree upon the most economical relocation scheme which is compatible with the utility owner's policy and the Authority's policy. The selected scheme shall be compared to all considered alternates and justified as the most economical. Provisions for owner access to the utility shall be considered at this time as well.

   The selected relocation scheme shall also be considered during preparation of erosion prevention and sediment control plans for review by the local soil conservation district(s) in order to identify potential conflicts with proposed drainage facilities.

The Engineer shall prepare a Check List and the Scheme of Accommodation for each utility owner, and request a preliminary cost estimate including engineering, materials, inspection and construction as applicable. The check lists and schemes should show existing facilities and proposed work, with betterments noted where applicable. The Authority prefers that all costs to be reimbursed to a utility owner be covered under the Utility Order. However, if a utility owner insists on reimbursement of early expenditures such as for engineering or long lead materials before execution of the Utility Order, the Engineer shall arrange to do so. At this time, the Engineer should obtain an estimate from the utility owner for such costs and issue a Utility Engineering Authorization Order. The Authority's website contains additional information. The Engineer shall reimburse the utility owner invoices as a direct cost in the Engineer's OPS.

The Engineer is to submit the approved Scheme and Check List (including time frames for notification and duration of work) and the owner's preliminary cost estimate for each affected owner to the Authority for approval a minimum of four weeks prior to a Phase "B" submission. This utility submission shall include for each location the details of the existing facility (size, materials, appurtenances, etc.), proposed facility (lengths, materials, sizes, etc.), facilities to be abandoned or removed, betterments and owner participation, and by whom the work is to be performed.

d. Once the Phase "B" submission is approved, the Engineer shall furnish the utility owner with full-scale plans for the Authority facility, showing the proposed utility relocations and requesting that the utility owner estimate and submit in writing the cost of the relocation and the schedule including ordering of materials, construction durations, and seasonal and time restrictions. At this time the Engineer and utility owner shall determine the availability of materials for the work and make arrangements necessary to obtain critical materials. All long lead equipment and materials need to be identified and considered in the timeline developed for the utility relocation to assure any and all delays are minimized. All betterment concepts shall be resolved to the satisfaction of all parties at this stage. Any utility relocation that is independent of the construction contract that can be performed in advance of the construction contract (without detriment to the project) should be ordered to be completed as soon as possible and the relocated as-built information provided as part of the contract documents. The Engineer and utility owner shall complete the schedule for construction staging of utility relocations.

e. Upon receipt of the utility owner's estimate, the Engineer shall review the estimate for accuracy and content and forward the accepted estimate to

the Authority. The Authority will assign a Utility Order number which will appear on the final Utility Order. The Engineer shall prepare the formal Utility Order and forward three draft copies of the Order, complete with the associated schedules and exhibits, to the Authority. Upon Authority approval, the Engineer shall forward seven final complete copies to the Authority. Utility Orders are to be forwarded to the Authority prior to making a Phase "C" submission. The Engineer shall verify that the Utility Order information is consistent with the utility relocation work in the Phase C plans and specifications.

The Engineer shall include copies of the check lists in an Appendix of the Supplementary Specifications.

The Engineer shall keep the utility owner apprised of the contract plan development at all times by sending him copies of the appropriate drawings from all Phase "B", "C" and "D" submissions.

After Phase "D", the Engineer shall schedule meetings, as appropriate, with all impacted utility owners and the Authority's design and construction representatives to advise of project status and continue coordination.

Additional utility installation submittal requirements related to underground installations are outlined in Exhibit 8-1.

2. Supplemental Utility Order

A Supplemental Utility Order is the formal document through which the Authority and the utility owner agree to the terms under which utility relocation costs, in excess of those covered in the initial Utility Order, will be paid. The Authority's website contains additional information regarding the Supplemental Utility Order.

Supplemental Utility Orders are occasionally required when changes in Authority construction concepts or unforeseeable construction complications increase utility relocation costs beyond those anticipated in the original Utility Order estimate. The circumstances requiring the execution of a Supplemental Utility Order must be thoroughly documented. Unexplained errors and omissions in the original estimate may not be accepted by the Authority as a basis for issuance of a Supplemental Order.

The Engineer shall prepare and justify all Supplemental Orders, and forward same to the Authority.

The Authority shall review the Supplemental Order for form and content. The same procedures and number of copies are to be used as described for Utility Orders.

3. Authorizing Letters

Authorizing letters are used by the Authority to authorize the commitment of Authority funds prior to or in lieu of the execution of the formal Utility Order. Authorizing letters would be required to authorize utility owners to order critical materials in advance of Utility Order execution, or to authorize utility owners to expend funds for engineering studies and estimates for proposed relocations. Upon Authority authorization, the Engineer shall prepare the Utility Engineering Authorization Orders described in 7.2.8.1.c.

Where betterments are included in utility relocation work to be performed under Authority contracts, the Authority will normally accept an authorizing letter from the utility owner accepting responsibility for the betterment cost as sufficient agreement to proceed with the work. Utility owner originated letters to the Authority are also normally considered adequate to establish the utility owner's intention to provide a portion of the utility materials to be installed under an Authority contract, or to establish the utility owner's concurrence with the Authority's plans to relocate his facilities under an Authority contract.

8.2.8.2. Other Agreements, Permits, and Licenses

1. License to Cross (LTC)

A License to Cross (LTC) (formerly referred to as an Occupancy Agreement) is to be entered into by the Authority with any utility company or authority which will have their facilities within the Authority's existing or proposed right of way. In all cases, the License to Cross document is prepared by the Authority's Engineering and Law Departments. When a utility owner has its own project that crosses Authority right of way, the utility owner shall prepare and submit a License to Cross application to the Authority for consideration. The Authority's website contains information on the application process and requirements. For utility installations that will require trenchless installation methods, refer to Exhibit 8-1 for additional LTC application requirements.

2. Other Agency Permits

Other Agency Permits, if applicable, are those permits for road openings, flight path clearance, stream encroachments, navigation, wetland, treatment works, water distribution, etc. which are necessary to allow the utility owner to relocate his facilities. These permits are normally applied for by the utility owner; however, the Engineer shall closely monitor the utility owner's progress in obtaining the necessary permits and provide such assistance and information as may be required. The last two permits may not be well known. Any work of building, installing, or modifying a sanitary sewer line, pumping station or force main having a flow of more than 8,000 gallons per day within

the public ROW or a septic system with flows greater than 2,000 gallons per day requires a Treatment Works Approval from NJDEP as per N.J. A. C. 7:14A. Whenever more than 1500 feet of new main that interconnects with a public water system, or there are more than 6,000 gallons per day of non-residential average demand, a Water Distribution permit is required from NJDEP as per N.J.A.C. 7:10A.

8.2.8.3. Betterment Calculations

Improvement betterments are the increases in cost which result from the replacement of existing facilities with facilities capable of increased function or service. Such additional costs will not be paid for by the Authority, except as provided in Subsection 8.2.5. Participating costs are the portion of the overall utility relocation cost which the Authority agrees to pay.

Where betterments are recognized, one method is to express participating costs as a percentage of the total utility construction cost, thus establishing the basis for determining the amount the Authority agrees to pay according to the terms set forth in the Utility Order. Another method is to determine the cost of each item of work and identify those that are subject to betterment percentages. In that these percentages must be established before the contract is awarded, it must be determined on the basis of past costs for similar work, or on some other fair and equitable basis. Other methods may be considered. The chosen method is subject to Authority approval. In all cases, betterments shall be based on a comparison of installed costs, including materials and labor.

Where the utility owner has sufficient staff and experience to do so, improvement betterments should be computed by the utility owner and checked and verified by the Engineer. Where small municipal or private utilities are involved, the Engineer shall perform such betterment computations as may be beyond the capacity of the utility owner and shall obtain the concurrence of the utility owner on the results.

The following commentary will clarify betterment conditions and the procedure to follow in determining calculations.

1. Case 1 - The Authority's contractor placing conduit between abutments, and the utility Company doing work outside the abutment limits for any crossings involving a partial betterment.

   Separate betterment calculations will be required for the Authority contractor's billings and the Utility Company's billings.

   The Utility Company will only be required to pay that betterment portion of hanger supports, hangers, conduit, cable / pipe and appurtenances.

However, all hanger supports, hangers, conduit, cable / pipe and appurtenances will be placed by the Authority's contractor between abutments, and the Authority will bill the Utility Company on the basis of the betterment percentage computed by the Utility Company. This betterment calculation must be approved by the Authority prior to construction by the Authority's Contractor.

It is not necessary to compute an aggregate betterment percentage for billing purposes. All invoices will be handled with the particular betterment involved in the area being worked. Each invoice under any one particular Utility Order will reflect the various betterment percentages within that order, as the work is completed in the respective areas. Any invoice can contain a certain part of a betterment, various different betterments or no betterment at all, depending on the work done under that particular invoice.

2. Case 2 - Utility Company doing all work involved in a relocation.

The Utility Company will submit betterment calculations to the Engineer for review and approval as above. All betterments involved within the Utility Order will be combined to form an aggregate betterment percent to be included on all the invoices sent to the Authority.

a. "Payment for Utility Line Supports on Structures"

For all miscellaneous hardware (U-bolts, neoprene pads, hanger rods, rollers, clamps, washers, nuts, etc.) required for utility conduit installations on structures, the cost of furnishing and installing such hardware is to be included in the linear foot unit price bid for the conduit.

Where these installations will be made on structures with steel superstructures, the weight of the structural steel members used to support the conduits, exclusive of hanger rods, rollers, etc., shall be included in the item for Structural Steel and paid for by the pound.

Where these conduit installations will be made on structures with concrete superstructures, the cost of the structural steel members used to support the conduits and their associated hardware shall be included in the linear foot unit price bid for the conduit.

Where pipelines and casings are involved, prices based on standard estimating guides, such as the "Dodge Estimating Guide for Public Works Construction" or some other basis, approved by the Authority, should be used by the Engineer for estimating or checking betterment costs.

8.2.8.4. Utility Service to Authority Facilities

Utility Service to Authority Facilities shall be arranged by the Engineer with the utility owner. The Engineer shall determine service demands and shall meet with the utility owner to establish the responsibilities for the various items of work to be performed, the date the service will be required, and the utility owner's terms for providing service as a requirement for Phase "B". The Engineer shall forward to the Authority any necessary agreement forms, together with a detailed outline of the size and type of required service, the costs, and the detailed individual responsibilities of the Authority and the utility owner. On the basis of this information, the Authority will sign and return agreement forms and if necessary provide a check payable to the order of the utility owner to the Engineer who shall formally request service from the utility owner. Service requests shall be completed by Phase "C".

8.2.8.5. Public Telephone

Public telephone facilities have been provided at Authority facilities at points convenient to the traveling public. For each project which includes toll plazas, rest areas or other public spaces, the number and locations of public telephones are to be determined by the Engineer in conjunction with Patron Services Department.

If public telephones will be provided, the Engineer will provide, in the Authority's construction contract, for the installation of conduit and appurtenant junction boxes between the existing public telephone lines and the telephone stand or building line. The Authority contract shall also provide for the power cable and conduit for lighting the stand and the power connection to the pre-wired stand, and for the stand foundation slab and concrete walkway serving the stand.

The Telephone Company will furnish and install the telephone, the stand, and the telephone cable. All telephone connections to the telephone and stand will be made by the Telephone Company. All materials furnished and work done by the Telephone Company shall be without cost to the Authority.

The Engineer will make all necessary arrangements with and will obtain all pertinent information from the Telephone Company and shall provide field liaison at the time of construction.

8.2.8.6. Tax Exempt Status

The Authority is exempt from taxes on materials ordered by utility owners for utility relocations to be made at Authority expense. In order to obtain this exemption, the Engineer shall request utility owners to arrange for shipment

in the name of the Authority in care of the Utility owner, thus gaining exemption from the tax.

8.2.8.7. Utility Policies

The following are the Utility Policies which have been approved by the Authority:

1. Power

   There shall be at least one (1) full size spare conduit installed in addition to the necessary quantity of conduits containing the power cables required by design.

   Riser poles are to be located outside the right of way lines. Cables are to be placed underground between structures.

2. Telephone

   For the first cable, provide two (2) ducts. Provide one (1) duct for each additional cable.

   The power and telephone ducts in structures are to be furnished and installed by the Authority's contractor.

Exhibit 8-1 Appendix A – General Requirements for Utility Installations

I. INTRODUCTION:

When utilities cannot be installed by cut and cover construction, trenchless technologies shall be considered and designed in accordance with the procedures described below. Due to the impact to pavement performance, presence of other utilities, and traffic impact, cut and cover construction methods will not be allowed for utility installations below any NJTA roadway or facility without written approval from the Authority.

Definitions:

A. **Auger Boring (AB)** A technique where a horizontal bore hole is created from a drive shaft to a reception shaft by means of a rotating cutting head. Spoils are transported back to the drive shaft by helical-wound auger flights rotating inside a steel casing that is being jacked in place simultaneously. AB may provide limited tracking and steering capability. It does not provide continuous support to the excavation face. AB is typically a 2-stage process (i.e., casing installation and carrier pipe installation).

