THE CLARK

The Sterling & Francine Clark Art Institute

Williamstown, MA.

Thesis Technical Assignment I

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Executive Summary

This report is to illustrate and provide a comprehensive background about the Sterling and Francine Clark Art Institute through analyses of schedules, different types of estimates, investigations, and evaluations. The project is adding a new extension to accommodate the new needs. The new addition serves as an exhibition, conference and visitor center, and a new plant where the new addition's equipment such as Heating/Ventilation/Air-Conditioning (HVAC) and electrical units will be place.

The construction process is split into phases where each represents a specific area of the new extension. Scheduling is discussed in the report to provide the necessary ideas how the job is being done from the early designing phases to substantial completion on the proposed date of July 17, 2013. Demolition work, as shown in the demolition part later in this report, on this project took place in the early stages of construction to provide a room for the new addition. It included the existing plant and parts of the existing plant.

The report provides estimation demonstration as mentioned earlier. The RSMeans CostWorks online software/tool was used in developing organizing, and tabulating estimates. The RSMeans estimate report indicates how inaccurate it is to rely on such tool.

There are site plans that include the existing conditions and site layout plans. The existing condition plan illustrates site restrictions. The site layout plans will illustrate some critical phases of construction such as excavation, superstructure, and finish phase of the project. Those illustrate locations of ramps, temporary parking and dumpsters, trailers, concrete pumps, etc.

The project will be delivered through a Guaranteed Maximum price (GMP) where Turner Construction would be the construction Manager at Risk for the project. The Sterling and Francine Clark Art Institute holds contracts with 7 parties including Turner Construction Company. The bids are usually given to the best bid package which would still be under the supervision of Turner even though they have separate direct contracts with the Sterling and Francine Clark Art Institute.

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Project Schedule Summary

The Sterling and Francine Clark Art Institute project schedule is very straightforward as it can be seen in Appendix A. The construction process is broken down into phases following a specific sequence of construction with each representing a specific area of the new building being constructed. Initially, the Construction Drawings were published on 01/04/2011 were it was approved on 04/04/2011. After which the following steps were Approvals, Coordination, Fabrication and delivery until Excavation began on 09/27/2011. The building is intended to be completed by 09/03/2013 which is very close to a period of construction of 2 years.

Foundation Sequence

The foundation sequence began by installing 800 Feet Sheeting at a rate of 27 feet per day; After which, excavation of the 22,000 CY began 2 weeks after sheeting process started at a rate of 1500 CY per day to finish on 10/25/2011. Before the excavation process would be completed, the process of forming, reinforcing and placing of the concrete foundation walls would begin along with the rest of the foundation area. Installing Stone cladding, curing and waterproofing would follow to complete the foundation phase.

Structural Sequence

As soon as the foundation is installed completely, the process of installing the concrete structural walls begins with each phase/area starting depending on when its foundation was completed. Since the structure of the building is a cast in place concrete, the same process as the foundation would be taking place which is the FRP process, curing and waterproofing. Installation of the curtain wall, depending on the area if there was, would be done after installing the exterior walls and before installing the roof.

Finishing Sequence

The final stage after installing the structural roof would be the finishing phase. In this final phase Interior fit-out would begin by installing the overhead HVAC piping, Electrical, Sprinkler and finishes in that order. This sequence is the same in other areas of the building except of minor differences such as Rough-In Overhead Drainage, Mechanical/Electrical/Plumbing (MEP) piping, Ductwork, Electric, and then Sprinkler mains. Installing ceiling framing would follow with the MEP drops which would be following by closing ceiling and walls. Following that, Acoustic Plaster would be placed, walls ceiling would be painted following by the wood Flooring finishes.

Building Systems Summary

Demolition

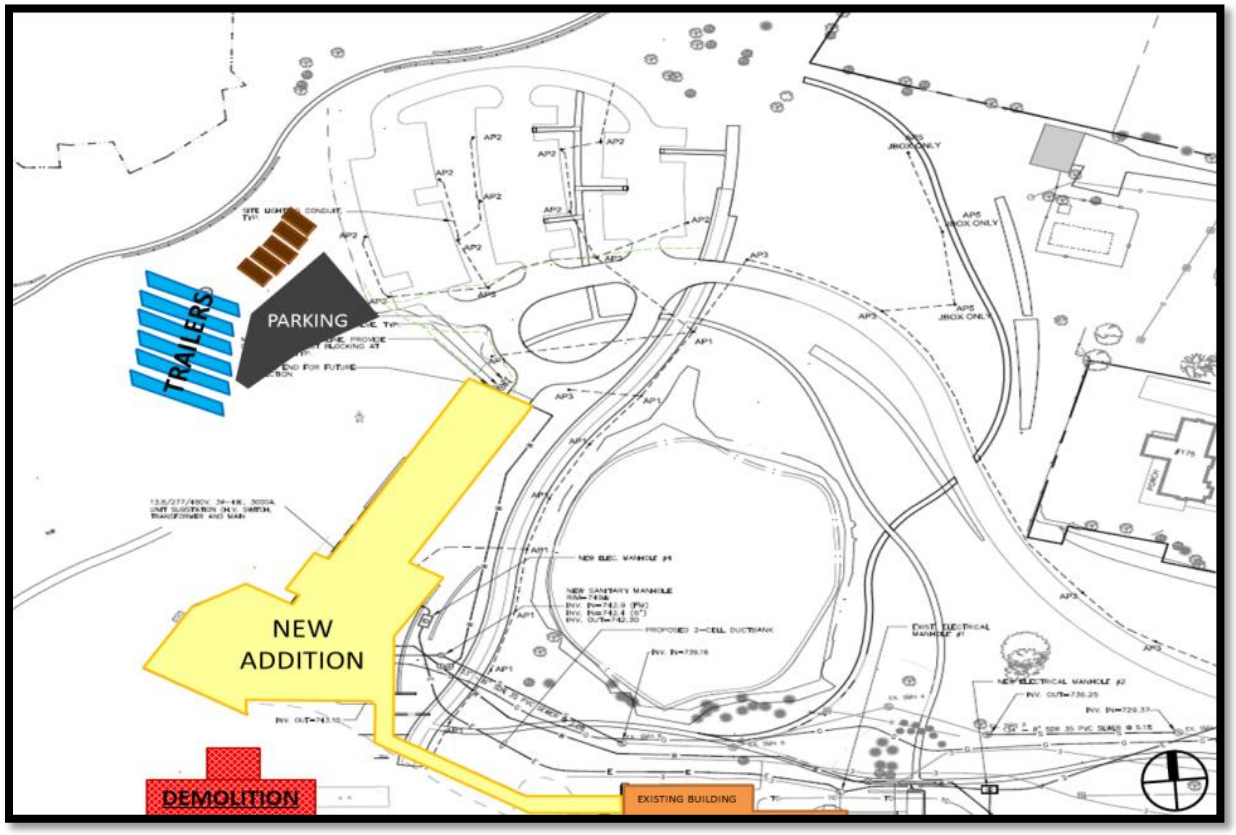


Figure 1: Demolition Plan

At the beginning of construction, there is some demolition. As shown in the figure 1, the are shaded in orange is a 2 story office building where the red shaded area is the existing plant which was demolished in order to make room for the new addition excavation and sheeting.

Structural System, Cast in Place Concrete

The foundation would be a 2 way reinforced cast in place flat slab with continuous mat slab which is top and bottom reinforcement. In addition, 18" x 18" concrete columns are all over the cast in place slab on grade (SOG) foundation which is holding the first floor. The first floor itself is also a 2 way reinforced slob on grade with concrete columns placed uniformly across the first floor. Concrete columns heights range from 57 feet to 12 feet depending on the location although most columns have a height of 17 feet. The SOG has thickness ranging from 2.5", which would be placed on a galvanized composite metal deck, up to 16" which is a two way slab. Strength of concrete SOG in this building should be 5000psi with the exception of the 2.5" SOG which would be 3000 psi. Concrete will mostly be pumped using a pump truck although some areas may require a standard crane and bucket method.

