INSERT TAB:

"Introduction"


ASC 2017 – Project Management
Instructions and Timeline

Introduction – 2/9/17

Your team will act as members of DPR Construction; determining if you will take the deal set forth by your client. You are empowered to make key contractual, business and logistical decisions. The decisions your team makes will have significant consequences and will impact the success of your project. The strategy that you choose will map the road ahead, but may also expose you to possible roadblocks. You are expected to adapt to situations, engineer solutions, demonstrate DPR's Core Values, and deliver a project decision while maintaining raving fans.

DPR is responding to a Request for Proposal for the Gattaca Project. DPR is still determining if the project is one in which we want to pursue. Your selection on whether or not to take the project is based upon your team decision about the client's contract, schedule and budget requirements; while maintaining a great relationship.

Gattaca (located in California) has been a great client of DPR in the past. We have built several projects for them over the past few decades and would like to continue the relationship as long as the deal is fair, equitable, and profitable.

Gattaca believes in delivering bioengineering projects that impact the world while ensuring a sense of community connectivity. Gattaca and DPR have transformed the world through design, construction, and through science on several past endeavors. Gattaca is looking to expand as a company and in doing so they are asking DPR to help with construction of the new Gattaca facility. Gattaca is a state of the art bioengineering leader for the chemical industry. It is a building that will last for 100 years and will be a marque milestone in the progression of chemistry to create sustainable products.

List of Project Modules:

The final team score will be a composite of the following:

20 Points	Contract Risk Assessment Module
20 Points	Logistics + Schedule Modules
20 Points	MEP Equipment Module
20 Points	General Conditions (GC's) and Schedule of Values (SOV) Module
20 Points	All Scenarios + Red-Zone "Go/No-Go" + Mini Presentation
30 Points	Final Presentation
130 Points	*Total Points*

Schedule:

THURSDAY, 2/9/17

Time	Activity	Activity is DUE
6:00 AM	Initial Presentation at Fremont Room.	
7:00 AM	Students Receive INITIAL PROJECT INFORMATION.	
10:00 AM	GC's and SOV Module Explanation – Only **(2)** Students per Team come down to Fremont Room for GC's and SOV Module Presentation. Students should bring questions about GC's and SOV module and DPR execs can answer.	
2:00 PM – 4:00 PM	Mini-Presentations - Information for this activity will be provided to you through email sometime during the day.	
3:00 PM		Contract Risk Assessment Module is DUE.
5:00 PM	Logistics Module - Only **(2)** Students per Team come down to Fremont Room for Logistics Module Presentation. This will be a new module which students did not receive at 7 AM.	
8:00 PM		1. GC Module is DUE. 2. SOV Module is DUE. 3. Schedule Module is DUE. 4. MEP Equipment Module is DUE.
10:00 PM		1. Logistics Module is DUE 2. Red Zone "Go/No-Go" is DUE.

FRIDAY, 2/10/17

7:00 AM	Presentation Times will be posted at Fremont Room.	All Presentation Materials are DUE to Fremont Room.
8:00 AM – 4:00 PM	Team Presentations at Fremont Room	
5:00 PM	Problem Recap at Fremont Room	
6:00 PM – 7:00 PM	Student Info Session – Hang out and talk to DPR at Fremont Room.	


1. Contract Risk Assessment Module

During this module, your team will evaluate the (2) contract documents provided. Use the Risk Assessment Form as a tool to dive deep into each contract and learn the positives and negatives of each. Then Fill out the Contract Comparison document to finalize your analysis and help lead you toward your contract selection. You can find detailed instructions in the module section of your binder and usb.

Turn In:
Your Team will turn in the following items for this module by email.

- **(2) Completed Risk Assessment Forms**
- **(1) Contract Comparison Document**

2. Logistics Module

It is crucial that all parties who are traveling through and nearby a construction project clearly understand how to travel safely. If this information is unclear, this could put people at risk of injury or worse.

During this module, your team will create logistics plans based on certain requests by your potential owner. You should be detailed and provide a clean, aesthetic final product. This is for your owner so make sure it looks great!

This module is NOT provided in your initial package. This module will be provided to you later in the day as per the schedule on page 2 of this document.

Turn In:
This information will be explained to you when you receive the module.

3. Schedule Module

Project schedules are like the backbone of a project. They explain how a project will flow and detail the sequence of the work. A schedule is also used to help the construction management team prioritize their management activities. By understanding when activities are taking place, and what activities are predecessors and successors, a manager can prioritize his workload to make sure the field team receives the information they need before the work starts.

During this module, your team will create a Line Item schedule in Smartsheet. Your team has been provided milestones and activities. Use what is given to you but also add additional milestones and


activities to create the complete schedule. You can find detailed instructions in the module section of your binder and usb.

Turn In:
Your Team will turn in the following items for this module by email.

- **(1) Smartsheet schedule as a pdf document.**
- **(1) Questionnaire filled out**

4. MEP Equipment Module

As a construction manager, we need to understand what the design is and if we think it works. When we receive design documents, it is our job to review and validate the design before the work starts. We do constructability reviews to help guide our owners and designers to create understandable and achievable construction documents.

During this module, your team will confirm if the design documents accurately depict the required MEP systems which are required for each piece of equipment. The equipment schedule will tell you what each piece of equipment needs.

