MT1 – CP08 - 28155

Construction Project Management and the Renovation of the Hillsborough County Court House

A Major Qualifying Project

Submitted to the Faculty of

Worcester Polytechnic Institute

In Partial Fulfillment of the Requirements for the

Degree of Bachelor of Science

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Abstract

This Project evaluates the construction project management practices during construction and the process of the pile tests for the Hillsborough County Courthouse. The construction management process was observed by attending owners meetings, site walkthroughs and participating in the everday practice as both an Assist Project Manager and as an onsite Control Quality Manager. By organizing and planning additional proper Control Quality and Waste Management Plans there will be added efficiency and progress overall. The pile test calculations were monitored by Engineered Foundation Technologies and the beams calculated were the beams used during the test.

Acknowledgements

For their support and assistance throughout this project, I would like to kindly thank those who supported me below:

TLT Construction Corporation

Tom Kostinden – Owner of TLT

Chris Cormier – Vice President for TLT

John Galasso – Project Manager for TLT

Lavalle Brensinger Architects

John Adams – Architect at Lavallee Brensinger Architects

Engineered Foundation Technologies

Rich Porter – Owner of EFT

Maurice Beaudoin – resident Engineer for the US Army Corps of Engineers

MingJians Tao – Professor of Civil Engineering

Guillermo Salazar - Professor of Civil Engineering

Capstone Design Statement

The capstone was satisfied through the calculations of the appropriate beams used for the Hillsborough County Courthouse pile load testing. According to Fohley Buhl Roberts & Assoc., the designated structural engineer, a pile load test was needed to verify the buildings original pile lengths and that they can withstand the new construction weight being applied to the existing building. Since the building was rebuilt in 1967, the records were poorly kept. Due to time, deterioration and bad record keeping; the lengths and strength of the original piles were an estimate.

Two site visits were made to establish a route to install the equipment needed to apply the load to the existing pile, as well as to choose the appropriate pile to test; one that was out of the way of ongoing demolition and had enough clearance above for the test its-self. It was established that there would need to be a ramp carved out by a backhoe into the soil leading to a lower entrance.

Quality Control and Coordination were two additional methods that were performed to smoothly carry out this procedure. A 5 foot trench needs to be dug through the existing lower level floor to expose the pile cap and the top of the existing piles. The soil dug out would need to be coordinated so that it would be out of the way of the equipment; but close enough to minimize time to backfill. By decreasing the backfill time, this would save man hours, which would then save money.

Cost is a big factor in completing this test. Pile load tests are generally expensive and if the test fails, additional costs will be incurred by the owner for installing new piles. So to obtain

reliable testing results on pile bearing capacity, the coordination by both the subcontractor and project manager is imperative.

Safety would be another concern if these piles did not pass a pile load test and construction proceeded without replacing or adding piles for the servicing load, the building would not only have a high risk of collapsing during construction, but could potentially fail while occupied by the state and civilians. It is crucial that the pile load test be carried out to determine pile bearing capacity when additional weight is added to any building that could result in possibility of extreme stress.

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1.0 Introduction

In the fiercely aggressive construction industry, proper management is what provides the success to stay alive in this economy. In 2007, construction produced roughly 4% of the US's gross domestic product. To capitalize on such a large amount of money proper management techniques are not only recommended, they are needed.

Administration of a project starts well before a shovel hits the ground, a project manager can get involved as early as the conceptual phase, and leave as late as the date of occupation. Project managers, otherwise known as P.M.'s, control every facet of the job from the estimating to the final completion submittals. P.M.'s do not necessarily have to represent the GC, they can also represent the owners or be a third party consultant.

Originally built in 1967 the renovation of the Hillsborough County Courthouse North began in 2010. Although the courthouse was over 40 years old and due for an upgrade, the major reason for this multi-million dollar renovation is for major asbestos abatement. The courthouse has three major participants involved in the project: The owner, the Construction Manager, TLT Construction, and the architect, Lavallee Brensinger Architects.

To complete this project properly, by August 2011, these three main contributors are expected to work collectively for the duration of the renovation. The best way to approach a project of this magnitude is to create a plan. By creating a plan, the construction project manager can control documentation, coordination and communication.

There are two main objectives for this report; the first objective is to create two plans for the project manager to follow; a contractor quality control plan and a waste management plan. The second objective is to help with the pile load test by assisting in the calculation process of the beams that need to be installed for the actual pile bearing capacity test.

I have completed two courses as a precursor to creating any plan used to organize the construction process. The first class was an in depth OSHA 30 hour course, which focused on the safety of a construction site and how to create plans to prevent most incidents. The second class was held by the Army Corps of Engineers, which focused on construction quality management. Information for these specific plans were gathered by attending on-site meetings, interviewing key people in the project and from direct interaction with the architects and project manager.

Both plans were designed to be followed by not only the project management team, but the architect and owner as well. By interviewing the P.M., and project staff and compiling the projects records, I was able to address the specific needs of this project and create templates for future projects as well.

Another large issue overshadowing the Hillsborough County Courthouse is the piles that were originally placed when the building was first constructed. These piles, over the years, have started to deteriorate and proper records have not been kept of the length, depth and size of these piles. For the building to add additional weight to the structure, these piles had to have their bearing capacity appropriately tested.

Engineered Foundation Technologies was hired as a subcontractor to perform the bearing capacity tests, but before the tests could be performed, the apparatus that provides the

downward force of the piles needed to be designed. The calculations in section 5.3 show the results of what steel beams were needed to perform this heavy duty task.

2.0 Methodologies

The three objectives of this project were to create a quality control plan, a waste management plan and to assist in the pile bearing capacity test for the Hillsborough County Courthouse. To appropriately assess these three issues, I worked with two different players in their respective fields. John Galasso was the project manager for TLT Construction; with his knowledge of project management and the issues surrounding the construction process, he was a vital source of information and advice in preparing both plans. For the pile bearing capacity test, I met with and interviewed Rich Porter, from Engineered Foundation Technologies. I met with rich to help assist with the pile load test and its calculations.

By interviewing key members in the project I was able to see the projects issues from their point of you and address those issues appropriately. I took a control quality management program and OSHA 30 hour test to better qualify myself as someone who could write the quality control plan. Once these plans were created they were put into use for the remainder of the project.

3.0 Background

Since 1769 the counties of NH and their courthouses have been a part of the United States incredible history. This chapter presents the reasons behind the renovation of the Hillsborough County Courthouse North (HCCN) and to gives a short description of the main

participants involved in the HCCN project. This section also covers core concepts involved in the project and their applications towards the end product.

3.1 Hillsborough County Courthouse

Figure 1: Hillsborough County Courthouse, Circa 1909.

The Provincial Act of 1769 helped to create the counties of New Hampshire. By dividing the Province into five separate counties, the King England made it easier and cheaper for the people to access the courts. This act defined the geographical boundaries for the Court of General Sessions of the Peace and conferred upon the Justices the power to assess taxes for "Building, Inspecting and Repairing all Prisons, Courthouses and other necessary public edifices within their respective counties. Of the five counties, Hillsborough County began to implement its judicial power on March 19, 1771 (Hillsborough County, New Hampshire, 2004).

In 1823, the original towns of Hillsborough County detached and recreated the geographical boundaries that we know today. The town of Amherst was established as the

county seat because it was the largest farming community. A jail was constructed and court sessions were held in the Amherst Public Meeting House(Figure 1). County officers and justices served the King of England (Hillsborough County, New Hampshire, 2004).

Figure 2: Hillsborough County Courthouse North, Manchester, NH (2010).

In 1967 the Manchester based Hillsborough County Courthouse was built on 300 Chestnut Street(Figure 2). Its outer envelope made of the states very own granite. Built to handle a large volume of the counties judicial hearings, the state of New Hampshire started to give a larger work volume to the new building, because its sister courthouse in Nashua was built in 1901(Waymarking, Nashua Court House, 2010) could not meet the growing capacity that was needed.

In September of 2009, it was first reported (Nashua Telegraph, 2009) that the courthouse located at 300 Chestnut Street was built with materials containing a vast amount of asbestos. The $2 to $3 Million asbestos abatement was slotted to begin on January of 2010. Due to the quantity of asbestos found in the walls, in the tile flooring, on the piping and in the parapet

on the roof, the HCCN had to have a complete overhaul. The Two phase project began on time in January of 2010, phase 1 being the initial abatement and phase 2 being the architectural and structural renovation. By the time May of 2010 came around, it became quite clear that there was much more asbestos than originally anticipated, thus pushing the phase 2 start time back 1 full month and delaying the original time frame given to phase 2 by one year. The courthouse is now expected to open its doors on the 1st of August, 2011 and an additional cost to abate the remaining asbestos has been added to TLT's contract.

3.2 TLT Construction

Founded originally in 1976 by Thomas Kostinden, TLT Construction Corp. is a commercial construction project management corporation that has matured into a leading general contracting firm involved primarily in Federal, State, Municipal (specializing in educational), Recreational, Commercial and Medical Facility construction. Based out of Wakefield, Massachusetts, TLT is among the top 400 general contractors in the nation. The Engineering News Record Magazine ranked TLT 283rd in their "Top 400 Contractors" in the nation and 9th in MA.

TLT's success is largely due to superb time tested management skills, safety, employee education/training, cost controls, and proficient scheduling (TLT Construction Corp, Company). TLT presently employs 120 construction management, field personnel and administrative professionals, all across the eastern states. With 0ne-Hundred Fifty Million dollars annually and a bonding capacity of Two-Hundred Million dollars, TLT has been able to put together an impressive resume including:

Figure 3: Brookline High School Located in Brookline, Ma. Cost: $39,000,000

Educational

1. Brookline High School (Figure 1)
2. Cohasset Middle/High School
3. Acton Boxborough Regional High School
4. Martha's Vineyard Regional High School
5. South Lawrence East Middle School

Historical (Renovations)

1. The Hatch Memorial Shell
2. Old South Meeting House
3. Dillaway-Thomas House
4. Salem Public Library

Medical

1. MIT Lincoln Labs
2. Phillips Labs
3. Joel Health & Dental Clinic

TLT's position as the leading school builder in Massachusetts is well established and with over $1 Billion dollars worth of educational facilities, TLT was recently placed on the top 25 Educational builders in the country (Source: ENR). To complement this impressive record, TLT has performed over 4,000 housing unit projects.

By staying financially consciences, TLT has been able to stay alive in today's ruthless market. Due to their large stakeholder status in the company both the Owner and Vice President see the flow of all financial transactions, as well as give their authorizations. By keeping a lean company and a lean budget, TLT is able to maximize their potential profits and mitigate larger financial problems.

For this particular project, TLT's staffing starts from the very top. At the very top, Tom Kostinden not only runs the company; he actively participates in the estimates and purchasing of all of the HCC's needs. On the next tier, Chris Cormier is the current Vice President, who leads most team meetings. The direct management staff to the project consists of John Galasso the project manager and Joe Tassone the site supervisor. Lastly, I am at the bottom of TLT's staffing hierarchy as the assistant project manager and construction quality manager, my primary role is to be the lead support to primarily the project manager and to assist the supervisor in most of his needs. Please refer to the flow

chart below (Figure 4).

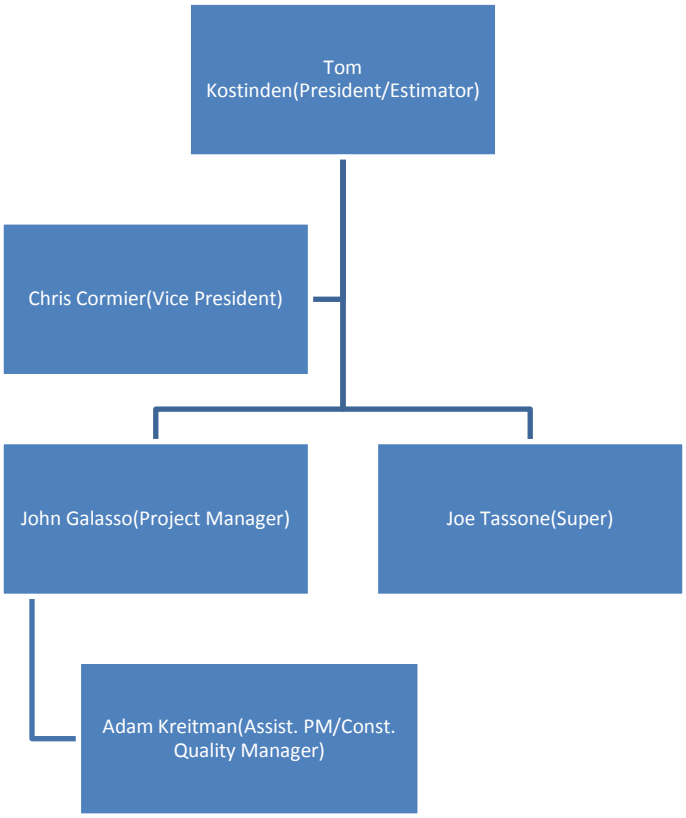


Figure 4: TLT Construction Hierarchy Flow Chart

3.3 LaVallee Brensinger Architectural

Architectural firms from the Boston area have primarily dominated the northeast for a substantial amount of time. From the beginning Barry Brensinger and Don Lavallee set out to prove that New Hampshire firms could compete. Creating Lavallee Brensinger Architects in the late 1970's in the heart of Manchester, NH; both Barry and Don formed one of the more productive companies in the granite state (Lavallee 2010).

The 40 person firm has been a main stay in Manchester's building development. LBA's main focus is in the Education and Healthcare fields; but with the vast number of projects such as the Verizon Center and the Hillsborough Courthouse, Lavallee Brensinger's resume is constantly growing. Since its creation, Don and Barry's business has received countless awards (over 50) and the company has gracious participated in numerous pro bon projects as well.

Brensinger stated his staff is not in the business of architecture, but rather the business of building better communities. Thus leading their firm to help design and renovate the Hillsborough County Courthouse. After various state and city contracts, Lavallee has had the lead in a large majority of New Hampshire's largest projects. That being said, LBA took the grasp they already had on the NH market and squeezed tighter, with the renovation of the HCCN.

3.4 Construction Project Management

According to the Merriam-Webster's Dictionary, a project is simply a planned undertaking, the act of managing is conducting or supervising over some particular action

and construction is the occupation or industry of building structures. So in short construction project management (CPM) is the supervision over the planned building of a structure. This definition although true; barely gives the field justice. A project is a venture that is initiated to construct the product the owner requested. It is the job of a Project Manager to see a project through to completion. Basically, while the project manager is paid by the owner, designer or contractor, he/she works for the project. CPM is the art of coordinating people, equipment, materials, money, and schedules to complete a specified project on time within approved cost.

There are so many variables in day to day construction, that it can be very overwhelming. A project can at one moment have a plumbing issue, and then due to the water; have an electrical and safety issue the next. A project manager is the hub of the project, thus he must know a vast amount of information. The Project Management Institute centers on nine specific areas necessitating P.M. knowledge and awareness(Oberlander 1993):

1. *Project Integration Management:* to ensure that the various project elements are effectively coordinated.
2. *Project Scope Management:* to ensure that all the work required (and only the required work) is included.
3. *Project Time Management:* to provide an effective project schedule.
4. *Project Cost Management:* to identify needed resources and maintain budget control.
5. *Project Quality Management:* to ensure functional requirements are met.
6. *Project Human Resource Management:* to development and effectively employ project personnel.

7. *Project Communications Management:* to ensure effective internal and external communications.
8. *Project Risk Management:* to analyze and mitigate potential risks.
9. *Project Procurement Management:* to obtain necessary resources from external sources.

For a construction project management firm to be successful in today's society, it seems to be quite clear that the ability to multi-task and perform proficiently is key. Effective supervision, communication, organization, etc. are all important features that the design team, general contractor, subcontractors and owners must share with each other. Proper communication and coordination will make sure that all parties involved are informed adequately. It is the job of the owner, design team and general contractor to declare what is expected of each other. This is pertinent for the project so all the parties are on the same page. This is usually done through a Charrette or Kick-off meeting.

Construction can be a tricky industry, not all sites and condition are crystal clean and without defect. By properly planning ahead the P.M. has all the tools to avoid most of the pitfalls in everyday construction. There are many variables for the company to avoid, so generally the CPM combats what it can by attacking them with a well organized scope, budget and schedule:

3.4.1 Scope

Construction projects come in all shapes and sizes. They range from smaller housing projects to multi-million dollar Athletic facilities; from minor renovations to completely new

structures. Although they range so far from each other, they all have three things in common: scope, budget and schedule (Oberlender, 1993).

Before a Project Manager can even be involved, an owner must conceive of a scope of work that needs to be preformed. A scope is detrimental to the project's success, it gives definition and a clear specific outline to what is to be done on the item at hand. If a carpenter was contracted by an owner to lay a carpet without a scope of work, the carpenter would not know what color of carpet to choose, what amount of carpet to buy, whether there needed to be demolition of the prior carpet; so the quote of this specific carpenter would be a shot in the dark. It is the job of the carpenter to not only provide service to the owner, but to also provide a quality product. If the said carpenter has no scope and orders a vast amount of an ugly purple rug for a small area, the owner will end up with a large bill and an ugly rug; thus not creating a happy customer and losing future profit in a potential customer. Now if the owner were to provide an in depth scope, the carpenter would now know all the variables that he would have to take into consideration when bidding for the job. The scope represents the work to be accomplished, i.e. the quantity and quality of work (Oberlander, 1993), thus making it a critical part of construction project management.

3.4.2 Schedule

In most occupations, time is a very crucial element for success. In construction time can be considered your enemy; with every day passing that's one day less then you had before to finish the given product for the owner. Wars are not won without proper planning; so consider the project the war and time your enemy, the only way to beat "time" is to properly plan. Planning is often confused with scheduling, mainly due to the fact that they are performed interactively. "For example a specific list of activities may be planned and

scheduled for a project. Then, after the schedule is reviewed, it may be decided that additional activities should be added or some activities should be rearranged in order to obtain the best schedule of events for the project ,"(Oberlander, 1993). A schedule runs the project, it can effect the budget by going over an allotted time and cause conflicts if not organized correctly. A schedule must mirror the scope of the project to gain the correct outcome. There are 7 key principles for planning and scheduling:

1. Begin planning before starting work, rather than after starting work.
2. Involve people who will actually do the work in the planning and scheduling process.
3. Include all aspects of the project: scope, budget, schedule and quality.
4. Build flexibility into the plan, include allowance for changes and time for reviews and approvals.
5. Remember the schedule is the plan for doing the work, and it will never be precisely correct.
6. Keep the plan simple, eliminate irrelevant details that prevent the plan from being readable.
7. Communicate the plan to all parties; any plan is worthless unless it is known.

When creating your schedule, all the factors must come in play and that's why you must plan even before you start the schedule. By creating a precedence diagram you can see that you want to start at "A" and finish at "H" (Oberlander, 1993):

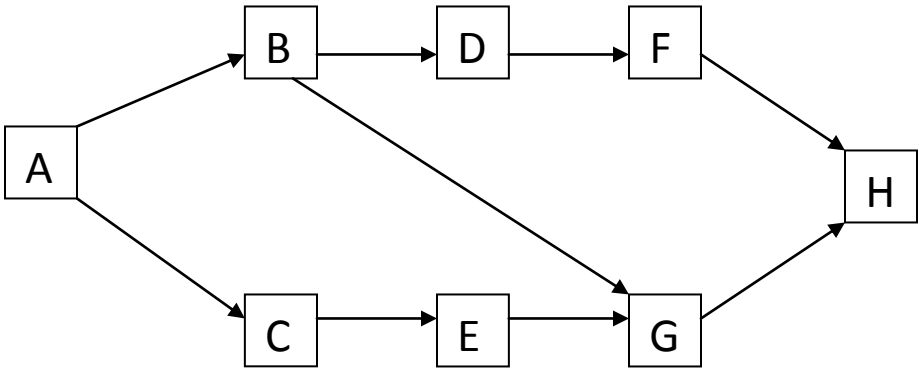


Figure 5: Precedence Diagram

As you can see, there are two different paths to the end, but one path needs the other to complete before it can complete its course (From B to G). This is called the critical path. The critical path determines the minimum time to complete a project. If anything obstructs the these activities, then the overall schedule is negatively affected. Therefore it is called the "*critical"* path.

TLT attacks the project usually by hiring a subcontractor to directly make a CPM schedule at least two to three months prior to the projects kick-off meeting. To do this, the Project Manager, Assistant Project Manager and site Supervisor must meet and go over the aspects that each is generally familiar with. At the beginning the PM is most knowledgeable with the budget portion, the familiarity with project issues, the cost and variables involved makes him her the prime candidate to represent the budget. Prior to the specification and drawings being distributed to the project staff, the APM applies most of his/her hours reading and understanding the documents. If there are any pre or post bid addendums, TLT, places

the task of updating the documents to the APM; thus the APM brings scope to the table. Lastly the "Super's" vast comprehension of project timetables is obviously crucial to creating the schedule. TLT Super's must understand the time and work force needed to complete every aspect of the project. If this is underestimated it is a loss of profit due to extra hours that need to be performed to complete the work; if it is overestimated then it is a loss of profit due to overpaying for manpower and equipment rentals. Creating the schedule is almost a science; there is such a fine line to walk when trying to maximize a profit in a lowest bidder wins project. After these three parties convene, they put together key dates to meet key milestones to create critical paths within the project. After forming the critical path the team logically places portions of the project along the timeline previously created. For example, the team would not want to schedule the final cleaning alongside erection of drywall; it would not be logical in the grand scheme. When the team finally finishes its organization, they then send their prepped schedule to a qualified professional to create a finely polished final schedule that can be submitted to the owner for record.

After the schedule is created, TLT's APM's create a submittal log to follow the flow of the project; "submittals" being anything that needs to be submitted to either the architect or owner for approval. From this point on it is crucial for the team to track the project as best as possible. TLT looks towards a simple method of weekly updates. By applying the schedule to an easily updatable Excel spreadsheet; TLT's staff is able to update their schedules without losing any profit to the use of outside construction software companies.

3.4.3 Budget

Simply, the budget is the ceiling sum of money the owner is willing to part with to cost-effectively validate the project. Don't get this confused with estimating, although estimating

is a prerequisite for a projects budget they are two completely different items. An estimate is exactly that, a knowledgeable guess to what the project may cost. As a CPM, a budget is an actual cost that you are now contracted to, and you must use that budget to provide a quality product while creating profit for the company, and allowing for cushion against potential pit falls.

A large majority of the cost of a project is exhausted during the construction stage. That is why it is critical that a project manager understands both the scope and schedule well; because that will help mitigate financial woes by keeping the flow of work continuous. If a project is not carefully budgeted and something like a fire sprinkler system goes off, there will be a lot of lost profit going towards the replacement of potentially moldy drywall and flooring. That is why the general contractor stays so consciences about the 5 W's plus 1 H of construction: Who, What, Where, Why, When and How. By knowing these the general contractor can control all the variables of that specific activity and alleviate the possible revenue loss.

3.4.4 Quality Control

The word, *Quality*, in construction, is tricky to classify. The end result is not a recurring entity that can be measured the same way with the same values. The end product in construction is more often than not a distinctive piece of work that has its own particular features. In the construction industry, it is not unusual for the design and construction phases to be contracted out separately; leaving total control of the project a "co-ownership". Most often the quality of finished work is controlled through inspection and testing's as construction advances (Chung, 1999). A major drawback to controlling quality through inspection is that you find out a problem only after it has already occurred. The paramount

procedure to ultimate quality control is simple; the habitual supervision by the contractors personnel themselves. By monitoring each other and the implementation practices, the contractor can diminish inferior work.

The Building research Establishment reports that 40% of building defects occur during the construction phase (BRE, 1982). In most cases, the defects are found to be the result of:

Table 1: 6 Reasons Behind Quality Breakdown in Construction.

1. Misinterpretation of drawings and specifications;
2. use of superseded drawings and specifications;
3. poor communication with the architect/engineer, subcontractors and material suppliers;
4. Poor coordination of subcontracted work;
5. Ambiguous instructions or unqualified operators;
6. Inadequate supervision and verification on site.

It is clear that deficiencies arising during the construction phase are primarily rooted to poor communication and supervision; either in the field or in the office. So anyone from the owner down to the carpenter laying nails is responsible for the quality of the project. By creating preventative measures, consistent quality can be achieved. If consistent quality is to be assured, all staff in the organization, both in the head office and on site, must obtain or create specific procedures to oversee one and other and stick to it (Chung, 1999). It not only effects everyone on site it effect's everything. Scope, budget and schedule are equally tied by quality. If one lacks the preventive measures and quality is affected then the equilateral triangle that unifies the big three will create an unstable environment.

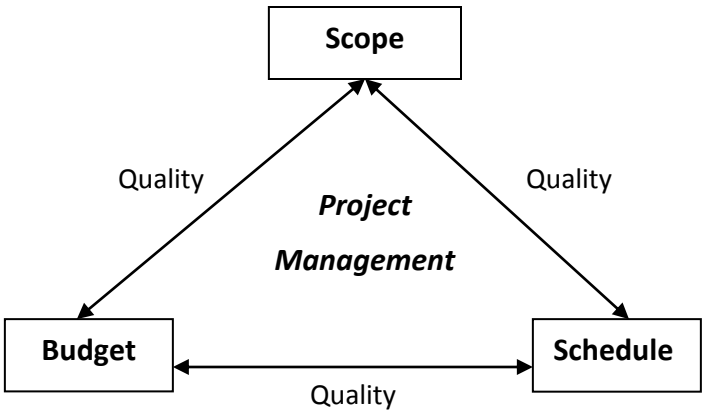


Figure 6: Quality is an integral Part of Scope, Budget and Schedule.