B. **Pipe Jacking (PJ)** A pipe is jacked horizontally through the ground from the drive shaft to the reception shaft. The excavation can be accomplished manually or mechanically.

C. **Microtunneling (MT)** A remote controlled guided pipe-jacking process that provides continuous support to the excavation face. The guidance system usually consists of a laser mounted in the drive shaft communicating a reference line to a target mounted inside the MT machine's articulated steering head. The MT process provides the ability to better control excavation face stability by applying mechanical or fluid pressure to counterbalance the earth and hydrostatic pressures.

D. **Horizontal Directional Drilling (HDD)** A multi-stage process that consists of drilling a small diameter pilot hole along a predetermined path. The pilot hole is then developed into a suitable bore hole that will accommodate the desired utility which is ultimately pulled back through the developed alignment. The HDD process provides the ability to track the location of the drill bit and steer it during the drilling process. The vertical profile of the bore hole is in the shape of an arc entrapping drilling fluid to form a slurry pathway rather than an open hole. This entrapped slurry provides continuous support to the bore hole.

E. **Casing Pipe** or casing is defined as a pipe which is installed for the purpose of stabilizing an excavation.

F. **Carrier Pipe** is defined as pipe which is installed inside of casing pipe to house the utility.

G. **Driving Shaft** is an excavation constructed for initiating the advancement of a casing as part of a trenchless technology operation, a.k.a. sending shaft or jacking pit.

H. **Reception Shaft** is an excavation constructed at the termination point of a trenchless technology operation.

I. **License to Cross (LTC)** is a legal document that grants permission to outside parties (i.e. utility owners) to impact Turnpike Authority property.

The Authority will only allow trenchless technology methods defined above (Items A through D) to be used under NJTA roadways and facilities. All other alternative methods will not be allowed by the Authority including; slurry boring, pipe ramming, soil compaction, or utility tunneling, as defined in *NCHRP Synthesis 242 Trenchless Installation of Conduits beneath Roadways*.

II. REQUIREMENTS:

A. **General**

1. Design of trenchless utility installations shall conform to current AASHTO LRFD Bridge Design Specifications
2. Design for trenchless methods shall accommodate protection against soil instability and uncontrolled ground water inflow into the driving shaft and/or reception shaft and prevention of soil subsidence/settlement along the alignment with adequate instrumentation/monitoring procedures. In addition, the design shall consider safe shaft ingress and egress where applicable, including but not limited to ladders, stairs, walkways, and hoists, protection against mechanical and hydraulic equipment operations, and for lifting and hoisting equipment and material, ventilation and lighting, monitoring for hazardous gases, protection against flooding and means for emergency evacuation, protection of shafts including traffic barriers, accidental or unauthorized entry, and falling objects, emergency protection equipment and safety supervising responsibilities.

3. Casings shall generally be new welded, threaded, or interlocking connected steel pipe with a minimum wall thickness as per design calculations and shall be shown on the plans included with the LTC application. Other materials may be allowed for specific methods of installation, as described below. It is recommended that the smallest diameter casing viable given a particular installation method, and capable of carrying the utility to be installed, be used. The larger the diameter of casing, the greater the potential for subsidence. If future expansion is planned, a larger casing may be installed to allow for additional / larger carrier pipe to be installed in the future. In addition, the casing should be capable of accommodating equipment for drilling through obstructions.

4. The horizontal limits of casing for pipelines carrying hazardous material or materials under pressure, shall extend from right of way line to right of way line unless precluded by field conditions and approved by the Authority. Casings for pipelines carrying products other than hazardous materials or materials under pressure may be terminated at the toe of slope or center line of the ditch.

5. With approval from NJTA Engineering, casing pipe may also serve as the carrier pipe depending on the installation method, pipe material, facility use and depth underneath Authority ROW.

6. Carrier Pipe may be composed of the following materials depending on the installation methods as described in the NJTA Supplemental Specification:
    a. High Density Polyethylene (HDPE)

b. Polyvinylchloride (PVC)
c. Glass Fiber Reinforced Polymer Pipe (GFRP)
d. Centrifugally Cast Fiberglass Reinforced Polymer Concrete (CCFRP)
e. Steel
f. Vitrified Clay Pipe
g. Reinforced Concrete Pipe (RCP) Class III

7. A minimum cover of the greater of 6 feet or two casing diameters below the lowest pavement surface shall be provided for all acceptable methods except HDD, which shall require a minimum cover of the greater of 10 feet or five casing diameters.

8. Ends of casing pipe shall be sealed with a flexible material prior to backfilling to prevent flowing water and debris from entering the annular space between the casing and the carrier pipe.

9. To ensure voids were not created by the operation, ground penetrating radar is required as described in 2016 Standard Specifications Section 534. Any voids found to have been created outside of the casing pipe must be filled in accordance with a method approved by the Authority.

10. The use of bentonite or polymer slurry to lubricate the outside of the casing to reduce driving forces may be allowed contingent upon Authority approval.

11. Overcut outside of the casing diameter shall not exceed 1 inch. Oversized holes must be backfilled with grout to fill the annulus between the pipe and the surrounding soil.

12. All pipeline casings shall be furnished with standoffs, which center and adequately support the carrier pipeline within the casing, and with link seals and casing end seals, manufactured especially for this purpose.

13. Manholes are to be located outside of the Authority right of way.

14. The utility owner shall place an above ground marker within 5’ feet inside the Authority’s right of way or fence to indicate the presence of the utility.

15. After trenchless installation begins, the operation must proceed continuously until complete.

16. Driving and receiving shafts shall conform to the following requirements:
    - The shaft shall not be located within 10 feet of the outer edge of the paved shoulder.
    - When located between 10 to 30 feet from the outer edge of the paved shoulder, the shaft shall be constructed with steel sheeting.
    - When located beyond 30 feet from the outer edge of the paved shoulder, the shaft shall be constructed with steel or timber sheeting for the closest face to the roadway, with the option of the remaining sides being unsheeted.
    - The exit and entrance face of all driving or receiving shafts must be sheeted, regardless

of the distance from the outer edge of the paved roadway.

- Unsheeted shaft sides are only permitted provided a 1 to 1 slope can be maintained and the excavation in other respects complies with OSHA regulations.
- Steel sheeting may be extracted upon backfilling the excavation except the front line closest to the roadway which shall be left in place and cut off 2 feet below grade.
- Timber sheeting shall be tongue-and-groove and cut off 2 feet below finished grade.
- Excavated materials shall be placed outside of the clear zone and surplus and waste materials shall be disposed of off Authority right of way.
- When the driving or receiving shaft is located between 10 and 30 feet from the outer edge of paved shoulder, a standard shoulder closing shall be installed as per the Authority's Manual for Traffic Control in Work Zones.
- If there is existing guide rail, concrete construction barrier is not required.
- Driving and receiving shafts in the median area shall not be permitted, unless 10 feet of clearance to the edge of pavement is available. All driving or receiving shafts in the median shall be constructed using steel sheetpiles.
- All work areas must be enclosed with 4-foot high fencing.

B. **Cut and Cover**

Cut and cover construction methods for utility installations crossing NJTA roadways and facilities will only be allowed if approved by the Authority. The use of cut and cover will be considered if special circumstances exist, for example if the existing pavement box will be replaced in the near future or if the roadway will be taken out of service for other reasons. Cut and cover installations will be allowed below spans between foundations but will require the assessment and mitigation of any impact to adjacent foundations.

Trenches shall be excavated in accordance with 2016 Standard Specifications Section 206. Fill material shall be Embankment Grade A as described by 2016 Standard Specifications Section 901. Compaction criteria shall be as described in 2016 Standard Specifications Section 203. If the designer requires more stringent criteria, it may be specified on the plans submitted with the LTC application.

C. **Auger Boring**

Casing material shall be steel. Thickness, section length, connection details, and grade of steel shall be specified on the plans included with the LTC application and must satisfy the minimum requirements provided here and in the 2016 Standard Specifications Section 534. The Authority will generally not consider less than 4-inch diameter or greater than 60-inch diameter casings installed with this method but may consider other diameters on an individual basis. The Authority will generally not consider this method feasible for installation lengths greater than 300 feet.

Although tracking and steering capabilities are limited, the equipment shall include any tracking and steering capabilities available for this method. The tolerances of these capabilities will be determined on a project specific basis and indicated on the plans included with the LTC application. The auger shall remain a minimum of 1 casing diameter behind the casing face, or as necessary to maintain a stable face. The leading edge of the casing shall also be reinforced with a surrounding band, which shall be detailed in the LTC application plans. 2016 Standard

Specifications Section 534 provides a minimum standard for monitoring excessive settlement. As the designer deems necessary, a more stringent monitoring program can be specified on the LTC application plans.

D. **Pipe Jacking**

The Authority will generally consider the following materials acceptable for casing: steel, reinforced concrete pipe (RCP), glass-fiber reinforced pipe (GFRP), or polymer concrete pipe (PCP). Thickness, section length, connection details, and material properties shall be specified on plans submitted with the LTC application but must satisfy the minimum requirements provided here and in the 2016 Standard Specifications Section 534. For this method, the Authority will generally allow these types of pipe for diameters between 36 inches and 72 inches but may consider other diameters on an individual basis.

Intermediate jacking stations will be allowed below the Authority roadways. The proposed length shall be verified to ensure the equipment and methods proposed are capable of exerting enough thrust. Excavation shall remain a minimum of 1 casing diameter behind the casing face, or as necessary to maintain a stable face.

E. **Microtunneling**

The Authority will generally consider the following materials acceptable for casing; steel, RCP, or GFRP. Thickness, section length, connection details, and material properties shall be specified on the LTC application plans but must satisfy the minimum requirements provided here and in 2016 Standard Specifications Section 534. For this method the Authority will generally allow these types of pipe for diameters between 24 inches and 48 inches but may consider other diameters on an individual basis.

Intermediate jacking stations will be allowed below the Authority roadways. The proposed length shall be verified to ensure the equipment and methods proposed are capable of exerting enough thrust. The shield shall remain at the face for the entire microtunneling operation.

F. **Horizontal Directional Drilling**

The Authority will generally consider the following materials acceptable for casing; steel, polyvinyl chloride PVC, or HDPE. Thickness, section length, connection details, and material properties shall be specified on LTC application plans but must satisfy the minimum requirements provided here and in 2016 Standard Specifications Section 534. For this method the Authority will generally allow these types of pipe for diameters between 3 inches and 48 inches but may consider other diameters on an individual basis.

2016 Standard Specifications Section 534 provides a minimum standard for monitoring excessive settlement. This method may require the Engineer to require a more stringent Instrumentation program. In addition, this specification provides minimum standard limitations on fluid pressures, which can be modified by the Engineer. Tracking and steering shall be provided with this method.

III. SUBMITTALS:

For new underground utilities to be installed using trenchless technology methods, the following information shall be required by the Authority for inclusion in the LTC application submission:

1. Calculations including, but not limited to:
    a. Soil boring logs
    b. Subsurface profile
    c. Laboratory test results
    d. Determination of loads on the proposed utility at Service Load Combination I (Reference 2, Article 12.5.2, Table 3.4.1-1, and Article 12.6, Article 3.6.2.2). Also consider hydraulic uplift and jacking or driving forces.
    e. Corrosion potential or abrasion loss of pipe (Reference ***1***, Article 12.6.9)
    f. Adequacy of proposed pipe section and material for shear, buckling, seam resistance, etc.
    g. Scour potential (Reference ***1***, Article 12.6.5)
    h. Deflection shall be accounted for when checking clearances
    i. Geotechnical bearing resistance and settlement of pipe
    j. Dewatering or ground improvement if necessary
    k. Drilling fluid will not enter pavement box
    l. Impact of vibration to existing foundations or utilities
    m. Anticipated heave or subsidence and mitigation proposed if necessary.
    n. Design of any walls required to provide thrust for the pipe or to stabilize an excavation. This shall include, but not be limited to, checking for sliding or lateral resistance if deep foundations are required, overturning, global stability, bearing capacity or axial resistance if deep foundations are required, uplift, amount and rate of settlement, and structural resistances. These tasks shall be performed in accordance with AASHTO (Reference 2).

2. Utility plans, in conformance with the plan requirements as specified on the Authority's website for LTC applications, shall include, but may not be limited to:
    a. Plan sheets showing:
        i. Proposed utility location and dimensions (length, wall thickness, and diameter)
        ii. Driving and receiving shafts locations and dimensions
        iii. Boring locations
        iv. Right-of-way lines
        v. Existing utilities
        vi. Existing features, such as buildings, roadway, barrier, structures, etc.
        vii. Instrumentation plans and monitoring requirements
    b. Profile sheets along the proposed utility alignment showing:
        i. Soil or rock conditions
        ii. Groundwater conditions
        iii. Existing and proposed utilities
        iv. Existing and proposed foundations
        v. Driving and receiving shafts
        vi. Existing and proposed ground lines
        vii. Limits of pavement box (i.e. Asphalt, DGA, Grade A Embankment, Common Embankment)
    c. Three cross sections perpendicular to the alignment showing the same information as listed above for the utility profile if six or more borings were taken at the site. No cross sections will be required if the site is considered to have low variability based on existing data
    d. Any incidental, environmental, drainage, staging, or structural plans as necessary.