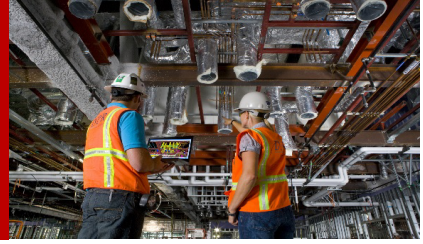
For example: An equipment schedule states that a gas range (oven and stove) requires 120V power at 15-Amps, a ¾" gas line, and a ventilation system. But what if the drawings showed 120V power, but didn't show a gas line or a ventilation system? It is in a construction manager's best interest to catch these discrepancies before schedule and costs are impacted.

Turn In:
Your Team will turn in the following items for this module by email.

- **(1) MEP Equipment Constructability Review**

5. General Conditions (GC's)

General Conditions are the costs to manage the project. This includes but is not limited to management staffing labor, field offices, equipment, safety, internet, vehicles, food/water, power, printers, etc. It is important for project managers to compile the costs for these items before a project starts so that you can get them into your budget. Imagine if your owner approved your costs for the job but you forgot to include a superintendent, or you forgot internet! Then your fee would have to cover those items!

In this module you will create your GC's for the project. Think hard about what you will need or don't need! You need to make sure you have everything you project requires and nothing more. You don't want to forget anything, but you also don't want to be the person who prices yourself out of a job!

Turn In:
Your Team will turn in the following items for this module by email.

- **(1) GC document in both pdf and excel formats.**

6. Schedule of Values (SOV) Module

Schedule of Values is where you will buy out your subcontractors. Be smart about who you choose. You want to make sure the subcontractors have included everything that will be required of that scope at a reasonable and competitive price. It is DPRs job to scrutinize the scope and the pricing of all our subcontractors. DPR does not want to take on any risk that the subcontractor should have within their subcontract.

In this module you will review each sub bid and select (1) subcontract per scope of work. Fill in the subcontractor values and add any comments that you think your DPR executive should know about your selected subcontractor.

Then fill out your Insurance/Bond %, Fee, Design and Construction Contingency to finalize your total project cost.

Turn In:
Your Team will turn in the following items for this module by email.

- **(1) SOV document in both pdf and excel formats.**
- **(1) DPR Subcontractor Bid Evaluation Sheet in both pdf and excel formats.**

7. All Scenarios

The construction industry is a fast-paced and exciting industry. Generally we construction managers are juggling many items at the same time. During the day your team will be sent emails with instructions for deliverables which will be due the same day. Make sure you respond to these emails in a professional and clear way. Your DPR executives expect you to perform at a high level and provide timely responses!


8. Red-Zone "Go/No-Go"

Ah, the most exciting question of the day. After you have built the many modules of the day, you have a great understanding of the risks that the project creates. So should DPR take the job or not? Read through the instructions in detail to provide a detailed response for this answer.

Turn In:

- **(1) Response to the RedZone "Go/No-Go" email.**

9. Mini Presentation

Sometimes email or phone communications are restrictive. It is hard to ask questions back-and-forth in a timely manner over email and phone calls don't allow you to read people's body language. Even face-time can't beat a face-to-face meeting. Sometime during the day we will ask members of your team to come down to Fremont room and present to your DPR executives. The content that you will present will be explained to you sometime during the day.

10. Final Presentation

The presentation will be structured as an internal DPR meeting held to discuss the risks of the project. Every member of your team must present. Teams will present their final risk assessments, budget and schedule for the project with a brief recap of how they arrived at those results. The presentation should cover your overall strategy including how the team was structured to accomplish the decision on whether or not to pursue this project. This meeting will also be a forum to present and review risk allowing us an opportunity to share how we might improve for future projects.

Typical Presentation Outline:

- Setup - 3 minutes
- Team Presentation - 20 minutes
- Question and Answer - 10 minutes
- Breakdown - 2 minute

7:00 am: All presentation materials are due. Any handouts or electronic files produced after this time cannot be utilized during the presentation. Please also return all specifications, drawings and USB Modems at this time.
7:00 am: Presentation times will be posted.
8:00 am – 4:00 pm: Team Presentations


11. Problem Requirements

Information can be directed to your team in numerous ways. Any information from your team to the problem sponsor's team should be transmitted via email.

Physical copies will only be provided for a limited number of the project documents, and if the internet isn't working. All documents will be provided in electronic format. The email accounts provided by your team must be utilized to submit all questions and responses. Therefore your team must have an internet connection during the course of the problem.

Email Address

During the course of the competition you will be communicating with the sponsor's team through this email address:

DPR Executive Team ASCdpr@gmail.com

Problem Material

Upon completion of the Initial Presentation your team will be provided with the following materials:

- Project Turnover Binder
- Room Signs
- DPR Survival Kit

Project Information

A real project was utilized to create this problem; however the problem's components are fictitious. The architect, client, and all parties associated to the project have generously granted us permission to utilize the project for the benefit of this educational experience. We insist that their generosity not be taken for granted. Under no circumstances should your team make contact with the client, architect or any representatives of the project. *Please refrain from using the internet as a guideline to complete the problem, this will not provide the educational experience in which the problem is intended to produce.*

During the course of the problem if any instructional questions arise please address them to Taylor Banks.