4.0 Contract Quality Control Plan

Construction management can become pretty tricky, especially since there are so many things going on at the same time. From cash flow, to coordination issues, to finding the correct products the owner wants; it becomes a daunting task to track all of this at once. Construction Managers use logs to track and control the flow of information throughout the life span of each project. One document, labeled "Contractor Quality Control Plan", sums up the entire projects quality logs and responsibilities. This section is the breakdown and making of the TLT Construction Corp. Contractor Quality Control Plan and its respective templates for documents throughout the projects timeline.

For this plan to be implemented correctly, I would need training. I attended the Army Corps of Engineers "Control Quality Management" course at the Hanscom Air Force Base, to properly educate myself in the process (Appendix I). This course was a one day course in which a final exam was given at the end with a needed passing score of 70%. The result of the course training was applied to the plan in this section.

4.1 Quality Control Organization

To begin, it is a must to clarify the projects administrators and their proper roles within the job. By defining these positions, TLT will be able to clearly label what person is in charge of what, so the lines of communication are clearly presented to the owner and other players within the project. The specific positions are created so there is a proper chain of command so certain questions and documents can be distributed.

1. Project Superintendent (On Site): Will be the highest level manager at the site being responsible for the quality of the work and its production. The project superintendent will maintain a physical presence at the site at all times being responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

2. CQC System Manager: Will be responsible for the contractor Quality Control Plan, its implementation, and working with the project superintendent to facilitate the quality of the work in accordance with the contract documents, submittals and its completion. The CQC Manager will have the authority to act in all CQC matters for the contractor and will implement the three (3) phase control system. Along with this monitoring, the CQC System Manager will keep the as-built documents current based on work performed, and design changes/clarifications.

3. Site Safety and Health Officer (SSHO): Will be part of the CQC staff, supplementing and providing input to the CQC Manager as to the implementation of the work and safe performance of the same. The SSHO will convey any/all observations that are necessary for this purpose.

4. Project Manager: Will be in charge of the home office support and will assist the Superintendent and the CQC Manager as the need arises to enforce the requirements of the CQC Plan with respective sub-contractors and suppliers. Being involved with the sub-contractors and suppliers initially, he/she will stress the importance and requirements of the CQC Plan and compliance with the same. His involvement in such a manner has

proven effective and helpful in implementation of the Contractor Quality Control Plan and to its staff.

5. Other CQC Personnel: These will be provided for the following trades – Civil, Structural, Mechanical and Electrical – and with names/resumes provided at a later date. The qualified personnel in accordance with section 04 45 01 / 3.4.3 will fill these positions as needed by the CQC manager will be obtained from the approved testing agency for the project and/or the respective subcontractor(s).

6. Testing Laboratory: An approved testing laboratory will be engaged for the support of the CQC Manager/Plan, Implementing methods and material testing as required by the contract documents.

4.2 Project Procedures

Procedures for scheduling and managing submittals, construction progress schedules, certificates of compliance, samples, etc. including those of subcontractors, off site fabricators, suppliers and purchasing are as follows:

The Submittal log in accordance with section 01 45 01 will be kept at the job site and will be current at all times. The log will be made up by sections of the specifications, and the subcontractor, fabricator, supplier and purchasing agent will be committed to a date for receipt of their submittal. These dates will be closely followed to insure timely submittals. An updated submittal log shall be submitted to the architect, resident engineer on a monthly basis. This log will also be reviewed at a weekly project meeting to identify/monitor sensitive items.

TLT Construction will utilize the Quality Control System (QCS) coputer data base program to monitor and track each item submitted for review and approval.

Each item required for government approval will be identified and registered in the CPM schedule with estimated dates for when material and equipment approvals will be needed.

TLT Construction will utilize Primavera P.3 scheduling software for CPM scheduling requirements.

Copies of submittals will be submitted as follows:

To:

John Harper/John Adams
LaVallee Brensinger Architects
155 Dow Street, Suite 400
Manchester, NH 03101

Submittals requiring state approval – 7 copies

Submittals For Information Only (FIO) – 5 copies

Submittals requiring state approval will be reviewed/returned in no more than 21 days (25 for refrigeration and HVAC control system) exclusive of mailing.

Three copies of the reviewed submittals will be returned to TLT Construction Corp. for action/distribution.

4.3 Control, Verification and Acceptance Testing Procedures

This CQC program is responsible for verification of all testing which is required by the contract documents.

Off site testing which has been done by a manufacturer was verified through certification documents, while on site testing was done under the direction of the Quality Control Manager and recorded on the Daily CQC Report.

A detailed listing of required testing was issued as materials and equipment were approved.

4.3.1 Testing Plan and Log

Testing will be performed as required in the contract document under the direction of the CQC System Manager. Testing requirements can be divided into a number of different categories. All field CQC tests will have a record of the test and any deficiencies and corrections included in the Daily CQC Report. Any test reports showing non-compliance will include procedures for corrections.

Testing Asbestos Containing Material Abatement will be performed by an approved testing lab. Testing will be conducted in accordance with applicable Federal and State of New Hampshire regulations and will be compared against a specific technical standard. If the work fails testing, rework or replacement will be completed prior to any additional work taking place. Testing procedures will be discussed during preparatory inspection meetings. Copies of tests will be included in the Daily CQC Reports.

Field Type Testing will be conducted by the CQC Staff. These tests will be discussed during the preparatory inspection meetings. Results will be included in the Daily CQC Reports.

Factory Tests required by technical specifications will be conducted prior to material being shipped to the job site. Prior notification will be given to the COR so he can have the opportunity to be present during testing.

Acceptance Testing will be performed on equipment and systems to demonstrate, to the CQC staff and the user that the item works and performs. An acceptance testing plan will be developed for each unit of work requiring performance testing.

The schedule of tests and tracking of test results will be similar to the tracking of submittals with the CQC System Manager being responsible for compliance to the test plan and contract requirements. An updated testing log will be issued monthly.

4.4 Quality Control System Procedures

The purpose of this (3) Phase Inspection System is to meet with all contractors prior to the beginning of their work, and establish a formal inspection process to assure their work complies with the Contract Documents. These initial inspections and subsequent follow up inspections are intended to identify any deficiencies at early stages and bring matters to resolution prior to the need for a lengthy punchlist at the completion of the project.

4.4.1 Procedures for Tracking Preparatory – Initial – Follow Up

4.4.1.1 Control Phases

The Quality Control Manager in conjunction with the Project Superintendent shall be responsible for the implementation and surveillance to insure that the three phase quality control system is followed by TLT Construction for all definable features of work. The enclosed listing

of the definable features of work will be used to schedule and track the completion of the required inspections and will be updated regularly.

4.4.1.2 The Preparatory Phase Inspection

A meeting shall be constructed one week prior to the start of a Definable Feature of Work to include the Resident Engineer, the CQC System Manager, the Project Superintendent, SSHO and the subcontractor's working foreman and/or project manager with the following discussed.

1. Review of each paragraph of applicable specifications.
2. Review of contract plans and applicable AHA(s).
3. Check to assure materials and equipment have been tested, submitted and approved.
4. Examine work area to assure compliance with contract documents.
5. Review appropriate hazard analysis to assure safety requirements will be met.
6. Discuss procedures to be used in constructing the work.
7. Discuss Owners coordination issues.
8. Review schedule.
9. Notify Resident Engineer 48 hours prior to start of preparatory phases of work. A meeting, to include the Architect or Owner's Representative, Quality Control Manager, Superintendent and working foreman will be held and documented as part of the CQC Report.
10. This meeting will be documented per the CQC Preparatory Inspection Report Form (Attachment D) attached to the CQC Daily Report (Attachment H).
11. Review contract, insurance and bonds for acceptance.

4.4.1.3 The Initial Phase Inspection

A meeting shall take place during the first week of the start of any Definable Feature of Work Including the Resident Engineer, the CQC System Manager, the Project Superintendent, the SSHO and the subcontractor's working foreman and/or project manager. The following will be discussed at this meeting.

1. Check to assure that the preliminary work as required in the preparatory phase has been accomplished. Any deficiencies will be identified and logged on the Rework Items List.
2. Establish a level of workman ship that is in compliance with contract documents and meets industry standards.
3. Continual surveillance of Safety Plan requirements and Activity Hazard Analysis. A review and follow up of the requirements will be performed with each foreman.
4. Separate minutes of this phase as documented on the CQC Initial Inspection Form (Attachment E) shall be prepared and attached to the CQC Daily Reports (Attachment H).

4.4.1.4 The Follow Up Phase Inspection

Daily checks of the ongoing work shall be performed to assure continuing compliance with contract requirements, including control testing. Any new deficiency items shall be recorded on the CQC Daily Report and the Rework Items List (Attachment F). Final follow up checks shall be conducted reviewing previous Deficiency Logs. All Deficiencies are to be corrected prior to the start of new work.

After the start of construction, the QC Manager will conduct QC meetings once every two weeks at the work site with the Project Superintendent, SSHO, and the foremen who are performing the work of the DFOWs. The Contracting Officer may attend these meetings. As a minimum, accomplish the following at each meeting:

a. Review the minutes of the previous meeting.

b. Review the schedule and the status of work and rework.

c. Review the status of submittals.

d. Review the work to be accomplished in the next two weeks and documentation required.

e. Resolve QC and production problems (RFI, etc.).

f. Address items that may require revising the QC Plan.

g. Review Accident Prevention Plan (APP).

h. Review environmental requirements and procedures.

i.. Review Waste Management Plan.

j. Review IAQ Management Plan.

k. Review Environmental Management Plan.

l. Review the status of training completion.

m. Review CX Plan and progress.

4.4.1.5 Material Receiving and Inspection Reports

The CQC System Manager will inspect material received and stored on the site for compliance with the approved submittals. A report for received materials will be part of the Daily CQC Report form. Materials not in compliance will not be received, and will be held in a secured area and tagged not for use. Materials will be inventoried and stored according to manufacturers' recommendations.

4.4.2 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Upon completion of work, the QC Manager will furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

4.4.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract".

Near the completion of all work or any increment thereof, the QC Manager must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract, providing a copy to the Government. The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government "Pre-Final Inspection".

4.4.4 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled.

4.4.5 Final Acceptance Inspection

Notify the Contracting Officer in accordance with the Contract Documents prior to the date a final acceptance inspection can be held. State within the notice that all items previously identified in the pre-final punch list will be correct and acceptable, along with any other unfinished Contract work of the final acceptance inspection.

4.5 Procedures for Tracking Construction Deficiencies

Construction Deficiencies will be documented in the following manner:

The CQC System Manager will discover, or be notified that a construction deficiency exists. Upon verification and review with Project Superintendent, the CQC Manager, the CQC System Manager. The CQC System Manager will log the deficiency on the Rework Items Log. The CQC manager will bring minor deficiencies will be brought to the attention of the individual worker and/or their supervisor. If other than a minor deficiency is discovered, it will be documented on the attached "Non Conforming Work Notice" (Attachment G) and a copy of the completed report will be given to the Project Superintendent, the subcontractor and/or supplier and the Resident Engineer.

Upon completion of the deficiency the responsible contractor will notify the CQC System Manager in writing.

With the CQC System Manager's and Superintendent's review/confirmation the Rework Items Log will be updated showing the item correct date, closing the "Nonconforming Work Notice". The log will be attached to the CQC Report at the end of the month.

4.6 Quality Control Reporting Procedure

4.6.1 CQC Daily Report:

The CQC System Manager will be responsible for completing a daily CQC Report Form. This CQC Report will cover the events of each day and will follow the format of the attached CQC Report Form. The completed report will accurately document the events of each project day. CQC Reports will be forwarded/ reviewed by Superintendent and Project Manager; forwarded to the Resident Engineer with the original and filed at the project site.

4.6.2 Requests For Information:

During the course of a Project, many questions arise as to the intention of the Contract Documents. A process has been established to clarify the questions and maintain a record of these issues. It is important that all parties participate in this process and strive to resolve clarifications each week.

The CQC System Manager and/or the Project Superintendent will be responsible for completing the attached Request for Information (RFI) report and maintaining a jobsite log containing the status of all RFI's. Copies of all RFI's will be filed on site and attached to as-built drawings with copies to TLT's main office. The RFI log will be reviewed weekly with the Resident Engineer.

4.6.3 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Resident Engineer as attached to the last daily Contractor Quality Control Report for each month

5.0 Waste Management Plan

LEED projects have several major focuses; one key aspect of the project is the waste management. A construction site can produce a vast amount of waste, most of which can be recycled and reused. By creating and managing a properly constructed waste management plan TLT will be able to properly track all waste and recycling efforts to qualify for all credits

available for the LEED program. These records can also be used by the state to gain more federal funding for future jobs which in turn can potentially offer TLT future jobs as well.

The primary focus of this section is to create a fully functional waste management plan for TLT construction. This will be a challenge because this plan needs to not only fulfill the LEED requirements but be user friendly enough so that the subcontractors can easily follow the plan as well. This plan will be site specific and will break down the specific materials being loaded on and off site.

5.1 W.M.P. Description:

A. This Construction Waste Management Plan is to be followed by all contractors and job personnel during the construction of the Hillsborough County Courthouse. The contents of this Plan as well as all waste handling/recycling requirements will be discussed at each safety orientation and will be made part of the Trade Contractors Weekly Tool Box Talk. In addition, each Trade Contractor shall sign a notification form confirming that they will adhere to the requirements of this Plan; failure to comply with the contents of this Plan as well as with the overall management process of all waste generated on the site will result in a $750.00 fine per applicable Trade Contractor.
   By effectively managing this Construction Waste Management Plan, we intend to recycle or salvage for reuse 75% by weight of the waste generated on site.

   The Plan outlines the expected wastes to be confronted on site, means of disposal and handling methods.

   TLT Construction, Corp. will monitor, implement and document this plan throughout the construction of this project. Monitoring of on-site compliance with this plan will be

performed by the TLT General Superintendent (or his designee) on a daily basis. TLT, unless otherwise stated in the individual Trade Contractor contract documents, will utilize a mixed waste construction and demolition facility to assist the project with meeting the recycling goal. This essentially means that a majority of the construction and demolition waste can be placed within a single thirty (30) cubic yard waste container. However TLT will require that 100% of the following materials be recycled; labeled waste containers/staging areas will be provided for these waste streams at designated locations:

Paper
Cardboard
Wood Crates
Plastic Containers

In addition, TLT will provide labeled containers for all non-construction and demolition waste streams (e.g. food scraps, cups, bottles, cans). These containers will be placed within all designated break and lunchroom areas. Also these materials must not be placed within any waste containers designated to contain construction and demolition waste.

In the event that mixed waste construction and demolition waste recycling center is not able to meet the projects established goals, TLT will make arrangements with another vendor and will require certain construction waste streams to be segregated before leaving the site. If this occurs, TLT will provide further instruction to all trades regarding the need to separate out specific waste streams.

Documentation of the plan will consist of the following:

1. Photographs of on-site activities taken on a monthly basis by the TLT LEED Coordinator.

2. Waste recycling and/or disposal receipts.

The TLT LEED Coordinator will make site inspections on a monthly basis to review overall compliance with the plan; prepare a monthly spreadsheet depicting the waste recycling process; and be responsible for completing the applicable LEED Credit Submittal.

5.2 Waste Management Goals:

This section specifies diversion of Construction and Demolition (C&D) waste from the landfill.

1. Waste Management Goals: a minimum of 75% of the total project waste should be diverted from landfill, by weight.
2. Provide contract documents, including a waste management plan, to show evidence of recycling, and reuse of recovered materials.
3. Inform Owner and architect where Construction and Demolition (C&D) Waste Management requirements could detrimentally impact C&D schedule.
4. Provide separate itemization of cost related to C&D Waste Management.
5. Effect optimum management of solid wastes via a materials management hierarchy.
6. The materials management hierarchy shall be: reduce, reuse, and recycle.
7. Prevent environmental pollution and damage.
8. Waste reduction will be achieved through building design, and reuse and recycling efforts will be maintained throughout the construction process.
9. Related Documents:
    1. Section 00 70 80 - General Conditions - BPW

2. Section 01 00 00 - General Requirements
3. Section 01 33 00 - Submittals Procedures.
4. Section 01 35 14 - LEED-NC 2009 Credit Summary
5. Section 01 35 15 - LEED Requirements
6. Section 01 35 16 - LEED Submittal Forms
7. Section 01 40 00 - Quality Requirements
8. Section 01 50 00 - Temporary Facilities and Controls
9. Section 01 50 50 - Construction Waste Management and Disposal.
10. Section 01 70 00 - Execution Requirements.
11. TLT IAQ - Indoor Air Quality Plan

5.3 Definitions:

A. **Inert Fill** – A permitted facility that accepts inert waste such as asphalt and concrete exclusively.

B. **Class III Landfill** - A landfill that accepts non-hazardous waste such as household, commercial, and industrial waste, including construction, remodeling, repair, and demolition operations.

C. **Construction and Demolition Waste** – Including solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting form construction, remodeling, repair, and demolition operations.

1. *Rubbish*: Including both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, tin cans, and bones.
2. *Debris*: Including both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

D. **Weight Conversion Factor** – It is the rate set forth in the standardized Weight Conversion Table approved by John Galasso for the use in estimating the volume or weight of materials identified in the Waste Management Plan.

E. **Deconstruction -** The process of removing existing building materials from renovation and demolition projects for the purposes of reuse, and recycling, in a efficient and safe manner possible.

F. **Divert** – Using material for any purpose other than disposal in a landfill.

G. **Waste Materials** – Large and small pieces of listed materials which are excess to contract requirements and generally include materials to be recycled and/or recovered from existing construction and items of trimmings, cuttings, and damaged goods resulting from new installations, which can be effectively used in the Work.

H. **Reuse –** Using a material or product that is recovered from construction, renovation, or demolition activities.

I. **Recycling –** The process of collecting and preparing recyclable materials in their original form or in manufacturing processes that do not cause the destruction/contamination of recyclable materials in a manner that precludes further use.

J. **Recovery** – Any process that reclaims materials, substances, energy, or other products contained within or derived from waste on-site. It includes waste-to-energy, composting, and other processes.

K. **Sources Separation** – Sorting the recovered materials into specific material types with no or a minimum amount of contamination on site.

L. **Time-Based Separation** – Collecting waste during each phase of construction or deconstruction which results in primarily one major type of recovered material. The material is removed before it becomes mixed with the material from the next phase of construction.

M. **Commingled or Off-site Separation** – Collecting all material types into a single bin or mixed collection system and separating the waste materials into recyclable material types in an off-site facility.

5.4 Waste Prevention Planning:

Project Construction Documents – Requirements for waste management which will be included in all work. The General Contractor will require all subcontractors to comply with TLT Construction Corp. mandatory recycling requirements. A copy of this Construction Waste Management Plan will accompany all Subcontractor Agreements and require subcontractor participation.

The Construction Waste Management Plan shall be implemented and executed as follows and as on the chart:

- Salvageable materials will be diverted from disposal where feasible.
- There will be a designated area on the construction site reserved for a row of dumpsters each specifically labeled for respective materials to be received.
- Before proceeding with any removal of construction materials from the construction site, Recycling Coordinators will inspect containers for compliance with TLT's requirements.
- Wood cutting will occur in centralized locations to maximize reuse and make collection easier.
- Hazardous waste will be managed by a licensed hazardous waste vendor.

- Provide the C&D Quality Manager with delivery receipts for the recovered materials and waste materials sent to the permitted recycling facilities, processing facilities, or landfill with the following information:
    1. Name of firm accepting the recovered materials or waste materials
    2. Specify type of facility (e.g. retail facility, recycler, processor, Class III landfill, MRF)
    3. Location of the facility
    4. Type of materials
    5. Net weights (or volume) of each type of material
    6. Date of delivery
    7. Value of the materials or tipping fee paid

5.5 Communication & Education Plan:

A. The General Contractor will conduct an on-site pre-construction meeting with subcontractors. Attendance will be required for the subcontractor's key field personnel. The purpose of the meeting is to reinforce to subcontractor's key field employees the commitments made by their companies with regard to the project goals and requirements.

B. Waste prevention and recycling activities will be discussed at the beginning of each weekly subcontractor coordination meeting to reinforce project goals and communicate progress to date.

C. As each new subcontractor comes on site, the recycling coordinators will present him/her with a copy of the Waste Management Plan and provide a tour of the recycling areas.

D. The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan.

E. All recycling containers will be clearly labeled. Containers shall be located in close proximity to the building(s) under construction in which recyclables/salvageable materials will be placed.

F. Lists of acceptable/unacceptable materials will be posted throughout the site.

G. All subcontractors will be informed in writing of the importance of non-contamination with other materials or trash.

H. Recycling coordinators shall inspect the containers on a weekly basis to insure that no contamination is occurring and precautions shall also be taken to deter any contamination by the public.

5.6 Motivation Plan:

The General Contractor will conduct a pre-con meeting for subcontractors. Subcontractors will be required to attend the meeting to review project goals and requirements with the project team. Attendance will be a mandatory for subcontractors to enter the site. A sign-off will be required by subcontractors attending the meeting that the project goals are understood. This document will be an attachment to every Project Meeting. Copies of the attachment will be posted prominently at the jobsite.

5.7 Evaluation Plan:

The General Contractor will develop, update, and post at the jobsite a graph indicating the progress to date for achieving the project's waste recycling goal of 75% by weight of the total project waste stream.

5.8 Expected Project Waste, Disposal, and Handling:

A. The recycling program could utilize one or a combination of any of the following common waste diversion strategies:

1. Sources Separation
2. Time-Based Separation

3. Commingled or Off-site Separation
4. Back haul of packaging
5. On-site sales auctions and removal.

B. Waste Material management hierarchy can be viewed as: reuse on-site, recycle on-site, reuse off-site, and recycle off-site.

C. Other innovative approaches to achieve the minimum diversion rate are encouraged and should be specified and described in the C&D Waste Management Plan.

B. Minimum diversion rate may be achieved by recovering and recycling the following materials:

1. Asphalt
2. Concrete and concrete blocks
3. Brick, tile and masonry materials
4. Ferrous metal
5. Non-ferrous metals: copper, aluminum … etc
6. Untreated lumber
7. Plywood, OSB and particle board
8. Gypsum wallboard scrap
9. Paper and cardboard
10. Beverage containers
11. Insulation
12. Rigid foam
13. Glass
14. Carpet and pad
15. Trees and shrubs
16. Soil
17. Plumbing fixtures
18. Windows
19. Doors
20. Cabinets
21. Architectural fixtures

22. Millwork, paneling and other similar interior finishes
23. Electric fixtures, motors, switch gear and other similar equipment
24. HVAC equipment, duck work, control systems, switches and other similar equipment
    Others as appropriate

The following charts identify waste materials expected on this project, their disposal method, and handling procedures:

Table 2: Waste Material (Continues)

Material	Quantity	Disposal Method	Handling Procedure
Top Soil		Stock pile on site for reuse on this project or other site needs.	Stock-pile in accordance with the SWPPP
Other Soils		Stock pile on site for reuse on this project or other site needs.	Stock-pile in accordance with the SWPPP
Land clearing debris		Keep separate for reuse and or wood sale	Keep separated in designated areas on site.
Clean dimensional woo and palette wood		Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. Recycle at:	Keep separated in designated areas on site. Place in "Clean Wood" container.
Plywood, OSB, particl board		Reuse, landfill	Keep separated in designated areas on site. Place in

Material	Quantity	Disposal Method	Handling Procedure
			"Trash" container.
Painted or treated woo		Reuse, landfill	Keep separated in designated areas on site. Place in "Trash" container.
Concrete		Recycle	
Concrete Masonry Uni		Keep separate for re-use by on-site construction or by site employees	Keep separated in designated areas on site
Metals		Recycle at:	Keep separated in designated areas on site. Place in "Metals" container.
Gypsum drywall (unpainted)		Recycle with supplier:	Keep scraps separate for recycling – stack on pallets in provided on site. All scrap drywall will be taken back by contractor to drywall supplier
Paint		Reuse or recycle at Environmental Depot; Cost = $xxx/lb latex, $xxx/lb oil	Keep separated in designated areas on site
Insulation		Reuse, landfill	
Flooring		Reuse, landfill	

Material	Quantity	Disposal Method	Handling Procedure
Carpet and pad		Reuse or recycle with carpet manufacturer	
Glass		Glass Bottles:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Plastics		Plastic Bottles: Recycle at: Plastic bags/scraps: Reuse, landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Beverage		Recycle at:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Cardboard		Recycle at:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Paper and newsprint		Recycle at:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal

Material	Quantity	Disposal Method	Handling Procedure
			Cans/Mixed Paper/ Cardboard" container
All Other Wastes		Landfill	Deposit in rubbish dumpsters
TOTAL			

5.9 Quality Assurance:

A. Regulatory Requirements

Comply with applicable requirements of the State of New Hampshire, local ordinances and regulations concerning management of construction, clearing, and inert materials.

B. Disposal Site, Recyclers and Waste Materials Processors

Use only facilities properly permitted by the State of New Hampshire, and/or by local authorities where applicable.