Mechanical System

The Mechanical system is located in the basement in the north side of the. The HVAC system will be using a fuel supply pump to operate the boiler and the generator. There are two main hot water boilers that supply heat to the Sterling and Francine Clark Art Institute each running at 150 HP to supply a NET MBH of 5021 per boiler. In addition, there will be 6 heat exchanger units, 3 located in the chiller room and the other 3 will be in the boiler room. As for the chilled water system, there will be 3 chillers; The 2 main chillers will have a capacity of 290 tons with a GPM of 696 supplying the Museum and the Manton (the existing building next to the new addition). The generator will be placed in the generator room in the plant part of the new addition on a concrete pad with a thickness of 24". There are a total of 8 sound attenuators for the mechanical equipment located in the Mechanical room.

Electrical System

The electrical room is also located in the basement in the north side along with the mechanical room. There are a large range of lighting fixtures that will be used throughout the museum. The voltages are 120 V for CFL and T4's while the voltage would be 277V for T8, MH, LED lighting and Par 38. The Sterling and Francine Clark Art Institute will be running on a 15KV feeder that branches of the main utility line. A dry type 2000kVA transformer will transform the electricity to produce a 3 phase (4 wire) 480/277V circuit. There is an emergency generator that can generate 1500KW/1875KVA

Masonry

The building envelope consists of concrete masonry unit CMU walls that rise from the basement and upwards. CMU for the wall goes all around the building except where there is an aluminum glazing and the triple insulated glass walls. The CMU walls range between thicknesses of 10" to 24" while the reinforcing used in the CMU walls is mostly #5@12" rebar going both ways, vertically and horizontally.

Curtain Wall

The Building is held up using CMU walls all around the southern wall all the way through until the Manton in addition to the concrete columns used throughout the floor. Hence, the northern part would use a curtain wall system through the use a glazed aluminum wall which would be composed of low-e coated, triple insulating laminate glass. Pre-formed intumescent fireproofing will be used, and fluid applied membrane air barrier will be placed in between the concrete and rigid insulation.

Support of Excavation

Shoring system is usually used until backfill is installed. This would support the excavation and keep it in place until the foundation phase begins, after which the shoring can be removed when the basement CMU walls can support themselves. Further information will be added upon retrieval from owner representative.

LEED Features and Certification

The Sterling and Francine Clark Art Institute is committed to build a sustainable building to line up with the surrounding environment. It is built with recycled, regional, and even some renewable materials. Also, low emitting materials was kept in mind while building this institute. What's more, The Clark made the construction waste management a priority in their plans. There are many efforts made to make the building as much sustainable as possible. For example, the materials were used in this building. For instance, marble claddings, at least 20% of the materials are post-consumer recycled content, regional materials, rapidly renewable materials such as bamboo, wool, cotton insulation, cork, etc. Regarding the low emitting materials, the adhesives, sealants and sealant primers that were used are in comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168. Also, the aerosol adhesives comply with the Green Seal Standard for Commercial Adhesives GS-36.

With all the efforts made on the building, it is aiming to achieve LEED® Silver Certification.

Project Cost Evaluation

Project Cost Evaluation

The following tables demonstrate different types of estimates and how they differ from the actual costs. A summary of cost estimate relative to square footage and major building systems costs will be demonstrated in the following two tables.

Table 1 : Gross Building Area by Floor	
Basement	37,525 SF
1st Floor	30,628 SF
TOTAL	68,153 SF

Table 2 : Cost Estimate		
Type of Cost	**Estimate**	
	Cost ($)	Cost/SF ($/SF)
Construction Cost (CC)	Confidential	Confidential
Total Cost (TC)	$28,000,000	$410

The total cost known is $28,000,000. The total calculated areas of the basement and the first floor are 68,153 ft^2. The construction cost was estimated based on the general range of 5-15% construction fees and 15% is what was considered. This is due to the confidentiality of the cost information per to the owner representative. The total cost is the only reported cost and was reported at the end of Spring 2011 semester and the Cost/SF was dertemind based on that.

Estimates

The estimates were calculated and developed using the online RS Means square foot estimate and assembly estimate tools. The estimates were built on the values as of the third quarter of 2011 RS Means release. Due to the unavailability of the exact matching of the Sterling and Francine Clark Art Institute, a vocational school was the best match to be chosen to develop the estimates. Also, adding a precise square footage for the basement in the online RS Means tools was not possible. So, the only left option was to include the basement and to add the basement square footage with the first floor to complete the calculation of the estimate. Finally, neither Williamstown, MA nor Berkshire County were available in the RS Means online tools. So, Pittsfield, which is the closest location to the project, was chosen.

Table 4: Estimate Summary	
Stories	1 Floor, Basement
Perimeter	20319 LF
Story Height	1st Floor: 14'-8" FT, Basement: 22'-2 ½" FT
Floor Area	68,153 SF
Cost/SF	$192.75
Construction Cost	$13,136,500

Table 5 shows an assembly estimate of the Mechanical, Electrical, and Plumbing (MEP) systems in the building. The estimate was developed using the online RS Means tools as mentioned earlier. The estimates reflect only the major components of the mentioned building systems.

Table 5: MEP Assembly Estimate Summary	
Mechanical	$2,213,575
Electrical	$1,358,474
Plumbing	$124,406

Total	$3,696,455

Table 6 is a comparison between the cost estimate developed using the online RS Means tools and the actual costs for the total construction cost (CC) and CC/SF.

Table 6: Estimate Summary vs. Actual

Estimate Type	RS Mean SF Estimate	Actual
Cost/SF	$192.75	Confidential
Construction Cost	$13,136,500	Confidential

Table 7 is a comparison between the cost estimate developed using the online RS Means tools and the actual costs for the Mechanical, Electrical, and Plumbing systems in the building.

Table 7: RS Means MEP Assembly Estimate vs. Actual

	Assembly Estimate	Actual
Mechanical	$2,213,575	Confidential
Electrical & Telecommunication	$1,358,474	Confidential
Plumbing	$124,406	Confidential
Total	$3,696,455	Confidential

The estimates produced thought the RS Means Square foot estimate and the RS Means Assembly estimate of the MEP system allows us to have an idea about what the cost of the a similar building or the cost of a specific system, as is in the case of the assembly estimate. But at the end of the day, they are just estimates that can never give us the exact cost but provide us with a close estimate.

In this case, the Actual cost was $28 million where the RS means Square Foot estimate was $13,136,500. It can be seen that the price from the RS mean is considerably lower than the actual and there are many reasons. First, the RSMeans does not include any special features of the building that may be costly, especially that the Sterling and Francine Clark Art Institute is a state

of the art museum in addition to it being LEED certified. In addition, the RS mean does not account for the specific systems that would be used in the building (which is the purpose of the Assembly Estimate). Those 2 issues by themselves could cause a huge difference between the actual and the estimate cost. Finally, the RS means Square foot estimate is performed by selecting the characteristics of the building through a list which may or may not in many cases have the required characteristics in the list. In that sense, many assumptions have been made while estimating; for example, a museum was not listed as one of the options for the type of building being estimated. The closest to such museum was a school since it has many rooms and features where the closest building that would have all of the features would be a school.

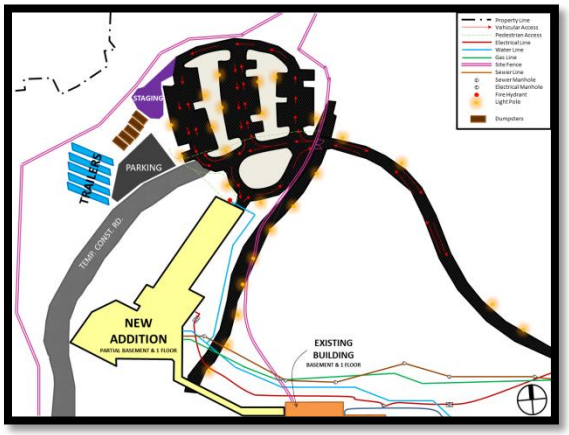
As for the Assembly cost, it provided a closer estimate than the Square footage estimate and that is because it asks for more details about the system being estimated. However, the same obstacles showed up where the system being using the Sterling and Francine Clark Art Institute could not be found in the RS Mean Assembly book, and so, the closest system to what is actually being used was chosen to create estimate.