INSERT TAB:

"Meet The Judges"

Meet the Judges

Greg Amon

School: Cal Poly San Luis Obispo
Problems Competed in at Reno: Heavy Civil, LEED, & Commercial
Favorite Reno Memory: Winning! It is the best feeling to represent your school and walk in the ceremony to collect your award. In that moment you are your college's top team like an athlete in a stadium.
Current Project: 1 million SF Corporate Office Complex worth $450 million

Taylor Banks

School: University of California Davis
Favorite Reno Memory: Watching last year's DPR problem winner hold up the DPR Championship belt!
Current Project: Corporate Office worth $20 million

Kegan Haerr

School: Cal Poly San Luis Obispo
Problems Competed in at Reno: Determining Project Risk as an alternate and as a champ!
Favorite Reno Memory: Getting a phone call to interview for my dream-job just minutes after finishing our presentation
Current Project: Ground-up, administration building on an active life-science campus with infrastructure upgrades worth $40 million

Katherine Christian

School: University of Southern California
Problems Competed in at Reno: Mixed Use, Design Build and IPD
Favorite Reno Memory: The final hour of the competition as the team scrambles to review and turn everything in on time. Nothing beats the adrenaline of running up the stairs to make it to the judge's room just in time.
Current Project: 1 million SF Corporate Office complex worth $450 million

Collin Weisenburger

School: San Diego State University
Problems Competed in at Reno: Preconstruction, Alternate competition
Favorite Reno Memory: Seeing the competition from the other side- as a judge!
Current Project: Multi-tenant Lifesciences project including Lab & Vivarium space.

DPR CONSTRUCTION

Meet the Judges

Drew Teicheira

School: California State University, Long Beach
Problems Competed in at Reno: Design Build and Determining Project Risk
Favorite Reno Memory: Taking second place in the DPR problem my senior year.
Current Project: 300,000 SF Lifesciences Client worth $72 million

Amanda Tyer

School: San Diego State University
Problems Competed in at Reno: Preconstruction
Favorite Reno Memory: Celebrating my team's success after our presentation. One of my favorite experiences in college!
Current Project: 1 million SF Corporate Office Complex worth $450 million

Austin McGaha

School: Cal Poly San Luis Obispo
Problems Competed in at Reno: Determining Project Risk
Favorite Reno Memory: My teammate had to get up and speak and when he went to sit back down his chair collapsed. Luckily it didn't affect the scoring, or so they claim.
Current Project: Life Sciences client, worth $300 million

Deanna Alexander

School: Cal Poly San Luis Obispo
Problems Competed in at Reno: Determining Project Risk
Favorite Reno Memory: Taking a late night dinner break with my team between finishing the day of competition and starting our presentation for the next day.
Current Project: Mission Critical client, worth $100 million

Nicholas Fondano

School: Arizona State University
Problems Competed in at Reno: LEED
Favorite Reno Memory: Introducing a new type of problem to the competition and educating students on the importance of Risk Assessment. This is a subject most students do not get to experience in their collegiate career.
Current Project: 125,000 SF Advanced Tech project, worth $17 million

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"PROJECT MODULES"

INSERT TAB:

"Contract Risk Assessment"

Module 1: Contract Risk Assessment

How to Complete Contract Risk Assessment Form:

Objective: Determine how risky each of the (2) contracts are for DPR.

Method: Fill out (1) "Owner Contract Risk Assessment" Form for each of the (2) contracts you have received. A total of (2) "Owner Contract Risk Assessment" forms should be filled out and turned in.

Procedure for how to fill out a "Owner Contract Risk Assessment Form:

1. Choose a contract.
2. Open a blank "Owner Contract Risk Assessment" Form.
3. Read the Risk Description, which is a Yes or No question.
4. Find the language in the contract which addresses the Risk Description.
5. Determine if the Risk Description answer is "Yes," "No," or "Other" and put an X in the appropriate box.
    a. "Other" means it is either Not applicable in the contract, or the answer is something other than a clear Yes or No. Explain why you chose "Other" in the "Comments" section.
6. In the Contract Reference column, write in the contract section number which addresses the Risk Description.
    a. For example, if Section 4.1.5.6 is the contract location which speaks to the Risk Description, write, "4.1.5.6" in the Contract Reference Section.
7. In the comment box, explain in 1-2 sentences what the contract states in regards to the risk description. By filling this in, it will help you remember how the contract reads in case your DPR executive asks you questions about that item.
8. Perform Steps 3-7 for all rows on the "Owner Contract Risk Assessment" Document.
9. When you get to Section L, review all risks which you have exposed while filling out the form, and write in the Top 3 most significant risks of that contract.
10. After (1) Owner Contract Risk Assessment form is complete, Perform Rows 1-9 for the 2nd contract.
11. Compare the (2) Owner Contract Risk Assessment forms and determine which contract is a riskier selection. Then choose which contract is a better selection for DPR.