C. Pre-C&D Waste Management Meeting

1. Prior to beginning work at the site, schedule and conduct a meeting to review the C&D Waste Management Plan and discuss procedures, schedules, coordination and specific requirements for waste materials recycling and disposal. Discuss coordination and interface between Contractor, sub-contractors, architect, engineers, project manager, Owner, and other C&D activities. Identify and resolve problems of compliance with requirements. Record minutes of the meeting, identifying conclusions reached and matters requiring further resolution. Maintain waste management as an agenda item at future construction meetings.
2. Attendees: Contractor and related contractor personnel associated with work of this section, including personnel in charge of the waste management program; C&D

Quality Manager; architect; engineers; material and equipment suppliers where appropriate; and such additional Owner personnel as Owner deems appropriate.

3. Plan Revision: Make revisions to C&D Waste Management Plan agreed upon during the meeting and incorporate resolutions agreed to be made subsequent to the meeting. Submit revised plan to architect or the Owner personnel as Owner deems appropriate for approval.

D. Implementation

1. Designate an on-site party responsible for instructing workers and implementing the C&D Waste Management Plan.
2. Distribute copies of C&D Waste Management Plan to job site foreman and each subcontractor.
3. Include waste management and recycling in worker orientation.
4. Provide on-site instruction on appropriate separation, handling, recycling, and recovery methods to be used by all parties at the appropriate stages of the work at the site.
5. Also include discussion of waste management and recycling in regular job meeting and job safety meetings conducted during the course of work at the site.

E. The Contractor will be responsible for ensuring that the appropriate governmental entities are notified of the work.

F. Remove and relocate reusable materials to be reinstalled or retained in a manner to prevent damage or contamination.

G. Conduct construction and demolition in such a manner to minimize damage to trees, plants and natural landscape environment.

H. Arrange for adequate collection, and transportation to deliver the recovered materials to the approved recycling center or processing facility. Maintain records accessible to the architect or C&D Quality Manager for verification of diversion of recovered waste materials.

5.10 Storage & Handling:

5.10.1 Site Storage

1. Remove materials for recycling and recovery from the work locations to approved containers or storage area as required. Failure to remove waste or recovered materials will be considered cause for withholding payment and termination of Contract.
2. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on site, also provide a sorting area and necessary storage containers.
3. Change-out loaded containers for empty containers, as demand requires.
4. If recovered materials are stored on-site for project duration provide adequate security from pilferage.

5.10.2 Handling

1. Deposit indicated recyclable, and recoverable materials in storage areas or containers in a clean (no mud, adhesive, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.
2. Insure all recovered materials are made safe for handling and storage.

3. If the contamination chemically combines with the material so that it cannot be cleaned, do not deposit into the recycle containers. In such case, request resolution by the C&D Quality Manager for disposal of the contaminated material. Directions from the C&D Quality Manager do not relieve the Contractor of responsibility for compliance with all legal and regulatory requirements for disposal, nor shall such directions cause a request for modification of the Contract.

5.11 Project Conditions:

5.11.1 Environmental Requirements:

1. Transport recyclable and recoverable waste materials from the Work Area to containers and carefully deposit in the containers without excess noise and interference with other activities, to minimize noise and dust.
2. The Contractor shall ensure adequate erosion control and storm water control, if required, to prevent or minimize the negative impact to its surrounding environment.
3. Provide measures to insure the containment of lead-based paint and dust, nails, asbestos-based products and any biological contaminants that may affect environmental health and safety conditions.

5.11.2 Site Condition:

1. Signs and instructions should be clear, and easy to understand. All recycling containers should be clearly labeled and lists of acceptable and unacceptable materials will be posted throughout the site. Whenever possible, they should be in multiple-languages, especially in Spanish, and in graphic symbols.

2. The Contractor shall ensure the safety of all personnel involved in the C&D process.
3. A C&D site management plan shall be created including: work areas, materials processing areas, materials storage and disposal areas, worker hand-washing and changing stations, first aid and medical information.

6.0 Pile Loading Reaction System

This section breaks down what a pile load test is; it's process of instillation and concludes the results of the actual test. The structural engineer, Fohley Buhl Roberts and Associates, called out in the job specifications (Appendix A) that there would be a test to determine the bearing capacity of the piles. If the test results in a capacity 2 times the actual load, then there would be no new piles driven and a credit would be given back to the state of New Hampshire.

To do this test, an apparatus needs to be constructed to apply the force downward onto the existing piles. This section breaks down the background of piles and its testing, then wraps up with the calculations of the beams needed to create the apparatus that applies the testing force on the existing piles. The engineering question here is, what size beams are needed to perform this test without failure?

6.1 What is a Pile?

Piles have been a part of construction since the Neolithic times, where the occupants of that era drove wooden stakes in the moist soil in the shallows of lakes to build their homes on. Even Venice was built on large timber piles in the Po River to protect their society from the invaders of Eastern Europe. Pile foundations are used the same today; they make it possible to construct in locations where soil conditions do not allow for not-so-deep foundations (Sower

1979). The standard role of a pile is to transfer a load that cannot be effectively supported at superficial depths to a distance downward where sufficient support is obtainable.

Steel Piles

Steel piles are extremely strong, lightweight and able to carry intense loads. Lengths can be easily fabricated to go deeper then timber and most concrete piles. Steel piles can take more stress due to driving and they displace a minimal amount of soil mass; which creates less spoils in the construction process.

Destruction of steel piles can occur in a few ways. Damage when driving the steel pile, usually into rock, can weaken the service strength of the steel. This can easily be solved by monitoring the driving resistance. Corrosion, can occur if water and oxygen are constantly attacking the steel; this mainly depends on the soils complexity and pH level (Prakash 1990).

6.2 Pile Bearing Test Construction Sequence

Test loading is one of the most accurate ways to determine the pile bearing capacity of the existing pile. To perform this test a series of beams and piles need to be installed in appropriate locations. To clearly explain the process I have created a step by step diagram which illustrates the construction sequence of assembling the apparatus for the pile bearing test.

1) First we need to perform the general excavation to expose the pile cap and top of existing pile.

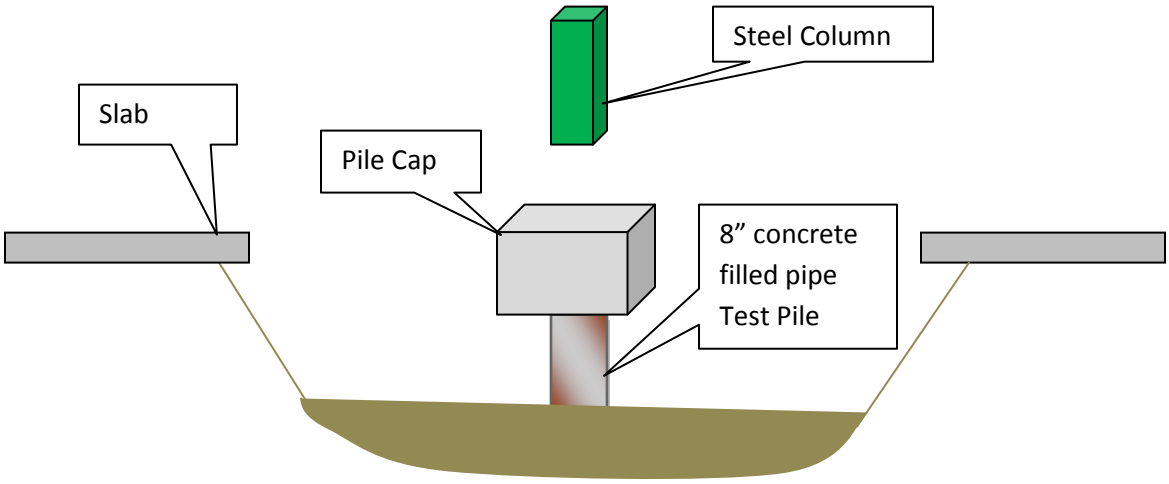


Figure 7: Pile Bearing Test Step 1

2) Install Two (2) helical piles and brackets to temporarily support the pile cap during the testing process.

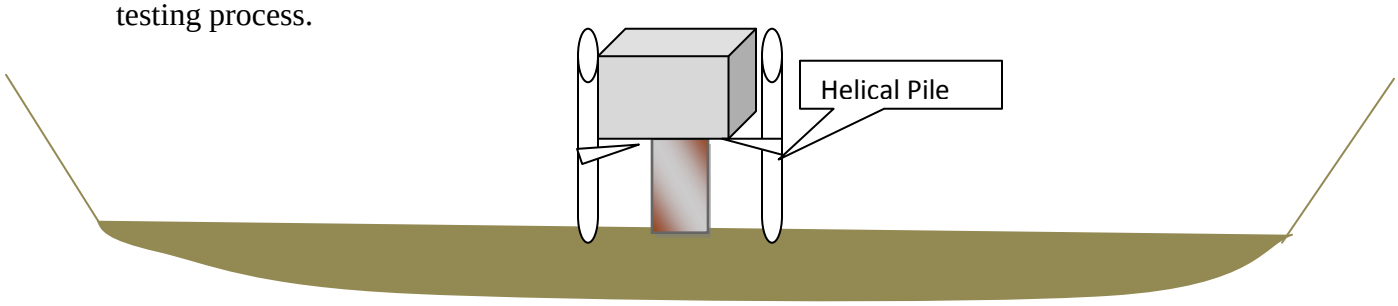


Figure 8: Pile Bearing Test Step 2

3) Install Four (4) helical tiedown anchors at the relative locations as shown.

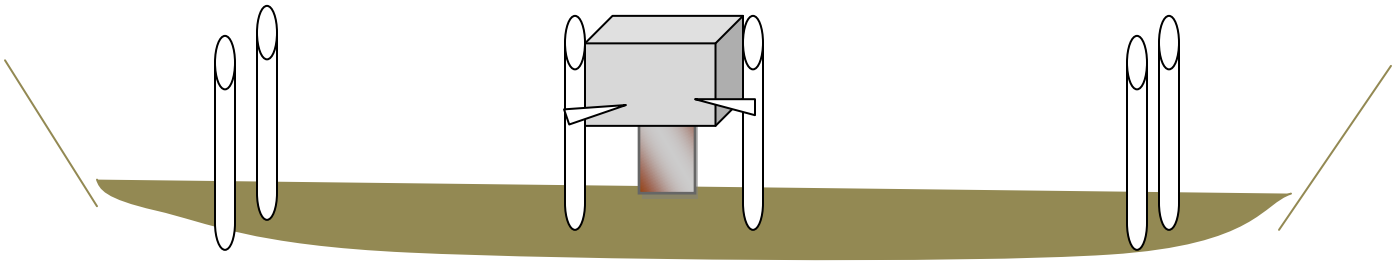


Figure 9: Pile Bearing Test Step 3

4) Install Two (2) helical piles for support of the reference beam(reference beam helps to measure the amount of deflection).

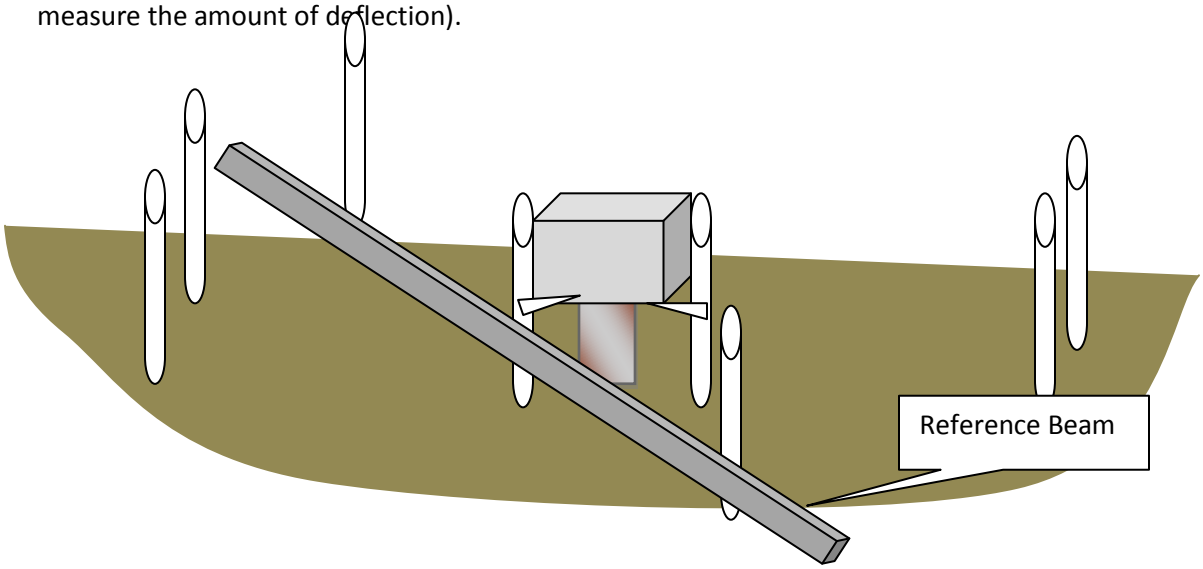


Figure 10: Pile Bearing Test Step 4

5) Cut out a section of the existing 8” diameter concrete filled test pipe test pile. The test pile shall be torch-cut as required to remove a large enough section to fit two steel plates and a hydraulic jack. The pile stub is to remain attached to the underside of the pile cap. The pile stub shall be a minimum of 6” long.

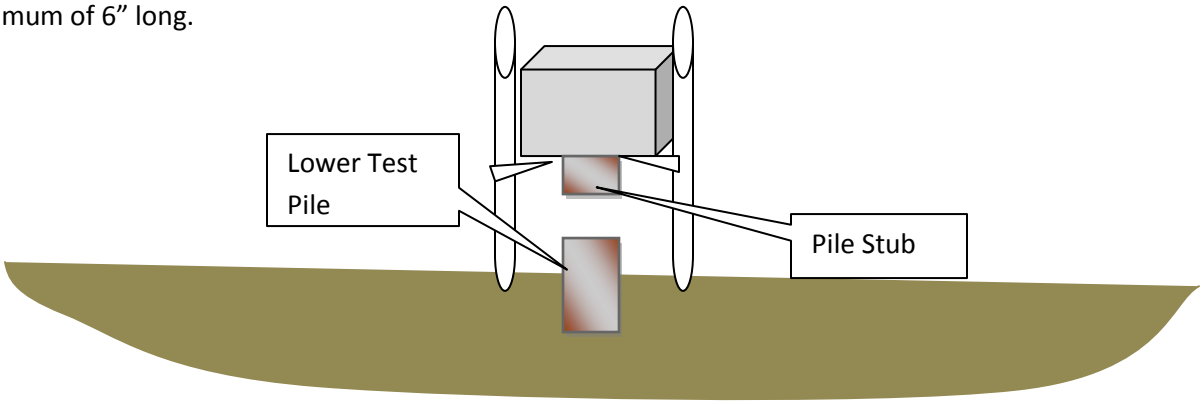


Figure 11: Pile Bearing Test Step 5

6) Install bearing plate/jack seat at the top of the lower test pile section. Install bearing plate/jack seat at the bottom of the pile stub.

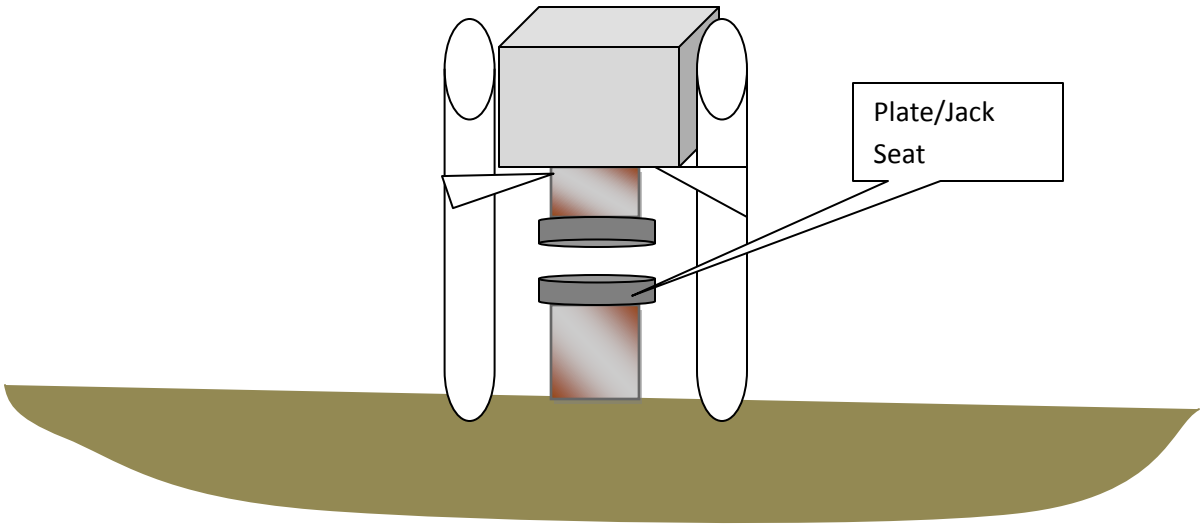


Figure 12: Pile Bearing Test Step 6

7) Center calibrated hydraulic jack on test pile head. Extend ram so that top of ram seats on stub plate. Do not load test pile. (I have remove the Helical pile supports to better show the jacking system.)

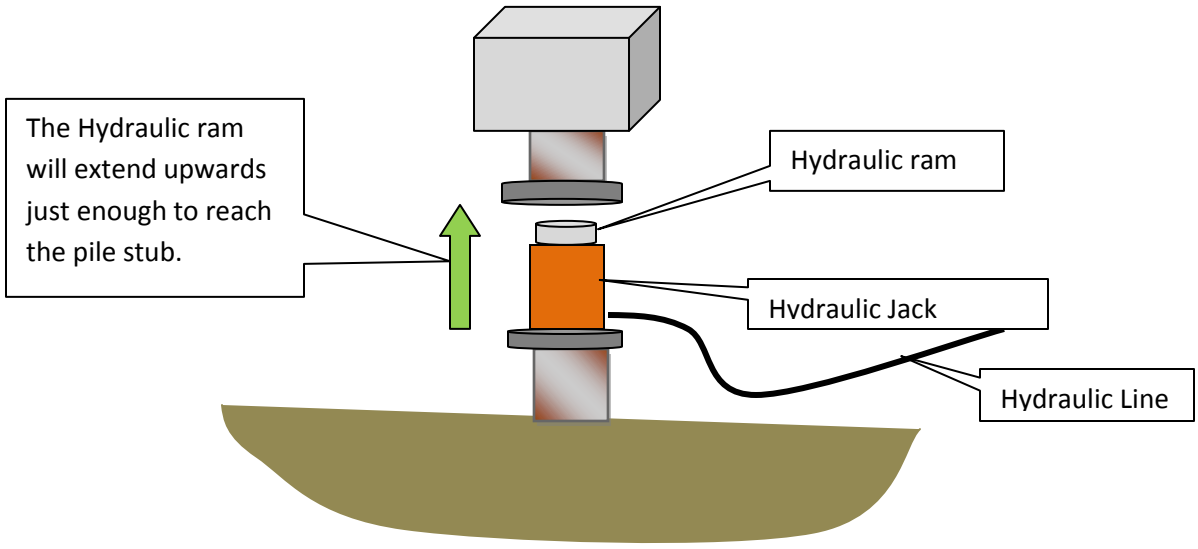


Figure 13: Pile Bearing Test Step 7

8) Place Jacking beam over top of existing pile cap. Jacking beam shall be centered over the top of the test pile. Jacking beam must have full contact with the pile cap(shims are allowed to meet this requirement).

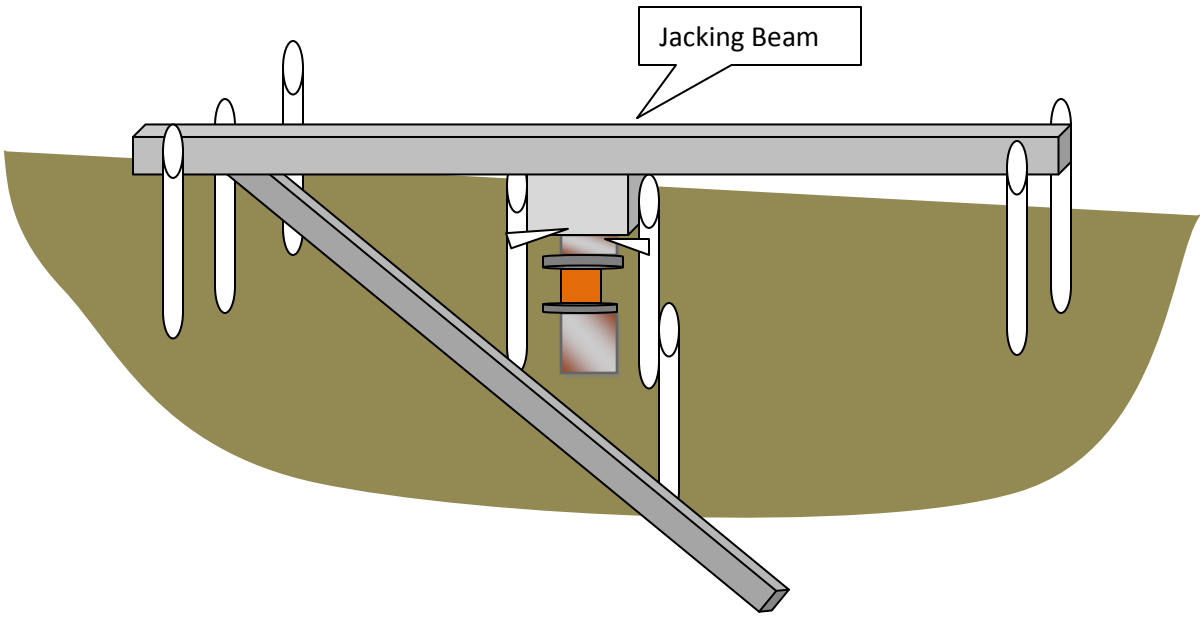


Figure 14: Pile Bearing Test Step 8

9) Install double channel reaction beam as shown.

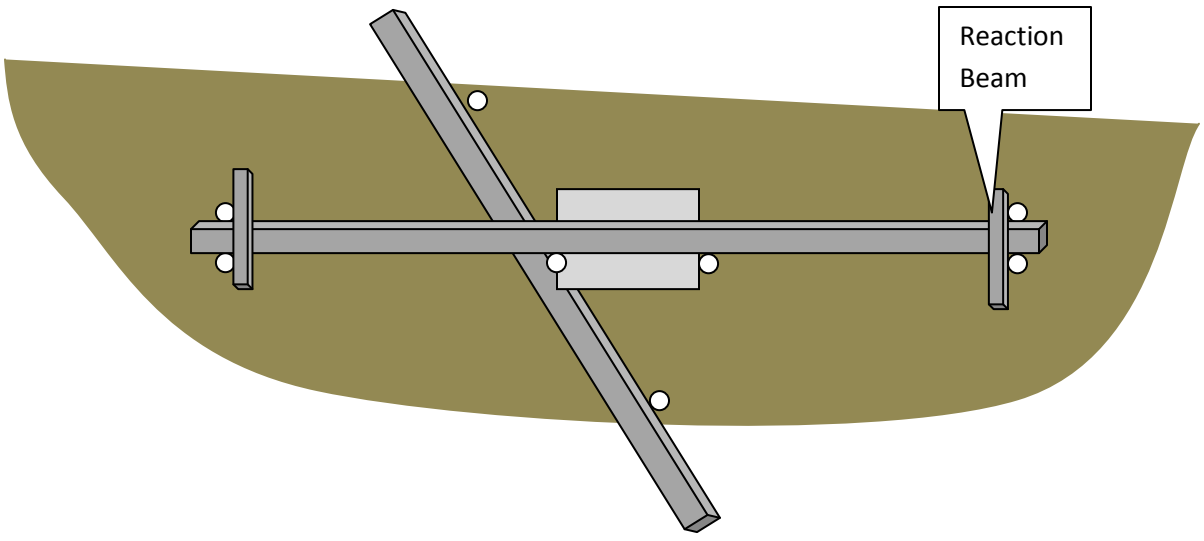


Figure 15: Pile Bearing Test Step 9

Once this sequence has been correctly performed, the GC will acknowledge that the subcontractor can then proceed to apply loads to the existing pile; but before the subcontractor can do this he/she must make sure all dials, gages and measurement tools are zeroed, so that correct values are shown during the text.

6.3 Methodology for the Pile Bearing Test

Figure 16: Pile Load Testing at Hillsborough County Court House, Manchester NH

The first objective was to determine the depth of excavation. The depth is critical to the process, for if the hole is not dug deep enough it will not allow for proper mounting of the pile-testing equipment and if it is dug to deep below the grade to much of the helical piles will show and alter the results. The depth of 5 feet below the lower level grade gave enough room for the testing and allowed for 15 feet of depth that was needed.

After the ground was excavated and the pile cap cleared of all soil, the steel members were then placed on top of the existing pile cap so the load could be properly applied (See calculations for steel members in the section 6.3 and Figure 16 above). Loading Jacks were positioned under the steel members to apply the load (See figure 17). The load to be applied was 80 kips and would be applied at a steady time interval, shown in appendix B. Once this test was

completed, TLT had to repair the pile and backfill the hole so that a concrete pour could be applied to level the existing lower level again. Below is a schematic diagram showing the beams placement for the pile load test.