3. 2016 Standard Specifications Section 534, modified as necessary to accommodate the site conditions and project constraints, shall also be required. This document includes the requirements of the Site Specific Work Plan (SSWP).

REFERENCES:

1. AASHTO. *LRFD Bridge Design Specifications*. Fifth Ed. 2010
2. AASHTO. *Technical Manual for Design and Construction of Road Tunnels – Civil Elements*. September 2010 Ed.
3. New York State Department of Transportation. *Design Guidance for Trenchless Installations of Casing*. 2007.
4. Transportation Research Board National Research Council. *NCHRP Synthesis 242 Trenchless Installation of Conduits Beneath Roadways*. 1997.

Section 9 - RIGHT OF WAY

9.1. GENERAL

9.1.1. Purpose

All maps, plans, and descriptions of parcel properties required by the Authority in connection with the acquisition of all interest in real estate shall be prepared under the supervision and direction of a land surveyor licensed by the State of New Jersey. The purpose and intention of this work is to provide all information and data necessary for the Authority's Law Department to obtain the necessary title search in order to conduct negotiations for a right-of-entry and/or agreement with property owners for the acquisition of all titles whether fee or easement necessary for the project or, if necessary, to facilitate an eminent domain action. All work shall be done in accordance with applicable statutes, laws, regulations of the State of New Jersey and the policy and procedures established by the Authority, as set forth herein and in accordance with good practice and procedure of the profession.

9.1.2. Sequence of Work

The Authority will approve the sequence in which the work will progress so that it will be coordinated with the requirements of design and construction. The Engineer is to submit a list of priority property acquisitions and a preliminary map showing their location.

9.1.3. Liaison

Close liaison will be required between the Engineer and the Authority. Rapid and orderly progress of the work is essential. Duplication and revision of work is to be avoided if possible. To this end, the Engineer shall, as his first work, prepare individual parcel maps and descriptions involving one sample of each phase of his work so that the results may be reviewed in detail by the Authority as a means of clarifying the procedures which these instructions attempt to define. All submissions are to be made to the Authority's Engineering Department.

9.1.4. Preliminary Submission

At the initiation of Preliminary Design, the Consultant Engineer shall supply the Authority's Engineering Department with two sets of prints of each tax map in the project area, showing the proposed baseline and preliminary proposed right of way lines. He shall also supply a list of affected property owners and addresses based upon the current tax rolls. At the same time, the Authority's Engineering Department will provide to the Consultant Engineer, a range of parcel numbers to be used in the development of the ROW plans.

1. Preliminary submission of right of way parcel property maps and descriptions required for a construction contract are due no later than the Phase B submission date of the contract plans. The preliminary submission date may be established earlier than Phase B depending on project requirements and schedules.

2. Preliminary submission shall consist of six sets of right of way parcel maps (ETM's, GPPM's, 25% of IPM's) and descriptions (including the associated Word files), and shall be submitted to the Authority's Engineering Department, and/or its designee, at least one month in advance of the scheduled final submission date to allow for the reviewers to comment and indicate changes and/or corrections for incorporation into the final documents. All such comments will be addressed on the plans and within a comment resolution summary (CRS), as necessary. For this preliminary review, one copy of all materials used in establishing parcel ownership shall also be submitted (deeds, subdivision maps, etc.).

9.1.5. Final Submission

1. Prior to the final submission, the Consultant Designer shall meet with the Authority's Engineering Department, and/or its designee, to go over the plan changes and CRS to ensure that all issues have been properly addressed.

2. Final submission shall consist of:

   a. Cover letter listing all parcels and owners required for the construction contract, parcels being submitted, parcels missing from submission (obtained from tax records).

   b. One reproducible of the Entire Tract Map's (ETM's), the General Property Parcel Map's (GPPM's), the Individual Parcel Maps (IPM's), and the Parcel Index and Ownership Data sheet, as defined in Subsections 9.2 and 9.4.

   c. Ten (10) full sets of ROW plans (ETM's, GPPM's, IPM's) signed and sealed by a licensed New Jersey Land Surveyor, and parcel descriptions (hard copy and CD ROM). All electronic files must be included for future reproduction.

3. When instructed by the Authority's Engineering Department, the Engineer is responsible for all revisions to a parcel map or description previously submitted. The submission procedure will be similar to that outlined in Items 2b and 2c above.

4. The original mylar maps are to be sent to the Authority's Engineering Department upon final notification by the Authority's Engineering Department.

5. In the event that condemnation becomes necessary to acquire a particular parcel, the Consultant Engineer will be required to submit 30 Individual Parcel Maps and descriptions for each such parcel. This is to enable distribution of a map and description, along with the associated court documents, to all parties having an interest in the action.

9.1.6. Authority's Procedure after Submission

In order that the Consultant Engineer may better understand and appreciate the necessity for complying with right of way submission dates, the following is a brief outline of the Authority's procedure, once final right of way plans and descriptions have been received by them.

A Notice of Entry letter is sent to the property owner in advance of appraisal and negotiations to permit access by the Authority for design purposes.

The Authority's Engineering Department, and/or its designee, checks to verify that all of the parcel maps and descriptions required for a particular contract have been submitted. Engineering then retains one set of the plans and data sheets for its files and forwards the remainder to the Law Department. One set of the documents is retained by the Law Department, while the others are used to obtain appraisals, environmental screenings, title work, and to conduct negotiations for the parcel to be acquired.

When the appraisal is complete, the negotiation process commences in accordance with the appropriate procedure of the Law Department and applicable law. Upon completion of appraisals, negotiations are undertaken in order to arrive at an agreement based on fair market value. In the event there is a failure of agreement between the Authority and the property owner, the Authority may exercise its right to Eminent Domain and commence condemnation.

The Authority then institutes condemnation at which time a hearing date is set. The case is heard by a group (usually three) of condemnation Commissioners appointed by the courts. The Consultant Engineer maybe required to provide a Professional Land Surveyor familiar with the property to testify at condemnation hearings and/or jury trials. The Commissioners will hear the facts and decide upon an Award of Just Compensation. Should either party feel this decision to be unjust, it has the right of appeal, with the case possibly reaching a jury trial.

Whether the matter is a voluntary acquisition or a condemnation case, the owner or tenant must be given a reasonable period of time in which to vacate the property. Where commercial or industrial buildings are involved, this period could be considerable.

The above information is provided to stress to the Consultant Engineer the fact that with the submission of right of way plans and description, the work is only approximately half done. The right of way acquisition process is, by necessity, time consuming and requires as much advance preparation as possible. Due to the number of steps involved, revisions become a complicated problem. The Consultant Engineer should take every precaution to ensure that the right of way documents are submitted on time and have been "carefully checked" so as to avoid wasted effort by attorneys, appraisers and negotiators and the consequent loss of time, which in most projects is at a premium.

In accordance with NJSA Title 46, Chapter 23 "Map Filing Law", Final Right of Way Documents are required be submitted to the county for filing. The Consultant Engineer will file the Final Right of Way Plans and pay the appropriate fees. The Authority's Law Department will file the Deeds and Individual Parcel Property maps and description with the appropriate county.

Upon completion of all negotiations, the Consultant Engineer shall meet with the Authority's project manager and other required staff to assure all terms and conditions of the settlement are compliant with the original understanding of work being performed by NJTA contractors and the work to be performed by owners (for which they were compensated). Contract documents and specifications shall be modified as necessary to assure that all work efforts are accounted for and that right of way availability for the contractor is clearly stated within the specifications.

9.2. MAPS

9.2.1. Types

There are four types of maps (Entire Tract Maps-ETM's, General Property Parcel Maps-GPPM's, Individual Property Parcel Maps-IPPM's and Special Maps) prepared in connection with and used as legal exhibits for the acquisition of property required by the Authority. This sequence of increasingly more detailed maps is intended to depict the property to be acquired by the Authority in as clear a manner as possible with the following requirements and map descriptions being a guide towards that end.

9.2.2. General Requirements for all Maps

1. All final maps plans shall be prepared on mylar material 0.003 inch to 0.004 inch thick. The Authority will not accept any originals with stick-ons attached to it; however, they may be photographically reproduced on a stable material. All maps are to be made in accordance with the current version of the Authorities CADD standards entitled "New Jersey Turnpike Authority, New Jersey Turnpike Roadway & Garden State Parkway Roadway, CADD Standards. The standards may be found on the Authority's website.
2. The title box shall be as shown in Exhibit 9-3 and shall appear on all maps.
3. The various maps shall be numbered sequentially according to numbers assigned by the Authority's Engineering Department. Numbers shall appear both in the title box and on the right sheet margin as indicated in Exhibit 9-3. The approximate number of sheets required shall be given to the Authority's project manager as early as possible to facilitate the assignment process.
4. Standard Right of Way Legend (Exhibit 9-4), is to appear in first GPPM in the Engineer's Right of Way Section.

5. All lettering generally shall be as indicated on Exhibit 9-7. Variations in lettering size should be used to emphasize relative importance of items presented.
6. Variations in line weights shall be as indicated in the Standard Right of Way Legend (Exhibit 9-4) and other attachments.
7. The New Jersey Plane Coordinate System is to be used and shown on all maps and mentioned in all deed descriptions together with the adjustment date tag to allow for proper corrections to be used NAD1983 (1995).
8. All County, Municipal and other political subdivisions shall be clearly indicated.
9. Map scale and north arrow shall be shown on every map.
10. Reasonable planimetric coverage, as the map size and scale permit, shall be shown outside the right of way line.
11. All revisions to a map shall be numbered, dated and noted as to their nature in the Revision Box provided on each map (Exhibit 9-2) The latest alteration number (highest number shown in revision box) shall be marked in pencil indicated on the right-hand border of each sheet (See Exhibit 9-3).
12. All metes and bounds descriptions and individual Parcel Property maps shall be signed and sealed.

9.2.3. Entire Tract Maps (ETM)

1. Scale
   a. 1”=200’ unless otherwise approved by the Right of Way Manager.
   b. If necessary, include an insert at a different scale in order to show owner’s complete (contiguous) property, including any improvements on the remainder.
2. Sheet size shall be 22” x 36”.
3. Topography
   a. All buildings to be acquired shall be shaded solid. Other buildings shall be shown unshaded.
   b. Increased detail shall be shown in areas not to be covered by the GPPM’s.
   c. Important features on parcel remainders such as buildings, roadways, etc. shall be shown.
4. Property Lines - all lines to be shown, plus deed or map information not shown on the GPPM’s. Complete tracts must be shown to their street or highway limits, or to their boundaries with other owners (all adjoining owners must be shown).
5. Baselines, stationing, and equations of all major roadways referred to in Descriptions are to be shown.

6. Identify match lines between strip maps, showing adjacent sheet number.
7. Include sheet layout for the GPPM's by tabulation.
8. Existing and proposed right of way lines are to be called out.
9. For parcel delineation and callout, see Subsection 9.5, Specific Requirements.
10. Restrictions (encumbrances) other than municipal must be clearly identified, (see Subsection 9.2.4).
11. Include a tabulation listing all streets being vacated, the controlling agency and the approximate mainline station.

9.2.4. General Property Parcel Maps (GPPM's)

1. Scale shall be 1"=30' or as directed by the Authority's Engineering Department.
2. Sheet size shall be 22" x 36".
3. Planimetry to be clearly shown and labeled.
    a. Existing Building Type shall be called out (e.g. 2 1/2 Sty. brick) with street address. Hatched if in taking area. Perpendicular offsets to remaining structures less than 5 feet from the proposed right of way line and those within slope areas (outside of right of way) must be measured and so indicated to the nearest 0.01 foot in accordance with proper survey procedures.
    b. Driveways and other paved areas shall be outlined with pavement type noted.
    c. Fences, walls, valuable shrubbery, etc.
    d. Railroads, transmission lines, sewer mains, water mains, gas mains, etc., along with all related easements, etc.
    e. Wells, underground storage tanks, leaching fields, etc.
    f. Existing drainage.
    g. Tree lines.
    h. Any special features, with appropriate notation.
    i. Show grid coordinate ticks - minimum three per sheet.
    j. Wetland delineation.
    k. Right of way legend shall be included on the first parcel property map.
4. Sources of Property line dimensions shall be identified using the following designations:
    a. Deed data (D), courses numbered as per deed description.
    b. Survey data (Stir.)

c. Calculated data (C)

d. Development map data (DM) also known as Filed Map (FM)

e. Tax Map data (TM)

f. Scaled (8), (To be used only when no other information is available.)

g. Measured (Meas.), (Incomplete survey-only some courses measured.)

h. Property corner information shall be noted when available.

5. Ownership Information to be shown shall include the following:

   a. Owner's name, using et. ux., et. vir., et. al., etc. as appropriate.

   b. For change of ownership during project, add new owner's name and insert "Formerly" prior to previous owner's name and enclose in parentheses.

   c. Deed book and page (Book/Page) or Will book and page.

   d. Deed area when applicable (subsequent deeds may invalidate original deed area).

   e. Tract number and lines.

   f. Exceptions outlined and noted.

   g. Easements and leases outlined and described as follows:

      Width, what used for, deed book and page.

   h. Names of adjacent owners.

   i. Existing right of way outlined and described as follows:

      Width, what used for, deed book and page.

   j. Plans will include roads and streets with official name, width, and information as to how such roadways were created or established, whether by filed development map, tax map, deed calls, etc. The Engineer should verify that streets were officially adopted by local ordinance. Should the local roads and streets be vacations or abandonments, they must be noted as to date and the location of source of information.

   k. Lot and block.

   l. Existing easements or ownership previously acquired by the Authority when pertinent. Reference to route, section, and date of acquisition.