Owner Contract Evaluation

Contract Type:	A
Owner:	
ASC School Name:	
Prepared Date:	

No.	Risk Description	Yes	No	Other	Contract Reference	Comments
A	**DPR Responsibilities**					
1	If the project is NOT Design-Build, is DPR responsible for the impacts of **errors and omissions** in the CDs that are not apparent and discoverable by DPR?					
2	If the Project is not Design Build, is DPR obligated to provide only what is **indicated** on the Construction Documents, not what is **intended** from the Construction Documents? ("reasonably inferable" is o.k.)					
3	If the Project is not Design Build, does DPR have to **"represent" or "warrant"** that the **Construction Documents are complete** and constructible?					
4	Is DPR required to agree **not to disclose confidential** Owner information? (this could be via contract language, or a separate Nondisclosure Agreement)					
5	Does Owner have unreasonable restrictions on **subcontracting** or unreasonable pass-through requirements for subcontracts?					
6	Does the Contract expressly state that DPR has a **"fiduciary" relationship** with the Owner?					
B	**Owner Responsibilities**					
1	Does the Owner disclaim responsibility for, and prevent DPR from relying on the **accuracy of, the Soils Report**, other Reports, or information they furnish?					
2	If the project is not Design-Build, does Owner disclaim responsibility for **accuracy of the Drawings** & Specifications?					
3	If Owner is a **Special Purpose Entity** (SPE), do we have a parent guaranty from an upstream owner with sufficient assets and cash flow?					
4	Does the contract require us to seek recovery for impacts by **Owner's Separate Contractors** directly from those contractors (rather than through the Owner)?					
5	Does the contract give Owner ownership rights to **proprietary DPR or subcontractor intellectual property** or technology?					
C	**Scope**					
1	If the project is not design build, are **conflicts in quantity or quality** resolved by requiring the higher quantity or better quality without an equitable adjustment in Contract Sum or Time?					
2	Is an **Order of precedence** of the Contract Documents stipulated?					
D	**Time**					
1	Does definition of Substantial Completion require a **final certificate of occupancy** or other unrealistic requirements?					
2	Are all of the following delays considered **Excusable Delays** (eligible for time extensions): (i) labor disputes not resolvable by dual gate; (ii) unusual or severe weather; (iii) force majeure events; (iv) acts of governmental authorities for which DPR or subs are not responsible?					
3	Are all delay costs for Owner-responsible delays compensable via Change Order? (There should be no indication that time is the sole remedy for delays.)					
4	Is DPR obligated to meet **all activity dates in our schedule**, instead of just the Contract Substantial Completion and/or Milestone dates?					
E	**Budget/GMP/Contract Sum**					
1	Is the Contract Sum qualified by a DPR **Basis of Contract/GMP (Basis of Estimate)?**					
2	Are individual **GMP line items**, other than General Conditions, separately guaranteed?					
3	Is there a fair definition for **allowable uses of contingency** for DPR?					
4	Can DPR use project **contingency without Owner's prior consent**?					
F	**Cost Reimbursement & Billings**					
1	If Owner **audits Labor Rates**, do they have the right to adjust them and pay less than agreed DPR rates?					
2	Are Lump Sum costs **auditable**?					

3	Does the contract require use of Owner custom **Lien Waiver forms** with Pay Apps, instead of DPR's state-compliant forms?					
4	Is DPR's obligation to **remove liens** relieved if Owner is in default of payments obligations to DPR?					
5	Are any of the following required prior to Owner's **Final Payment:** (1) expiration of lien rights at all tiers; (2) unconditional lien & claim waivers/releases; or (3) payment of all costs, including to subcontractors?					
6	Does DPR have to waive all claims as a prerequisite to receipt of **Progress Payments**?					
7	Is payment due within **30 days** or sooner of Owner's receipt of DPR's Pay Application?					
8	Is the Owner allowed to hold **retainage** until Final Completion (rather than Substantial Completion)?					
9	Does **Interest** accrue on late Owner payments?					
10	Does DPR have the right to **stop work** if Owner fails to pay per the Contract?					
11	For cost-reimbursable contracts (including GMP): is the definition of **reimbursable costs** (Cost of the Work) reasonable and complete?					
12	If Owner terminates for convenience, are we entitled to be paid our incurred **costs due to the termination** in addition to payment of costs & fee for Work completed up thru termination?					
G	**Indemnification/Insurance**					
1	Does the Owner indemnify DPR for **existing Hazardous Materials**?					
2	Is DPR responsible for risk of loss to the Work other than due to the negligence of DPR or our subs?					
3	If the Owner is providing **Builder's Risk** coverage, has their policy been reviewed by our broker?					
4	If DPR is providing **Builder's Risk,** do we have verification from our broker that the coverage is in effect?					
5	If required by DPR's policy on **subcontractor default insurance** (i.e., Subguard), will the project be enrolled in the program?					
H	**Changes**					
1	Do Change Orders take **precedence** over the Agreement?					
2	Does Contract allow a change in Contract Price/GMP and Contract Time for **undisclosed or concealed subsurface or physical conditions**?					
3	Is a reasonable **Change Order Fee** percentage stipulated?					
4	Is a **Construction Change Directive** process (or similar) allowed for performing change work prior to Change Order?					
5	Is our **Fee reduced** for deductive change orders?					
6	Does the Owner have the right to issue Change Orders that can change DPR's **Contract Sum or Contract Time unilaterally** (with only their signature)?					
I	**Damages/Disputes**					
1	Is there a mutual waiver of **Consequential Damages** clause?					
2	Are **Liquidated Damages** the sole remedy stipulated for late performance by DPR?					
3	Are Attorneys fees payable to the **Prevailing Party** in a dispute under the Contract?					
J	**Design-Build - if applicable**					
1	Is this a **Design-Build Project/Contract**?					
2	Is the **Owner's Program** attached as Contract Document?					
3	Are the Owner's **Design requirements** clearly defined?					
K	**Other**					
1	Is DPR's obligation to **correct defective work** limited to 1 year after substantial completion?					
2	Does DPR's **warranty** exclude damage by others, failure to properly maintain, and wear and tear under normal or excessive usage?					
3	Does Owner have the right to take **assignment** of our **subcontracts** in a **termination for convenience**?					
L	**Top 3 Significant Risks from this Contract**					
1						
2						
3						