So even though the estimates did not provide an exact close answer, it did provide us with an idea about what the cost of such facility or system would be.

NOTE: Please refer to Appendix B for detailed estimates.

Site Plans Summary

Existing Conditions



Since this project is adding a new extension to accommodate the owner new needs, it will use some of the existing utilities and will have new ones as well. The existing buildings have to remain fully functional during all construction phases, including demolition, because of the museum nature that holds several galleries year around. Temporary parking will be made for construction. Also, there are roads that are either located nearby or on existing utility lines that require extra care not to affect them due to construction heavy loads. Otherwise, the site is not very congested and has a fair amount of space.

Site Layout Planning

As mentioned earlier, the site has a decent amount of space. There is new temporary parking beside the trailers. Dumpsters were placed near the northern side of the temporary parking and to the eastern side of the trailers whereas the staging area for the project is located at the eastern side of the dumpsters. The location of both dumpsters and the staging are chosen based on the ease of accessing them from the eastern side of the staging area where there is a vehicular access to them. A temporary construction was paved to facilitate access to trailers and different areas of the new building construction. Since the staging area is located inconveniently somewhat far, there will be a multiple smaller staging areas around the site as needed and the space permits that. That might be a little bit of waste of time and money due to moving material more than once. Overall, the site is well planned logistically.

NOTE: Please refer to Appendix C for 11x17 plans.

Local Conditions

Preferred Methods

Williamstown, Massachusetts is a city of just 4,592 people, according to 2007 census, in Berkshire County north east of Massachusetts. Due to the temperate climate and very low seismic loads, the commonly preferred methods of construction in Williamstown, MA are reinforced concrete, which is the case in The Sterling and Francine Clark Institute, and steel.

Construction Parking, Waste, and Tipping Fees

The construction of the new addition will be adjacent to the north side of the current two buildings. The current parking lot will be temporary construction parking.

The building is achieving a Silver LEED certificate. With being said, many of the waste will be recycled. For instance, a removed on site marble will be used as a recycled crushed stone.

Dumpster, Tipping, and Recycling expenses are confidential.

Client Information

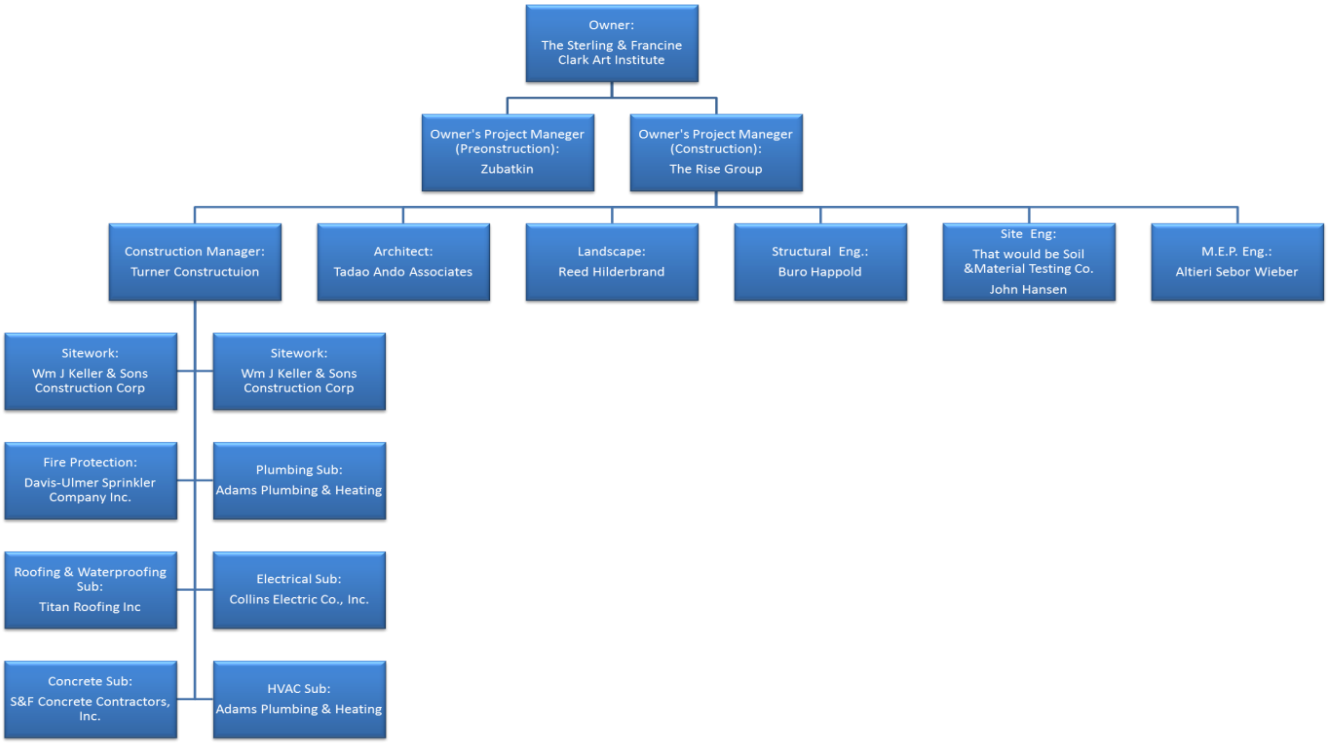
Sterling and his spouse, Francine, shared a passion of collecting art work. They founded the "Sterling and Francine Clark Art Institute which is an art museum and a center for research and higher education, dedicated to advancing and extending the public understanding of art."[1] The major reason was to protect their valuable art work such as paintings, sculpture, porcelain, drawings, and prints, they collected through the years. With time, the institute needed another extension for doing research work. A building was built on the 1970's. Nowadays, with current advancements in sciences and arts, a new building is essential. The new addition will mainly have an exhibition, conference, visitor center, and a new plant.

The new addition will reinforce the Clark's unique standing as one of the only major art museums in the world located in a dramatic rural setting. Also, the new galleries will present the special exhibitions programs highlighting the Clark's collection as well as works representing periods and cultures not currently shown. One of the new galleries is a space for American art and decorative arts. The improved visitor amenities, including a new shop and restaurant in the Exhibition, Visitor, and Conference Center, will support the institute's role as a public art museum. More space will be included for the library and its special collection of works on paper and public reading room. Moreover, expanded visitor amenities, including a full-service restaurant, café, museum shop, and family activity room will be accommodated. Last but not least, an auditorium and conference center will also be available to accommodate a wide range of museum and academic programs.

The Clark logo is courtesy of the Sterling and Francine Clark Art Institute website.

[1] "The Clark - Mission." *Sterling and Francine Clark Art Institute*. Web. 20 Sept. 2011. <http://www.clarkart.edu/about/content.cfm?ID=37>.

Project Delivery System

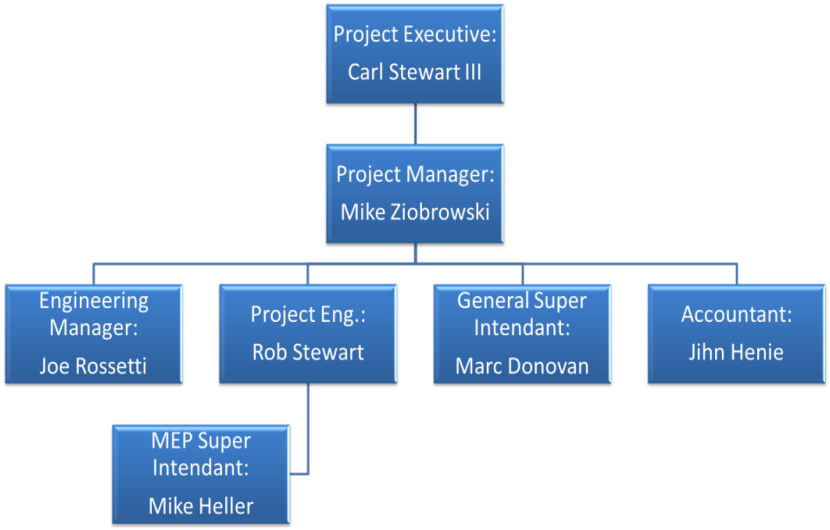


The project will be delivered through a Guaranteed Maximum price (GMP) where Turner construction would be the construction Manager at Risk for the project. Since the project involves world renowned architects where quality is a major concern, a lump sum would not have been a good idea and the only other economical best option would be a GMP.