6. Proposed edges of pavement shall be shown by dashed lines, on the GPPM's only.

7. Proposed baseline data shall include the following:

   a. All baselines necessary for establishment of right of way lines.

b. Continuous and original stationing, equations, P.C.'s, PT's, tangent bearings.

c. Baselines of crossroads tied into coordinate system.

d. Curve data and coordinates tabulated and labeled on appropriate sheet.

e. Relationship between new and existing baselines shall be accurately shown.

f. Existing monuments designating or controlling existing baselines must be shown.

8. Proposed monuments showing relation to proposed or existing baselines are to be shown. All monuments are to have New Jersey Plane Coordinates shown.

9. Match lines, showing adjacent sheet numbers, shall be identified.

10. Parcel delineation shall be as follows:

a. Parcels shall be field surveyed in accordance with the NJSA Title 46, Chapter 23 "Map Filing Law".

b. Proposed right of way line labeled.

c. Set points, stations, offsets, angles and/or bearings shown accurately and clearly. Field establishments of right of way line must be possible from right of way plans. All distances shall be indicated to the 100th of a foot, ± and scaled distances will not be accepted.

d. Proposed drainage and slope lines shown when outside right of way line or when necessary for delineation of parcel.

e. Proposed temporary roads, easements, etc. clearly delineated.

f. For outlining of parcel, numbering, revisions, etc., see Subsection 9.5.

11. Restrictions: (Encumbrances - other than municipal) Delineation and or notes shall be made on maps to specifically locate, or denote the absence of, these restrictions. This is important since such restrictions affect both design (permits and impact statements required) and property (taking and remainder) value. Some of the restrictions that must be investigated are listed below. The explanation of the following terms are generally introductory descriptions rather than precise definitions. Applicable law should be consulted where additional information is necessary or appropriate.

a. State of New Jersey, Department of Environmental Protection, Division of Marine Services, Bureau of Marine Lands Management.

Riparian Lands ("tideland") are now or formerly tideflowed lands to which the State holds title to up to the highwater mark (mean or ordinary high tide - if possible, an average based on 18.6 years of records). These tidelands are affected by "Riparian Rights" which may be acquired or may have been acquired

from the State by grant or rented by lease, easement or license. Riparian Rights are delineated on State maps entitled "Areas Now or Formerly Below Mean High Water." At locations where pierhead and bulkhead lines are not defined by the U.S. District Engineer (see Paragraph 9.2.4); such lines should be determined from said maps.

"Wetlands" under S404 of the Federal Water Pollution Control Act, are waters of the United States. No one may add dredged or fill materials into water bodies of the United States, including wetlands without obtaining a permit from the Corps of Engineers. Wetlands have been defined as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil condition.

Additionally, Freshwater Wetlands, including certain buffer areas, are subject to state regulation as well under the Freshwater Wetlands Protection Act.

"Coastal Wetlands" are lands over which the State of New Jersey for ecological reasons, has been given regulatory powers covering both use and development. These wetlands include any bank, marsh, swamp, meadow, flat or other low land subject to tidal action in the State of New Jersey, at particular locations stated in the "Wetlands Act" of 1970 N.J.S.A. l3:9A-l et seq. and whose surface is at or below an elevation of 1 foot above local extreme highwater and upon which may grow or is capable of growing some, but not necessarily all, of certain grasses and plants listed in the act. These "Wetlands" shall not include any land ("meadowland") or real property subject to the jurisdiction of the Hackensack Meadowlands Development Commission.

b. State of New Jersey, Department of Environmental Protection, Division of Water Resources.

"Floodway" areas when specifically designated by the Department includes the natural water channel and portions of the immediate adjacent overbank. This area carries the major portion of the flood flow with correspondingly greater depths and higher velocities and, therefore as such, makes up a higher energy zone.

The major objective of this land use classification is to control those land uses which have a high potential for environmental harm, particularly increased flood damage, such as structures that obstruct or back-up flood waters, pollution sources, dangerous objects which a flood might sweep along, and stream modifications.

c. U.S. District Engineer, Philadelphia or New York District. In some areas of New Jersey, harbor lines have been established by the Secretary of the Army for the

protection and preservation of the harbor. Detailed location information may be obtained from the District Engineer.

"Hackensack Meadowlands" are lands to which the State of New Jersey has assumed a certain control, and which are shown on filed maps entitled the "Hackensack Meadowland Reclamation and Development Act".

"Coastal Area" is any area described in the Coastal Area Facility Review Act in which certain facilities cannot be constructed without first obtaining a permit. Generally, this Act does not apply to those portions of the coastal areas regulated pursuant to enforceable orders under the Coastal Wetlands Act.

"Pierhead Line" is the outward limit line by the Secretary of the Army and sometimes adopted by the State of New Jersey, to which an open structure may be built through which, however, a tide can ebb and flood.

"Bulkhead Line" is also the outward limit line established by the Secretary of the Army and sometimes adopted by the State of New Jersey, on which a structure may be built and to which solid fill may be deposited.

"Pierhead-Bulkhead Line" is a combined line and the solid fill may be extended thereto.

9.2.5. Individual Property Parcel Maps (IPPM's)

1. Scale - variable - appropriate to show complete parcel on 8 1/2" x 11" sheets with match lines. If necessary, 8 1/2" x 14" 11" x 17" or 22" x 36" sheets may be used. If one sheet, it is noted "Exhibit A". If more than one sheet, they are noted "Exhibit A-l, A-2, etc.", (see Exhibit 9-6).
2. Information shown is the same as for the GPPM's for the specific parcel including adjacent owner's names; and specifically noting the current owner/owners' name/names.
3. IPPM's must include an inset of the entire property on which the parcel is located, if needed to show the entire property. The parcel to be acquired should be the focus and remain at the normal scale.
4. IPPM's are to be color-coded as follows:
    a. Outline proposed fee taking parcels and fee taking parcel number balloons in red.
    b. Outline proposed slope easement parcels and slope easement parcel number balloons in yellow.
    c. Outline proposed drainage easement parcels and drainage easement parcel number balloons in green.

d. Outline proposed utility easement parcels and utility easement parcel number balloons in blue.

e. Outline proposed construction easement parcels and construction easement parcel number balloons in orange.

f. Outline temporary and/or detour roads or other features outside the right of way, not mentioned above, in brown.

9.2.6. Special Maps

Special maps and/or descriptions required by the Authority's Engineering Department, (e.g. advance purchase or lease by Authority).

9.2.6.1. Right-of-Entry Exhibits

For all property to be acquired whether in fee or in easement, the Consultant Engineer on an as needed basis shall submit to the Authority's Engineering Department Right-of-Entry Exhibits of an adequate scale, which have been color coded, to assist in the procurement of a Right-of-Entry for the Project.

These Exhibits shall show the owner's property in its entirety along with the Parcels being acquired by the Authority on 8-1/2" x 11", 8-1/2" x 14", 11" x 17" or 22" x 36" sheets.

Larger sizes are acceptable provided they may be folded "accordion style" to comply with the previously stated sizes.

Specific requirements are as follows:

1. Three copies will be submitted with each right of way submission.
2. Exhibit shall include the Section Number, Parcel Number, Parcel Area, Roadway Names and/or Numbers, Remainder Areas, Scale and North Arrow.
3. The color-coding shall be in accordance with Paragraph 9.2.5, 4a through 4f.

9.3. RIGHT OF WAY PARCEL DATA SHEETS – DESCRIPTIONS

1. For all property to be acquired whether in fee or easement, a Right of Way Parcel Data Sheet shall be prepared by the Consultant Engineer that will be used by the Authority, in conjunction with the maps previously described, during the acquisition process.
2. The Right of Way Parcel Data Sheet is to be incorporated into a form as shown in Exhibit 9-5. The date of the preliminary submission should be in the upper left corner of each Data Sheet. Subsequent revisions shall be duly noted. This applies to property taken in fee as well as easements. In the event that negotiations indicate the need for separate descriptions, or the attachment of additional specific forms supplied by others, they shall be prepared in accordance with instructions from the Authority's Engineering Department.
3. During negotiations with Property Owners, the Authority's Law Department may make accommodations in regard to partial takings, including but not limited to, interference with

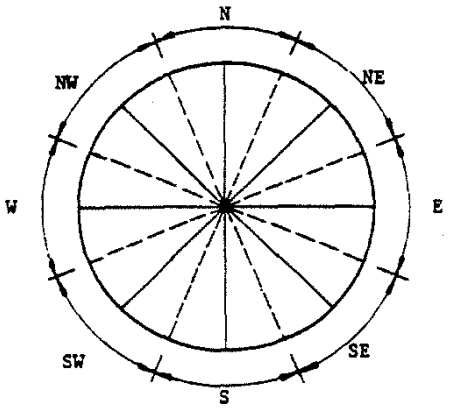
access to the property. In such cases, it may be necessary to revise maps and descriptions to delineate adequately the nature of the commitments, and the provision of information for engineering design in conformity with the accommodations. The Consultant Engineer is to assure that any and all of these "commitment driven" modifications are properly shown within the final contract documents (plans and specifications) so that all of these issues are clear to the contractor prior to bidding on the project.

4. Descriptions shall include referencing each parcel by project baseline stationing so that the location of each parcel will be defined with respect to the baseline. The Station selected shall identify the extremities of the parcel (See Exhibit 9-5). When deemed necessary, the Consultant Engineer may reference parcels fronting on local, county or State roads to stationing other than New Jersey Turnpike or Garden State Parkway baselines, with prior approval from the Authority's Engineering Department.

5. Types of Descriptions

   a. Standard format. Each description shall contain metes and bounds beginning at an easily identifiable proposed or existing right of way line, side street, road, etc., and continuing clockwise around the parcel to the point of beginning. The directions in the description used shall be as indicated on Exhibit 9-1.

Exhibit 9-1 Compass Direction



When referring in the descriptions to side lines of roads or to any lines other than those Authority owned, call these lines "northerly line", southwesterly line", etc., instead of "right of way" so as to eliminate confusion. Standard clauses are indicated in Exhibit 9-8.

   b. Easements - note these additions on the Parcel Description. See Standard Clauses (Exhibit 9-8).

   c. Utility Easement - See Exhibit 9-8.

   d. Entire taking - the lot and block clause should be included in the description on the right of way Parcel Data Sheet.

   e. Partial taking – "Being a portion of Lot… in Block…" should be noted.

   f. Remainder Parcel (RA-Parcel) - a right of way Parcel Data Sheet and parcel description is to be prepared when the Consultant Engineer is advised that the remainder will be

purchased by the Authority, the associated GPPM and IPPM shall be amended at the same time to reflect the RA parcel number.

9.4. PARCEL INDEX AND OWNERSHIP DATA SHEETS

1. The Engineer shall prepare a tabulation of property parcels for the project. This listing will serve as a composite reference for all pertinent information given on the ETM's and GPPM's.
2. Due to contract phasing, additional parcel takings having a common owner, may be designated by a different suffix letter, even if they are adjacent or continuous tracts of land from a previous contract.
3. General Requirements
   a. CADD Standards are the same as for ETM's and GPPM's.
   b. Sheet numbers will be assigned by the Authority's Engineering Department.
   c. Title box similar to ETM's and GPPM's, (see Exhibit 9-3).
4. All reference maps used in the preparation of the right of way plans shall be listed at the bottom of the sheet.
5. Sheet shall be of tabular format, listing the required information beneath the following column headings. Ditto marks are to be used for identical repeating entries. All presently owned Authority "RA-Parcels" should be noted as such in the remarks column.
   a. Baseline or centerline used for station reference
   b. Parcel number
   c. Map reference number - the GPPM's
   d. Parcel area
   e. Parcel location (Station to Station - Left or Right)
   f. Easement, type and ownership
   g. Name and mailing address of owner
   h. County of recording
   i. Deed book and page number
   j. Tax map, block and lot
   k. Filed map, block and lot
   l. Remarks

9.5. SPECIFIC REQUIREMENTS

9.5.1. Parcel Numbers

Parcels will be designated using a series of basic parcel numbers which will be assigned by the Authority's Engineering Department. These numbers will be part of an overall Authority numbering sequence. The Consultant Engineer shall furnish to the Authority's

project manager the approximate number of parcels involved, as early as possible, so that the numbers to be assigned can be established.

1. Parcel designations shall be placed on the maps in locations that promote clarity, and shall be situated adjacent to the owner's name, using leader extensions if necessary. The parcel designation shall be enclosed in a circle of 5/8-inch diameter as noted in Attachments, (Larger only if necessary for clarity.)

2. Different parcels having a common owner shall be identified by the same basic numeral and these individual parcels shall be further designated by adding a suffix letter. These letters shall be assigned in sequence from "A" to "Z", then "Ak" to "Az", except that the letters I, 0, U, X, and Y shall not be used.