Owner Contract Evaluation

Contract Type:	B
Owner:	
ASC School Name:	
Prepared Date:	

No.	Risk Description	Yes	No	Other	Contract Reference	Comments
A	**DPR Responsibilities**					
1	If the project is NOT Design-Build, is DPR responsible for the impacts of **errors and omissions** in the CDs that are not apparent and discoverable by DPR?					
2	If the Project is not Design Build, is DPR obligated to provide only what is **indicated** on the Construction Documents, not what is **intended** from the Construction Documents? ("reasonably inferable" is o.k.)					
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4	Is DPR required to agree **not to disclose confidential** Owner information? (this could be via contract language, or a separate Nondisclosure Agreement)					
5	Does Owner have unreasonable restrictions on **subcontracting** or unreasonable pass-through requirements for subcontracts?					
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3	Does Owner have the right to take **assignment** of our **subcontracts** in a **termination for convenience**?					
L	**Top 3 Significant Risks from this Contract**					
1						
2						
3						

Contract Comparison

Objective:
Determine which contract is the better choice for the company.

Method:
In the boxes below, compare the corresponding sections from the two contracts **and explain which section would be a better fit for DPR and why.**

- For example, Compare Section A – "DPR Responsibilities" for Contract A vs. Section A – "DPR Responsibilities" for Contract B and explain which Section A would be a better fit for DPR based on the risks.

A. DPR Responsibilities

B. Owner Responsibilities

C. Scope

D. Time

E. Budget/GMP/Contract Sum

F. Cost Reimbursement & Billings

G. Indemnification/Insurance

H. Changes

I. Damages/Disputes

J. Design-Build – if applicable

K. Other

L. Top 3 Significant Risks from this Contract

Which Contract is a Better Fit for DPR and why?

INSERT TAB:

"Logistics"

Module 2: Logistics

No information provided in this binder. This information will be provided to you when you sit through the presentation as shown on the schedule.

INSERT TAB:

"Schedule"

Module 3: Schedule

Build a Schedule

Instructions:

- Start date is Monday, February 13, 2017
- Owner wants to be 100% moved in & operational by end of January 2018
- Sequence and include the below milestones in your schedule – Add any other milestones you see necessary
- At a minimum the below activities need to be in your schedule – Add any other activities you see necessary
- Schedules need to be at least 150 line items
- We are grading based on quality not quantity of line items in your schedule
- This schedule should be built using the information found on the plans provided. Understand the type of structure this is and what elements go into the building to develop a *project specific* schedule.
- **Please turn in your schedule by printing to PDF!**
    - Use "smartsheet" to build your schedule, see the attached instructions for how to access and use the program.
    - Make sure that the following columns are shown in your PDF
        - Activity Names
        - Durations
        - Start & Finish Dates
        - Activity Bars

Milestones:

- Building Demolition
- Certificate of Occupancy
- Demolition Permit
- East Skin System
- Mechanical Yard
- Shell City Submittal
- Shell Permit
- Site Improvements
- West Skin System
- Start Shell Construction
- Start TI Construction
- Steel Procurement
- Substantial Completion
- Substructure
- Superstructure
- TI City Submittal
- TI Permit

Activities:

- Air balance
- carpet
- Casework
- ceiling grid
- connect to site utilities
- curtain wall skin
- Demolish existing building
- drop ceiling tiles
- drywall
- epoxy flooring
- Erect structural steel
- Excavation
- exterior framing
- Flooring base
- Fly roof equipment
- Infill tilt up concrete panel openings with skin system
- Inspect elevator
- Install haz mat shed
- Install lobby stair
- Install mech yard CMU
- Install racks in server room
- interior framing
- MEP fixtures
- Metal decking

- overhead MEPF
- painting
- Place concrete foundations
- Rebar foundations
- reclaimed wood flooring
- resilient flooring
- roofing
- SOMD
- start elevator install
- Startup/ commission MEP equipment
- tape & mud drywall
- tile
- Toilet partitions
- Venetian plaster

Questionnaire

The intent of the questions below are to test your knowledge and spark ideas for creating your schedule, but you do not need to update your schedule to reflect your answers.

1. Who from your project team should be included in pull planning sessions?

2. Who would you not include in pull planning sessions?

3. The overhead MEPF (Mechanical, Electrical, Plumbing, Fire Protection) BIM team has informed you of an increase of 3 weeks to their coordinated shop drawings schedule, which in turn delays their start date. Since this activity would be considered on the critical path explain 3 ways in which you could put your schedule back on track.

4. Fire protection is a design build system by your subcontractor. How early in the project should they be brought on board and why?

5. The lab casework subcontractor recently experienced a small fire in their warehouse damaging a lot of your product and has informed you of a 4 week delay in your procurement schedule. Since this activity would be considered on the critical path explain 3 ways in which you could put your schedule back on track.

6. Building Information Modeling (BIM) has a big impact on planning the work before you build it. List the subcontractors that could help make the project benefit from modeling their work and why.