The Sterling and Francine Clark Art Institute holds contracts with around 7 parties including Turner Construction Company. First and foremost is the famous Architect Tadao Ando who has designed this state of the art museum; and so, the most important factor to take into consideration is delivering a high quality facility. Hence, when it came to choose a General Contractor to deliver the project and bring the Architecture into reality, the requirements for a GC changed. Many companies came to bid for the project and Turner won the Bid for many reason including but is not limited to the fact that it is a worldwide trusted company that has delivered thousands of projects all over the world which speak for the architects that designed them and Turner company.

As for the other contractors and subcontractors, the bids are usually given to the best bid package which would still be under the supervision of Turner even though they have separate direct contracts with the Clark Art Institute. Turner's subcontractors are chosen in a similar way where Turner would create scopes of work in which eventually both Turner and the Sterling and Francine Clark Art Institute have to agree on the subcontractors that were chosen.

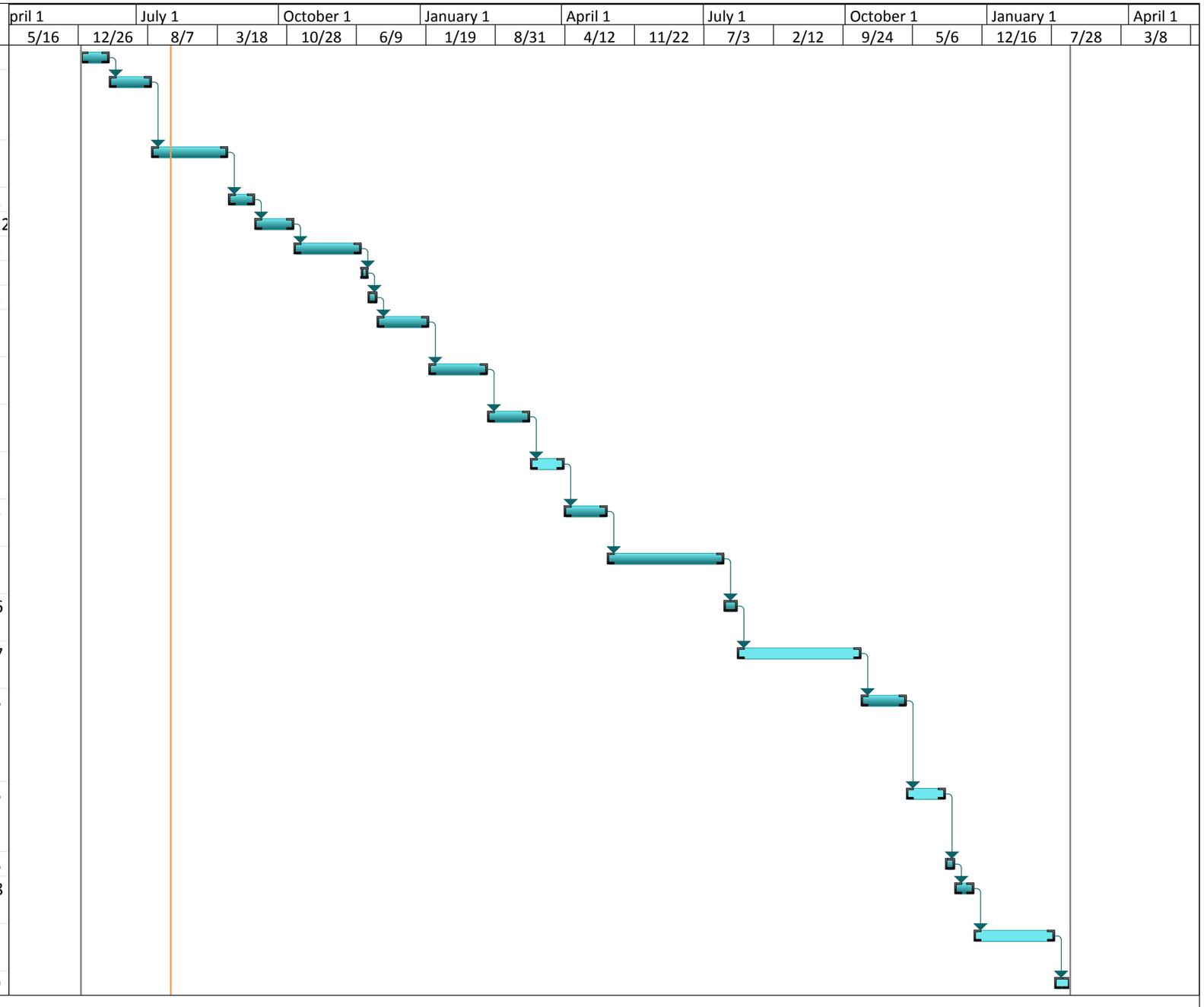
Staffing Plan



The Sterling and Francine Clark Art Institute project is managed by the order of major role players shown in the above chart. The project executive Carl Stewart III overseas the whole project, while the project manager Mike Ziobrowski handles the overall project tasks. The general superintendant Marc Donovman manages the day to day on site operations generally. There are also four main people in the team that supports solving the daily job problems such as the project engineer Rob Stewart.

Appendix A
Project Schedule Summary

ID	Task Mode	Task Name	Duration	Start	Finish
1		Publish GMP Documents	65 days	Tue 1/4/11	Mon 4/4/11
2		Procurement (preparing contracts + Owner Review and Approval)	98 days	Tue 4/5/11	Thu 8/18/11
3		Shop Drawings & Approvals	176 days	Fri 8/19/11	Fri 4/20/12
4		MEP coordination	61 days	Mon 4/23/12	Mon 7/16/12
5		Budget Development	90 days	Tue 7/17/12	Mon 11/19/12
6		Fabrication & Delivery	155 days	Tue 11/20/12	Mon 6/24/13
7		Utility Relocation	16 days	Tue 6/25/13	Tue 7/16/13
8		Excavating	21 days	Wed 7/17/13	Wed 8/14/13
9		East Lower Lobby: FRP +Curing + Waterproofing	119 days	Thu 8/15/13	Tue 1/28/14
10		MEP/Resevoir: FRP +Curing + Waterproofing	135 days	Wed 1/29/14	Tue 8/5/14
11		Display: FRP +Curing + Waterproofing	98 days	Wed 8/6/14	Fri 12/19/14
12		East MER: FRP +Curing + Waterproofing	79 days	Mon 12/22/14	Thu 4/9/15
13		Central: FRP +Curing + Waterproofing	99 days	Fri 4/10/15	Wed 8/26/15
14		Central: Install Roof + Interior Fitout	268 days	Thu 8/27/15	Mon 9/5/16
15		West: FRP +Curing + Waterproofing	31 days	Tue 9/6/16	Tue 10/18/16
16		West: Install Rood + Interior Fitout	285 days	Wed 10/19/16	Tue 11/21/17
17		Lower Level (Displays A, B, C/ Court/MER/ Resevoir): Rough-In Overhead	104 days	Wed 11/22/17	Mon 4/16/18
18		Lower Level (Displays A, B, C/ Court/MER/ Resevoir): Finishing	90 days	Tue 4/17/18	Mon 8/20/18
19		East MEP/Link: FRP	22 days	Tue 8/21/18	Wed 9/19/18
20		East MEP/Link: Install Stone Cladding	44 days	Thu 9/20/18	Tue 11/20/18
21		East MEP/Link: Interior Fitout	186 days	Wed 11/21/18	Wed 8/7/19
22		Closeout	35 days	Thu 8/8/19	Wed 9/25/19



Project: Schedule Tech 1
Date: Thu 10/20/11

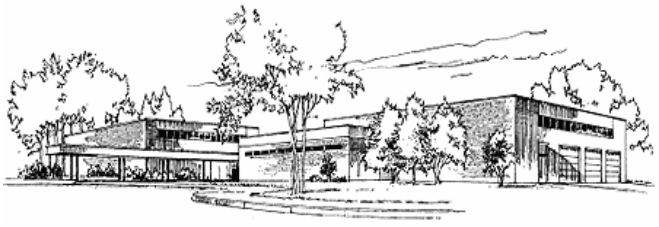
Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Appendix B
RSMeans Estimate

Square Foot Cost Estimate Report

Estimate Name: **Untitled**

Building Type:	**School, Vocational with Face Brick with Concrete Block Back-up / Steel Frame**
Location:	PITTSFIELD, MA
Stories Count (L.F.):	**1.00**
Stories Height	**18.00**
Floor Area (S.F.):	**68,153.00**
LaborType	**Union**
Basement Included:	Yes
Data Release:	**Year 2011 Quarter 3**
Cost Per Square Foot	**$192.75**
Total Building Cost	**$13,136,500**



Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.
Parameters are not within the ranges recommended byRSMeans.