3. The prefix letter RA shall be used to designate any remaining area adjacent to an area of taking. When there is only one such remainder, it shall be designated RA. When there are more than one such remainders for a given parcel, they are designated, RA-l, RA-2, RA-3, etc. When a remainder is clearly associated with a specific parcel of a common owner, the common ownership suffix letter is included in the RA-Parcel designation. Remaining areas (RA prefix) do not have a Parcel Bubble placed around them unless being acquired as uneconomic. The Engineer will be instructed by the Authority as to the treatment of such remainders on Project Plans, (see Exhibit 9-9 through Exhibit 9-11).

4. Prefix Letters

a. Prefix Intended Use or Encumbrance

A.....permanent access or marginal (frontage) road

AE.....Aerial easement

C.....Construction easements (a temporary easement) are to be given a parcel number only when there is no fee taking or other easement required from a given owner. Where other transactions are involved, construction easements should be shown as an additional clause in the Agreement, preceded by the words "AND ALSO the right to

Construction Easements are necessary for reconstruction / relocation of private driveways.

D .....Drainage easement (limits or width defined)

DA .....Denial of access

E .....Easement (slope)

F .....“Floodway” is a specific designation by D.E.P., Division of Water Resources which aims to control activities harmful to the environment by this land-use classification.

PA .....Private access

PE.....Protective easement

RA .....Remaining Area adjacent to an area of taking.

SD.....Sight Distance

T.....Parcel involves tidal land for which the riparian rights are owned or claimed by the State. A "T" parcel is that land owned or claimed up to the mean high water line.

TE.....Easement on parcel having riparian "T" prefix.

Q.....Parcel involves tidal land for which the riparian rights are owned or claimed to some extent (more questionable ownership or land which is subject to State regulations and lies between mean high water line and some other line, such as a line at an elevation of 1 foot above local extreme high water forming an area subject to State regulatory powers, (see Subsection 9.2.4 "Wetlands"). This Q prefix shall also be used to designate State owned interests, other than those represented by the riparian "T" prefix, labeled "portions of these areas were formerly below mean high water" as shown on maps entitled "Hackensack Meadowlands". Proof as to the State's ownership is to be provided with the parcel submission.

QE .....Easement on parcel having riparian "Q" prefix.

UE .....Utility easement

b. The meaning of these letters is dependent upon the meaning of the suffix letters described above. That is, parcel UE2OF is adjacent to Parcel 20F. Two UE parcels would be noted UE2OF and 2UE2OF.

c. To indicate that a revision to the description or map for a given parcel has been made, R, 2R, 3R, RUE, 2RUE, etc. will be used for successive revisions. Revision shall be made only after a Phase C parcel submission has been made to the Authority's Engineering Department, unless otherwise directed due to project scheduling.

d. If the same prefix is required for a given owner more than once, the prefix letters are preceded by the appropriate numbers (e.g. E, 2E, 3E, or UE, 2UE, 3UE, etc.).

e. All temporary easement descriptions shall include the duration of time necessary for the proposed work to be completed. This duration is to be based only on the time necessary to complete the work on the subject property, and not the project in general. The description shall indicate the easement as beginning upon the owner's receipt of written notification from the Authority's Construction Engineer. Should the duration need to be extended for cause, the description should also state that the owner shall be compensated at the same rate of payment indicated within the Authority's approved appraisal, (see Exhibit 9-8).

5. Different Uses

In those cases where various parts of a property are to be used for different purposes, each such different-use part shall be given a separate parcel designation even though the different uses may overlap. The only difference between the separate designations shall be in the prefix letter described elsewhere in this Section.

6. In some cases, multiple use of all or part of a taking will be contemplated. For example, it may be necessary to obtain a drainage easement for all of a parcel and an easement for relocation of a utility on part of it. In such cases the same basic numeral shall be used in the parcel number, but each easement shall be identified by a separate parcel designation (the designations differing only in the appropriate prefix letter in each case) and shall be treated in all respects as a separate and distinct unit in itself. The easement areas shown are for the particular easement involved, even though the areas may overlap, (see Exhibit 9-9 through Exhibit 9-11).

7. Previously Acquired Parcels

   a. Property outside of the existing Authority right of way line that is presently owned by the Authority shall be treated as a normal parcel in that it is assigned a parcel number. All such tracts within a Section shall be indicated by one basic Parcel number and suffix letters accordingly.

   b. Property previously acquired by an agency other than the Authority, which is outside of the right of way established by that agency (e.g. a slope easement outside a State route), shall be clearly noted on the Property Map with reference to the route, section, date of acquisition, etc.

8. Parcels that have been identified and later eliminated from the contract are to be noted “Parcel Eliminated” and a cross is to be drawn through the parcel number on both the ETM’s and GPPM’s. A line should also be drawn through the entire parcel entry on the Parcel Index and Ownership Data sheet and the parcel noted as “Eliminated”. The parcel number is not to be reassigned to another property, (see Exhibit 9-9 through Exhibit 9-11).

9. For parcels that are identified and later subdivided, a note is to be made next to the original parcel designation clearly identifying the parcels into which it was subdivided on the ETM’s and GPPM’s (e.g. Parcel 25 subdivided into Parcels R25 and RA-25, or 25A and 25B, Parcel 25A subdivided into Parcels 25A-l and 25A-2). The original parcel designation is to remain on the maps, (see Exhibit 9-9 through Exhibit 9-11).

9.5.2. Parcel Ownership

Full names of parcel owners shall be shown on the maps and in descriptions when identifying the owners of bounding properties if possible. Abbreviated names, if used, are to be as shown below:

"Richard Roe, et. ux."..... a man and wife

"Mary Roe, et. vir." ..... a woman and husband

"Richard Roe, et. al."..... two owners

"Richard Roe, et. als." ..... several owners

"Richard Roe Estate"..... the estate of a deceased owner

"Roe Realty Co."..... a company

On the Description form and Parcel Index and Ownership Data Sheet, the full names of all owners shall be completely shown.

9.5.3. Establishing Right of Way Line

In the following situations, the criteria to be used for the establishment of a proposed right of way taking line shall be the one which results in the designated maximum right of way width as determined by the Authority's Engineering Department. However, where special conditions or controls are present, reduced or enlarged limits of taking may be necessary. In these latter cases, approval shall be obtained from the Authority's Engineering Department for such revised widths.

Earthwork Sections

1. The right of way line, where practical, shall be a minimum of 70 feet from the outside edge of through-travel pavement.
2. The right of way line shall be a minimum of 25 feet from toe of slope, where no drainage ditch at the toe of slope is present.
3. The right of way line shall be a minimum of 10 feet from the top of ditch back slope where a drainage ditch at the toe of slope is required.
4. The right of way line shall be a minimum of 10 feet outside the top of slope where no top of cut ditch is required.
5. The right of way line shall be a minimum of 10 feet from the top of ditch backslope where a top of cut ditch is required.

Structures

1. At short overpass type structures, the right of way line is to be determined by the approach embankment.
2. Along long bridges and viaducts, the right of way lines are to be established at minimum of 50 feet outside the fascia lines of structure. Easements will be acceptable for those cases where fee acquisition is not feasible, i.e. as at railroads, certain utilities, etc.

The above noted criteria also apply to design sections. In addition, for those areas on a new alignment a minimum right-of -way width will be determined by the Right of Way Manager.

It is recognized that special situations, based on other than the above criteria may dictate right of way acquisition. In these cases the recommended right of way should be reviewed with the Authority's Engineering Department and approval secured before final right of way maps are prepared. Right of way lines shall be defined by "set' stations and offsets from a proposed baseline. These set dimensions should be established at maximum intervals of approximately 500 feet along the baseline. A series of chords is preferable for the right of way line; however, curves may be used if necessary for a concentric right of way line. At least two set dimensions are required to define each right of way line. Existing property lines may be used as the right of way lines, provided these are located by actual field survey. It is intended to define the right of way line primarily from the roadway baseline with sufficient data being shown so that a land surveyor may establish the right of way line from the Parcel Property Map and field surveys of the existing properties. The intersections of the right of way lines so established and existing property lines shall not be designated on the drawings by station and offset from the baselines, but shall be shown merely as the drawn intersections without geometrical value. Examples of various methods of setting the right of way line are indicated in Exhibit 9-9, Exhibit 9-10 and Exhibit 9-11.

9.5.4. Existing Monuments

All existing monuments encountered shall be located and referenced by project baseline station and offset right or left and, where possible, tied to physical features, which will not be disturbed by construction. Such references shall be noted in field notebooks. Monuments reset in the field shall be referenced and tied in their new locations. Monuments shall be shown and described on the GPPM's. Before construction begins, the pertinent agencies will be contacted by the Authority's Engineering Department, and requested to remove and relocate promptly all Federal, State, County, and Municipal Government Monuments, which lie within the proposed right of way or within easements taken for project construction. It is therefore imperative that all such existing monuments be shown and referenced accurately, thus enabling accurate subsequent relocations.

9.5.5. Proposed Monuments

Monuments shall be proposed at each set point defining the right of way line and at all angle points in the right of way line except where the right of way line is defined by a property line not located by a property survey. The intervals between monuments shall not be greater than 1,000 feet (500 feet in built-up areas). In general, monuments shall be placed by the Engineer supervising the construction under the direct supervision of a New Jersey licensed Land Surveyor. These monuments shall be set on the right of way

line unless otherwise directed. Consideration shall be given in locating these monuments so that they will not be covered, disturbed or removed by subsequent construction.

All proposed monuments shall be shown on the GPPM's, shall be referenced to the proposed baseline and to the New Jersey Plane Coordinate System. Any monument reset in the field shall be referenced and shown in its new location. Applicable requirements of "Instructions Covering the Inspection of Construction" shall be strictly adhered to.

9.5.6. Parcel Areas

Parcel areas are to be calculated using dimensions obtained from the best available data from one of the following sources: deeds, surveys (in cases where surveys have been accomplished), and calculations. Areas shall be as accurate as the basic data permits, but every effort is to be made to attain a high degree of accuracy. Areas shall be computed to the nearest square foot and 0.001 acre. When areas are shown on maps and stated in descriptions, the numbers on maps will be followed by the symbol "plus or minus" and the phrase "about' will precede the area quantity in the descriptions. Units of measure shall be shown in all instances. When more than one parcel has been designed under the same owner's name, each such parcel shall have its area expressed in the same units of measurement where feasible. Areas shall be shown on all the GPPM's in the manner indicated in Exhibit 9-9, Exhibit 9-10 and Exhibit 9-11.

All acquisition areas and remaining areas for a given owner shall be shown separately. The total of all acquisition areas and remaining areas shall represent that owner's complete property.

9.5.7. Street and Road Areas

Street and road areas, except where privately owned, shall not be included in an area designated by a parcel number, even though the present deeds run to the middle of the street, or even if the street or road is to be vacated. Boundaries of parcels shall be the right of way line of the contiguous street or road. Areas shall be computed, descriptions written, and referencing made accordingly. Vacated streets, proposed streets and streets which may or may not be vacated will be noted on maps when their final status is determined. An appropriate clause will be added to the description of any property which may have a right, title, and interest to the street area, or to any other areas such as those carrying reversionary clauses, etc.

9.5.8. Easements

An easement is required and must be secured for any and all work that is done on, or associated with disturbance to, property outside of the right of way for which the Authority will acquire rights. All easements shall have a parcel designation and area in the GPPM's.

1. As stated in this Section with respect to parcel designations, easements for different types of work or disturbances are separate and distinct. Easement areas may overlap and should also be shown on Authority owned land outside the right of way. Within the right of way, utilities are not located within easements but are there by permit as explained in Section 8 - Utility Installations, Relocations and Adjustments of this Manual.

2. Slope easements and drainage rights shall be of a size adequate to include an allowance for "wash and spread" consistent with the type of material in the embankment and the height and steepness of slope, and also an allowance for drainage rights along the toe of slope.

3. The descriptions of drainage easements shall provide for all requirements necessary in connection with cross-drains, culverts, ditches, headwalls and related appurtenances. The right and/or the responsibility for maintenance and the need for the privilege to enter upon lands of the owner for the purpose of deepening, widening, or straightening an existing water course shall be considered, and the appropriate clauses included in the Description.

4. Maps will be the same for permanent and for temporary easements. The description and prefix letter shall indicate the permanent or temporary nature. In the description, a suitable statement should denote the conditions governing terminations.

5. The limits of easement lines shall be referenced by project baseline stationing and offset right or left on the Parcel Index and Ownership Data Sheet and in the easement description.

6. An explanation of each easement shall be entered in the "Remarks" column of the Parcel Index and Ownership Data sheet; all easements shall be clearly indicated and labeled on the maps, and descriptions shall be prepared just as completely as for parcels for which fee title is to be acquired.

7. Treatment of public utility easements is often subject to the requirements of that utility. The Authority often must purchase an easement across public utility property rather than a purchase in fee. Specific agreement terms between the Authority and the public utility must be determined by the Consultant Engineer in conjunction with the utility owner.

9.5.9. Instrument Survey

Instrument surveys are necessary to develop data not already available or if required to describe adequately any property or easement. For surveying procedures, see Section 4 - Design Surveys of this Manual.