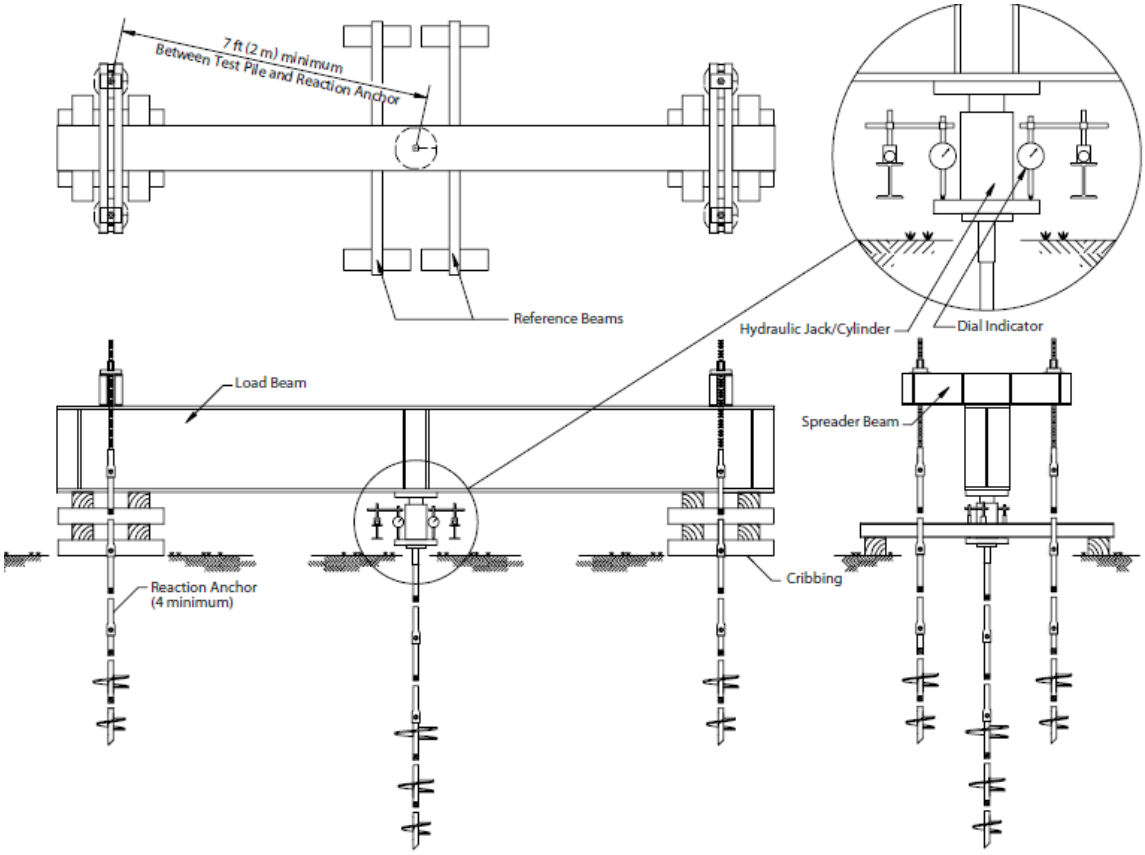


Figure 17: Diagram Showing the Correct Positioning of the Helical Piles and the Loading Jacks

6.4 Calculations

The pile load test will be exerting a certain amount of force both down on the pile itself and upward onto the main beam. As the saying goes, every action has an equal and opposite reaction. We will be maxing out the load at 80 kips, so the beams and channels need to be able to with stand this load. By using the Load and Resistance Factor Design, otherwise known as the LRFD method, we were able to the Plastic Moment Yeild, Maximum Load and Shear Strength that were needed to determine whether these beams could be used.

The parameters for the main beam that needed to be found were the plastic moment yield, the lateral torsion buckling, the maximum test load, shear strengths and web buckling. Below is a broken out step by step process showing the calculations used and their results. By comparing the load of the 80 kips being pushed out by the jacking system to the loads the beam can handle, we can see whether or not we can use this particular beam.

6.4.1 MAIN BEAM: (1)-W14x109

Max. Span $L_b := 17 \cdot ft$

Steel Properties	$F_y := 50 \cdot ksi$	$E := 29000 \cdot ksi$	
DEPTH	$d := 14.3 \cdot in$	MOM. INERTIA	$I_x := 1240 \cdot in^4$
WEB THICKNESS	$t_w := 0.525 \cdot in$	MOM. INERTIA	$l_y := 447 \cdot in^4$
FLANGE WIDTH	$b_f := 14.6 \cdot in$	RADIUS GYRATION	$r_v := 3.73 \cdot in$
FLANGE THICKNESS	$t_f := 0.860 \cdot in$	TORSIAN CONSTANT	$J := 7.12 \cdot in^4$
AREA	$A := 32.0 \cdot in^2$	SECTION MODULUS	$S_x := 173 \cdot in^3$
DISTANCE	$k := 1.46 \cdot in$	PLASTIC MODULUS	$Z_x := 192 \cdot in^3$
LOAD FACTOR for controlled or measured load			$LF := 1.2$

Compute Available Flexural Strength of (1) – 14x109 Beam

Plastic Moment Yield $\varphi_b(Strength\ Reduction\ Factor) := 0.9$

$M_p(Plastic\ Moment) := F_y \cdot Z_x$ $M_{np}(Nominal\ Plastic\ Strength) := M_p$

$Z_x := 192 \cdot in^3 = \frac{192}{12} = 16\ ft$ $M_p := 50 * 16 = 800$

$\underline{\varphi_b * M_{np}(Nominal\ Maximum\ Load\ Moment) := 800 * 0.9 = \mathbf{720\ kip \cdot ft}}$

Lateral Torsional Buckling Limiting Unbraced Lengths $c := 1$

$h_o := d - t_f$ $r_{ts} := \sqrt{\frac{l_y \cdot h_o}{2 \cdot S_x}}$ (For W36x194)

$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}}$

$$L_r := 1.95 \cdot r_{ts} \cdot \frac{E}{0.7 \cdot F_y} \cdot \sqrt{\frac{J \cdot c}{S_x \cdot h_0}} \cdot \sqrt{1 + \sqrt{1 + 6.76 \cdot (\frac{0.7 \cdot F_y}{E} \cdot \frac{S_x \cdot h_o}{J \cdot c})^2}}$$

$L_p = 13ft$ $L_r = 48.4\ ft$

Lateral Torsion Modification Factor $C_b := 1.32\ Assume: simply\ supported\ beam$

$M_{nltb} := C_b \cdot [M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot (\frac{L_b - L_p}{L_r - L_p})]$ $\varphi_b \cdot M_{nltlb} = 912.3\ kip \cdot ft$

Available Moment Capacity

$M_{avail} := \frac{\min(\varphi_b \cdot M_{np}, \varphi_b \cdot M_{nltlb})}{LF}$ $M_{avail} = 600\ kip \cdot ft$

Determine Maximum Test Load

$P_{tot} := \frac{4 \cdot M_{avail}}{L_b}$ $P_{tot} = 141\ kip$ $P_{tot} = 71\ ton$

General Provisions for Shear

$V_r := \frac{P_{tot}}{2} \cdot LF$ $V_r = 84.7\ kip$

Nominal Shear Strength

Unstiffened or Stiffened Web: $\varphi_v := 1.0$ $C_v := 1.0$

$A_w := (d - 2 \cdot t_f) \cdot t_w$ $A_w = 7\ in^2$

$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v$ $\varphi_v \cdot V_n = 198\ kip$

$If\ (V_r \leq \varphi_v \cdot V_n$, "No Web Stiffeners Required","NG")="No Web Stiffeners Required"

Flanges and Webs with Concentrated Forces

Determine minimum available strength of web for concentrated load point at jack

Maximum Test Load $P_{tot} = 141\ kip$ $P_{tot} = 71\ ton$

Flange Local Bending

Not Applicable-Plate used at top of jack

Web Local Yielding

$k = 1.46in$ $\varphi_{wly} \coloneqq 1.0$

$N \coloneqq 12 \cdot in$ (Plate Dimension)

$R_{nwly} \coloneqq (2.5 \cdot k + N)F_y \cdot (t_w)$ $\varphi_{wly} \cdot R_{nwly} = 411\ kip$

Web Crippling

$R_{nwc} \coloneqq 0.80 \cdot {t_w}^2 \cdot [[1 + 3 \cdot \left(\frac{N}{d}\right) \cdot (\frac{t_w}{t_f})]^{1.5}] \cdot \sqrt{\frac{E \cdot F_y \cdot t_f}{t_w}}$ $\varphi_{wc} \cdot R_{nwc} = 1030\ kip$

Web Sidesway Buckling

Compression Flange is not restrained against rotation

$h \coloneqq d - 2\left(t_f + k\right)$ $if\left[\frac{\left(\frac{h}{t_w}\right)}{\left(\frac{L_b}{b_f}\right)} > 1.7,\text{Sidesway Buckling Does Not Apply,NG}\right] = \text{NG}$

Web Compression Buckling $\varphi_{wcb} \coloneqq 0.90$

$R_{\boldsymbol{nwcb}} \coloneqq (\frac{24 \cdot {t_w}^3 \cdot \sqrt{E \cdot F_y}}{h})$ $\varphi_{\boldsymbol{wcb}} \cdot R_{\boldsymbol{nwcb}} = 390\ kip$

$P_w \coloneqq min(\varphi_{wly} \cdot R_{nwc}, \varphi_{wcb} \cdot R_{nwc}, \varphi_{wcb} \cdot R_{nwcb})$ $P_w = 390\ kip$

$$if(P_w \geq LF \cdot P_{tot},\text{ok,Use Web Stiffeners}) = \text{OK}$$

Web Stiffener Design – *NO WEB STIFFENERS ARE REQUIRED*

6.4.2 REACTION BEAMS: (2)-C8x11.5

Max. Span $L_b \coloneqq 4 \cdot ft$

Steel Properties	$F_y := 50 \cdot ksi$	$E := 29000 \cdot ksi$	
DEPTH	$d := 8.00 \cdot in$	MOM. INERTIA	$I_x := 32.5 \cdot in^4$
WEB THICKNESS	$t_w := 0.220 \cdot in$	MOM. INERTIA	$l_y := 47.2 \cdot in^4$
FLANGE WIDTH	$b_f := 2.26 \cdot in$	RADIUS GYRATION	$r_v := 2.65 \cdot in$
FLANGE THICKNESS	$t_f := 0.390 \cdot in$	TORSIAN CONSTANT	$J := 4.30 \cdot in^4$
AREA	$A := 3.37 \cdot in^2$	SECTION MODULUS	$S_x := 814 \cdot in^3$
DISTANCE	$k := 0.938 \cdot in$	PLASTIC MODULUS	$Z_x := 9.63 \cdot in^3$
LOAD FACTOR for controlled or measured load			$LF := 1.2$

Compute Available Flexural Strength of (2) – C8X11.5 Channels

Plastic Moment Yield $\varphi_b := 0.9$

$M_p := F_y \cdot Z_x$ $M_{np} := 2M_p$

$\varphi_b * M_{np} := \mathbf{72.2\ kip \cdot ft}$ **(for both C8x11.5s)**

Lateral Torsional Buckling Limiting Unbraced Lengths $c := 1$

$h_o := d - t_f$ $r_{ts} := \sqrt{\frac{l_y \cdot h_o}{2 \cdot S_x}}$ (For each C8x11.5)

$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}}$

$$L_r := 1.95 \cdot r_{ts} \cdot \frac{E}{0.7 \cdot F_y} \cdot \sqrt{\frac{J \cdot c}{S_x \cdot h_0}} \cdot \sqrt{1 + \sqrt{1 + 6.76 \cdot (\frac{0.7 \cdot F_y}{E} \cdot \frac{S_x \cdot h_o}{J \cdot c})^2}}$$

$L_p = 9ft$ $L_r = 4.0\ ft$

Lateral Torsion Modification Factor $C_b := 1.32\ Assume: simply\ supported\ beam$

$M_{nltb} := 2 \cdot C_b \cdot [M_p - (M_p - 0.7 \cdot F_y \cdot S_x) \cdot (\frac{L_b - L_p}{L_r - L_p})]$ $\varphi_b \cdot M_{nltlb} = 5593.4\ kip \cdot ft$

Available Moment Capacity

$M_{avail} := \frac{\min(\varphi_b \cdot M_{np}, \varphi_b \cdot M_{nltlb})}{LF}$ $M_{avail} = 60.2\ kip \cdot ft$

Determine Maximum Test Load

$P_{tot} := \frac{4 \cdot M_{avail}}{L_b}$ $P_{tot} = 60\ kip$ $P_{tot} = 30\ ton$

$P_{maxTL} := 2 \cdot P_{tot}$ $p_{maxTL} := 60\ ton$

General Provisions for Shear Max Anchor Load $P_{anch} := \frac{P_{maxTL}}{4}$

$P_{anch} = 30\ kip$

$V_r := \frac{P_{anch}}{2} \cdot LF$ $V_r = 18.1\ kip$

Nominal Shear Strength

Unstiffened or Stiffened Web: $\varphi_v := 1.0$ $C_v := 1.0$

$A_w := (d - 2 \cdot t_f) \cdot t_w$ $A_w = 2\ in^2$

$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v$ $\varphi_v \cdot V_n = 48\ kip$

$If\ (V_r \leq \varphi_v \cdot V_n$, "No Web Stiffeners Required","NG")="No Web Stiffeners Required"

Flanges and Webs with Concentrated Forces

Determine minimum available strength of web for concentrated load point at jack

Maximum Test Load $P_{anch} = 30\ kip$ $P_{anch} = 15\ ton$

Flange Local Bending

Not Applicable-Plate used at top of jack

Web Local Yielding

$k = 1in$ $\varphi_{wly} := 1.0$

$N := 12 \cdot in$ (Plate Dimension)

$R_{nwly} := 2 \cdot (2.5 \cdot k + N) F_y \cdot (t_w)$ $\varphi_{wly} \cdot R_{nwly} = 3.16\ kip$

Web Crippling

$R_{nwc} := 2 \cdot 0.80 \cdot {t_w}^2 \cdot [[1 + 3 \cdot \left(\frac{N}{d}\right) \cdot (\frac{t_w}{t_f})]^{1.5}] \cdot \sqrt{\frac{E \cdot F_y \cdot t_f}{t_w}}$ $\varphi_{wc} \cdot R_{nwc} = 620\ kip$

Web Compression Buckling $\varphi_{wcb} := 0.90$

$R_{nwcb} := 2 \cdot (\frac{24 \cdot {t_w}^3 \cdot \sqrt{E \cdot F_y}}{h})$ $\varphi_{wcb} \cdot R_{nwcb} = 57\ kip$

$P_w := min(\varphi_{wly} \cdot R_{nwc}, \varphi_{wcb} \cdot R_{nwc}, \varphi_{wcb} \cdot R_{nwcb})$ $P_w = 57\ kip$

$if(P_w \geq LF \cdot P_{anch}$,ok,Use Web Stiffeners) = "OK"

Tiedown Anchor Plates

Plate Properties $B := 8 \cdot in$ $N := 8 \cdot in$ $F_{yp} := 36 \cdot ksi$ $\varphi_p := 0.9$

Clearance Between Beams $Clr := 4 \cdot in$

Diameter of Nut or Wedge Plate $D_n := 2.72 \cdot in$ $V_r = 18kip$ $V_r = 9\ ton$

$V_n := LF \cdot V_r$ $V_n = 22kip$

Determine Plate Thickness Using One-way Bending(conservative)

$M_{pl} := \frac{1}{4} \cdot V_n \cdot \left[Clr + \frac{1}{2} \cdot (N - Clr - D_n)\right]$ $\varphi_p \cdot M_{pl} = 23\ in \cdot kip$

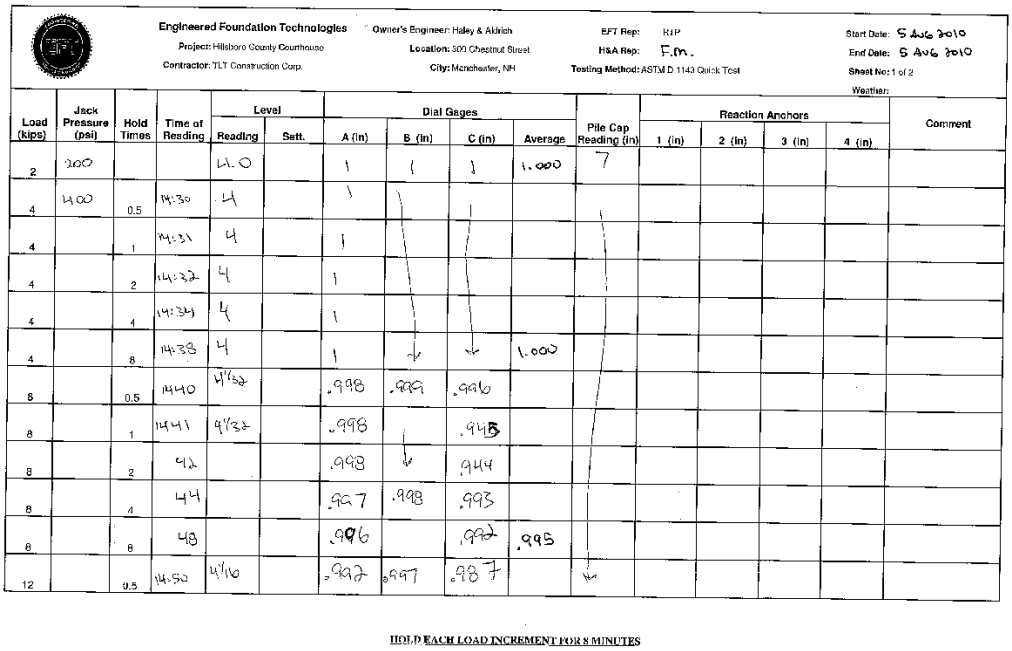
$S := \frac{\varphi_p \cdot M_{pl}}{F_{yp}}$ $S = 1\ in^2$

$t_p := \sqrt{6 \cdot \frac{S}{B}}$ $t_p = 0.686\ in$

***Use: ¾" thick anchor plate**

6.5 Results

After the trench was dug for the equipment to be applied, the test began. The test began at 4 kips and slowly raised in increments of 4 kips till finally reaching a load of 80 kips. Each Kip measurement was held for .5, 1, 2, 4, and 8 minutes. After each test was applied the deflection and elasticity was measured and recorded on the template below:



Engineered Foundation Technologies
Project: Hillsboro County Courthouse
Contractor: TLT Construction Corp.
Owner's Engineer: Haley & Aldrich
Location: 300 Chestnut Street
City: Manchester, NH
EFT Rep: RP
H&A Rep: F.M.
Testing Method: ASTM D 1143 Quick Test
Start Date: 5 Aug 2010
End Date: 5 Aug 2010
Sheet No: 1 of 2
Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
2	200			4.0		1	1	1	1.000	7					
4	400	0.5	14:30	4		1									
4		1	14:31	4		1									
4		2	14:32	4		1									
4		4	14:34	4		1									
4		8	14:38	4		1			1.000						
8		0.5	1440	4'52		.998	.999	.996							
8		1	1441	4'32		.998		.995							
8		2	42			.998		.994							
8		4	44			.997	.998	.993							
8		8	48			.996		.992	.995						
12		9.5	14:50	4'16		.992	.997	.987							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Figure 18: Pile Load Test Template(Provided by North East Helical)

Once the piles were tested at the maximum load of 80 kips the pile caps were measured to show any instability. The pile itself deflected down 0.112” and rebounded back up at .035” at a zero load. The deflection was minimal and showed that the piles could take at least an 80 kip load. It was decided before hand to not apply any more kips then structurally needed for this project. Please see the table below for the testing results.

Table 3: Applied Pile Load vs. Pile Settlement

Applied Load on Pile (Kips)	Pile Settlement in inches
2-4	0.000
8	0.005
12	0.012
16	0.016
20	0.023
24	0.028
28	0.032
32	0.039

36	0.047
40	0.049
44	0.054
48	0.062
52	0.065
56	0.070
60	0.077
64	0.084
68	0.088
72	0.095
76	0.102
80	0.112
0	0.035

Although the test performed better than expected, the coordination could have been slightly enhanced. Due to bad communication and an overloaded subcontractor's schedule, the test came significantly close to disrupting the critical path of the project schedule. My recommendation is too have the state/owner make a decisive plan of action for tests to be done; outline the key dates that these tests must be met and clearly state in a subcontractors contract the he/she must meet these deadlines.

In conclusion, after loading the piles with an 80 kip load and only deflecting 0.112", it clearly shows that these piles are still in good condition after 40 plus years. There will be no need for additional piles to be driven and a credit will be given back to the state for that portion of the contract. There will also be no time delays due to the pile driving process, which in turn allows for TLT to remain on their critical path.

7.0 Conclusion and Recommendations

This projects three main objectives were to create a quality control plan, waste management plan and to assist in the pile bearing capacity test. The quality control plan was needed to better manage the project and its final product. The waste management plan was needed to better meet the waste diversion rate needed for a LEED project. The last objective, the pile bearing capacity test, was needed to show whether the existing piles could handle the new construction.

Before I commenced writing the quality control plan, my first objective was to become a certified quality control manager. By studying the U.S. Army Corps quality control manual and attending a class held by the Army Corps I was able to take and pass the construction quality management exam. Thru working with the project manager and seeing the detailed specifications needed, I was able to create a construction quality management plan. Deciphering what was needed and creating the plan turned out to be the easier part, getting all of the employees and subcontractors to buy into the plan and coordinate appropriately was the harder part. I believe by making each and every subcontractor read and sign the CQ plan along with their contract, it would hold the subcontractor more accountable to meeting the inspection requirements and coordinating their time appropriately.

The waste management plan turned out almost the same way as the CQ plan. A lot of material was noted as being reused by the architects, but to meet the LEED silver criteria; we would need to divert at least 70% of our waste to the recycling facilities. At first creating when creating the plan, I contacted our dumpster subcontractor and spoke with him on the project specifics and how we could separate the materials appropriately before he came to pick up his

dumpsters. The first dilemma was making the dumpsters easily accessible. The dumpsters needed to be located on the south side of the building, because the north, east and west would have heavy traffic flow and a larger amount of excavation. By placing the dumpsters on the south side, workers would need to load their trash and materials into bins and wheel it to the dumpsters. LEED states that the easiest way to make sure waste is being recycled properly is by making the dumpsters more available to the workers; unfortunately we could not meet this criteria, so our laborers would lose time during the day by having to take several trips to bring material from inside the building to the south end of the construction yard. TLT has strictly enforced the waste management plan thus far though, and at this point ¾ of the way thru the projects schedule we are at a 95.6% recycling rate(see appendix K: LEED Recycling Rates).

The last objective was to assist in the pile bearing capacity test. By interviewing the owner of Engineered Foundation Technologies and walking thru the site with him, we were able to assess the conditions and the pile that we would be testing. The next step in this process was to establish the steel needed to be used in the apparatus that would apply the load downward onto the existing pile. Once we found the appropriate beams that needed to be used, the excavation began and the testing assembly was put together. Engineered Foundation Technologies applied a load in integrals of 4 kips, until reaching the maximum load of 80 kips. The maximum load was established because it was double the load the existing pile would carry (40 kips). The results show that the pile only deflected 0.112 of an inch, thus stating that the pile did not fail and only moved minutely and could handle the deigned load of 40 kips.

Besides from the obvious gross amount of time it took for me to complete this project, there were a few more things I could do to better improve my results across the board. Both plans could have been designed better if we had the subcontractors and architects working

together from the beginning and understanding where we were coming from with these plans. By giving them a hand in the development process they would have been more aware of the needs that these plans call out for. As for the pile loading test, it would have been more beneficial to have the subcontractor come out a month or two earlier, so he could better coordinate the needs of his equipment and access points before walls began to be torn down and obstruct passage ways. In the end though, I learned much more than I expected throughout this process. From project management to simply throwing away trash, experience is king. There will always be hurdles in construction, and the only way to successfully maneuver around them is to have a plan and consult those who have experienced similar issues.

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Appendices

Appendix A: Specification Section 02 74 00

SECTION 02 74 00 – Drilled Piles

PART 1 - GENERAL

1.1 SUMMARY

A. The Work covered by this section, without limiting the generality thereof, consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with the design and installation of 35-ton allowable design capacity (compression; 70-ton ultimate capacity), cement-grouted, reinforced, drilled-in piles at the locations and to the grades as shown on the Drawings and includes, but is not limited to the following:

1. The design and installation of the piles in order to achieve the specified design capacity of 35 tons based on the technical criteria presented herein and other information available to the contractor, and in accordance with the Building Code. Design calculations and shop drawings shall be submitted, for review by the Geotechnical Engineer.
2. Piles shall be uncased within the bearing stratum. Each pile shall be designed with a steel core as specified herein.
3. Drilling equipment and methods used by the Contractor shall permit advancement of casing through soils, gravel, cobbles, naturally occurring boulders, rock/boulder fill, and all other materials encountered.
4. Each pile shall be installed from within the existing building basement into the underlying bearing strata.
5. Suitable indoor air quality shall be maintained during all work.
6. Conduct one acceptable pile load test in accordance with the requirements herein and the Building Code.
7. Provide survey control, layout of design pile locations and as-built sketches by a registered land surveyor.