		% of Total	Cost Per SF	Cost
A Substructure		**13.4%**	**19.27**	**$1,313,500**
A1010	**Standard Foundations**		**5.77**	**$393,000**
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	Spread footings, 3000 PSI concrete, load 200K, soil bearing capacity 6 KSF, 6' - 0" square x 20" deep			
A1030	**Slab on Grade**		**5.34**	**$364,000**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**3.63**	**$247,500**
	Excavate and fill, 10,000 SF, 8' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**4.53**	**$309,000**
	Foundation wall, CIP, 12' wall height, pumped, .444 CY/LF, 21.59 PLF, 12" thick			
B Shell		**33.4%**	**48.18**	**$3,283,500**
B1010	**Floor Construction**		**20.29**	**$1,383,000**
	Cast-in-place concrete column, 12" square, tied, 200K load, 12' story height, 142 lbs/LF, 4000PSI			
	Flat slab, concrete, with drop panels, 6" slab/2.5" panel, 12" column, 15'x15' bay, 75 PSF superimposed load, 153 P			
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and column, 25'x30' bay, 29" deep, 100 PSF su			
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and column, 25'x30' bay, 29" deep, 100 PSF su			
	Fireproofing, gypsum board, fire rated, 2 layer, 1" thick, 10" steel column, 3 hour rating, 17 PLF			
B1020	**Roof Construction**		**9.10**	**$620,500**
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 25'x30' bay, 25" deep, 40 PSF superimposed load, 60			
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 25'x30' bay, 25" deep, 40 PSF superimposed load, 60			
B2010	**Exterior Walls**		**9.48**	**$646,000**
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill			
B2020	**Exterior Windows**		**2.74**	**$186,500**
	Aluminum flush tube frame, for insulating glass, 2" x 4-1/2", 5'x6' opening, no intermediate horizontals			
	Glazing panel, insulating, 1/2" thick, 2 lites 1/8" float glass, tinted			
B2030	**Exterior Doors**		**0.58**	**$39,500**
	Door, aluminum & glass, without transom, wide stile, double door, hardware, 6'-0" x 7'-0" opening			
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening			

		% of Total	Cost Per SF	Cost
	Door, steel 24 gauge, overhead, sectional, manual operation, 10'-0" x 10'-0" opening			
	Door, steel 24 gauge, overhead, sectional, electric operator, 10'-0" x 10'-0" opening			
B3010	**Roof Coverings**		**5.83**	**$397,500**
	Roofing, single ply membrane, EPDM, 60 mils, fully adhered			
	Insulation, rigid, roof deck, polyisocyanurate, 2#/CF, 2" thick			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
B3020	**Roof Openings**		**0.15**	**$10,500**
	Roof hatch, with curb, 1" fiberglass insulation, 2'-6" x 3'-0", galvanized steel, 165 lbs			
	Smoke hatch, unlabeled, galvanized, 2'-6" x 3', not incl hand winch operator			
C Interiors		**18.4%**	**26.53**	**$1,808,000**
C1010	**Partitions**		**5.86**	**$399,500**
	Concrere block (CMU) partition, light weight, hollow, 6" thick, no finish			
C1020	**Interior Doors**		**1.83**	**$125,000**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
C1030	**Fittings**		**1.29**	**$88,000**
	Toilet partitions, cubicles, ceiling hung, stainless steel			
	Chalkboards, liquid chalk type, aluminum frame & chalktrough			
C2010	**Stair Construction**		**1.31**	**$89,000**
	Stairs, steel, cement filled metal pan & picket rail, 16 risers, with landing			
C3010	**Wall Finishes**		**4.93**	**$336,000**
	2 coats paint on masonry with block filler			
	Painting, masonry or concrete, latex, brushwork, primer & 2 coats			
	Painting, masonry or concrete, latex, brushwork, addition for block filler			
	Wall coatings, acrylic glazed coatings, maximum			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		**6.98**	**$476,000**
	Carpet, tufted, nylon, roll goods, 12' wide, 36 oz			
	Carpet, padding, add to above, minimum			
	Terrazzo, maximum			
	Vinyl, composition tile, maximum			
C3030	**Ceiling Finishes**		**4.32**	**$294,500**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		**34.7%**	**49.98**	**$3,406,500**
D1010	**Elevators and Lifts**		**2.13**	**$145,500**
	Hydraulic passenger elevator, 2500 lb., 2 floor, 125 FPM			
D2010	**Plumbing Fixtures**		**4.61**	**$314,500**
	Water closet, vitreous china, bowl only with flush valve, floor mount			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, wall hung, PE on CI, 20" x 18"			
	Kitchen sink w/trim, countertop, stainless steel, 44" x 22" triple bowl			
	Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"			
	Shower, stall, baked enamel, terrazzo receptor, 36" square			
	Water cooler, electric, wall hung, dual height, 14.3 GPH			
	Bathroom, lavatory & water closet, 1 wall plumbing, share common plumbing wall*			
D2020	**Domestic Water Distribution**		**0.57**	**$39,000**
	Gas fired water heater, commercial, 100< F rise, 500 MBH input, 480 GPH			
D2040	**Rain Water Drainage**		**0.51**	**$34,500**
	Roof drain, CI, soil,single hub, 4" diam, 10' high			

		% of Total	Cost Per SF	Cost
	Roof drain, CI, soil,single hub, 4" diam, for each additional foot add			
D3010	**Energy Supply**		**9.53**	**$649,500**
	Commercial building heating system, fin tube radiation, forced hot water, 10,000 SF, 100,000 CF, total 2 floors			
	Commercial building heating systems, terminal unit heaters, forced hot water, 10,000 SF bldg,100,000 CF, total, 2 fl			
D3030	**Cooling Generating Systems**		**13.55**	**$923,500**
	Packaged chiller, water cooled, with fan coil unit, schools and colleges, 40,000 SF, 153.33 ton			
D4010	**Sprinklers**		**3.07**	**$209,500**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 10,000 SF			
D4020	**Standpipes**		**0.95**	**$65,000**
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor			
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, additional floors			
D5010	**Electrical Service/Distribution**		**1.67**	**$114,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 800 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 800 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 800 A			
D5020	**Lighting and Branch Wiring**		**10.18**	**$694,000**
	Receptacles incl plate, box, conduit, wire, 8 per 1000 SF, .9 W per SF, with transformer			
	Wall switches, 2.0 per 1000 SF			
	Miscellaneous power, 2 watts			
	Central air conditioning power, 4 watts			
	Fluorescent fixtures recess mounted in ceiling, 1.6 watt per SF, 40 FC, 10 fixtures @32watt per 1000 SF			
D5030	**Communications and Security**		**3.07**	**$209,000**
	Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 12 outlets			
	Communication and alarm systems, fire detection, addressable, 50 detectors, includes outlets, boxes, conduit and w			
	Fire alarm command center, addressable with voice, excl. wire & conduit			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, master clock systems, 10 rooms			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 30 outle			
	Internet wiring, 2 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		**0.12**	**$8,500**
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 1			
E Equipment & Furnishings		**0.1%**	**0.15**	**$10,000**
E1020	**Institutional Equipment**		**0.15**	**$10,000**
	Architectural equipment, laboratory equipment, counter tops, stainless steel			
E1090	**Other Equipment**		**0.00**	**$0**
F Special Construction		**0.0%**	**0.00**	**$0**
G Building Sitework		**0.0%**	**0.00**	**$0**
Sub Total		**100%**	**$144.11**	**$9,821,500**
Contractor's Overhead & Profit		**25.0%**	**$36.03**	**$2,455,500**
Architectural Fees		**7.0%**	**$12.61**	**$859,500**
User Fees		**0.0%**	**$0.00**	**$0**
Total Building Cost			**$192.75**	**$13,136,500**