9.5.10. Field Inspection

A field inspection and check of each parcel shall be made to insure that the GPPM's, IPPM's and the Special Maps accurately define and show in proper location and extent all physical features which in any way affect the value of the property, such as; driveways, sidewalks, size and type of all buildings which shall be shown to scale, trees, drainage features, underground utility connections, and other appurtenances typified by oil tanks, wells, septic systems, etc.

Exhibit 9-2 Property Parcel Map Layout

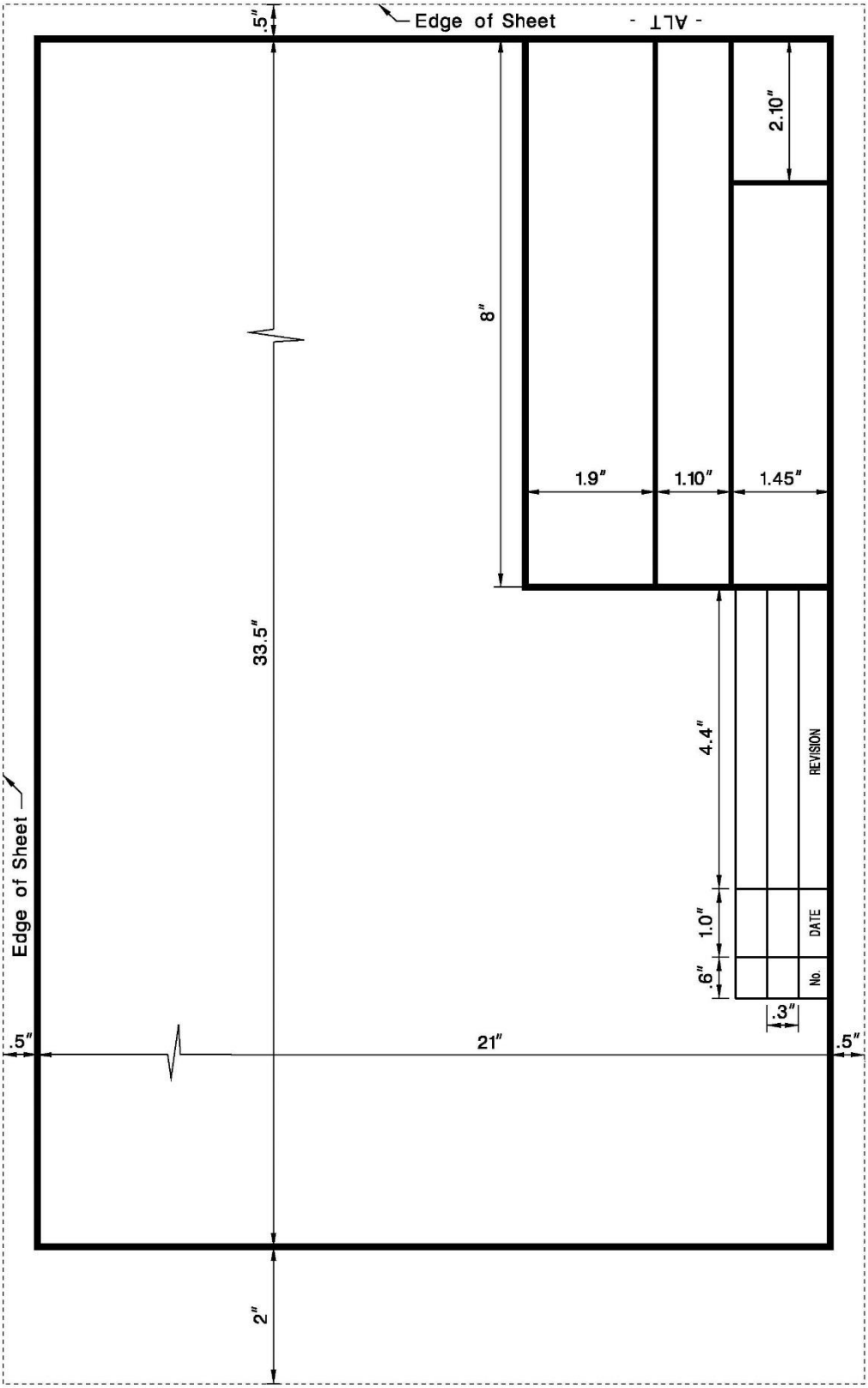


Exhibit 9-3 Title Block

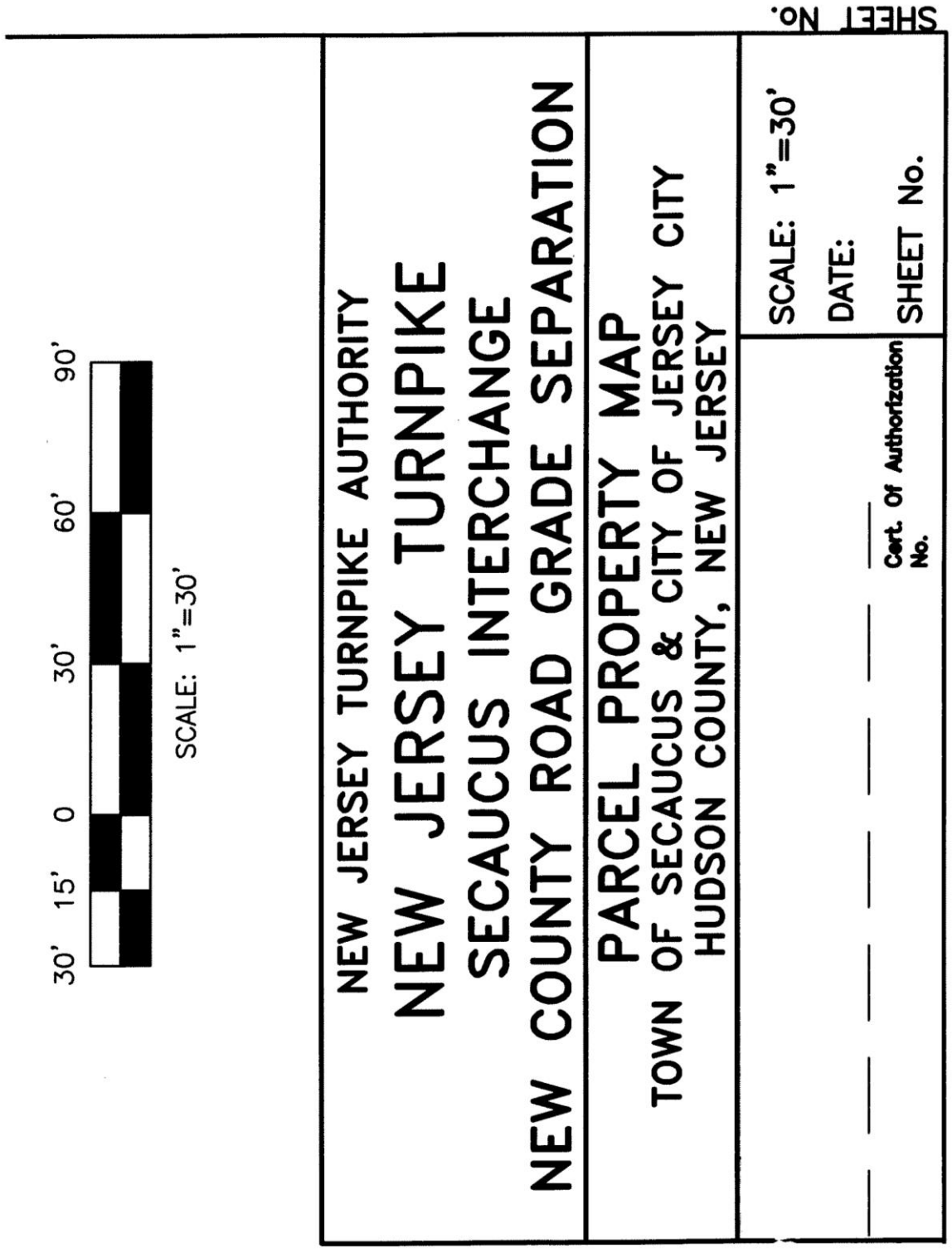
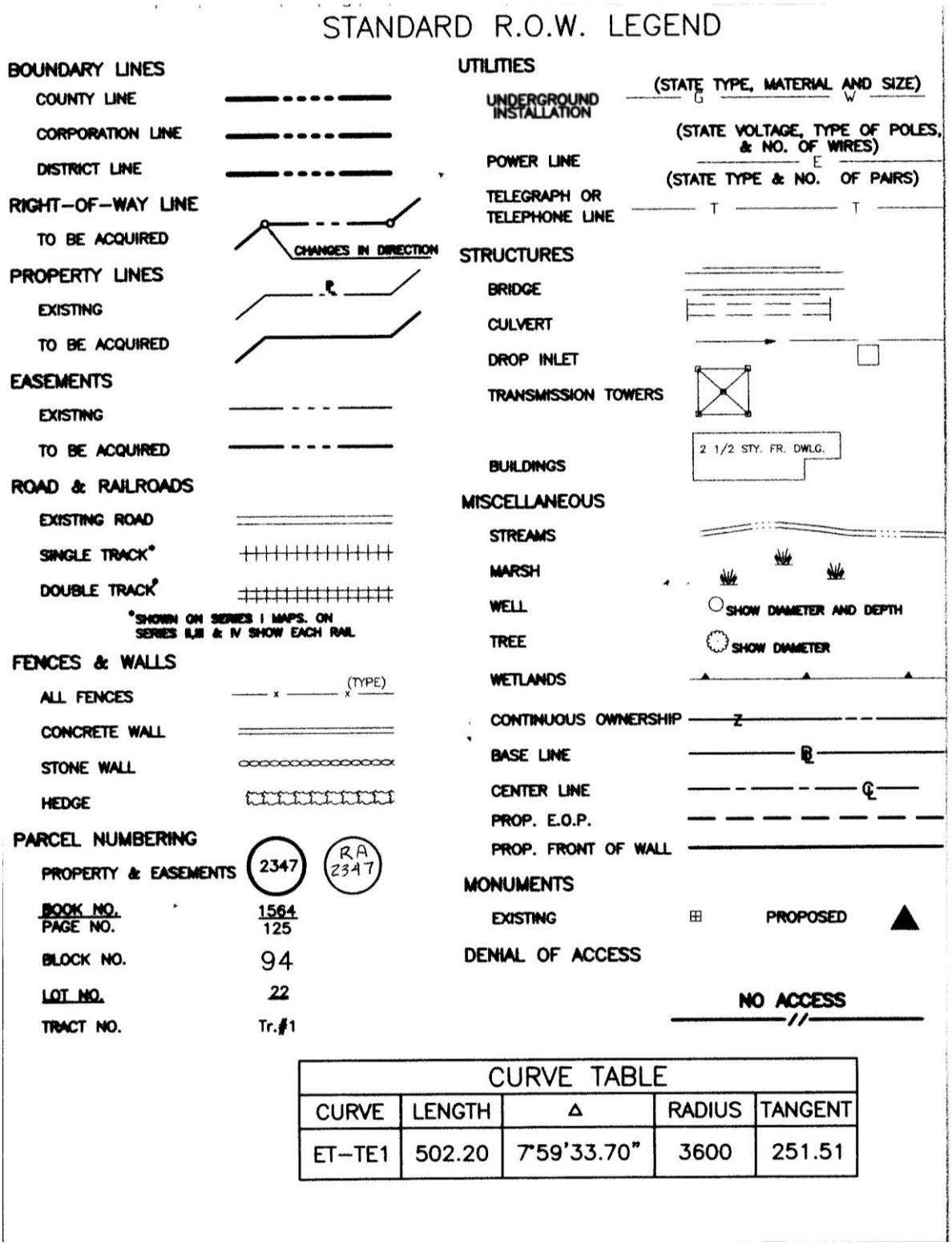


Exhibit 9-4 Standard R.O.W. Legend



CURVE TABLE				
CURVE	LENGTH	Δ	RADIUS	TANGENT
ET–TE1	502.20	7°59'33.70"	3600	251.51

Exhibit 9-5 Sample Description

Preliminary Submission Date / Init of Eng in charge / Steno's Init's
Rev. 1/ Date / Init of Eng in charge / Steno's Init's
Rev. 1/ Date / Init of Eng in charge / Steno's Init's etc.

RIGHT OF WAY DESCRIPTION

PARCEL NO:

BLOCK & LOT NO:

PROPERTY ADDRESS:

CURRENT RECORD OWNER:

Owner's name(s) as they appear on deed

Owner's mailing address if different from above property address

BOUNDED DESCRIPTION:

Parcels XXX, XXX and XXX as designated on a map filed or about to he filed in the Office of the Clerk of XXX Count, entitled "NEW JERSEY TURNPIKE AUTHORITY, [ROADWAY NAME], ENTIRE TRACT MAP, SECTION XXX, MILE xx.x TO MILE XXX, Engineering Firm's Name Engineering Firm's Address, City, State, SCALE: 1" = 200'" and "NEW JERSEY TURNPIKE AUTHORITY, [ROADWAY NAME], GENERAL PROPERTY PARCEL MAP, SECTION XXX, MILE xxx, TO MILE xx.x, Engineering Firm's Name Engineering Firm's Address, City, State , SCALE: 1" = 30'" and as shown on the Exhibit A entitled "…"

Said Parcel XXX including specifically.