1.2 DEFINITIONS AND REFERENCE STANDARDS

A. ASTM: Specifications of the American Society for Testing and Materials.

B. AWS: Standard Code for Welding in Building Construction, of the American Welding Society.

C. AISC: Specification of the American Institute of Steel Construction.

D. ACI: American Concrete Institute.

E. EPA: U.S. Environmental Protection Agency.

F. NHDES: New Hampshire Department of Environmental Services.

G. Building Code: International Building Code, 2006, as amended.

H. Owner: State of New Hampshire

I. Owner's Representative: Haley & Aldrich, Inc. (Haley & Aldrich) shall be considered the Owner's Representative and Geotechnical Engineer for the work of this Section.

1.3 QUALITY ASSURANCE

A. Comply with all rules, regulations, laws and ordinances of the State of New Hampshire, City of Manchester, OSHA, and that of all other authorities having jurisdiction. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided without additional cost to the Owner.

B. Pile design and installation shall comply with the Building Code.

C. All welding shall be performed by operators who have been previously qualified by tests as prescribed in the AWS. Evidence that welders meet qualification requirements shall be submitted to the Owner's Representative before welding is begun.

D. Field Monitoring and Testing:

1. Full-time field monitoring of the drilled pile installation and pile load test operations will be provided by the Owner's Representative. No piles shall be installed except in the presence of the Owner's Representative.
2. The Owner's Representative will provide on-site monitoring of cement grout and reinforcement placement. Cement grout test cylinders will be taken and tested by the Contractor, who shall also facilitate storing samples. The Contractor shall provide a minimum of two (2) seven-day and two (2) twenty-eight day compressive strength tests per grout mix. Samples shall be stored and cured at temperatures and conditions comparable to those existing in-situ.
3. From time to time, monitoring of welding and welds may be performed by an independent testing agency employed by the Owner. The Contractor shall fully cooperate with the agency to facilitate inspection, notifying it in advance when welding operations are to be performed. Welds which do not conform to applicable specifications shall be repaired as directed by the Engineer.
4. Certification of the quality of the pile materials to be used in the Work shall be furnished, in a form acceptable to the Owner's Representative, at the time of delivery of materials to the site. Pile materials shall also be subject to on-site observation for conformance with specifications.
5. Approvals and acceptance given by the Owner's Representative shall not relieve the Contractor of responsibility for performing the Work in accordance with the Contract Documents and the Building Code.

E. Lines and Grades:

1. The Contractor shall be responsible for the correct location of piles and keeping a record of the piles installed.
2. The Contractor shall establish, maintain and record all locations and elevations required, including the elevation of the top of the pile and casing, the bottom of the pile and casing, and other location and elevation information required regarding the piles.

F. Qualifications:

1. The Contractor's personnel shall have a minimum of 5 years experience in the work specified in this Contract and shall have successfully completed a minimum of 5 similar projects in the past 3 years.

1.4 SUBMITTALS

A. General:

1. The Contractor shall submit the information specified herein to the Owner's Representative for review. Unless otherwise specified, submittals shall be made not less than two (2) weeks prior to the start of the Work. Pile installation shall not commence until all required submittals have been reviewed and accepted, and approval to proceed is provided by the Owner.
2. Submit documentation of qualifications to satisfy the requirements of Article 1.3.F.
3. Prepare and submit an Indoor Air Quality Maintenance Plan to the Owner's Representative for review and acceptance.

B. Drawings:

1. Drawings and design calculations indicating proposed pile capacities, pile diameter and materials, total length and length in bearing stratum, pile layout, details of the pile including splice details, reinforcing, procedures for placement of grout, temporary or permanent casing, and other items pertinent to pile installation.
2. Proposed reinforcement splice detail, if applicable.
3. Details of equipment and procedures for pile installation.
4. Shop drawings of the load test setup and test procedures including all details of equipment and apparatus to be used for the load tests, a certificate of calibration for both the pressure gage and the hydraulic jack, and design details of the test pile including proposed method for isolating the test pile from the fill soils. The pressure gage and hydraulic jack shall have been calibrated together as a unit within 30 days prior to the load test.

C. Installation:

1. Provide details of the pile including: reinforcing, reinforcement connection methods, procedures, pressures and equipment for placement of grout, steel core centralizers and other items pertinent to pile installation.
2. Details of equipment and procedures to be used for pile installation including those to be used to drill through obstructions.
3. Planned construction and drilling sequence and platform elevation of drill rig and drill hole.

D. The mix design and documentation of achieving the required compressive strength for the proposed cement grout.

E. Before Work is begun, the Contractor shall prepare and submit a coordination drawing showing the size and location of equipment relevant to complete the pile installation. Included on the drawing shall be shown the areas planned to use for staging, access areas, pile locations, and any other element of the installation.

F. Details of plans to contain and dispose of drill spoil during the drilling operation.

G. As-Built Data: Actual pile location data, determined by a registered land surveyor, shall be submitted within two (2) working days after a pile is installed. The Contractor shall provide the Owner's Representative with written tabulation indicating the following information:

1. Pile number.
2. Elevation of top of each pile after installation of the cap plate (measured to the nearest 0.05 ft.).
3. Deviation from design plan location (measured to the nearest 0.01 ft.).
4. Length and tip elevation
5. Time and date installed
6. Other information required in Article 1.3.

1.5 MINIMUM PILE INSTALLATION CRITERIA

A. General: Design and installation details of the piles shall be in accordance with previously accepted and approved submittals.

B. Subsurface Conditions:

1. A geotechnical engineering report has been prepared by Haley & Aldrich, Inc. dated 12 October 2009. This report is specifically not part of the Contract Documents, but is available to bidders for informational purposes for use in preparing their bids.
2. Review available logs of subsurface explorations and other pertinent data for the site. After obtaining Owner's permission, take whatever additional subsurface explorations deemed necessary at no expense to the Owner.
3. Soil and/or rock core samples may be examined upon written request to the Owner's Representative, as available.
4. The above data are for general information and are accurate only at the particular locations and times the subsurface explorations were made. It is the Contractor's responsibility to make interpretations and to draw conclusions based on the character of materials to be encountered and the impact on his work based on his expert knowledge of the area and of earthwork techniques.
5. If a potential conflict exists between the Geotechnical Report and these technical specifications, the Contractor shall, immediately upon its discovery, request clarification from the Owner's Representative.
6. The Contractor assumed allowable adhesion in the soils and rock is subject to confirmation by load test. The actual pile lengths in the bearing strata shall be adjusted to reflect the confirmed allowable adhesion and the strata breaks between the soils and rock observed during the installation of each pile, and shall be subject to the approval of the Owner's Representative. The actual length of pile will be measured, and the Contractor will be paid in accordance with these specifications.

C. Pile Length:

1. Proposed pile lengths shall be initially determined by the Contractor in accordance with Article 1.5.B.6, as accepted by the Owner's Representative. Production pile lengths shall be determined based on load testing and as accepted by the Owner's Representative.

D. Pile Diameter:

1. Each pile shall bear, uncased, in the approved bearing strata.
2. The design pile diameter within the bearing strata shall be taken as the outside diameter of the temporary casing or the diameter of the drill bit attached to the bottom of the temporary casing.

E. Pile installations shall be designed in accordance with the Building Code and additional criteria as follow:

1. Piles shall be formed with a steel core and grout encasement to transfer load to the bearing strata.
2. Maximum allowable stress in the steel core shall be forty (40) percent of the minimum specified yield strength, but shall not exceed 25,500 psi on the area of the core steel. The allowable stress on the cement grout shall be thirty-three (33) percent of the twenty-eight (28) day unconfined compressive strength, but not exceeding 1,650 psi.
3. The steel core shall be designed to carry not less than forty (40) percent of the design compression load. The steel core shall be sized such that it will not yield before twice the design load is achieved.
4. Minimum thickness of grout cover over core steel shall be one (1) inch.
5. The steel core shall be centered in the pile and shall extend from the top of the pile through the grout to the bottom of the pile. Centralizers shall be used at maximum 10 ft intervals.
6. The mating ends of the steel core sections shall be spliced so as to safely withstand the stresses to which they may be subjected. Each core steel section and splice shall be assembled to develop the full compressive and tensile strengths of the section.
7. Piles shall not be loaded until the cement grout has achieved the design compressive strength.
8. Additional steel reinforcing shall be provided if required by the Building Code.

1.6 CONDUCT OF THE WORK

A. The piles shall be installed as indicated on the Drawings. The design, materials, equipment and installation procedures developed shall avoid any detrimental effects to the existing building and additions, unnecessary noise or vibrations, dust, and damage to the property.

B. The Contractor will be completely and solely responsible for job safety and security, and any damage caused to any existing facility.

C. The Contractor shall comply with all requirements of the Owner relative to noise, vibrations, dust, access and other operations.

D. The Contractor shall have the known utility locations in the vicinity of proposed pile locations marked in the field by utility companies and/or the Owner, prior to commencing work. The Contractor is responsible for all Dig-Safe calls and utility coordination. In addition, the Contractor shall be responsible for completing pile installation without damage to any utilities or other substructures.

E. The Contractor shall provide provisions to control exhaust from equipment, the flow of water/cuttings and disposal of same, and shall keep the premises clean and free of water and debris from the drilling/pile installation work, such that the other work activities in the building and the site are not interrupted.

F. The Contractor shall produce an indoor air quality maintenance plan which will be subject to the acceptance of the Owner's Representative

G. The Contractor shall immediately repair any damage to existing structures or property caused from performing the Work described herein.

PART 2 – PRODUCTS

2.1 CEMENT GROUT

A. Cement grout for piles shall conform to the requirements of the Code and ASTM Specification C94 for Ready Mixed Concrete, Third Edition.

B. The cement grout mixture shall have a minimum 28-day compressive strength (f'_c) of 5,000 psi.

2.2 STEEL CORE

A. Steel core reinforcement as a minimum shall be standard deformed steel conforming to the requirements of ASTM A615 Grade 60 or Grade 75, or A722 Grade 150, a structural steel section conforming to ASTM A36, welded or seamless pipe conforming to ASTM designations: A53, A500, A501 or A618, or equivalent.

2.3 STEEL CASING

A. Pipe or drill casing, if designed to contribute to the structural capacity, shall conform to one of the following ASTM designations: A53, A500, A501 or A618.

PART 3 - EXECUTION

3.1 GENERAL

A. Piles shall be installed to the line and grades specified in the Drawings.

B. The Contractor shall provide provisions to control the flow of water and disposal of same, and shall keep the premises clean and free of water and debris from the drilling/pile installation Work.

C. The Contractor shall provide provisions to control equipment exhaust within the building and to monitor and control indoor air quality in accordance with the indoor air quality maintenance plan.

D. Pile Interaction

1. Pile drilling sequence shall be determined prior to the start of Work, such that new piles shall not be drilled within 10 ft. of recently completed "fresh" piles for a period of 24 hours from grouting of "fresh" piles.

2. If interaction between new/fresh piles is observed during drilling, the drilling operations shall cease immediately, until the "fresh" pile has cured (a minimum of 24 hours). Drilling may commence at other pile locations.

3.2 OPERATIONS AND EQUIPMENT

A. Piles shall be installed with the equipment as described in the Contractor's submittals. The proposed pile installation equipment and methods shall not be altered from the procedure presented in the submittal at any time unless approval is given by the Owner's Representative in writing.

B. The Contractor shall provide one fully equipped pile installation rig in full time operation at the site during the installation work.

3.3 METHOD OF INSTALLATION

A. The method of pile installation shall be determined by the Contractor, subject to review by the Owner's Representative. Pile installation shall be made by non-displacement, low vibration methods such as rotary drilling. Wet rotary drilling methods shall employ sufficient fluid pressure to provide complete removal of the drill cuttings from the hole. Driving of casing is prohibited. Installation equipment and methods for production piles shall be the same as used to install the successful load test pile.

B. Drilling shall be made in such a manner to prevent loss of ground beyond the specified pile diameter. Drilling casing, mud, or other methods shall be employed as required to stabilize the hole and prevent loss of ground. Drilling mud in the hole shall be sufficiently fluid such that it is readily and fully displaced by the cement grout.

C. All excavation and drilling spoil shall be controlled to minimize disturbances to site conditions and hindrances to pile installation procedures and requirements. The drilling water, spoil or other resulting by-products shall not be allowed to enter into any site or municipal drainage system without prior written approval from the controlling agency (EPA, NHDES, City of Manchester) and the Owner.

D. The Contractor is responsible for controlling the amount of dust and spoil created by the pile installation process using whatever methods are most appropriate.

E. All piles shall be installed at locations determined by the Contractor, and reviewed and accepted by the Owner's Representative. Pile location shall be checked during installation and appropriate measures taken as necessary to maintain the correct pile location.

F. Each pile shall be drilled to achieve the foundation support within the identified bearing strata and shall be capable of supporting the specified design load.

G. Grouting of the piles shall provide complete filling of the pile with a minimum of segregation. Grout shall be placed under pressure by means of a tremie pipe and grout pump from the bottom of the pile upward in one continuous operation until the pile is filled and suitable, undiluted cement grout returns at the top of the pile. The cement grout shall not be allowed to fall freely through slurry or water.

H. Core steel shall be centered in the hole with appropriate centering devices. Place steel core and reinforcing after initial grouting and before commencing removal of the casing within the bearing length of the pile and pressure grouting.

I. The casing shall be withdrawn in a controlled manner with the grout level maintained at the top of the pile, to ensure that the grout completely fills the drill hole. During withdrawal of the casing, the grout level inside the casing shall be constantly monitored to check that the flow of grout inside the casing is not obstructed.

J. Piles shall be of the regroutable type, and the embedment length of the pile shall be post-grouted between 24 and 48 hours after initial pile installation. A minimum grout pressure of 200 psi shall be utilized during regrouting through a Manchette Tube with ports 3 ft on center throughout the embedment length.

K. Piles shall be checked 24 hours after installation for grout loss or shrinkage. Additional grout shall be added as required to achieve design cut-off elevation. Any soil or other contamination present on the pile top shall be removed prior to adding grout.

L. Piles may not be loaded until the cement grout has achieved design compressive strength.

3.4 PILE LOAD TESTING

A. General:

1. One, 35-ton allowable design capacity pile shall be load tested to a minimum ultimate compressive load of 70 tons before installing production piles, in accordance with procedures contained in ASTM D1143, Standard Method of Testing Piles under Static Axial Compressive Load. If the pile load test indicates that the pile did not perform successfully in accordance with the Building Code at the design load, the Owner's Representative shall, at his option, direct the Contractor to adjust the pile lengths or otherwise redesign the piles using the load test data.
2. The Contractor shall provide all labor, materials and equipment required to set up, conduct and dismantle the load test.
3. The test pile shall be installed by the methods and equipment specified for production piles.
4. The load test shall be made at a location approved of by the Owner's Representative, and shall be completed and accepted before production piles are installed.

5. The test pile shall be a non-production pile unless otherwise approved by the owners engineer in writing. After completion of the pile load test the pile shall be cut-off at the level indicated on the drawings.
6. Grout in the test piles shall have attained a minimum compressive strength of 5,000 psi prior to load testing. The Contractor shall provide substantiating compressive strength test data prior to load testing.
7. In the event the load test does not meet the requirements stated herein, the Contractor shall perform additional load test(s) as required to achieve a successful test, at no additional cost to the Owner.

B. Pile Instrumentation:

1. The Contractor shall embed two (2) ½-inch I.D. steel pipes in the test pile to permit the Engineer to install telltale rods. One (1) steel pipe shall be installed at the top of the bond zone and one (1) steel pipe shall be installed to the bottom of the pile.
2. The Owner's Representative will furnish and install instrumentation to monitor settlement of the pile.

C. Test Procedure:

1. Load shall be applied to the test pile by means of a hydraulic jack operated by the Contractor which reacts against a pile supported reaction beam. Reaction beam supports shall be at least 7 feet away from the test pile. Temporary piles for support of the reaction and reference beam systems shall be removed to a depth of at least 5 ft below finished grade.
2. The hydraulic jack shall have a capacity of at least 90 tons and shall be capable of moving the pile a minimum of 6 inches.
3. The Contractor shall provide a minimum 21 inches of clearance between the top of the pile and the underside of the reaction beam to allow the Owner's Representative to install a load cell.
4. The top of the test pile shall be level and capped to provide a horizontal bearing surface.
5. The Owner's Representative will furnish and install up to three micrometer dial indicators (range of 2 inches, graduated in 0.001 inch divisions).
6. Micrometer dials shall be mounted by the Owner's Representative to one or more steel reference beams provided by the Contractor. The beam(s) shall be rigid and supported by piles extending at least 10 feet below the bottom of any fill soils at a distance of at least 10 feet from the test pile. The reference beams shall be fixed at one end and shall be free to move horizontally at the other end to allow for expansion and contraction of the reference beam without vertical deflection at points where dials are mounted. Wood or other materials subject to variations in moisture content shall not be used in reference beams, crossbeams, shims, or for any other means of dial support.
7. The Contractor shall protect the entire measuring apparatus against disturbances which may affect the reliability of the settlement observations. The Contractor shall provide suitable heaters and suitable enclosures to maintain the temperature around the test apparatus at a minimum of 40°F, and shall provide temporary lighting as necessary.
8. Loading and unloading of the test pile shall be performed only in the presence of the Owner's Representative, and in accordance with ASTM D1143 Section 5.6 Quick Load Test for Individual Piles with the following modification. Hold times for

the allowable load (35 tons) and twice the allowable load (70 tons) shall be a minimum of 15 minutes and 30 minutes, respectively.

3.5 TOLERANCES AND CRITERIA FOR ACCEPTANCE

A. Piles shall be installed as close as practicable to the required locations. A maximum lateral deviation of the center of the pile from the correct location at cut-off elevation permitted will be 3.0 inches. A maximum deviation from design cut-off elevation equal to 1.0 inch will be permitted.

B. Piles which are believed to have collapsed, based on the grout take volume, or which are otherwise unsatisfactory as specified above and which cannot be removed or repaired, shall be abandoned.

C. Piles that are rejected because of damage, mislocation or misalignment, or failure to meet other installation criteria, shall be cut off at least 24 inches below the design cut-off grade and abandoned. Additional pile(s) shall be installed as necessary subject to review by the Owner's Representative. Whenever, in the judgment of the Owner's Representative, misalignment or rejection of a pile is caused by the Contractor's violation of the specifications or other error on the Contractor's part, and installation of one or more replacement piles is necessitated, the cost of such re-installation shall be borne by the Contractor.

3.6 DISPOSAL OF EXCAVATED MATERIAL

A. All excavated material, slurry, slurry contaminated materials and other waste materials resulting from pile installation shall be removed and legally disposed of off-site by the Contractor. Prior to clear drill water discharge, the excess water shall pass through a sedimentation basin and otherwise filtered as necessary to remove soil fines. Additional treatment of water or slurry shall be performed as necessary to comply with any and all permits issued for dewatering and discharging of water and with all applicable regulatory requirements. Slurry or other by-products of the pile installation shall be contained in the immediate work area and shall not be allowed to enter storm drains or sewers.

PART 4 - MEASUREMENT

4.1 GENERAL

A. Pile installation includes all services, permits, labor, equipment, transportation, material, and supplies for the complete work. Payment for piles shall include furnishing, installing and grouting the piles, mobilization and demobilization for completion of the work, and all related work. No other payments for any specified or indicated work nor for any work implied therefrom shall be made.

4.2 MEASUREMENT

A. Final payment shall be on a per pile unit price basis, for piles installed and accepted in accordance with the criteria presented herein. The unit price shall include any adjustments in length to reflect the results of the pile load test(s) and the observed stratigraphy, and all other incidental costs. The unit price shall not include mobilization and demobilization. Lengths of piles shall not be measured for payment.

B. No change in unit prices shall be made if the pile length, total footage or number of piles differs from the estimated quantities or that shown on the drawings.

C. No separate payment will be made for removing or overcoming obstructions.

D. Separate measurement and payment will be made for mobilization and demobilization.

E. Whenever, in the judgment of the Owner's Representative, misalignment or rejection of a pile or piles, caused by the Contractor's violation of the specification or his other error, necessitates structural redesign, the cost of such redesign shall be deducted from sums otherwise due to the Contractor under the contract. If the redesigned pile cap requires greater quantities of concrete and reinforcing steel, as compared with the quantities required for the pile cap as originally designed, the additional cost for pie cap concrete, reinforcing steel and form work shall also be deducted from the contract price.

F. Load test(s) will be measured and paid separately as a lump sum per accepted test. The lump sum is to include any and all design, equipment, setup, labor to conduct test, removal, and other incidental work to complete the load test.

END OF SECTION

Appendix B: Original Pile Load Test Submittal

Engineered Foundation Technologies, LLC

P.O. Box 707
Nashua, New Hampshire 03061
Telephone: 603.598.0089
Fax: 603.598.0091

Design/Build Services
Pressure Grouting
Foundation Underpinning
Helical Anchoring
Earth Support

9 August 2010

Mr. John Galasso
TLT Construction Corp.
One Pope Way
Wakefield, Massachusetts 01880

RE: New Helical Piers for Foundation Support
Nashua Community College

Dear Mr. Galasso:

We have recently completed the pile load test for the above referenced project in Manchester, New Hampshire.

The 8" diameter concrete-filled steel pipe pile was load tested in general accordance with the ASTM D-1143 "Quick Load Test" method. The pile load incrementally loaded up to 80 kips and movement was measured by dial gauges attached to a reference beam. The pile deflected down 0.112" at maximum load and rebounded back .076" at zero load. Net pile settlement was measured .036" after the test was complete.

We have generated a load vs. deflection curve and this is attached herewith for your use. We have also appended copies of our field records.

Please call if you have any questions or require anything further.

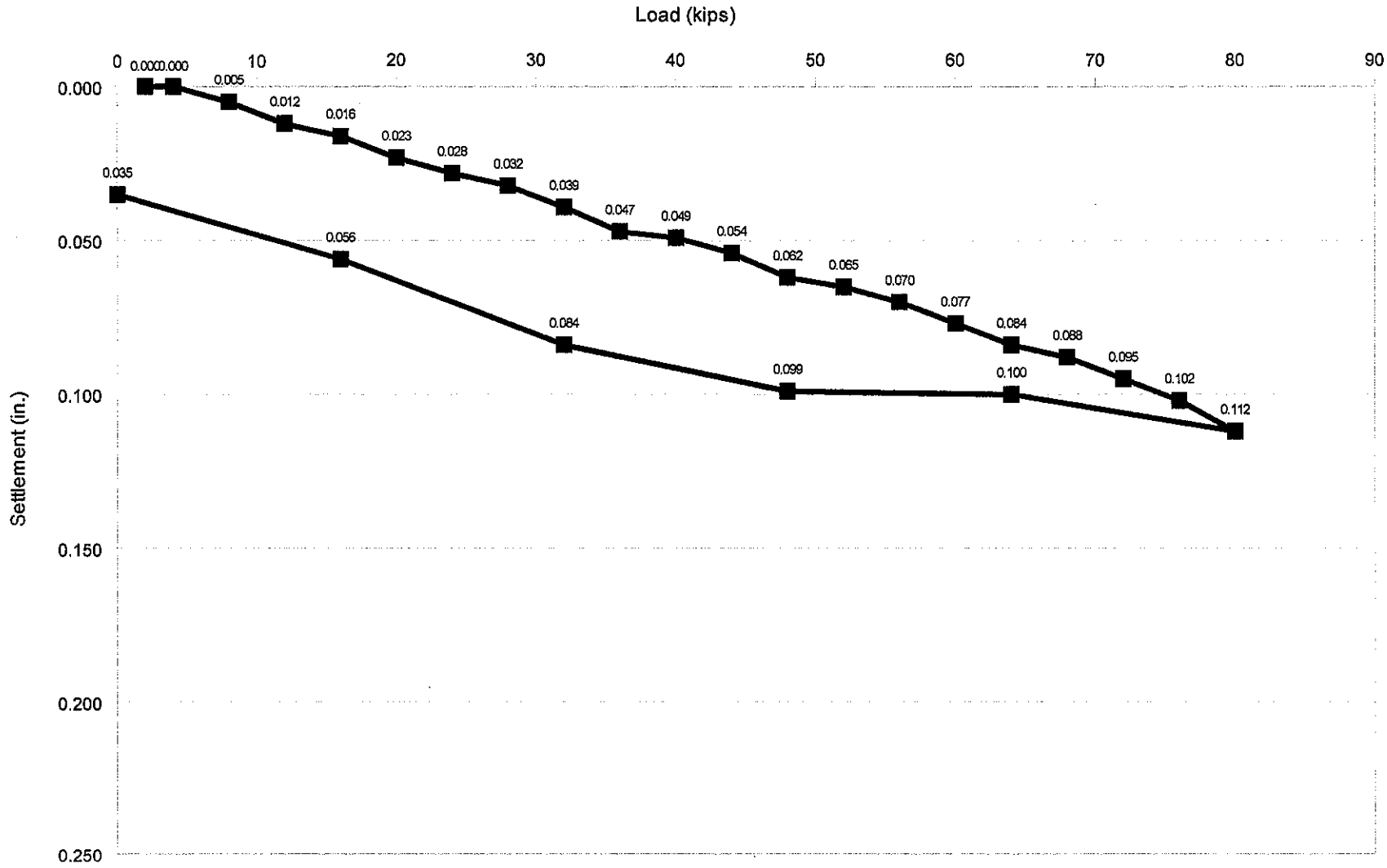
Sincerely,

Engineered Foundation Technologies, LLC

Richard T. Porter, P.E.
General Member

Hillsboro County Courthouse Pile Load Test

Load vs. Deflection Curve



Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
2	200			41.0		1	1	1	1.000	7					
4	400	0.5	14:30	4		1									
4		1	14:31	4		1									
4		2	14:32	4		1									
4		4	14:34	4		1									
4		8	14:38	4		1			1.000						
8		0.5	1440	4'1/32		.998	.999	.996							
8		1	1441	4'1/32		.998		.945							
8		2	42			.998		.944							
8		4	44			.997	.998	.993							
8		8	48			.996		.992	.995						
12		0.5	14:50	4'1/16		.992	.997	.987							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: FM