Assembly Detail Report

Cost Estimate Report
CostWorks
RSMeans

Year 2011 Quarter 3

Clark

Prepared By:
Mohamed Alali
emar

Date: 23-Sep-11

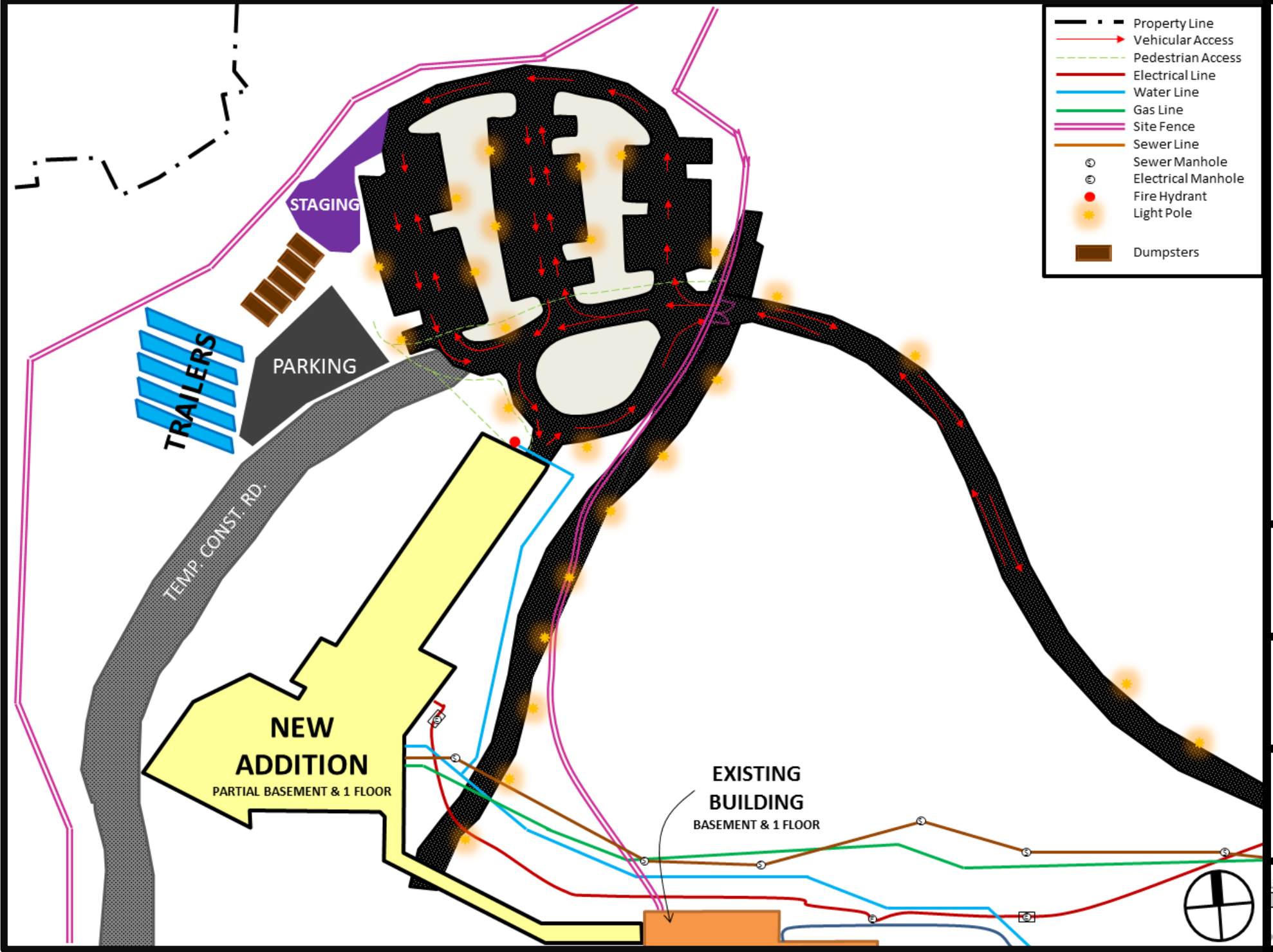
Assembly Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
D Services							
D20101102080			Water closet, vitreous china, bowl only with flush valve, wall hung	9.00	Ea.	$2,540.45	$22,864.05
D20101102160			Water closet, vitreous china, bowl only with flush valve, floor mount, 18" high bowl, ADA compliant	6.00	Ea.	$1,591.94	$9,551.64
D20102102000			Urinal, vitreous china, wall hung	5.00	Ea.	$1,398.07	$6,990.35
D20103101640			Lavatory w/trim, vanity top, PE on CI, 18" round	17.00	Ea.	$1,329.17	$22,595.89
D20104101760			Kitchen sink w/trim, countertop, PE on CI, 30" x 21" single bowl	2.00	Ea.	$1,764.35	$3,528.70
D20104101800			Kitchen sink w/trim, countertop, PE on CI, 32" x 21" double bowl	1.00	Ea.	$1,593.66	$1,593.66
D20104102160			Kitchen sink w/trim, countertop, steel, enameled, 32" x 21" double bowl	1.00	Ea.	$1,738.51	$1,738.51
D20108101920			Drinking fountain, 1 bubbler, wall mounted, non recessed, stainless steel, no back	2.00	Ea.	$1,818.08	$3,636.16
D20202401820			Electric water heater, commercial, 100< F rise, 50 gallon tank, 9 KW 37 GPH	1.00	Ea.	$5,579.78	$5,579.78
D20202401860			Electric water heater, commercial, 100< F rise, 80 gal, 12 KW 49 GPH	1.00	Ea.	$7,813.00	$7,813.00
D20402101960			Roof drain, DWV PVC, 3" diam, 10' high	5.00	Ea.	$1,146.65	$5,733.25
D20402102000			Roof drain, DWV PVC, 3" diam, for each additional foot add	18.00	Ea.	$30.85	$555.30
D20402102040			Roof drain, DWV PVC, 4" diam, diam, 10' high	22.00	Ea.	$1,306.39	$28,740.58
D20402102080			Roof drain, DWV PVC, 4" diam, for each additional foot add	99.00	Ea.	$35.21	$3,485.79
D30105202000			Commercial building heating system, fin tube radiation, forced hot water, 10,000 SF, 100,000 CF, total 2 floors	68,153.00	S.F.	$10.12	$689,708.36
D30201060700			Boiler, electric, steel, hot water, 510 KW, 1,739 MBH	2.00	Ea.	$26,398.50	$52,797.00
D30201060760			Boiler, electric, steel, hot water, 2,100 KW, 7,167 MBH	2.00	Ea.	$71,670.50	$143,341.00
D30201081320			Heating systems, CI boiler, gas, terminal unit heaters, 163 MBH, 2,140 SF bldg	2.00	S.F.	$13.96	$27.92
D30301154600			Packaged chiller, water cooled, with fan coil unit, schools and colleges, 60,000 SF, 230.00 ton	68,153.00	S.F.	$13.78	$939,148.34
D40103101100			Dry pipe sprinkler systems, steel, ordinary hazard, 1 floor, 50,000 SF	30,628.00	S.F.	$4.52	$138,438.56
D40103101240			Dry pipe sprinkler systems, steel, ordinary hazard, each additional floor, 50,000 SF	37,525.00	S.F.	$3.28	$123,082.00
D40203300580			Dry standpipe risers, class I, steel, black, sch 40, 6" diam pipe, 1 floor	1.00	Floor	$9,419.78	$9,419.78
D40203300600			Dry standpipe risers, class I, steel, black, sch 40, 6" diam pipe, additional floors	1.00	Floor	$3,098.80	$3,098.80
D50201100280			Receptacles incl plate, box, conduit, wire, 4 per 1000 SF, .5 watts per SF	68,153.00	S.F.	$1.95	$132,898.35
D50201250840			4 way switch, 15 A with box, plate, 3/4" EMT & wire	8.00	Ea.	$285.70	$2,285.60
D50201300240			Wall switches, 1.2 per 1000 SF	68,153.00	S.F.	$0.31	$21,127.43
D50202100240			Fluorescent fixtures recess mounted in ceiling, 2 watt per SF, 40 FC, 10 fixtures @40 watt per 1000 SF	155.00	S.F.	$5.03	$779.65