7. What scopes of work can be overlapped or staggered in the construction schedule and why?

8. Please list the activities that are or could be controlled by the owner.

9. In order to bring the end date of the project in our owner's typically ask for ways to save time out of our schedule. Name two good ways to decrease the overall length of the construction schedule.

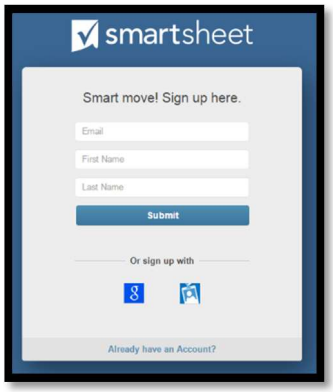
10. At what point in your schedule did you staff up or down your General Conditions. Define the changes in staffing and what activities in your schedule triggered these changes.

Please fill out these questions and send to DPR executives by email.

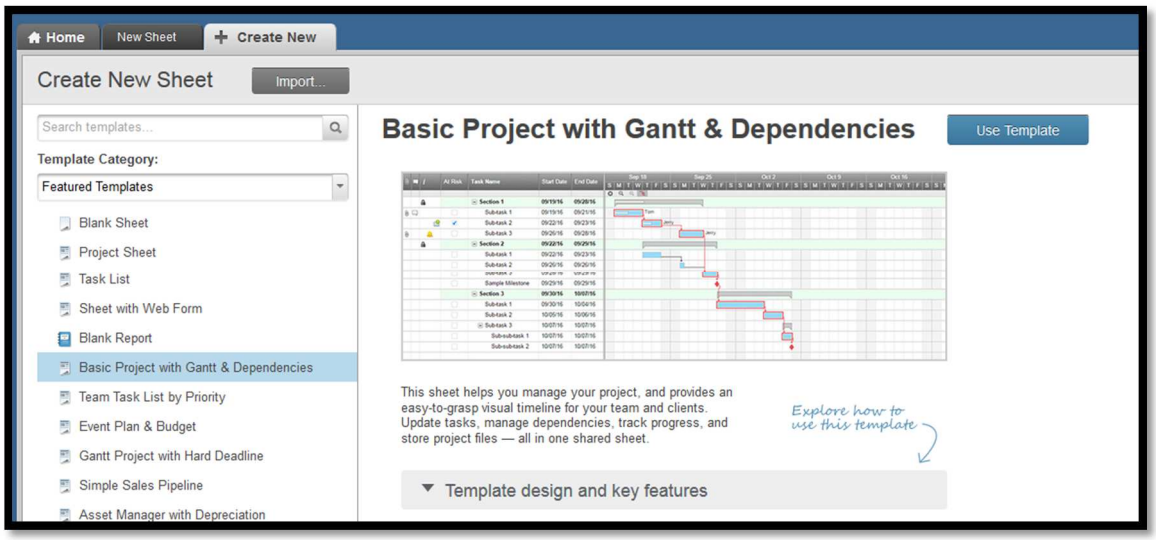
Smartsheet How-To

Smartsheet is a web-based software that has Gantt chart capabilities. Very similar to other scheduling software you may have used, it allows you to insert tasks with durations and dates and set up dependencies to build a schedule. Best of all, its free to use for a 30-day trial! Follow the steps below and utilize the links to understand the software. Its very user friendly, but if you're having troubles watch the quick videos.

1. **Create an account online https://app.smartsheet.com/b/signup**

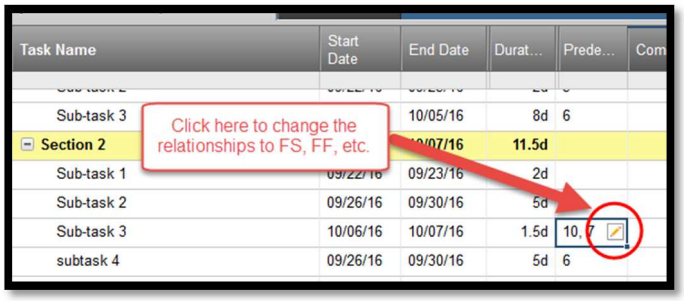


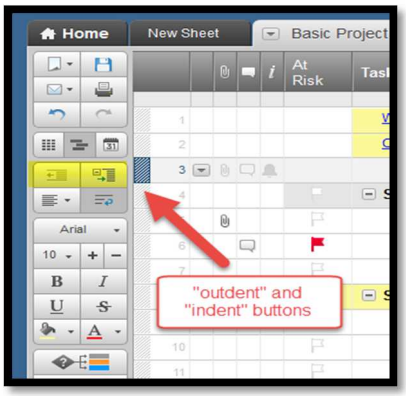
2. **From the homepage, click " + Create New" to start a new sheet**
3. **Choose the "Basic Project with Gantt & Dependencies" template**
4. **The sheet allows you to type task names, dates, durations, and predecessors directly into the spreadsheet, or drag from bar to bar to create relationships. To understand all the tools at your disposal utilize the links below**
    - How-To Video (4:16) https://www.youtube.com/embed/WBUnbrN4UvY
    - Template How-To Webpage https://www.smartsheet.com/solutions/basic-project-with-gantt-and-dependencies?tmgl=7D0ii8KknF2lW34WkeRubg