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
12		1	14:51	4'/16		.991	.997	.987							
12		2	52			"	"	.986							
12		4	54			"	"	.985		7					
12		8	58			.990	.996	.980	.988	7					
16	1500	0.5	15			.985	.995	.979							
16		1	1501			"	.944	.979							
16		2	1502			"	.993	.978							
16		4	1504			.984	"	.978							
16		8	1508			"	.992	.976	.984	7					
20	1850	0.5	1510			.980	.990	.972		7					
20		1	1511			.979	"	.971							
20		2	1512			.978	.986	.964							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: FM

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
20	15:14	4		4 1/16		.977	.986	.966							
20	15:18	8				.977	.987	.966	.977	7					
24	1520	0.5				.975	.986	.966		7 1/32					
24	1521	1				.975	.986	.966							
24	1522	2				.972	.984	.962							
24	1524	4				.971	.983	.961							
24	1528	8				.971	.984	.961	.972	7 3/64					
28	1530	0.5				.968	.982	.960		7 3/64					
28	1531	1					.981	.959							
28	1532	2					.982								
28	1534	4					.982								
28	1538	8				.967	.981	.958	.968	7 3/64					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

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Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
32		0.5	15:40	4 3/32		.963	.978	.954		7 1/16					
32		1	15:41			↓	↓	.954							
32		2	42			↓	↓	.954							
32		4	44			.962	↓	.953							
32		8	48			.960	.975	.948	.961	7 1/16					
36		0.5	50			.958	.973	.946		7 1/16					
36		1	51			↓	.972	.946							
36		2	52			↓	.972	.946							
36		4	54			.954	.967	.947							
36		8	58			.954	.968	.937	.953	7 1/16					
40		0.5	16:00	4 1/8		.951	.967	.937		7 1/16					
40		1	16:01	4 1/8		.951	.966	.937							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Owner's Engineer: Haley & Aldrich | **EFT Rep:** RTP | **Start Date:** 5 Aug 2010

Project: Hillsboro County Courthouse | **Location:** 300 Chestnut Street | **H&A Rep:** F.M. | **End Date:** 5 Aug 2010

Contractor: TLT Construction Corp. | **City:** Manchester, NH | **Testing Method:** ASTM D 1143 Quick Test | **Sheet No:** 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
40		2	16:07	4 1/8		.951	.966	.937							
40		4	16:04			.950	.967	.937							
40		8	16:08			.950	.967	937	.951	7 1/16					
44		0.5	16:10			.947	.963	932		7 3/32					
44		1	16:11			.946	.962	932							
44		2	12			.946	.962	932							
44		4	14			.946	.963	931							
44		8	18			.945	.963	~~93~~	.946	7 3/32					
48		0.5	20			.942	.959	925		7 3/32					
48		1	21			.942									
48		2	22			.941									
48		4	24			.941									

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
48		8	1628	4 1/8		.939	956	921	.938	7 3/32					
52	4775	0.5	16:30			.938	955	921		7 3/32					
52		1	31			.937	955	921							
52		2	32			.937	955	921							
52		4	34			.936	954	918							
52		8	38			.935	953	918	.935	7 3/32					
56	5150	0.5	40			.932	950	915							
56		1	41			.932	950	915							
56		2	42			.931	950	914							
56		4	44			.930	948	912							
56		8	48			930	949	911	.930						
60	5500	0.5	50			927	945	907		7 1/8					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
60		1	1651			← MISSED		→							
60		2	1652	4 1/8		925	945	906							
60		4	1654			925	944	905							
60		8	58			924	943	903	.923	7 1/8					
64		0.5	1700			922	941	902							
64		1	01			921	941	901							
64		2	02			921	941	900							
64		4	04			919	940	897							
64		8	08			915	939	895	.916						
68		0.5	10			915	936	893							
68		1	11			"	935	892							
68		2	12			"	935	892							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
68		4	17:14	4 1/8		.913	932	890							
68		8	18			.913	933	890	.912	7 1/8					
72	4600	0.5	20			.910	929	885							
72		1	21			.908	928	884							
72		2	22			.908	928	884							
72		4	24			.908	928	883							
72		8	28			907	927	881	.905						
76	6950	0.5	17:30			903	922	875							
76		1	31			902	922	875							
76		2	32			901	921	874							
76		4	34			↓	920	873							
76		8	38			↓	920	872	.898	7 1/8					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
80	7300	0.5	1740	897			915	867							
80		1	41	896			914	865							
80		2	42	895			913	864							
80		4	44	894			913	863							
80		8	48	892			911	861	.888						
64	5875	1	50	904			925	875							
64		2	52	904			925	.875							
64		4	54	903			924	.875							
64		8	58	903			924	.875	.900						
48	4225	1	00	905			926	.875							
48		2	1802	1			926	.875							
48		4	1804				926	873							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
48		8	1808			905	926	873	.901	7'9					
32	2950	1	1810			920	938	882							
32		2	11			919	938	882							
32		4	12			919	938	882							
32		8	14			922	940	888	.916						
16	1500	1	18			944	956	905		7'1/16					
16		2	20			940	959	910							
16		4	22			940	959	910							
16		8	24			948	980	910	.944						
0		1	28			968	980	936							
0		2	30			969	981	938							
0		4	34			971	981	939	.965						
0		8	38			972	982	939	.966	7.0					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Appendix C: Load Test Summary

Engineered Foundation Technologies, LLC

P.O. Box 707
Nashua, New Hampshire 03061
Telephone: 603.598.0089
Fax: 603.598.0091

Design/Build Services
Pressure Grouting
Foundation Underpinning
Helical Anchoring
Earth Support

9 August 2010

Mr. John Galasso
TLT Construction Corp.
One Pope Way
Wakefield, Massachusetts 01880

RE: New Helical Piers for Foundation Support
Nashua Community College

Dear Mr. Galasso:

We have recently completed the pile load test for the above referenced project in Manchester, New Hampshire.

The 8" diameter concrete-filled steel pipe pile was load tested in general accordance with the ASTM D-1143 "Quick Load Test" method. The pile load incrementally loaded up to 80 kips and movement was measured by dial gauges attached to a reference beam. The pile deflected down 0.112" at maximum load and rebounded back .076" at zero load. Net pile settlement was measured .036" after the test was complete.

We have generated a load vs. deflection curve and this is attached herewith for your use. We have also appended copies of our field records.

Please call if you have any questions or require anything further.

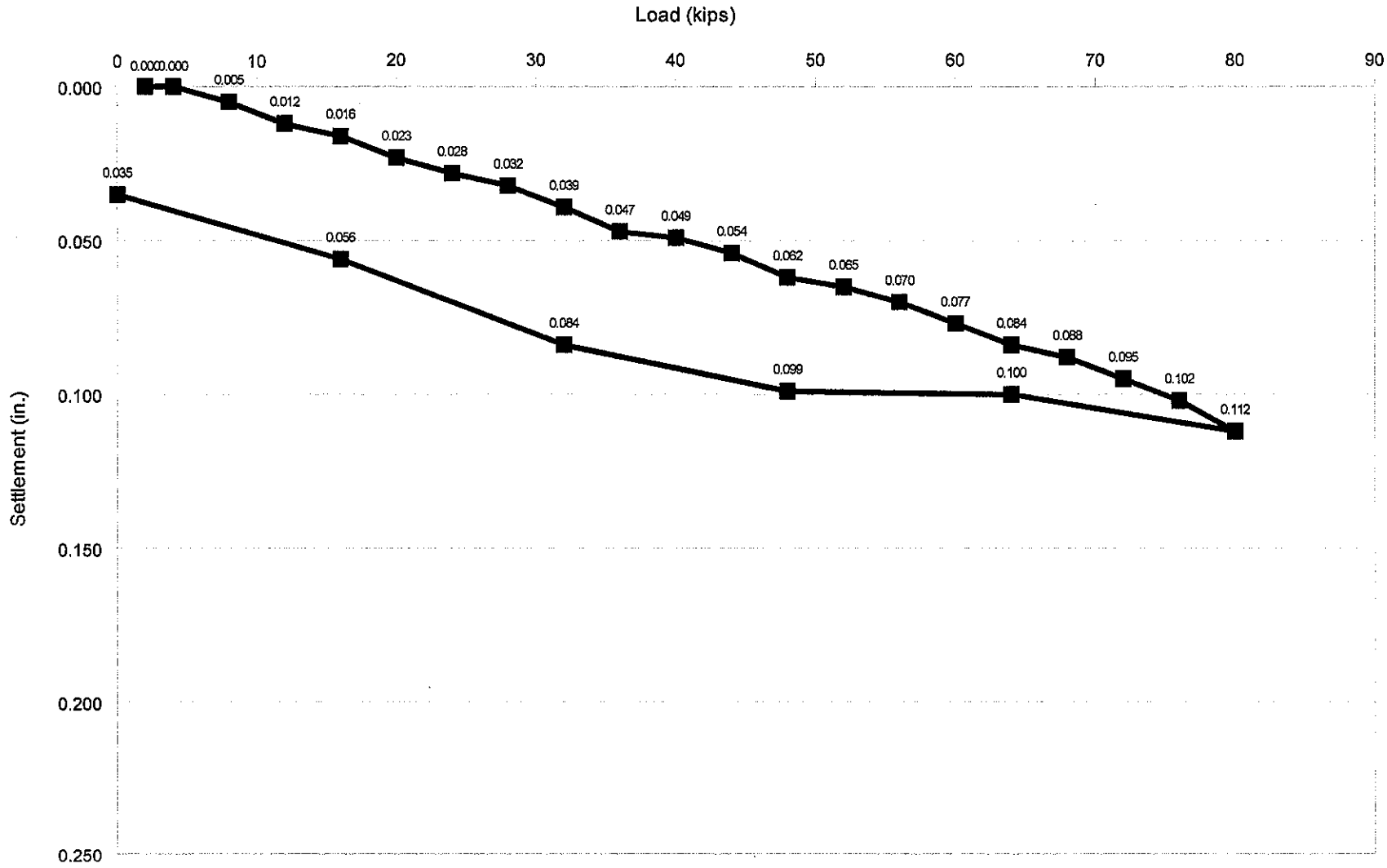
Sincerely,

Engineered Foundation Technologies, LLC

Richard T. Porter, P.E.
General Member

Hillsboro County Courthouse Pile Load Test

Load vs. Deflection Curve



Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
2	200			41.0		1	1	1	1.000	7					
4	400	0.5	14:30	4		1									
4		1	14:31	4		1									
4		2	14:32	4		1									
4		4	14:34	4		1									
4		8	14:38	4		1			1.000						
8		0.5	1440	4'1/32		.998	.999	.996							
8		1	1441	4'1/32		.998		.945							
8		2	42			.998		.944							
8		4	44			.997	.998	.993							
8		8	48			.996		.992	.995						
12		0.5	14:50	4'1/16		.992	.997	.987							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: FM

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
12		1	14:51	4'/16		.991	.997	.987							
12		2	52			"	"	.986							
12		4	54			"	"	.985		7					
12		8	58			.990	.996	.980	.988	7					
16	1500	0.5	15			.985	.995	.979							
16		1	1501			"	.944	.979							
16		2	1502			"	.993	.978							
16		4	1504			.984	"	.978							
16		8	1508			"	.992	.976	.984	7					
20	1850	0.5	1510			.980	.990	.972		7					
20		1	1511			.979	"	.971							
20		2	1512			.978	.986	.964							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: FM

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
20	15:14	4		4 1/16		.977	.986	.966							
20	15:18	8				.977	.987	.966	.977	7					
24	1520	0.5				.975	.986	.966		7 1/32					
24	1521	1				.975	.986	.966							
24	1522	2				.972	.984	.962							
24	1524	4				.971	.983	.961							
24	1528	8				.971	.984	.961	.972	7 3/64					
28	1530	0.5				.968	.982	.960		7 3/64					
28	1531	1					.981	.959							
28	1532	2					.982								
28	1534	4					.982								
28	1538	8				.967	.981	.958	.968	7 3/64					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: FM

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

End Date: 5 Aug 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
32		0.5	15:40	4 3/32		.963	.978	.954		7 1/16					
32		1	15:41			↓	↓	.954							
32		2	42			↓	↓	.954							
32		4	44			.962	↓	.953							
32		8	48			.960	.975	.948	.961	7 1/16					
36		0.5	50			.958	.973	.946		7 1/16					
36		1	51			↓	.972	.946							
36		2	52			↓	.972	.946							
36		4	54			.954	.967	.947							
36		8	58			.954	.968	.937	.953	7 1/16					
40		0.5	16:00	4 1/8		.951	.967	.937		7 1/16					
40		1	16:01	4 1/8		.951	.966	.937							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Owner's Engineer: Haley & Aldrich | **EFT Rep:** RTP | **Start Date:** 5 Aug 2010

Project: Hillsboro County Courthouse | **Location:** 300 Chestnut Street | **H&A Rep:** F.M. | **End Date:** 5 Aug 2010

Contractor: TLT Construction Corp. | **City:** Manchester, NH | **Testing Method:** ASTM D 1143 Quick Test | **Sheet No:** 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
40		2	16:07	4 1/8		.951	.966	.937							
40		4	16:04			.950	.967	.937							
40		8	16:08			.950	.967	937	.951	7 1/16					
44		0.5	16:10			.947	.963	932		7 3/32					
44		1	16:11			.946	.962	932							
44		2	12			.946	.962	932							
44		4	14			.946	.963	931							
44		8	18			.945	.963	~~93~~	.946	7 3/32					
48		0.5	20			.942	.959	925		7 3/32					
48		1	21			.942									
48		2	22			.941									
48		4	24			.941									

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M.

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
48		8	1628	4 1/8		.939	956	921	.938	7 3/32					
52	4775	0.5	16:30			.938	955	921		7 3/32					
52		1	31			.937	955	921							
52		2	32			.937	955	921							
52		4	34			.936	954	918							
52		8	38			.935	953	918	.935	7 3/32					
56	5150	0.5	40			.932	950	915							
56		1	41			.932	950	915							
56		2	42			.931	950	914							
56		4	44			.930	948	912							
56		8	48			930	949	911	.930						
60	5500	0.5	50			927	945	907		7 1/8					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

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Start Date: 5 AUG 2010

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Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
60		1	1651			← MISSED		→							
60		2	1652	4 1/8		925	945	906							
60		4	1654			925	944	905							
60		8	58			924	943	903	.923	7 1/8					
64		0.5	1700			922	941	902							
64		1	01			921	941	901							
64		2	02			921	941	900							
64		4	04			919	940	897							
64		8	08			915	939	895	.916						
68		0.5	10			915	936	893							
68		1	11			"	935	892							
68		2	12			"	935	892							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

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Testing Method: ASTM D 1143 Quick Test

Start Date: 5 Aug 2010

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Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
68		4	17:14	4 1/8		.913	932	890							
68		8	18			.913	933	890	.912	7 1/8					
72	4600	0.5	20			.910	929	885							
72		1	21			.908	928	884							
72		2	22			.908	928	884							
72		4	24			.908	928	883							
72		8	28			907	927	881	.905						
76	6950	0.5	17:30			903	922	875							
76		1	31			902	922	875							
76		2	32			901	921	874							
76		4	34			↓	920	873							
76		8	38			↓	920	872	.898	7 1/8					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

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Start Date: 5 Aug 2010

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Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
80	7300	0.5	1740	897			915	867							
80		1	41	896			914	865							
80		2	42	895			913	864							
80		4	44	894			913	863							
80		8	48	892			911	861	.888						
64	5875	1	50	904			925	875							
64		2	52	904			925	.875							
64		4	54	903			924	.875							
64		8	58	903			924	.875	.900						
48	4225	1	00	905			926	.875							
48		2	1802	1			926	.875							
48		4	1804				926	873							

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Engineered Foundation Technologies

Project: Hillsboro County Courthouse

Contractor: TLT Construction Corp.

Owner's Engineer: Haley & Aldrich

Location: 300 Chestnut Street

City: Manchester, NH

EFT Rep: RTP

H&A Rep: F.M

Testing Method: ASTM D 1143 Quick Test

Start Date: 5 AUG 2010

End Date: 5 AUG 2010

Sheet No: 1 of 2

Weather:

Load (kips)	Jack Pressure (psi)	Hold Times	Time of Reading	Level		Dial Gages				Pile Cap Reading (in)	Reaction Anchors				Comment
				Reading	Sett.	A (in)	B (in)	C (in)	Average		1 (in)	2 (in)	3 (in)	4 (in)	
48		8	1808			905	926	873	.901	7'9					
32	2950	1	1810			920	938	882							
32		2	11			919	938	882							
32		4	12			919	938	882							
32		8	14			922	940	888	.916						
16	1500	1	18			944	956	905		7'1/16					
16		2	20			940	959	910							
16		4	22			940	959	910							
16		8	24			948	980	910	.944						
0		1	28			968	980	936							
0		2	30			969	981	938							
0		4	34			971	981	939	.965						
0		8	38			972	982	939	.966	7.0					

HOLD EACH LOAD INCREMENT FOR 8 MINUTES

Appendix D: CQC Implemented Plan

CONTRACTOR
TLT CONSTRUCTION CORP.

Renovation of Hillsborough County Courthouse
Contract # 80475D

_____Approved

_____ Approved with corrections as noted on submittal data and / or attached sheet(s)

SIGNATURE: _____

TITLE: _____Project Manager_____

DATE: _____

TLT CONSTRUCTION CORP.

CONTRACTOR QUALITY CONTROL PLAN

Renovation of Hillsborough County Courthouse North
300 Chestnut Street
Manchester, New Hampshire

Contract #80475D

TLT Construction Corp. CQC Plan

Table of Contents

A) QUALITY CONTROL ORGANIZATION

- Project Superintendent (on site) – Joseph Tassone - will be the highest level manager at the site being responsible for the quality of the work and its production. The project superintendent will maintain a physical presence at the site at all times being responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

- CQC System Manager (on site)- Adam Kreitman - will be responsible for the Contractor Quality Control Plan its implementation and working with the project superintendent to facilitate the quality of the work in accordance with the contract documents, submittals and its completion. The CQC Manager will have the authority to act in all CQC matters for the contractor and will implement the three (3) phase control system. Along with this monitoring, the CQC System Manager will keep the as-built documents current based on work performed, and design changes/clarifications.

- SSHO (on site)- Joseph Tassone - will be part of the CQC staff, supplementing and providing input to the CQC Manager as to the implementation of the work and safe performance of the same. The SSHO will convey any/all observations that are necessary for this purpose.

- Project Manager- John Galasso - will be in charge of the home office support and will assist the Superintendent and CQC Manager as the need arise to enforce the requirements of the QC Plan with respective sub-contractors and suppliers. Being involved with the sub-contractors and suppliers initially, he will stress the importance and requirements of the QC Plan and compliance with the same. His involvement in such a manner has proven effective and helpful in implementation of the Contractor Quality Control Plan and to its staff.

- Other CQC Personnel- These will be provided for the following trades – Civil, Structural, Mechanical, & Electrical- and with names/resumes provided at a later date. The qualified personnel in accordance with Section 01 45 01 / 3.4.3 will fill these positions as needed by the CQC manager will be obtained from the approved Testing agency for the project and/or the respective subcontractor(s).

- Testing Laboratory- an approved testing laboratory will be engaged for the support the CQC Manager/Plan, implementing methods and material testing as required by the contract documents.

PROCEDURES FOR SCHEDULING, REVIEWING, CERTIFYING, AND MANAGING SUBMITTALS

Procedures for scheduling and managing submittals, construction progress schedules, certificates of compliance, samples, etc. including those of subcontractors, off site fabricators, suppliers, and purchasing are as follows:

The submittal log In accordance with Section 01 45 01will be kept at the job site and will be current at all times. The log will be made up by sections of the specifications, and the subcontractor, fabricator, supplier, and purchasing agent will be committed to a date for receipt of their submittal. These dates will be closely followed to insure timely submittals. An updated submittal log shall be submitted to the Corps of Engineers, Resident Engineer on a monthly basis. This log will also be reviewed at weekly project meeting to identify/monitor sensitive items.

TLT Construction will utilize the Quality Control Systems (QCS) computer data base program to monitor and track each item submitted for review and approval.

Each item required for Government approval will be identified and registered in the CPM schedule with estimated dates for when material and equipment approvals will be needed.

TLT Construction will utilize Primavera P.3 scheduling software for CPM scheduling requirements.

Copies of submittals will be submitted as follows:

To:
John Fink, P.E.
ACOE, Resident Engineer
5414 Washington Loop
C4ISRIPO Offices
Aberdeen Proving Grounds
Aberdeen, Maryland 21005

Submittals requiring government approval – 7 copies
Submittals For Information Only (FIO) – 5 copies
Submittals requiring government approval will be reviewed/returned in no more than 15 days (25 days for refrigeration and HVAC control system) exclusive of mailing.
Three copies of the reviewed submittals will be returned to TLT Construction for action/distribution.

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CONTROL, VERIFICATION, AND ACCEPTANCE TESTING PROCEDURES

This CQC program is responsible for verification of all testing which is required by the contract documents.

Off site testing which has been done by a manufacturer will be verified through certification documents, while on site testing will be done under the direction of the Quality Control Manager and recorded on the Daily CQC Report.

A detailed listing of required testing will be issued as materials and equipment are approved.

TESTING PLAN AND LOG

Testing will be performed as required in the contract document under the direction of the CQC System Manager. Testing requirements can be divided into a number of different categories. All field CQC tests will have a record of the test and any deficiencies and corrections included in the Daily CQC Report. Any test reports showing non-compliance will include procedures for corrections.

Testing Asbestos Containing Material Abatement will be performed by an approved testing lab. Testing will be conducted in accordance with applicable Federal and State of New Hampshire regulations and will be compared against a specific technical standard. If the work fails testing, rework or replacement will be completed prior to any additional work taking place. Testing procedures will be discussed during Preparatory Inspection meetings. Copies of tests will be included in the Daily CQC Reports.

Field type testing will be conducted by the CQC staff. These tests will be discussed during the Preparatory Inspection meetings. Results will be included in the Daily CQC Reports.

Factor tests required by technical specifications will be conducted prior to material being shipped to the job site. Prior notification will be given to the COR so he can have the opportunity to be present during testing.

Acceptance testing will be performed on equipment and systems to demonstrate, to the CQC staff and the user that the item works and performs. An acceptance testing plan will be developed for each unit of work requiring performance testing.

The scheduling of tests and the tracking of test results will be similar to the tracking of submittals with the CQC System Manager being responsible for compliance to the test plan and contract requirements. An updated testing log will be issued monthly.

QUALITY CONTROL SYSTEM PROCEDURES

The purpose of this (3) Phase Inspection System is to meet with all contractors prior to the beginning of their work, and establish a formal inspection process to assure their work complies with the Contract Documents. These initial inspections and subsequent follow up inspections are intended to identify any deficiencies at early stages and bring matters to resolution prior to the need for a lengthy punchlist at the completion of the project.

PROCEDURES FOR TRACKING PREPARATORY – INITIAL – FOLLOW UP CONTROL PHASES

The Quality Control Manager in conjunction with the Project Superintendent shall be responsible for the implementation and surveillance to insure that the three phase quality control system is followed by TLT Construction for all definable features of work. The enclosed listing of the definable features of work will be used to schedule and track the completion of the required inspections and will be updated regularly.

THE PREPARATORY PHASE INSPECTION

A meeting shall be constructed one week prior to the start of a Definable Feature of Work to include the Resident Engineer, the CQC System Manager, the Project Superintendent, SSHO and the subcontractor's working foreman and/or project manager with the following discussed.

1. Review of each paragraph of applicable specifications.
2. Review of contract plans and applicable AHA(s).
3. Check to assure materials and equipment have been tested, submitted and approved.
4. Examine work area to assure compliance with contract documents.
5. Review appropriate hazard analysis to assure safety requirements will be met.
6. Discuss procedures to be used in constructing the work.
7. Discuss Owners coordination issues.
8. Review schedule.
9. Notify Resident Engineer 48 hours prior to start of preparatory phases of work. A meeting, to include the Architect or Owner's Representative, Quality Control Manager, Superintendent and working foreman will be held and documented as part of the CQC Report.
10. This meeting will be documented per the CQC Preparatory Inspection Report Form (Attachment D) attached to the CQC Daily Report (Attachment H).
11. Review contract, insurance and bonds for acceptance.

THE INITIAL PHASE INSPECTION

A meeting shall take place during the first week of the start of any Definable Feature of Work Including the Resident Engineer, the CQC System Manager, the Project Superintendent, the SSHO and the subcontractor's working foreman and/or project manager. The following will be discussed at this meeting.

1. Check to assure that the preliminary work as required in the preparatory phase has been accomplished. Any deficiencies will be identified and logged on the Rework Items List.

2. Establish a level of workman ship that is in compliance with contract documents and meets industry standards.
3. Continual surveillance of Safety Plan requirements and Activity Hazard Analysis. A review and follow up of the requirements will be performed with each foreman.
4. Separate minutes of this phase as documented on the CQC Initial Inspection Form (Attachment E) shall be prepared and attached to the CQC Daily Reports (Attachment H).