Assembly Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
D50202100280			Fluorescent fixtures recess mounted in ceiling, 3 watt per SF, 60 FC, 15 fixtures @40 watt per 1000 SF	200.00	S.F.	$7.58	$1,516.00
D50202100280			Fluorescent fixtures recess mounted in ceiling, 3 watt per SF, 60 FC, 15 fixtures @40 watt per 1000 SF	200.00	S.F.	$7.58	$1,516.00
D50202100280			Fluorescent fixtures recess mounted in ceiling, 3 watt per SF, 60 FC, 15 fixtures @40 watt per 1000 SF	174.00	S.F.	$7.58	$1,318.92
D50202100320			Fluorescent fixtures recess mounted in ceiling, 4 watt per SF, 80 FC, 20 fixtures @40 watt per 1000 SF	312.00	S.F.	$10.07	$3,141.84
D50202100320			Fluorescent fixtures recess mounted in ceiling, 4 watt per SF, 80 FC, 20 fixtures @40 watt per 1000 SF	50.00	S.F.	$10.07	$503.50
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	200.00	S.F.	$12.62	$2,524.00
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	100.00	S.F.	$12.62	$1,262.00
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	120.00	S.F.	$12.62	$1,514.40
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	200.00	S.F.	$12.62	$2,524.00
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	210.00	S.F.	$12.62	$2,650.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20

Assembly Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	10.00	S.F.	$12.62	$126.20
D50202100400			Fluorescent fixtures recess mounted in ceiling, 5 watt per SF, 100 FC, 25 fixtures @40 watt per 1000 SF	64.00	S.F.	$12.62	$807.68
D50202100580			Fluorescent fixtures recess mounted in ceiling, 4 watt per SF, 100 FC, 25 fixtures @32 watt per 1000 SF	100.00	S.F.	$12.97	$1,297.00
D50303100240			Telephone systems, underfloor duct, 5' on center, high density	68,153.00	S.F.	$14.47	$986,173.91
D50309100220			Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 12 outlets	1.50	Ea.	$20,339.85	$30,509.78
D50309100400			Communication and alarm systems, fire detection, non-addressable, 50 detectors, includes outlets, boxes, conduit and wire	1.50	Ea.	$33,334.40	$50,001.60
D50309100960			Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 12 outlets	1.50	Ea.	$15,671.25	$23,506.88
D50309200104			Internet wiring, 4 data/voice outlets per 1000 S.F.	68.15	M.S.F.	$1,210.83	$82,521.70
D50902101400			Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 1000 kW	1.50	kW	$283.24	$424.86
D Services Subtotal							**$3,576,166.72**
E Equipment & Furnishings							
E10903500110			Architectural equipment, kitchen equipment, bake oven, single deck	1.00	Ea.	$5,776.64	$5,776.64
E10903500120			Architectural equipment, kitchen equipment, broiler, without oven	1.00	Ea.	$4,432.81	$4,432.81
E10903500150			Architectural equipment, kitchen equipment, cooler, beverage, reach-in, 6 FT long	1.00	Ea.	$5,773.30	$5,773.30
E10903600110			Special construction, refrigerators, prefabricated, walk-in, 7'-6" high, 6' x 6'	550.00	S.F.	$189.65	$104,307.50
E Equipment & Furnishings Su							**$120,290.25**

Appendix C

Site Plans



THE STERLING & FRANCINE CLARK ART INSTITUTE

225 South Street, Williamstown, MA 01267

EXISTING CONDITIONS SITE PLAN

SEPTEMBER 23, 2011

MOHAMED ALALI - CM

Scale

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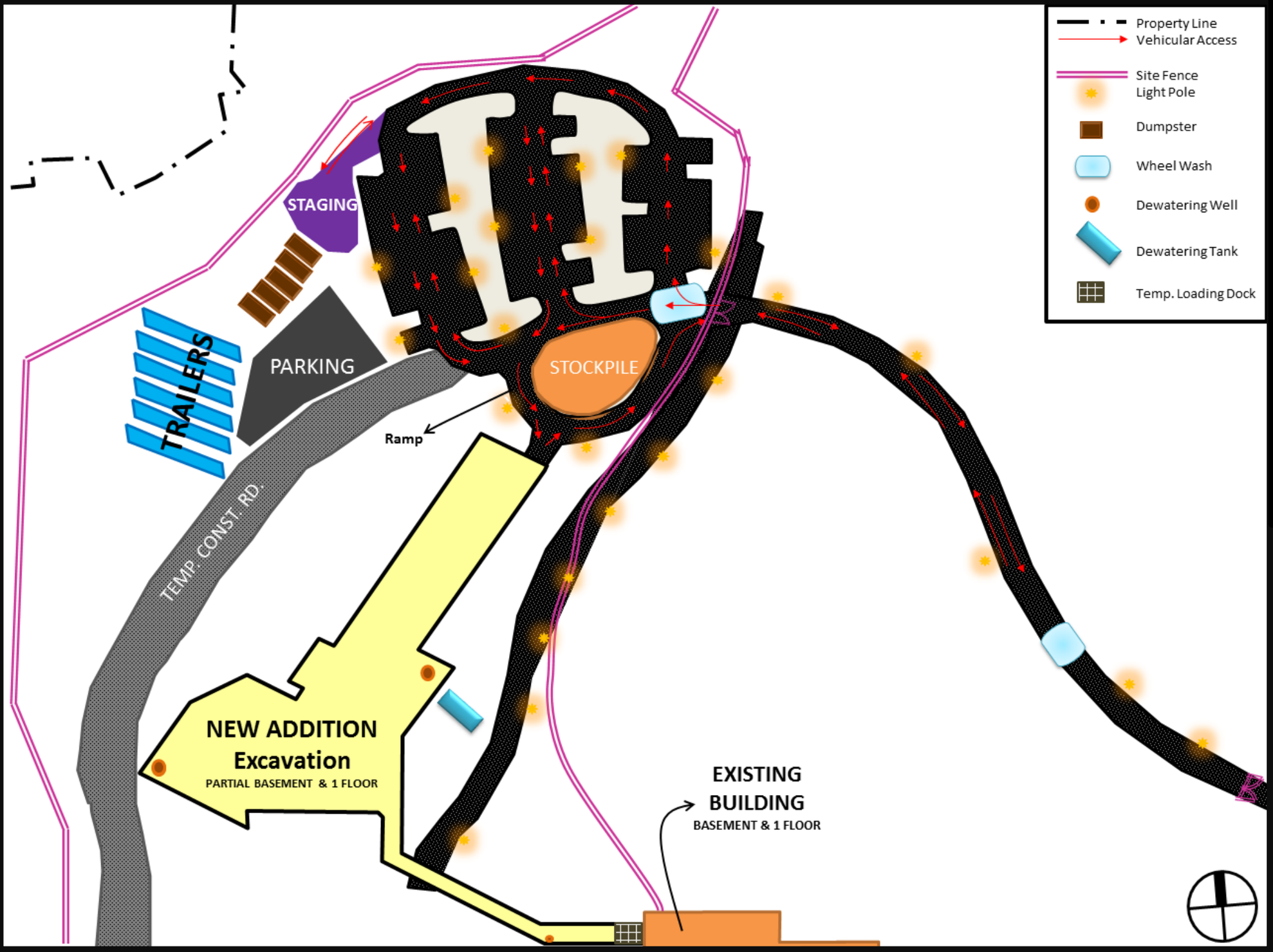