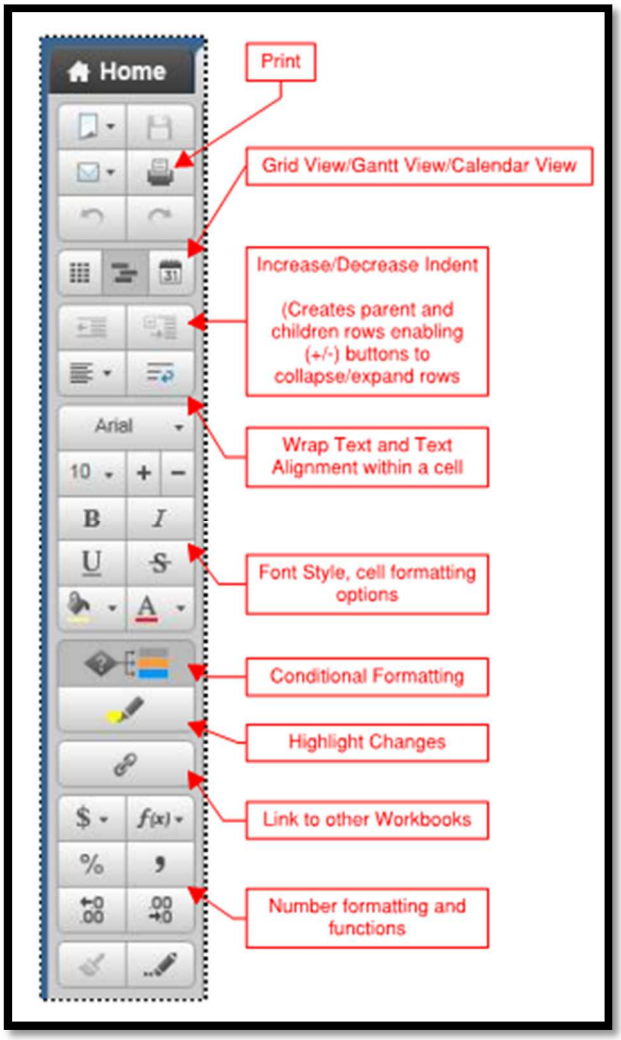


Additional Tips

- Rearrange columns to meet your needs and hide columns you may not use (% complete, assigned to, etc.)
- Change the row colors to create a visual breakdown between task types, similar to a P6 layout
- If you change the duration to 0, it will automatically create a milestone
- Remember to save frequently in-case you lose your internet connection
- Use the “outdent” and “indent” buttons to create summary activities and sub-tasks
- In the predecessor box, click on the small edit button to change the relationship to Finish-Start, Finish-Finish, etc.
-
- Click the gear logo, at the top of the Gantt view to change the project settings and modify working days







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"MEP Equipment"

Module 4: MEP Equipment

MEP EQUIPMENT CONSTRUCTABILITY REVIEW

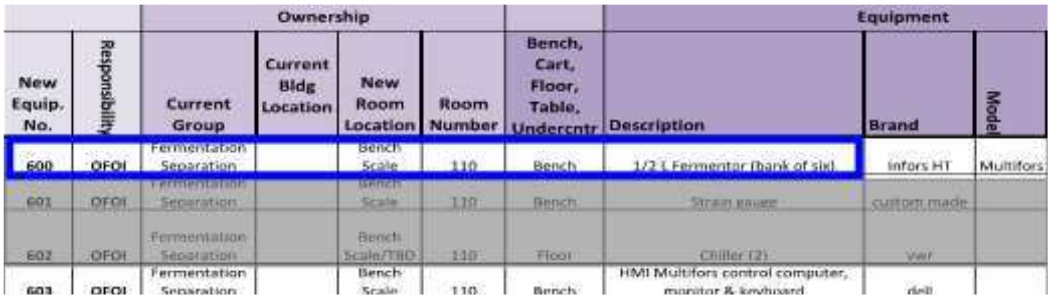
One of the many ways DPR determines the amount of risk involved in a project is through the review of the design documents. If the design documents are difficult to interpret or incomplete the project will be difficult to build, exposing DPR to more risk and unforeseen costs.

A constructability review enables you to define unclear or missing information prior to the start of construction. Communicating this information to the design team and owner can help align the team and clarify information prior to the start of construction.

Because of the complexity of GATTACA's equipment it is essential that the proper utilities are routed to each piece of equipment. Your task will be to review the equipment list provided and confirm all utilities have been identified accordingly on the design documents.

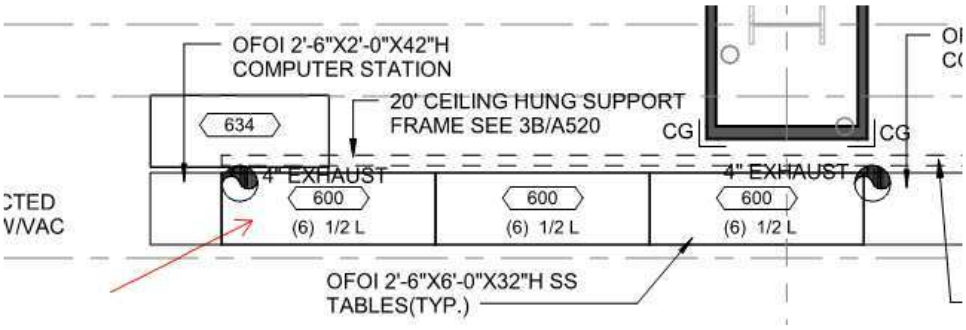
INSTRUCTIONS:

1. Begin with the equipment matrix - select a piece of equipment to review and identify the utilities that are required per the matrix.