THE FOLLOW UP PHASE INSPECTION

Daily checks of the ongoing work shall be performed to assure continuing compliance with contract requirements, including control testing. Any new deficiency items shall be recorded on the CQC Daily Report and the Rework Items List (Attachment F). Final follow up checks shall be conducted reviewing previous Deficiency Logs. All Deficiencies are to be corrected prior to the start of new work.

After the start of construction, the QC Manager will conduct QC meetings once every two weeks at the work site with the Project Superintendent, SSHO, and the foremen who are performing the work of the DFOWs. The Contracting Officer may attend these meetings. As a minimum, accomplish the following at each meeting:

a. Review the minutes of the previous meeting.

b. Review the schedule and the status of work and rework.

c. Review the status of submittals.

d. Review the work to be accomplished in the next two weeks and documentation required.

e. Resolve QC and production problems (RFI, etc.).

f. Address items that may require revising the QC Plan.

g. Review Accident Prevention Plan (APP).

h. Review environmental requirements and procedures.

i.. Review Waste Management Plan.

j. Review IAQ Management Plan.

k. Review Environmental Management Plan.

l. Review the status of training completion.

m. Review CX Plan and progress.

MATERIAL RECEIVING AND INSPECTION REPORTS

The CQC System Manager will inspect material received and stored on the site for compliance with the approved submittals. A report for received materials will be part of the Daily CQC Report form. Materials not in compliance will not be received, and will be held in a secured area and tagged not for use. Materials will be inventoried and stored according to manufacturers' recommendations.

AS-BUILT DRAWINGS

The QC Manager is required to ensure the as-built drawings, are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Upon completion of work, the QC Manager will furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

COMPLETION CERTIFICATION

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract".

Near the completion of all work or any increment thereof, the QC Manager must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract, providing a copy to the Government. The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government "Pre-Final Inspection".

PRE-FINAL INSPECTION

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled.

FINAL ACCEPTANCE INSPECTION

Notify the Contracting Officer in accordance with the Contract Documents prior to the date a final acceptance inspection can be held. State within the notice that all items previously identified in the pre-final punch list will be correct and acceptable, along with any other unfinished Contract work of the final acceptance inspection.

PROCEDURES FOR TRACKING CONSTRUCTION DEFICIENCIES

Construction Deficiencies will be documented in the following manner:

The CQC System Manager will discover, or be notified that a construction deficiency exists. Upon verification and review with Project Superintendent, the CQC Manager, the CQC System Manager. The CQC System Manager will log the deficiency on the Rework Items Log. The CQC manager will bring minor deficiencies will be brought to the attention of the individual worker and/or their supervisor. If other than a minor deficiency is discovered, it will be documented on the attached "Non Conforming Work Notice" (Attachment G) and a copy of the completed report will be given to the Project Superintendent, the subcontractor and/or supplier and the Resident Engineer.

Upon completion of the deficiency the responsible contractor will notify the CQC System Manager in writing.

With the CQC System Manager's and Superintendent's review/confirmation the Rework Items Log will be updated showing the item correct date, closing the "Nonconforming Work Notice". The log will be attached to the CQC Report at the end of the month.

QUALITY CONTROL REPORTING PROCEDURE

CQC DAILY REPORT:

The CQC System Manager will be responsible for completing a daily CQC Report Form. This CQC Report will cover the events of each day and will follow the format of the attached CQC Report Form. The completed report will accurately document the events of each project day. CQC Reports will be forwarded/ reviewed by Superintendent and Project Manager; forwarded to the Resident Engineer with the original and filed at the project site.

REQUESTS FOR INFORMATION:

During the course of a Project, many questions arise as to the intention of the Contract Documents. A process has been established to clarify the questions and maintain a record of these issues. It is important that all parties participate in this process and strive to resolve clarifications each week.

The CQC System Manager and/or the Project Superintendent will be responsible for completing the attached Request for Information (RFI) report and maintaining a jobsite log containing the status of all RFI's. Copies of all RFI's will be filed on site and attached to as-built drawings with copies to TLT's main office. The RFI log will be reviewed weekly with the Resident Engineer.

TEST RESULTS

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Resident Engineer as attached to the last daily Contractor Quality Control Report for each month.

DEFINABLE FEATURES OF WORK

Quality Control Checklist

Contract No.: 80475D
Renovation of Hillsborough County Courthouse North
300 Chestnut Street, Manchester, NH

TLT FINAL APPROVAL_____

COR FINAL APPROVAL_____

DEFINABLE FEATURE	**DATE OF PREP**	**DATE OF INITIAL**	**DATE OF FOLLOW UP**
02 41 00 Demolition			
02 74 00 Drilled Piles			
03 30 00 Cast-In-Place Concrete			
04 20 00 Unit Masonry			
04 42 00 Exterior Stone Cladding			
05 12 00 Structural Steel Framing			
05 30 00 Metal Decking			
05 40 00 Cold Formed Metal Framing			
05 50 00 Metal Fabrications			
05 51 00 Metal Stairs			
05 73 13 Glazed Decorative Metal Railings			
06 10 54 Wood Blocking and Curbing			
06 20 00 Finish Carpentry			
06 41 00 Architectural Wood Casework			
06 82 00 Glass Fiber Reinforced Plastic			

07 11 13 Bituminous Dampproofing			
07 14 00 Fluid Applied Waterproofing			
07 17 13 Composite Panel Water Proofing			
07 21 00 Thermal Insulation			
07 21 19 Foamed-In-Place Insulation			
07 25 00 Weather Barriers			
07 42 14 Insulated Metal Wall Panels			
07 42 64 Metal Composite Material Wall Panels			
07 52 00 Modified Bituminous Membrane Roofing			
07 62 00 Sheet Metal Flashing and Trim			
07 72 00 Roof Accessories			
07 84 00 Firestopping			
07 90 05 Joint Sealers			
08 11 13 Hollow Metal Doors and Frames			
08 14 16 Flush Wood Doors			
08 31 00 Access Doors and Panels			
08 36 13 Overhead Sectional Doors			
08 43 13 Aluminum Framed Storefronts			
08 44 13 Glazed Aluminum Curtain Walls			
08 45 00 Translucent Assemblies			
08 71 00 Door Hardware			

08 80 00 Glazing			
08 91 00 Louvers			
09 21 16 Gypsum Board Assemblies			
09 30 00 Tiling			
09 51 00 Acoustical Ceilings			
09 65 00 Resilient Flooring			
09 67 00 Fluid Applied Flooring			
09 68 00 Carpeting			
09 68 13 Tile Carpeting			
09 90 00 Painting and Coating			
10 11 01 Visual Display Boards			
10 14 25 Code Required Building Signage			
10 14 26 Post and Panel Signage			
10 21 13.19 Plastic Toilet Compartments			
10 28 00 Toilet Accessories			
10 40 00 Fire Protection Specialties			
10 51 00 Lockers			
10 55 13 Central Mail Delivery Boxes			
10 75 00 Flagpoles			
11 12 00 Parking Control Equipment			
11 19 00 Detention Equipment			
11 19 01 Bullet Resistant Fiberglass Panels			
12 24 00 Window Shade System			

12 36 00 Countertops			
12 48 13 Entrance Mats			
12 61 00 Fixed Audience Seating			
14 20 10 Passenger Elevators			
21 00 00 Fire Suppression			
22 00 00 Plumbing			
22 13 13 Facility Sanitary Sewer			
22 14 23 Storm Drainage Pipe Specialties			
22 14 29 Sump Pumps			
23 00 00 HVAC			
23 11 23 Facility Natural Gas Piping			
26 05 33 Raceway and Boxes for Electrical Systems			
27 13 43 Communications Services Cabling			
31 10 00 Site Clearing			
31 20 00 Earth Moving			
31 23 19 Dewatering			
31 25 13 Erosion Control			
32 12 16 Asphalt Paving			
32 12 13 Concrete Paving			
32 17 23 Pavement Markings			
32 31 14 Fence Restoration and Granite Posts			
32 92 00 Turf and Grasses			
32 93 00 Plants			

33 23 15 Building Pad Earthwork			
33 41 00 Storm Utility Drainage Piping			
33 46 00 Subdrainage			

ATTACHMENT G

TLT CONSTRUCTION CORP.

NON-CONFORMING WORK NOTICE

REPORT NO. _____

DATE: _____

PROJECT: Renovation of Hillsborough County Courthouse North

JOB SUPERINTENDENT: _____

SUBCONTRACTOR: _____

Section/Location/Type of Work being performed:

List of Defects in Material or Workmanship:

Signed, **Signed,**

_____ _____

(Superintendent) (CQC System Manager)

****CORRECTIVE WORK MUST BEGIN IMMEDIATELY UPON RECEIPT OF THIS NOTICE****

ATTACHMENT H

CONTRACTOR QUALITY CONTROL REPORT

TLT Construction Corp. **Contract Day: _____**

Contract No. 80475D **Report No.: _____**
Renovation of Hillsborough County Courthouse North

D ate: _____

Description and Location of Work:

Weather: **Temperature:** **Rainfall:** /inches

Contractor/Subcontractor and Area of Responsibility:

a.
b.
c.
d.
e.

Delays Encountered:

Work Performed Today:

a.
b.
c.
d.
e.

Results of Control Activities:

Preparatory Inspections Conducted:

Initial Inspections Conducted:

Scheduled Inspections:

CONTRACTOR QUALITY CONTROL REPORT (cont'd)
Contract No.

Tests Required by Plans/Specifications and Results of Tests:

Monitoring of Materials and Equipment:

Off-Site Surveillance Activities:

Job Safety:

Miscellaneous Activities and Remarks:

a. Verbal instructions received from ACOE:

b. Delivery of Equipment:

c. Submittal Actions:

d. Tests performed:

e. Delivery of Materials:

f. Misc. Items:

g. Rental Equipment on Site

h. Dumpster Removal

Contractors Verification:

The above report is complete and correct and all material and equipment used and work performed during this report period are in compliance with contract plans and specifications, except as noted above.

CQC System Manager

TLT CONSTRUCTION CORP

ATTACHMENT D

CQC Preparatory Inspection Report

PROJECT NAME: Renovation of Hillsborough County Courthouse North

Report No.: **Date:**

Contract Section(s):

Description and Location of Work:

Attendees:

Submittal Review:

Materials Review:

Control Testing:

TLT CONSTRUCTION CORP

CQC Preparatory Inspection Report

PROJECT NAME: Renovation of Hillsborough County Courthouse North

Report No.: **Date:**

Contract Section(s):

Preliminary Work Inspection:

Contract Drawing/Specification Review:

Review of Owner Coordination Issues:

1. **Acceptable Delivery Times**
2. **Construction Access Authorization/Security**
3. **Construction Parking Areas**
4. **Sexual Harassment Policy**
5. **MSDS Review**
6. **Work Time Limits**
7. **Noise Control**
8. **Site Use Plan Review**
9. **Review Contract insurance & bonds**

Review of Hazard Analysis, Safety Plan, and Contract Safety Rules:

CQC System Manager: (signed)

Attachments: As deemed necessary

TLT CONSTRUCTION CORP

ATTACHMENT E

CQC Initial Inspection Report

PROJECT NAME: Renovation of Hillsborough County Courthouse North

Report No.: **Date:**

Contract Section(s):

Description and Location of Work:

Attendees:

1. **Review of Preparatory Meeting Minutes: P-_____**
2. **Quiz Workers for Knowledge of Contract Requirements:**
3. **Review Control Testing Scheduled:**
4. **Review of Details:**
5. **Establish Acceptable Level of Quality Workmanship:**
6. **Review of Hazard Materials Analysis & Safety Plan:**

Signed:_____

CQC System Manager

TLT CONSTRUCTION CORP

ATTACHMENT F

CONSTRUCTION DEFICIENCY REPORT (RWI) LOG

Renovation of Hillsborough County Courthouse North

RWI #	Date Initiated	Subcontractor	Description Of Deficiency	Date Corrected

ATTACHMENT I

REQUEST FOR INFORMATION (RFI)

TLT Construction Corp. **RFI #: _____**

Contract No. 80475D **Date: _____**
Renovation of Hillsborough County Courthouse North

Priority: A (24 hours)
B (3 days)
C (7 days)
D (other)

To the Resident Engineer: **John Fink**
Aberdeen Proving Ground
Aberdeen, Maryland

Submitted By: **Company: TLT CONSTRUCTION CORP.**

References: **Specification Section Number:_____**

Article/ Paragraph/ Subparagraph:_____

Drawing Number:_____

Detail Number:_____

Request for information

Refer to Attachment(s) – pages

Signed By: TLT Construction Corp

Response:

☐ **Refer to Attachment(s)**

Response From: _____ **date:** _____

Signed by: _____

Copies to:
Subcontractor_____ _____

Subcontractor_____
File

Appendix E: Waste Management Implemented Plan

1 Pope Street
Wakefield, MA 01880

CONSTRUCTION WASTE MANAGEMENT PLAN

Company Name: **TLT Construction Corp.** **Contact Person:** **Adam Kreitman**
Telephone #: **781-438-4100 ex. 325**

Project Location: **Hillsborough County Courthouse**
300 Chestnut Street
Manchester, NH 0310

Designated Recycling Coordinators: **???????**

Project Description:

A. This Construction Waste Management Plan is to be followed by all contractors and job personnel during the construction of the Hillsborough County Courthouse. The contents of this Plan as well as all waste handling/recycling requirements will be discussed at each safety orientation and will be made part of the Trade Contractors Weekly Tool Box Talk. In addition, each Trade Contractor shall sign a notification form confirming that they will adhere to the requirements of this Plan; failure to comply with the contents of this Plan as well as with the overall management process of all waste generated on the site will result in a $750.00 fine per applicable Trade Contractor.

By effectively managing this Construction Waste Management Plan, we intend to recycle or salvage for reuse 75% by weight of the waste generated on site.

The Plan outlines the expected wastes to be confronted on site, means of disposal and handling methods.

TLT Construction, Corp. will monitor, implement and document this plan throughout the construction of this project. Monitoring of on-site compliance with this plan will be performed by the TLT General Superintendent (or his designee) on a daily basis. TLT, unless otherwise stated in the individual Trade Contractor contract documents, will utilize a mixed waste construction and demolition facility to assist the project with meeting the recycling goal. This essentially means that a majority of the construction and demolition waste can be placed within a single thirty (30) cubic yard waste container. However TLT will require that 100% of the following materials be recycled; labeled waste containers/staging areas will be provided for these waste streams at designated locations:

Paper
Cardboard
Wood Crates
Plastic Containers

In addition, TLT will provide labeled containers for all non-construction and demolition waste streams (e.g. food scraps, cups, bottles, cans). These containers will be placed within all designated break and lunchroom areas. Also these materials must not be placed within any waste containers designated to contain construction and demolition waste.

In the event that mixed waste construction and demolition waste recycling center is not able to meet the projects established goals, TLT will make arrangements with another vendor and will require certain construction waste streams to be segregated before leaving the site. If this occurs, TLT will provide further instruction to all trades regarding the need to separate out specific waste streams.

Documentation of the plan will consist of the following:

1. Photographs of on-site activities taken on a monthly basis by the TLT LEED Cordinator.
2. Waste recycling and/or disposal receipts.

The TLT LEED Coordinator will make site inspections on a monthly basis to review overall compliance with the plan; prepare a monthly spreadsheet depicting the waste recycling process; and be responsible for completing the applicable LEED Credit Submittal.

Waste Management Goals:

This section specifies diversion of Construction and Demolition (C&D) waste from the landfill.

1. Waste Management Goals: a minimum of 75% of the total project waste should be diverted from landfill, by weight.
2. Provide contract documents, including a waste management plan, to show evidence of recycling, and reuse of recovered materials.
3. Inform Owner and architect where Construction and Demolition (C&D) Waste Management requirements could detrimentally impact C&D schedule.
4. Provide separate itemization of cost related to C&D Waste Management.
5. Effect optimum management of solid wastes via a materials management hierarchy.
6. The materials management hierarchy shall be: reduce, reuse, and recycle.
7. Prevent environmental pollution and damage.
8. Waste reduction will be achieved through building design, and reuse and recycling efforts will be maintained throughout the construction process.
9. Related Documents:
    1. Section 00 70 80 - General Conditions - BPW
    2. Section 01 00 00 - General Requirements
    3. Section 01 33 00 - Submittals Procedures.
    4. Section 01 35 14 - LEED-NC 2009 Credit Summary
    5. Section 01 35 15 - LEED Requirements
    6. Section 01 35 16 - LEED Submittal Forms
    7. Section 01 40 00 - Quality Requirements
    8. Section 01 50 00 - Temporary Facilities and Controls
    9. Section 01 50 50 - Construction Waste Management and Disposal.
    10. Section 01 70 00 - Execution Requirements.
    11. TLT IAQ - Indoor Air Quality Plan

Definitions:

A. **Inert Fill** – A permitted facility that accepts inert waste such as asphalt and concrete exclusively.

B. **Class III Landfill** - A landfill that accepts non-hazardous waste such as household, commercial, and industrial waste, including construction, remodeling, repair, and demolition operations.

C. **Construction and Demolition Waste** – Including solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting form construction, remodeling, repair, and demolition operations.

1. *Rubbish*: Including both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, tin cans, and bones.

2. *Debris*: Including both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

D. **Weight Conversion Factor** – It is the rate set forth in the standardized Weight Conversion Table XXXX approved by XXXX for the use in estimating the volume or weight of materials identified in the Waste Management Plan.

E. **Deconstruction -** The process of removing existing building materials from renovation and demolition projects for the purposes of reuse, and recycling, in a efficient and safe manner possible.

F. **Divert** – Using material for any purpose other than disposal in a landfill.

G. **Waste Materials** – Large and small pieces of listed materials which are excess to contract requirements and generally include materials to be recycled and/or recovered from existing construction and items of trimmings, cuttings, and damaged goods resulting from new installations, which can be effectively used in the Work.

H. **Reuse** – Using a material or product that is recovered from construction, renovation, or demolition activities.

I. **Recycling** – The process of collecting and preparing recyclable materials in their original form or in manufacturing processes that do not cause the destruction/contamination of recyclable materials in a manner that precludes further use.

J. **Recovery** – Any process that reclaims materials, substances, energy, or other products contained within or derived from waste on-site. It includes waste-to-energy, composting, and other processes.

K. **Sources Separation** – Sorting the recovered materials into specific material types with no or a minimum amount of contamination on site.

L. **Time-Based Separation** – Collecting waste during each phase of construction or deconstruction which results in primarily one major type of recovered material. The material is removed before it becomes mixed with the material from the next phase of construction.

M. **Commingled or Off-site Separation** – Collecting all material types into a single bin or mixed collection system and separating the waste materials into recyclable material types in an off-site facility.

Waste Prevention Planning:

Project Construction Documents – Requirements for waste management which will be included in all work. The General Contractor will require all subcontractors to comply with TLT Construction Corp. mandatory recycling requirements. A copy of this Construction Waste Management Plan will accompany all Subcontractor Agreements and require subcontractor participation.

The Construction Waste Management Plan shall be implemented and executed as follows and as on the chart:

- Salvageable materials will be diverted from disposal where feasible.
- There will be a designated area on the construction site reserved for a row of dumpsters each specifically labeled for respective materials to be received.
- Before proceeding with any removal of construction materials from the construction site, Recycling Coordinators will inspect containers for compliance with TLT's requirements.
- Wood cutting will occur in centralized locations to maximize reuse and make collection easier.
- Hazardous waste will be managed by a licensed hazardous waste vendor.
- Provide the C&D Quality Manager with delivery receipts for the recovered materials and waste materials sent to the permitted recycling facilities, processing facilities, or landfill with the following information:
    1. Name of firm accepting the recovered materials or waste materials
    2. Specify type of facility (e.g. retail facility, recycler, processor, Class III landfill, MRF)
    3. Location of the facility
    4. Type of materials
    5. Net weights (or volume) of each type of material
    6. Date of delivery
    7. Value of the materials or tipping fee paid

Communication & Education Plan:

- The General Contractor will conduct an on-site pre-construction meeting with subcontractors. Attendance will be required for the subcontractor's key field personnel. The purpose of the meeting is to reinforce to subcontractor's key field employees the commitments made by their companies with regard to the project goals and requirements.
- Waste prevention and recycling activities will be discussed at the beginning of each weekly subcontractor coordination meeting to reinforce project goals and communicate progress to date.
- As each new subcontractor comes on site, the recycling coordinators will present him/her with a copy of the Waste Management Plan and provide a tour of the recycling areas.
- The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan.
- All recycling containers will be clearly labeled. Containers shall be located in close proximity to the building(s) under construction in which recyclables/salvageable materials will be placed.
- Lists of acceptable/unacceptable materials will be posted throughout the site.
- All subcontractors will be informed in writing of the importance of non-contamination with other materials or trash.
- Recycling coordinators shall inspect the containers on a weekly basis to insure that no contamination is occurring and precautions shall also be taken to deter any contamination by the public.

Motivation Plan:

- The General Contractor will conduct a pre-con meeting for subcontractors. Subcontractors will be required to attend the meeting to review project goals and requirements with the project team. Attendance will be a mandatory for subcontractors to enter the site. A sign-off will be required by subcontractors attending the meeting that the project goals are understood. This document will be an attachment to every Project Meeting. Copies of the attachment will be posted prominently at the jobsite.

Evaluation Plan:

- The General Contractor will develop, update, and post at the jobsite a graph indicating the progress to date for achieving the project's waste recycling goal of 75% by weight of the total project waste stream.

Expected Project Waste, Disposal, and Handling:

A. The recycling program could utilize one or a combination of any of the following common waste diversion strategies:
   1. Sources Separation
   2. Time-Based Separation
   3. Commingled or Off-site Separation
   4. Back haul of packaging
   5. On-site sales auctions and removal.

B. Waste Material management hierarchy can be viewed as: reuse on-site, recycle on-site, reuse off-site, and recycle off-site.

C. Other innovative approaches to achieve the minimum diversion rate are encouraged and should be specified and described in the C&D Waste Management Plan.

B. Minimum diversion rate may be achieved by recovering and recycling the following materials:

1. Asphalt
2. Concrete and concrete blocks
3. Brick, tile and masonry materials
4. Ferrous metal
5. Non-ferrous metals: copper, aluminum … etc
6. Untreated lumber
7. Plywood, OSB and particle board
8. Gypsum wallboard scrap
9. Paper and cardboard
10. Beverage containers
11. Insulation
12. Rigid foam
13. Glass
14. Carpet and pad
15. Trees and shrubs
16. Soil

17. Plumbing fixtures
18. Windows
19. Doors
20. Cabinets
21. Architectural fixtures
22. Millwork, paneling and other similar interior finishes
23. Electric fixtures, motors, switch gear and other similar equipment
24. HVAC equipment, duck work, control systems, switches and other similar equipment

    Others as appropriate

The following charts identify waste materials expected on this project, their disposal method, and handling procedures:

Material	Quantity	Disposal Method	Handling Procedure
Top Soil		Stock pile on site for reuse on this project or other site needs.	Stock-pile in accordance with the SWPPP
Other Soils		Stock pile on site for reuse on this project or other site needs.	Stock-pile in accordance with the SWPPP
Land clearing debris		Keep separate for reuse and or wood sale	Keep separated in designated areas on site.
Clean dimensional wood and palette wood		Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. Recycle at:	Keep separated in designated areas on site. Place in “Clean Wood” container.
Plywood, OSB, particle board		Reuse, landfill	Keep separated in designated areas on site. Place in “Trash” container.
Painted or treated wood		Reuse, landfill	Keep separated in designated areas on site. Place in “Trash” container.
Concrete		Recycle	
Concrete Masonry Units		Keep separate for re-use by on-site construction or by site employees	Keep separated in designated areas on site
Metals		Recycle at:	Keep separated in designated areas on site. Place in “Metals” container.

Material	Quantity	Disposal Method	Handling Procedure
Gypsum drywall (unpainted)		Recycle with supplier:	Keep scraps separate for recycling – stack on pallets in provided on site. All scrap drywall will be taken back by contractor to drywall supplier
Paint		Reuse or recycle at Environmental Depot; Cost = $xxx/lb latex, $xxx/lb oil	Keep separated in designated areas on site
Insulation		Reuse, landfill	
Flooring		Reuse, landfill	
Carpet and pad		Reuse or recycle with carpet manufacturer	
Glass		Glass Bottles:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Plastics		Plastic Bottles: Recycle at: Plastic bags/scraps: Reuse, landfill	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Beverage		Recycle at:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Cardboard		Recycle at:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
Paper and newsprint		Recycle at:	Keep separated in designated areas on site. Place in "Glass/Plastic bottles/Metal Cans/Mixed Paper/ Cardboard" container
All Other Wastes		Landfill	Deposit in rubbish dumpsters
TOTAL			

QUALITY ASSURANCE:

A. Regulatory Requirements
Comply with applicable requirements of the State of New Hampshire, local ordinances and regulations concerning management of construction, clearing, and inert materials.

B. Disposal Site, Recyclers and Waste Materials Processors
Use only facilities properly permitted by the State of New Hampshire, and/or by local authorities where applicable.