THE STERLING & FRANCINE CLARK ART INSTITUTE

225 South Street, Williamstown, MA 01267

EXCAVATION SITE PLAN

SEPTEMBER 23, 2011

MOHAMED ALALI - CM

Scale

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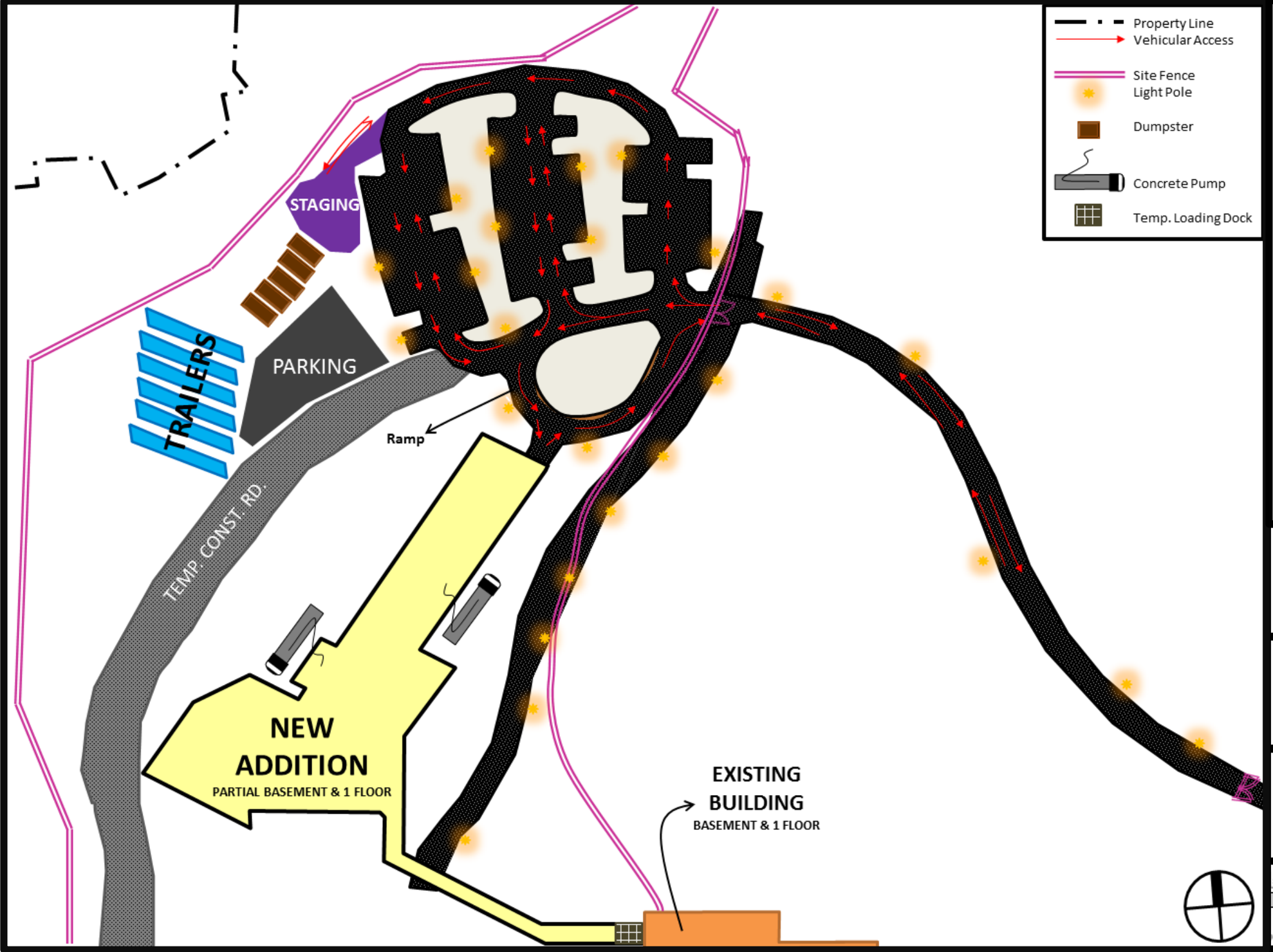

THE STERLING & FRANCINE CLARK ART INSTITUTE

225 South Street, Williamstown, MA 01267

SUPER STRUCTURE SITE PLAN

SEPTEMBER 23, 2011

MOHAMED ALALI - CM

Scale

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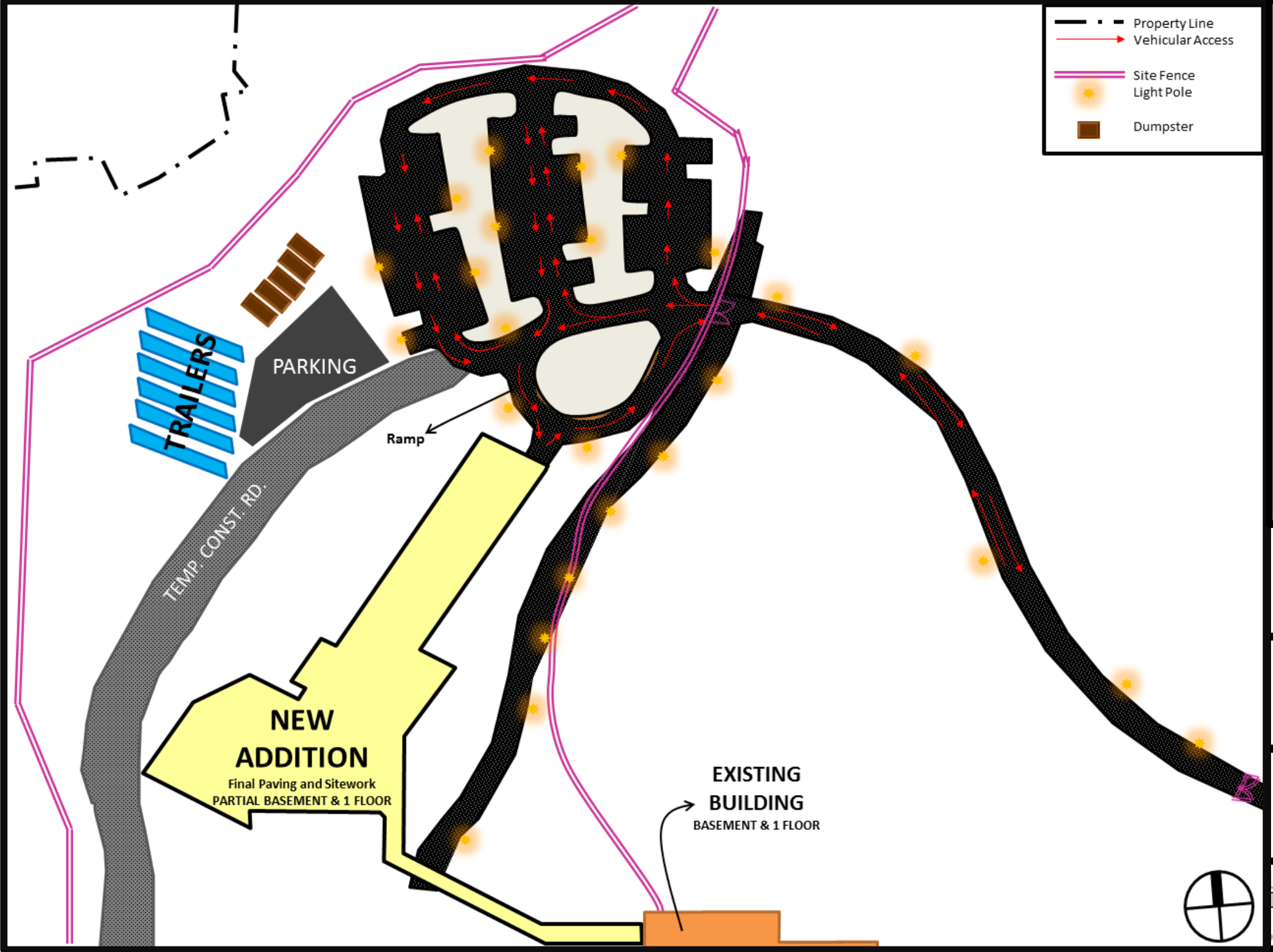

THE STERLING & FRANCINE CLARK ART INSTITUTE

225 South Street, Williamstown, MA 01267

FINISHING
SITE PLAN

SEPTEMBER 23, 2011

MOHAMED ALALI - CM

Scale
25 50 100 150