BEING PART OF/THE SAME premises conveyed to the seller herein by

TOGETHER WITH any and all rights of direct access to…

TOGETHER WITH any and all right title and interest.

SUBJECT, HOWEVER, to a XXX easement for XXX affecting the herein dc premises dated XXX, as filed with the County Clerk of XXX County in deed book XXX on page XXX. List all easements (Authority and third party), restrictions, encumbrances, etc. in separate paragraphs

Said parcel XXX including specifically . . .

Exhibit 9-6 Individual Property Parcel Map Layout

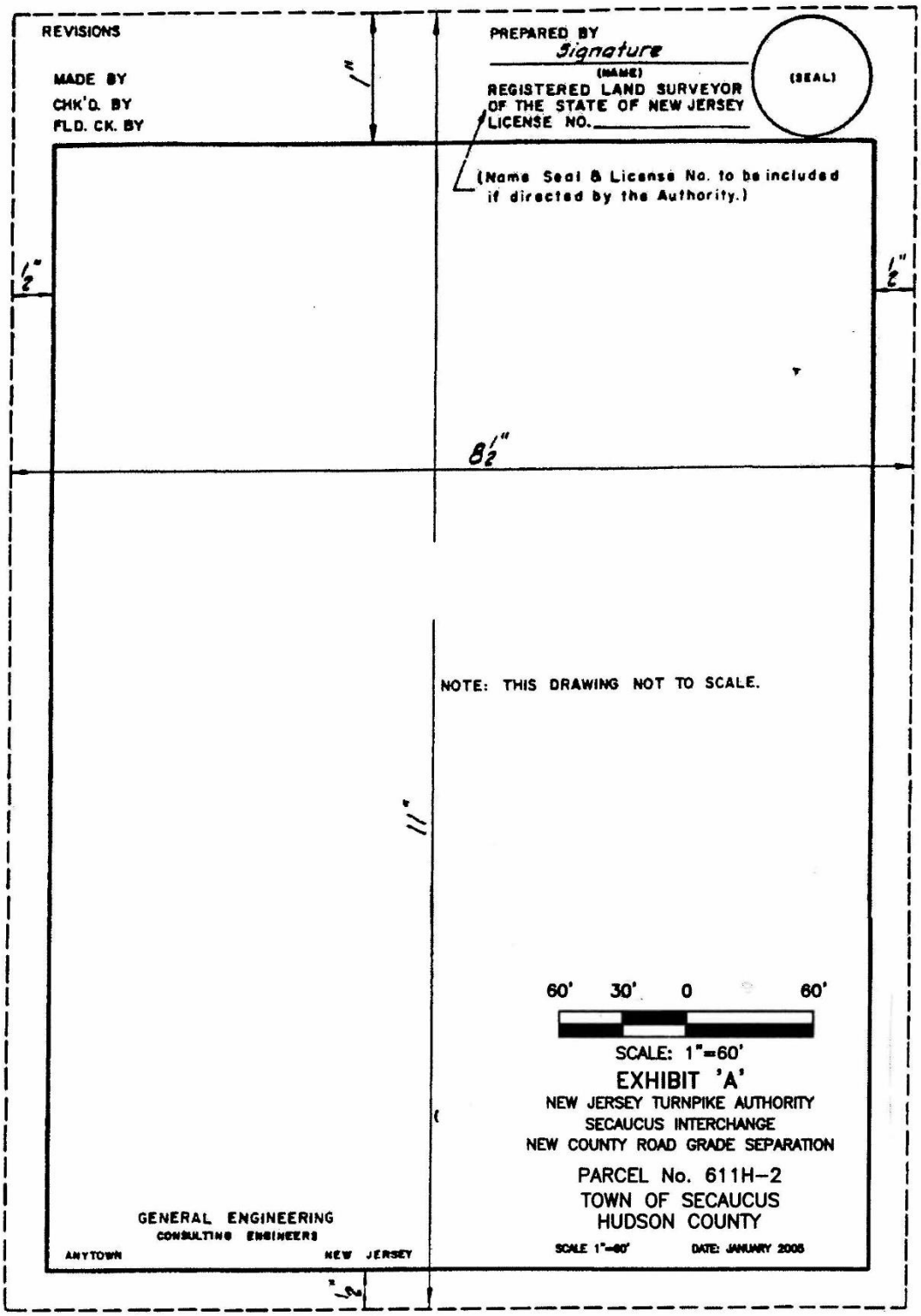


Exhibit 9-7 Sample Line Weights and Letter Sizes

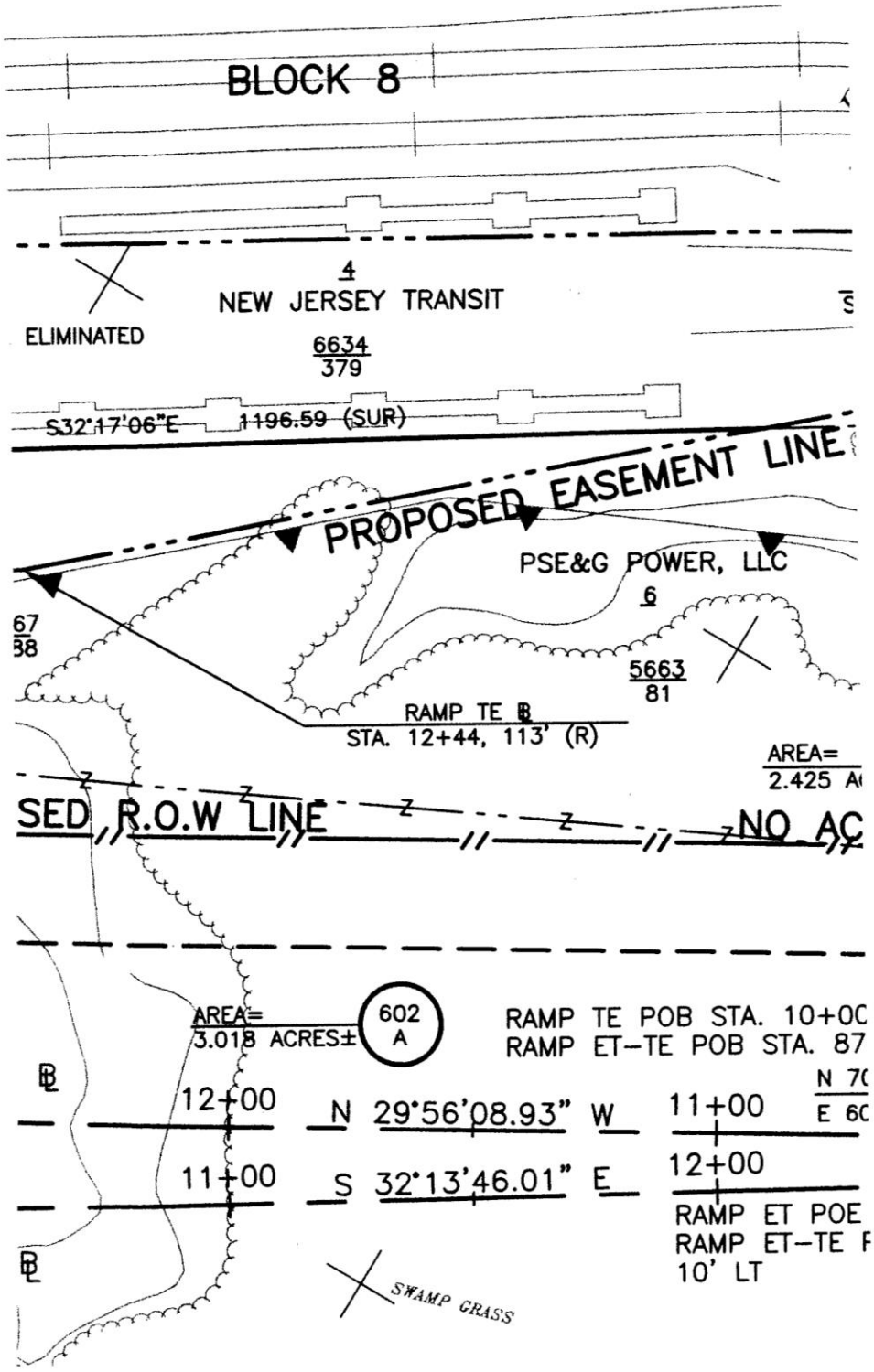


Exhibit 9-8 Typical Clauses for Description

GENERAL

Parcels 825A, 825B, 825C, A825, RCB25A, 2C825, UE825, E825, R2E825, 3E825, as designated on a map filed or about to be filed in the Office of (fill in) of (fill in) County, entitled: ("GPPM Title excluding date, municipal - county and sheet numbers"). The description shall also contain an identical reference for the ETM's.

NOTE: Parcel designations may include a prefix assigned to identify the particular project for which the right of way is required (e.g. DE9-825A, DE9-825B, etc.)

FEE ACQUISITION

Said Parcel 825A including specifically all the land and premises bounded on the north and west by the Proposed *[Roadway Name]* right of way line, as defined by proposed right of way monuments as shown on parcel property map, on the east by the westerly line of Walton Avenue, and on the south by lands now or formerly of Frank L. Dudley; extending from about Proposed *[Roadway Name]* Baseline Station 462+20 on the southwest to about Station 462+55 on the north, as shown on said map; containing about 2120 square feet.

FEE ACQUISITION - ENTIRE PROPERTY WITHIN RIGHT OF WAY

Said Parcels 825B and 825C including specifically all the land and premises lying within the Proposed *[Roadway Name]* right of way lines as laid down on said map, bounded on the north by lands now or formerly of Andrew Wood; on the east by lands now or formerly of John Smith; on the south by lands now or formerly of Sam Jones; and on the west by the easterly line of Tulip Street; extending from about Proposed *[Roadway Name]* Baseline Station 562+50 on the southeast to about Station 563+05 on the northwest, as shown on said map; containing about 1570 square feet.

Said Parcel 825B and 825C being also designated as Lot 57 in Block 432 on the tax map of (fill in Municipality), and also known as 476 Tulip Street of said municipality.

NOTE: Metes and Bounds descriptions are to be provided.

AERIAL EASEMENT

Said Parcel AE39 as designated for an aerial easement to carry the *[Roadway Name]* across the parcel of land described as follows: Bounded on the

The grantor shall enjoy full utilization of his property provided the grantor agrees not to erect any structure within the aerial easement area or use said area for the storage or use of flammable or explosive material, etc. when in the opinion of the Chief Engineer of the New Jersey Turnpike Authority, said structure or use may have an adverse effect or a potential hazard on the [Roadway Name] structure, roadway, appurtenances or the safety of the traveling public. These restrictions shall not apply to railroad trains and their contents in transit or to their normal operations.

Further, the grantor shall permit the Authority and its designees the right to enter upon the property for the purpose of constructing, reconstructing, maintaining, repairing, inspecting or replacing the structure

located thereon and the appurtenances thereto which includes but is not restricted to the drainage, footings and other facilities located within the aforementioned aerial easement.

CONSTRUCTION EASEMENT (Temporary)

Said Parcel C825 consisting of the right to (describe temporary work) for use during the construction of (designation of proposed permanent construction). Said right shall commence upon the owner's receipt of written notification from the Authority's Construction Engineer, and shall remain in effect for (state duration in number of months), or until such use is no longer required, at which time the land shall be restored to substantially the same condition that prevailed before said temporary use began. Should the duration need to be extended for cause, the description should also state that the owner shall be compensated at the same rate of payment indicated within the Authority's approved appraisal.

REVISED DETOUR ROAD EASEMENT

Said Parcel R0825A consisting of the right to construct and maintain a temporary road and appurtenances on lands now or formerly of (owner), as shown on said map, for use during the construction of the [Roadway Name] Bridge and the grading of State Highway Route 26. Said right to exist for the duration of construction of the permanent roadway at which time said temporary road and appurtenances will be removed and the land restored to substantially the same condition that prevailed before the work was started

DRAINAGE EASEMENT

Said Parcel D825 consisting of the right to construct and maintain a drainage ditch on lands now or formerly of (owner), as shown on said map, and also the right to maintain the flow of surface drainage from the cross drain at about Station 12+90, and discharge said water on lands of the owner on the southeasterly side of the [Roadway Name].

SLOPE EASEMENT

Said Parcel E825 consisting of the right to form and maintain slopes on lands now or formerly of (owner), as shown on said map, for grading and draining Ford Road; provided, however, that the above recited slope easement.

PRIVATE ACCESS

Some PA parcels may be situated that they must be shown on a Property Strip Map in order to show their boundaries and their relationship to the Authority's roadways. When negotiation dictates no purchase of the RA-Parcel (description not included in an agreement) as access will be provided thru an PA (private access) parcel then an agreement shall be made that includes the following:

Subject, however, that the New Jersey Turnpike Authority would grant unto the Seller herein a Private Access parcel designated as _____, also known as lot _____ in block _____ on the _____ map of _____ of _____, and which lands are now or formerly of _____. Said Parcel _____, including specifically all the land and premises bounded _____; located about and opposite of Proposed ___ Baseline _____ Station Office

of _____ entitled _____ Property Strip Map _____ 1" = 200', containing about ____ acres.