C. Pre-C&D Waste Management Meeting

1. Prior to beginning work at the site, schedule and conduct a meeting to review the C&D Waste Management Plan and discuss procedures, schedules, coordination and specific requirements for waste materials recycling and disposal. Discuss coordination and interface between Contractor, sub-contractors, architect, engineers, project manager, Owner, and other C&D activities. Identify and resolve problems of compliance with requirements. Record minutes of the meeting, identifying conclusions reached and matters requiring further resolution. Maintain waste management as an agenda item at future construction meetings.
2. Attendees: Contractor and related contractor personnel associated with work of this section, including personnel in charge of the waste management program; C&D Quality Manager; architect; engineers; material and equipment suppliers where appropriate; and such additional Owner personnel as Owner deems appropriate.
3. Plan Revision: Make revisions to C&D Waste Management Plan agreed upon during the meeting and incorporate resolutions agreed to be made subsequent to the meeting. Submit revised plan to architect or the Owner personnel as Owner deems appropriate for approval.

D. Implementation

1. Designate an on-site party responsible for instructing workers and implementing the C&D Waste Management Plan.
2. Distribute copies of C&D Waste Management Plan to job site foreman and each subcontractor.
3. Include waste management and recycling in worker orientation.
4. Provide on-site instruction on appropriate separation, handling, recycling, and recovery methods to be used by all parties at the appropriate stages of the work at the site.
5. Also include discussion of waste management and recycling in regular job meeting and job safety meetings conducted during the course of work at the site.

E. The Contractor will be responsible for ensuring that the appropriate governmental entities are notified of the work.

F. Remove and relocate reusable materials to be reinstalled or retained in a manner to prevent damage or contamination.

G. Conduct construction and demolition in such a manner to minimize damage to trees, plants and natural landscape environment.

H. Arrange for adequate collection, and transportation to deliver the recovered materials to the approved recycling center or processing facility. Maintain records accessible to the

architect or C&D Quality Manager for verification of diversion of recovered waste materials.

STORAGE AND HANDLING:

A. Site Storage

1. Remove materials for recycling and recovery from the work locations to approved containers or storage area as required. Failure to remove waste or recovered materials will be considered cause for withholding payment and termination of Contract.
2. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on site, also provide a sorting area and necessary storage containers.
3. Change-out loaded containers for empty containers, as demand requires.
4. If recovered materials are stored on-site for project duration provide adequate security from pilferage.

B. Handling

1. Deposit indicated recyclable, and recoverable materials in storage areas or containers in a clean (no mud, adhesive, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.
2. Insure all recovered materials are made safe for handling and storage.
3. If the contamination chemically combines with the material so that it cannot be cleaned, do not deposit into the recycle containers. In such case, request resolution by the C&D Quality Manager for disposal of the contaminated material. Directions from the C&D Quality Manager do not relieve the Contractor of responsibility for compliance with all legal and regulatory requirements for disposal, nor shall such directions cause a request for modification of the Contract.

PROJECT CONDITIONS:

A. Environmental Requirements:

1. Transport recyclable and recoverable waste materials from the Work Area to containers and carefully deposit in the containers without excess noise and interference with other activities, to minimize noise and dust.
2. The Contractor shall ensure adequate erosion control and storm water control, if required, to prevent or minimize the negative impact to its surrounding environment.
3. Provide measures to insure the containment of lead-based paint and dust, nails, asbestos-based products and any biological contaminants that may affect environmental health and safety conditions.

B. Site Condition:

1. Signs and instructions should be clear, and easy to understand. All recycling containers should be clearly labeled and lists of acceptable and unacceptable materials will be posted throughout the site. Whenever possible, they should be in multiple-languages, especially in Spanish, and in graphic symbols.
2. The Contractor shall ensure the safety of all personnel involved in the C&D process.
3. A C&D site management plan shall be created including: work areas, materials processing areas, materials storage and disposal areas, worker hand-washing and changing stations, first aid and medical information.

Waste Disposal:

Contractor:
Contact:

- **Name of landfill for disposal of non-recyclable waste:**
  - Transfer Stations:
  - Landfills (ultimate disposal location):
- **Landfill tipping fee:** $XX / ton
- **Estimate of waste for landfill disposal:**

Recycling Calculation:

If all construction waste was disposed in landfill: XX lbs = XX tons x $XX/ton = **$XX**

With recycling: TOTAL = **$XX**

RECYCLING OPERATIONS

Action ***	Who	When
□ Choose bins/collection methods		
□ Order bins - oversee deliver		
□ Site bins/collect sites for opt. Convenience		
□ Sort or process wood		
□ Sort or process metal		
□ Sort or process cardboard		
□ Sort or process drywall		
□ Sort or process TLT (material)		
□ Sort or process _____ (material)		
□ Schedule material pickups/dropoffs		
□ Protect Materials from Contamination		
□ Document material pickups/dropoffs		

*** Depending on the service option chosen, these may be the responsibility of either the field personnel, the hauler, a full-service recycling contractor, or the subcontractors.

COMMUNICATION PLAN - Except for mandatory items (*), check other items intended to be used.

Action	**Who**	**When**	**Completed**
□ Complete Construction Waste Mgmt. Plan*			□
□ Hold Orientation/Kick-off Meeting*			□
□ Update & Progress in Weekly Job-Site Meetings*			□
□ Encourage Just-In-Time Deliveries			□
□ Post Targeted Materials (Signage)			□
□ Distribute Tip Sheets for Job-Site Personnel			□
□ Post Goals/Progress (Signage)			□
□ _____			□

MOTIVATION PLAN - Except for mandatory items (*), check other items intended to be used.

Action	**Who**	**When**	**Completed**
□ Use formal agreements committing Subs to program			□
□ Require Mis-Sorters to Re-Sort Bin			□
□ Provide Stickers, T-Shirts, or Hats			□
□ Public Recognition of Participating Subs			□
□ Letters of Recognition			□
□ Awards Luncheon			□
□ _____			□

EVALUATION PLAN - Except for mandatory items (*), check other items intended to be used.

Action	Who	When	Completed
☐ Perform Short Form Waste Audit			☐
☐ Perform Full Waste Audit			☐
☐ Perform Mid-Course Assessment			☐
☐ Perform Monthly Cost and Materials Tracking*			☐
☐ Perform Final Evaluation*			☐
☐ _____			☐

SUBCONTRACTOR	NAME	INITIALS	DATE

SUBCONTRACTOR	NAME	INITIALS	DATE

SUBCONTRACTOR	NAME	INITIALS	DATE

SUBCONTRACTOR	NAME	INITIALS	DATE

Appendix F: Submittal Log

TLT Construction Corp
Hillsborough County Courthouse North
Submittal Log
8/18/2010

P/D = Product Data S = Sample
LEED = LEED Req. C/O = Close Out Doc.
S/D = Shop Drawing T/R = Test or report
Certs = Certification

#	Copies	Para #		Source	Sub/Vendor	Installer/Sub	Sub #	Date Submitted	Date Due	Date Returned	Over Due	Action	Comments	Dist.
230000	1	2.00	Piping and Fittings	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000	1	2.01	Pipe hangers and Supports	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000			Identification	P/D	Merrimack Valley Corp.									
230000	1	2.03	Firestopping	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10		49		Expected by Wed. 8/11/10	
230000			Pipe Expansion Joints, Guides and Anchors	P/D	Merrimack Valley Corp.									
230000	1	2.05	Valves and Accessories	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000	1	2.07	Expansion Tanks	P/D	Merrimack Valley Corp.		004	06/09/10	06/30/10		49		Expected by Wed. 8/11/10	
230000	1	2.08	Air Seperators	P/D	Merrimack Valley Corp.		004	06/09/10	06/30/10		49			
230000	1	2.09	Pressure Gauges, Thermometers, Accessories	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000			Electric Motors and Starters	P/D	Merrimack Valley Corp.									
230000	1	2.11	Pumps (Water Systems)	P/D	Merrimack Valley Corp.		004	06/09/10	06/30/10		49			
230000	1	2.13	Baseboard Radiation	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000	1		Duct Construction	P/D	Merrimack Valley Corp.		006	06/09/10	06/30/10	7/22/2010	0			
230000	1	2.14	Boiler/Burner Units	P/D	Merrimack Valley Corp.		006.1	08/11/10	09/01/10		(14)		Expected by Wed. 8/11/10	
230000			Water Treatment Systems	P/D	Merrimack Valley Corp.									
230000	1	2.16	Chillers	P/D	Merrimack Valley Corp.		003	08/11/10	09/01/10		(14)	Disaproved	Expected by Wed. 8/11/10	
230000	1	2.17	Cooling Towers Induced Draft	P/D	Merrimack Valley Corp.		002	06/09/10	06/30/10	7/6/2010	0			
230000	1		Cooling Tower Filtration Pump	P/D	Merrimack Valley Corp.		002	06/09/10	06/30/10	7/6/2010	0			
230000	1	2.17	Cooling Towers Open	P/D	Merrimack Valley Corp.		002	06/09/10	06/30/10		49	R&R	Expected by Wed. 8/11/10	
230000			Factory tests	P/D	Merrimack Valley Corp.									
230000	9		Controls	P/D	Merrimack Valley Corp.		008	06/22/10	07/13/10		36			
230000		.	Dustless Split AC System	P/D	Merrimack Valley Corp.									
230000		novia	Vinration Isolation	P/D	Merrimack Valley Corp.									
230000			Complete Ductwork, Layout and Piping Drawings	S/D	Merrimack Valley Corp.									
230000	1	2.21	Sound Attenuation Equipment 1	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.21	Sound Attenuation Equipment 2	P/D	Merrimack Valley Corp.		001	8/610	01/21/00					
230000	1	2.21	Sound Attenuation Equipment 3	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.21	Sound Attenuation Equipment 4	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.21	Sound Attenuation Equipment 5	P/D	Merrimack Valley Corp.		001	8/610	01/21/00					
230000	1	2.21	Sound Attenuation Equipment 6	P/D	Merrimack Valley Corp.		001	8/610	01/21/00					
230000	1	2.21	Sound Attenuation Equipment 7	P/D	Merrimack Valley Corp.		001	8/610	01/21/00					
230000	1	2.21	Sound Attenuation Equipment 8	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.21	Sound Attenuation Equipment 9	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.21	Sound Attenuation Equipment 10	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.22	Diffusers, Registers and grilles	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49	R&R	Expected by Wed. 8/11/10	
230000		2.22	Arch. Diffusers	P/D	Merrimack Valley Corp.								In talks with vendor	
230000	1	2.23	Louver Colors	S	Merrimack Valley Corp.		007	06/22/10	07/13/10		36			
230000	1	2.23	Louvers	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49	R&R	Expected by Wed. 8/11/10	
230000	1	2.24	Fans	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.03	Firestopping	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1		Fire Dampers	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49	R&R	Expected by Wed. 8/11/10	
230000	1		Condensing Vents	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000	1	2.25	Coils	P/D	Merrimack Valley Corp.		004	06/09/10	06/30/10		49			
230000		.	Air filters	P/D	Merrimack Valley Corp.									
230000	1	2.27	Air Handling Units 1	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000	1	2.28	Variable Air Volume Terminal Units	P/D	Merrimack Valley Corp.		004.1	07/16/10	08/06/10		12	R&R		
230000	1	2.27	Air Handling Units 2	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000	1	2.30	Unit heaters	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10		49	Disaproved	Expected by Wed. 8/11/10	
230000	1	2.31	Cabinet Unit Heaters	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10		49	Disaproved	Expected by Wed. 8/11/10	
230000			Factory Painting	P/D	Merrimack Valley Corp.									
230000	1	2.13	Pipe Insulation	P/D	Merrimack Valley Corp.		003	06/09/10	06/30/10	7/16/2010	0	Approved as Noted		
230000	1	2.33	Air Handling Insulation	P/D	Merrimack Valley Corp.		004	06/09/10	06/30/10		49			
230000	1	2.35	Roof Curbs	P/D	Merrimack Valley Corp.		001	06/09/10	06/30/10		49			
230000		.	Coordination Drawings	S/D	Merrimack Valley Corp.									
230000		.	HVAC Control Systems	P/D	Merrimack Valley Corp.									
230000		novia	Seismic Restraints	P/D	Merrimack Valley Corp.									
230000			Color Selection charts for equipment and systems in finished areas	S	Merrimack Valley Corp.									
230000			LEED Requirement Submittals	LEED	Merrimack Valley Corp.									
230000			HVAC	S/D	Merrimack Valley Corp.									

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#	Copies	Para #		Source	Sub/Vendor	Installer/Sub	Sub #	Date Submitted	Date Due	Date Returned	Over Due	Action	Comments	Dist.
230000			HVAC Scheduel	P/D	Merrimack Valley Corp.									
230000	1		TAB Plan	P/D	Merrimack Valley Corp.		005	06/09/10	06/30/10	6/16/2010	0	Approved		
230000			TAB Draft and Final Balancing Reports	T/R	Merrimack Valley Corp.									

Appendix G: Material Status Log

TLT Construction Corp
HCCN
Material Status Log

		Sub/Vendor	Sub #	Action	CPM Date	Confirming Ltr Sent	Date Confirmed	Status
230000	Piping and Fittings	Merrimack Valley Corp.			9/12/2010	7/29/2010		
230000	Pipe hangers and Supports	Merrimack Valley Corp.			10/18/2010	7/29/2010		
230000	Identification	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Firestopping	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Pipe Expansion Joints, Guides and Anchors	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Valves and Accessories	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Expansion Tanks	Merrimack Valley Corp.						
230000	Air Seperators	Merrimack Valley Corp.						
230000	Pressure Gauges, Thermometers, Accessories	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Electric Motors and Starters	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Pumps (Water Systems)	Merrimack Valley Corp.			2/22/2011	7/29/2010		
230000	Baseboard Radiation	Merrimack Valley Corp.			2/22/2011	7/29/2010		
230000	Duct Construction	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Boiler/Burner Units	Merrimack Valley Corp.			2/22/2011	7/29/2010		
230000	Water Treatment Systems	Merrimack Valley Corp.			3/22/2011	7/29/2010		
230000	Chillers	Merrimack Valley Corp.			3/17/2011	7/29/2010		
230000	Cooling Towers Induced Draft	Merrimack Valley Corp.			2/22/2011	7/29/2010		
230000	Cooling Tower Filtration Pump	Merrimack Valley Corp.			2/22/2011	7/29/2010		
230000	Cooling Towers Open	Merrimack Valley Corp.			2/22/2011	7/29/2010		
230000	Factory tests	Merrimack Valley Corp.			5/10/2011	7/29/2010		
230000	Controls	Merrimack Valley Corp.						
230000	Dustless Split AC System	Merrimack Valley Corp.			3/2/2011	7/29/2010		
230000	Vinration Isolation	Merrimack Valley Corp.						
230000	Sound Attenuation Equipment	Merrimack Valley Corp.						
230000	Diffusers, Registers and grilles	Merrimack Valley Corp.			12/26/2010	7/29/2010		
230000	Louvers	Merrimack Valley Corp.			12/26/2010	7/29/2010		
230000	Fans	Merrimack Valley Corp.			1/11/2010	7/29/2010		
230000	Firestopping	Merrimack Valley Corp.						
230000	Fire Dampers	Merrimack Valley Corp.						
230000	Condensing Vents	Merrimack Valley Corp.			11/10/2010	7/29/2010		
230000	Coils	Merrimack Valley Corp.			11/10/2010	7/29/2010		
230000	Air filters	Merrimack Valley Corp.			11/1/2010	7/29/2010		
230000	Air Handling Units	Merrimack Valley Corp.			3/2/2011	7/29/2010		
230000	Variable Air Volume Terminal Units	Merrimack Valley Corp.			3/2/2011	7/29/2010		
230000	Unit heaters	Merrimack Valley Corp.			3/2/2011	7/29/2010		
230000	Cabinet Unit Heaters	Merrimack Valley Corp.			3/2/2011	7/29/2010		
230000	Roof Curbs	Merrimack Valley Corp.			10/10/2010	7/29/2010		
230000	HVAC Control Systems	Merrimack Valley Corp.						

Appendix H: RFI Log

RFI #	Date issued	Date returned	Issued By	Description	Response	Add/Rev. No.	Distributed To
1	4/30/10	5/24/10	Cheever	Gas-Sand Interceptor Overhead Weight Issue			JT, JG, AK, CRM
2	4/30/10	5/17/10	Cheever	Sump Pum Size			JT, JG, AK, CRM
3	5/3/10	5/17/10	Cheever	Water Meter			JT, JG, AK, CRM
4	5/10/10	5/24/10	Griffen	Buildings Exterior Light Fixtures			JT, JG, AK, Griffen
5	5/11/10	5/24/10	Griffen	Exit Sign adjacent to Elevator 1			JT, JG, AK, Griffen
6	5/12/10	5/24/10	Griffen	Fixture Schedule: Exit Sign 1			JT, JG, AK, Griffen
7	5/13/10	5/24/10	Griffen	FS1 Fixture Placement on the Lower Level			JT, JG, AK, Griffen
8	5/14/10	5/24/10	Griffen	Mens and Womens Room Light Fixture			JT, JG, AK, Griffen
9	5/15/10	5/24/10	Griffen	Elevator 3 and Mcahine room Light fixture placement			JT, JG, AK, Griffen
10	5/16/10	5/24/10	Griffen	Stairway B W1 placement			JT, JG, AK, Griffen
11	5/17/10	5/24/10	Griffen	Machine Rooms 2, 3 & 4 Lighting Fixtures			JT, JG, AK, Griffen
12	5/18/10	5/24/10	Griffen	Power For Elevator 1			JT, JG, AK, Griffen
13	5/13/10	5/20/10	TLT	Fixed Jury Seating fabric issue			JT, JG, AK
14	5/14/10	5/20/10	Griffen	FR9 Fixture in rm 120			JT, JG, AK, Griffen
15	5/14/10	5/24/10	Griffen	Exit sign circuits			JT, JG, AK, Griffen
16	5/14/10	5/24/10	Griffen	Lower level courtroom lighting control			JT, JG, AK, Griffen
17	5/14/10	6/4/10	Griffen	Recessed fixtures installed in fire-resistive ceiling			JT, JG, AK, Griffen
18	5/20/10	6/9/10	TLT	Anchor Bolt Elevations			JT, JG, AK
19	5/20/10	5/20/10	Barker	Rebar for site improvements			JT, JG, AK, Barker
20	6/9/10	6/9/10	TLT	Roof Opening Infill			JT, JG, AK, Design Fab
21	6/11/10	6/28/10	TLT	Granite Panel Conditions			JT, JG, AK, A1
22	6/11/10	6/11/10	Lizotte	Curtain Wall Plywood Dimensions			JT, JG, AK, Lizotte
23	6/16/10	9/21/10	TLT	Jamb and Sill Details	Draft Sent for TLT's review		JT, JG, AK
24	6/16/10		TLT	Granite Pavers Joint Condition			JT, JG, AK
25	6/16/10	6/17/10	TLT	Exterior Face of Concrete Foundation Dimensions			JT, JG, AK
26	6/25/10	7/1/10	TLT	Roof Drain Opening Supports			JT, JG, AK
27	6/28/10	7/1/10	Griffen	Site Plan Tele/ Data Conduits			JT, JG, AK, Griffen
28	6/28/10		Griffen	Door Symbol			JT, JG, AK, Griffen
29	6/28/10	7/8/10	Griffen	Note 1: Empty Conduits			JT, JG, AK, Griffen
30	7/7/10	7/14/10	Merrimack	Duct Sizes			JT, JG, AK, Merrimack
31	7/9/10	7/13/10	TLT	Petroleum Odor Testing			JT, JG, AK
32	7/9/10	7/14/10	Merrimack	Duct Sizes #2			JT, JG, AK, Merrimack
33	8/11/10		Merrimack	Expansion tank			JT, JG, AK, Merrimack
34	8/12/10	8/31/10	Lizzote	Obscure Glass Detail			JT, JG, AK, Lizzote
35	8/16/10	9/1/10	TLT	Granite Panel Support Detail			JT, JG, AK
36	8/19/10		Griffin	Aluminum Conductors			JT, JG, AK
37	8/25/10		Cheever	Pipe Hangers			JT, JG, AK, Cheever
38	8/26/10	9/7/10	TLT	Electrical Floor Vaults			JT, JG, AK, Griffen
39	8/27/10	9/7/10	Cheever	Copper Water Piping			JT, JG, AK, Cheever
40	8/30/10	8/31/10	TLT	Channel Girts			JT, JG, AK
41	9/2/10	9/2/10	Aubin	3-Tier Jury Box and 2-Tier Jury Box			JT, JG, AK, Aubin
42	9/2/10		Aubin	ADD 3.2			JT, JG, AK, Aubin
43	9/2/10	9/2/10	Aubin	Clerk Counter 121/Clerical 122			JT, JG, AK, Aubin
44	9/2/10	9/2/10	Aubin	Door 122A			JT, JG, AK, Aubin
45	9/2/10	9/2/10	Aubin	Sheriff 118			JT, JG, AK, Aubin
46	9/2/10	9/2/10	Aubin	CP Counter 120			JT, JG, AK, Aubin
47	9/2/10	9/2/10	Aubin	Probate 126			JT, JG, AK, Aubin
48	9/2/10	9/2/10	Aubin	Storage 275			JT, JG, AK, Aubin
49	9/6/10	9/9/10		Abatement Report			JT, JG, AK
50	9/13/10	9/23/10	Middlesex	Roof Edge Panels			JT, JG, AK, Middlesex
51	9/13/10		Merrimack	Duct Ceiling Conflicts			JT, JG, AK, Merrimack
52	9/20/10		TLT	Air and Vapor Barrier			JT, JG, AK
53	9/20/10	9/23/10	TLT	Loose MC Channel			JT, JG, AK
54	9/24/10		Cheever	Coordination Drawings			JT, JG, AK, Cheever

Appendix I: Army Corps of Engineers Certificate

U.S. ARMY CORPS OF ENGINEERS

PROFESSIONAL DEVELOPMENT SUPPORT CENTER
HUNTSVILLE, ALABAMA

CERTIFICATE

This is to certify that

Adam Kreitman

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

THIS CERTIFICATE EXPIRES 14-September 2015

Given at Concord, MA New England 14-September 2010
Location Instructional District Date

Maurice Beaudoin, PE 978-318-8223
Facilitator

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Chief, USACE Professional Development Support Center

Appendix J: OSHA 30

OSHA Occupational Safety and Health Administration

36-900288372

This card acknowledges that the recipient has successfully completed a 30-hour Occupational Safety and Health Training Course in

General Industry Safety and Health

ADAM KREITMAN

Michael Millsap

(Trainer name – print or type)

9/24/2010

(Course end date)

Appendix K: LEED Recycling Rates

Hillsborough County Courthouse North
LEED 2009(V3) New Construction and Major Renovations

Recycling Rate Calculations

Month	Ticket Number	Service Date	Container Size (Cubic Yards)	Type (Commingled or Source Sep.)	Total Tonnage	Concrete Tonnage (Diverted)	Metal Tonnage (Diverted)	Wood Tonnage (Diverted)	Paper & Cardboard Tonnage (Diverted)	Other Recyclable Tonnage (Diverted)	Residual / Trash Tonnage (Landfill)	Total Diverted Tonnage	Facility Receiving Material	Comments (If Landfilled, explain why Material was not diverted. If other recycled material, include description of material
July	80868	7/22/2010	20	Source Sep	14.00	14.00						14.00	Graniteville	Concrete
July`	100391	7/28/2010	20	Source Sep	14.00	14.00						14.00	Graniteville	Concrete
September	99879	9/10/2010	30	Commingled	9.25	0.93	0.93	3.70	1.85	0.93	93.00	8.34	TBI	
September	104701	9/13/2010	20	Source Sep	21.33	21.33						21.33	M Bradsher	Concrete
September	82355	9/17/2010	20	Source Sep	14.00	14.00						14.00	Beneveto	Sand & Stone
September	99919	9/21/2010	20	Source Sep	14.00	14.00						14.00	Graniteville	Concrete
October	92695	10/12/2010	30	Source Sep	2.60		2.60					2.60	Windfield Alloy	Metal
October	92737	10/12/2010	30	Commingled	3.58	1.07	0.36	0.72	1.07	0.36		3.58	Bow Recycling	
October	101519	10/21/2010	30	Commingled	7.02	0.70	0.70	1.40	2.81		1.40	5.61	Bow Recycling	
November	93376	11/11/2010	30	Commingled	3.42		0.86	0.86	0.17	0.86	0.68	2.75	Bow Recycling	
November	102302	11/19/2010	30	Commingled	3.76			1.13	0.75	1.50	0.38	3.38	TBI	
November	102210	11/29/2010	30	Commingled	2.79		0.28	0.28	0.56	1.12	0.28	2.24	Bow Recycling	
December	94092	12/13/2010	30	Commingled	5.08		2.54	1.02		1.52		5.08	Bow Recycling	
January	96287	1/5/2011	30	Commingled	4.87		0.97	0.49		2.44	0.97	3.90	Aggregate Recycling	
February	13764	2/11/2011	30	Commingled	4.23		1.27	0.85	0.21	1.69	0.21	4.02	Bow Recycling	
February	104307	2/16/2011	30	Commingled	3.09	0.31	0.62	0.31	0.31	1.24	0.31	2.79	Bow Recycling	
February	96760	2/22/2011	30	Commingled	7.78	4.67				2.33	0.78	7.00	Aggregate Recycling	
February	96767	2/23/2011	30	Commingled	2.98		2.98					2.98	Second Street	Metal Load
February	104347	2/28/2011	30	Commingled	5.23		0.52	0.52	1.05	3.14		5.23	Bow Recycling	
Subtotal (Tonnage)					143.01							136.83		
											Total Tonnage	95.67862		