PROTECTIVE EASEMENT

Said Parcel PE39 as designated for a protective easement, contiguous to the Authority right of way or aerial easement, being described as follows: Bounded on the . . . .

Structures of fireproof construction shall be permitted within this protective easement area below the elevation of the profile grade line of the nearest Authority roadway without the prior approval from the Authority's Engineering Department as long as no structure is erected within 5 feet of an Authority roadway; provided, however, that no lights, signs or advertising media will be permitted whether upon, attached to or protruding from any structure or appurtenances and which may be above the elevation of the profile grade line of the nearest Authority roadway when, in the opinion of the Authority's Engineering Department, said lights, signs, or advertising media reflect or cause to be reflected or produce a distracting effect upon patrons traveling on the Authority's roadways.

Now or in the future, where physically accessible, the grantor shall permit the Authority and its designees the right of ingress and egress across the easement for the purpose of access to the adjacent Authority structure and appurtenances thereto after proper notification by the Authority's Engineering Department.

Nothing herein shall be construed as preventing the grantors from enjoying the maximum utilization of his land in accordance with the permitted uses as enumerated by local, State and Federal ordinances, statutes and regulations, provided the above provisions are adhered to by the grantor.

SIGHT DISTANCE

Said Parcel SD1A, including specifically all the land bounded on the north by the proposed line of Relocated Jackson Mills - Lakewood Road (County Route 9), as shown on parcel property map; on the east by the existing westerly line of Cooks Bridge Road and on the south by the proposed line distance easement, as shown on parcel property map; extending from about Proposed Relocated Jackson Mills - Lakewood Road Baseline Station 24+90 on the west to about Station 26+55 on the east as shown on said map: containing about 1,010 square feet.

UTILITY EASEMENT

Said Parcel UES25A consisting of the right to install and maintain Colonial Pipeline; located along the Proposed Authority right of way line, adjacent to Parcel 825A, as shown in the area marked containing about 1500 square feet.

Utility Easement (Easements for Jersey Central Power and Light Co. - only).

Said Parcel UE82SA consisting of the right to construct, maintain and operate thereon one or, from time to time, more lines for the transmission and distribution of electric energy consisting of overhead and underground conductors and lighting protective and communication wires, supporting structures, guys, push braces, ducts and conduits and other accessory apparatus and equipment deemed by Jersey Central Power and Light Company to be necessary therefore, upon, over, across and under the lands of

_____

_____

including within the side lines of said easement and prolongations thereof any roads, rivers, streams, streets or highways bounding or crossing the same, subject, however, to the rights of the public or others therein.

Together with the right from time to time to patrol, inspect, redesign, rebuild or alter said lines and to install such additional lines, apparatus and equipment as Jersey Central Power and Light Company may at any time deem necessary and the right to remove any line or any part thereof.

And also with the right from time to time to remove or clear and keep clear any or all trees, underbrush, structures and other obstructions upon said easement, and such trees beyond the same as in the judgment of Jersey Central Power and Light Company may interfere with or endanger said lines or appurtenances when erected. Together also with the right to enter without notice upon Crantors said lands for all of the purposes aforesaid.

Except as provided by law and subject to Jersey Central Power and Light Company's exercise of their rights granted hereby, Grantors may farm, cultivate, or use the ground within the limits of said easement without substantial change of grade, provided that in Jersey Central Power and Light Company's opinion such use shall not endanger Jersey Central Power and Light Company's facilities nor interfere with, limit or obstruct any subsequent exercise of the rights hereby granted, and provide further that no building or other structures shall be erected within said easement.

FOR ALL PROPERTIES WHICH HAVE FRONTAGE ON A STREET

TOGETHER WITH all right title and interest that owner may have in and to existing Tulip Street contiguous to the above described premises. (For fee taking only where access to the existing street is being acquired). This clause should not be used where and existing road is simply being widened. It can be interpreted as to deny future access to the widened roadway.

DENIAL OF ACCESS

(Clause to be used in conjunction with a partial fee taking.)

TOGETHER WITH any and all rights of direct access to and from the (Designation of Roadway) constructed or to be constructed on land herein above described. This clause should clearly designate the roadway, i.e. New Jersey Turnpike or Garden State Parkway.

DENIAL OF ACCESS (Only Taking Involved)

Said Parcel DA2O consisting of the right to deny any and all right of direct access to and from (Designation of Roadway) ± as shown on said map, from about Station 12+30 to Station 15+30 extending about 300 feet in length.

SUBJECT, HOWEVER, to the colonial Pipeline Easement affecting the herein described premises. (Specific easements must be noted based on recorded documents and or facilities identified in the field)

RIPARIAN RIGHTS

SUBJECT, HOWEVER, to the rights of the State of New Jersey to the riparian lands (or meadowlands).

STRUCTURES

AND ALSO, the right to construct, reconstruct, maintain and use an overhead bridge, together with its piers, subsurface footings and appurtenances to carry the Authority roadway across the above described parcel(s) of land.

ENVIRONMENTAL IMPACT

SUBJECT, HOWEVER, to all environmental impacts created during route location, construction, and highway use. These impacts may involve health, safety and welfare and may be evidenced by the highways effects upon water and air quality, ambient noise and aesthetic characteristics of the area. (To be used in Agreements Conveying surplus Property \ to New Owners).

Exhibit 9-9 Sample Parcel Designations - 1

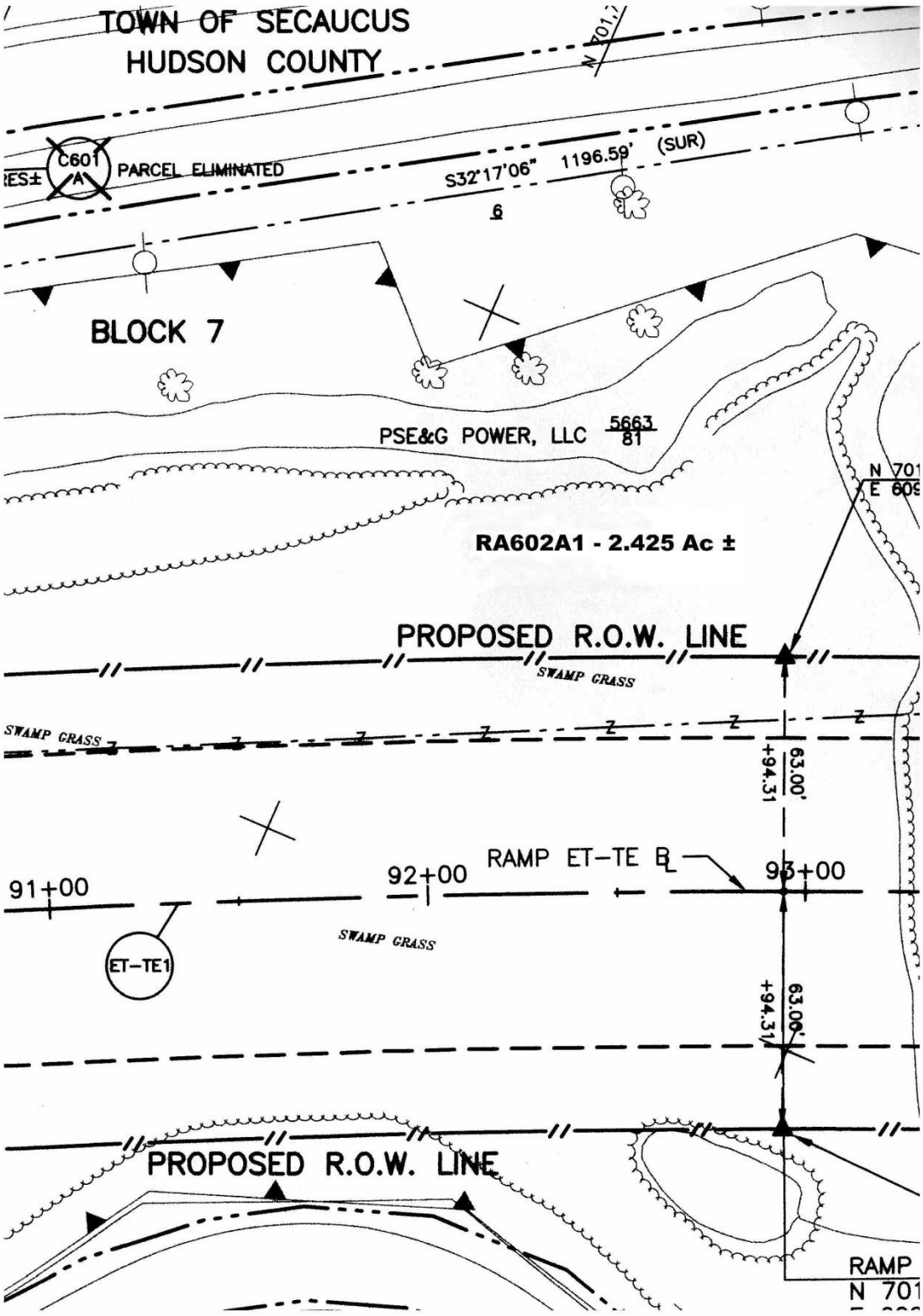


Exhibit 9-10 Sample Parcel Designations - 2

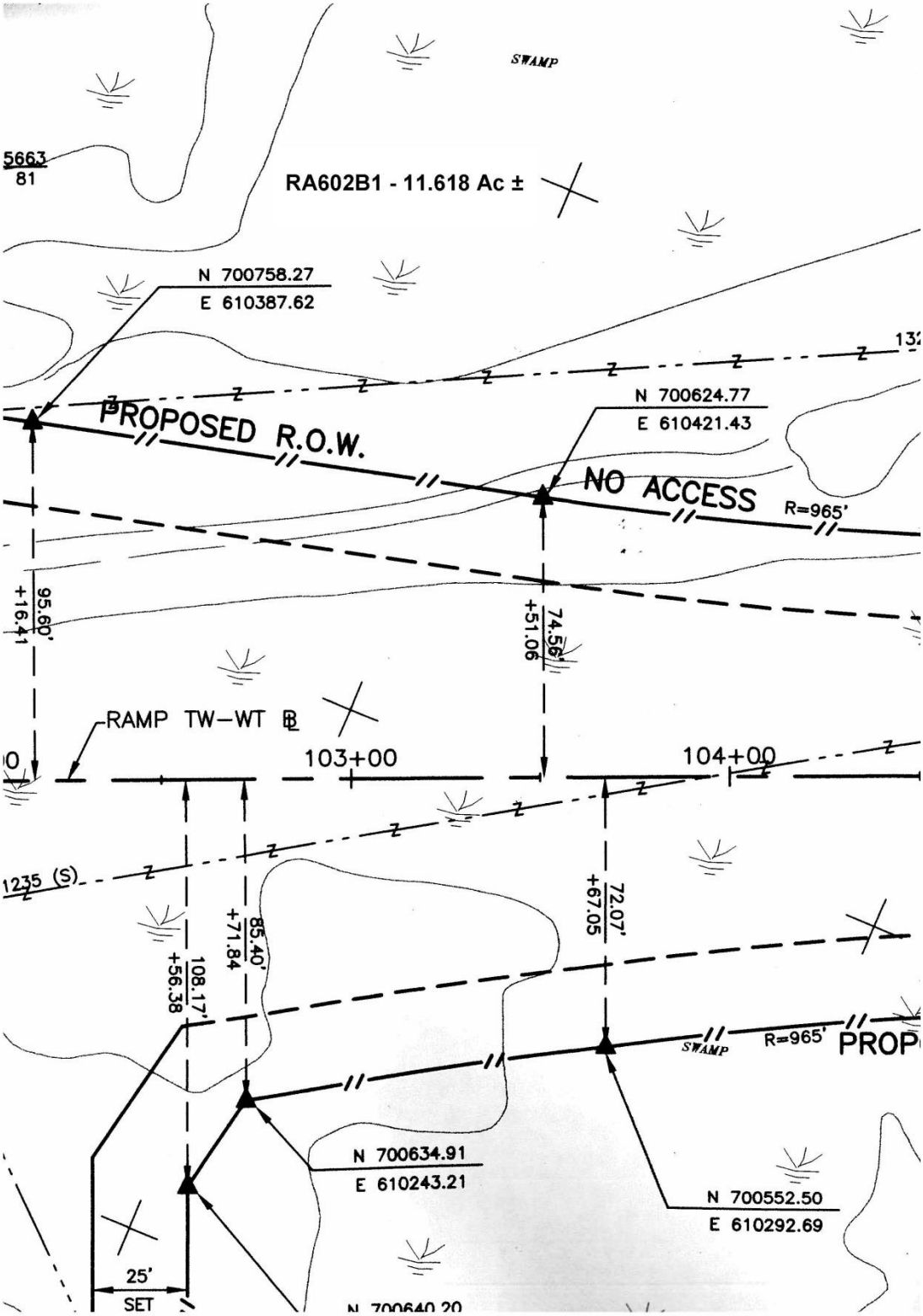


Exhibit 9-11 Sample Parcel Designations - 3