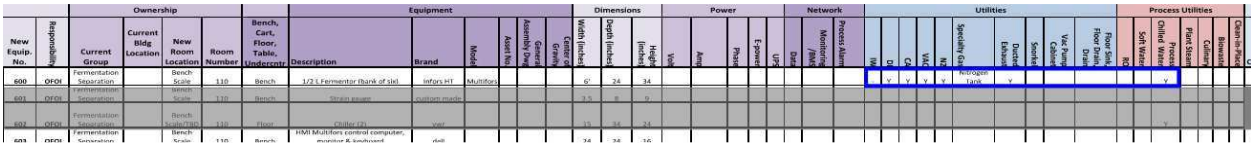


		Ownership					Equipment		
New Equip. No.	Responsibility	Current Group	Current Bldg Location	New Room Location	Room Number	Bench, Cart, Floor, Table, Undercntr	Description	Brand	Model
600	OFOI	Fermentation Separation		Bench Scale	110	Bench	1/2 L Fermentor (bank of six)	Infors HT	Multifors
601	OFOI	Fermentation Separation		Bench Scale	110	Bench	Strain saver	custom made	
602	OFOI	Fermentation Separation		Bench Scale/TBD	110	Floor	Chiller (2)	ver	
603	OFOI	Fermentation Separation		Bench Scale	110	Bench	HMI Multifors control computer, monitor & keyboard	dell	

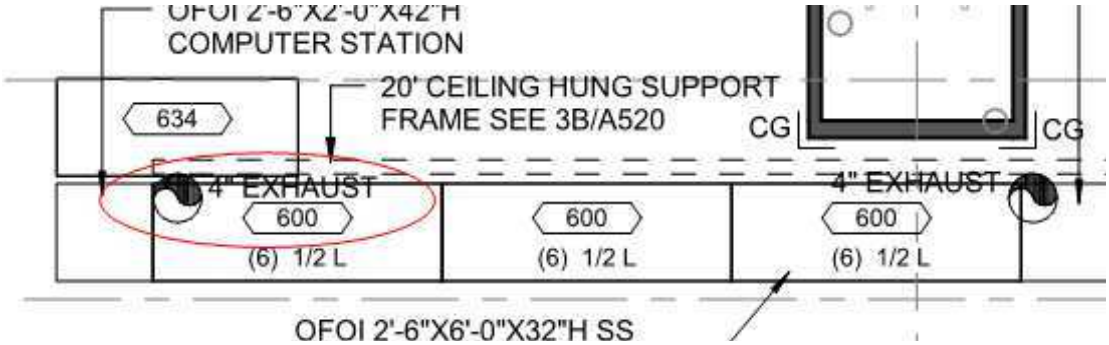
2. Locate the equipment on the Enlarged Architectural Laboratory Plans (A-510.a & A-510.b)



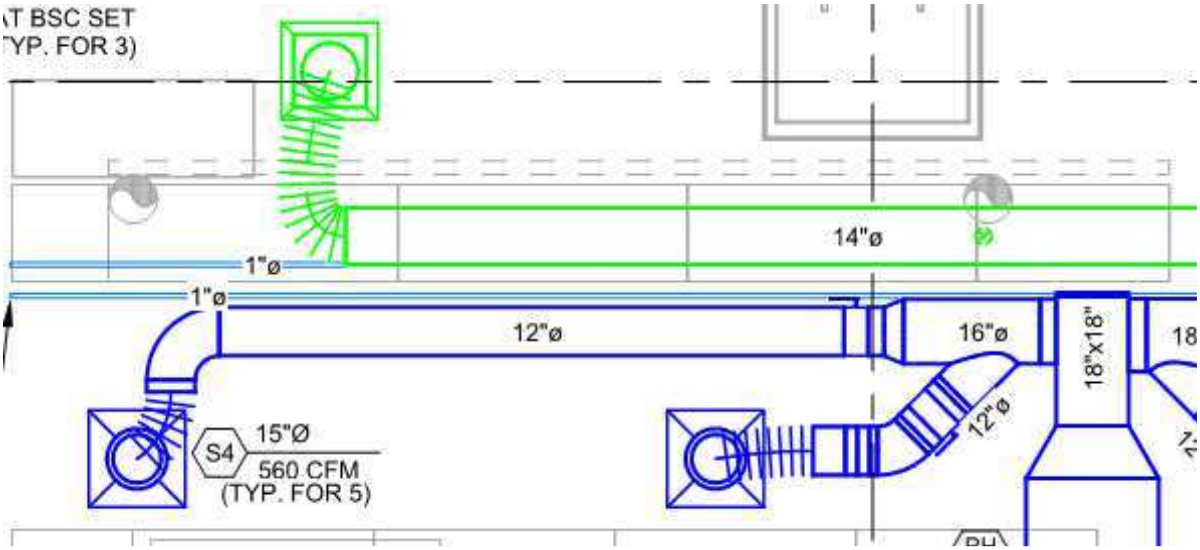
3. Use the MEP plans to see if all utilities are accounted for.
    a. **Example –** Equipment #600 requires DI, CA, VAC, N2, Ducted Exhaust & Process Chilled Water per the equipment matrix. Now review the drawings to ensure they have also been incorporated into the design documents.



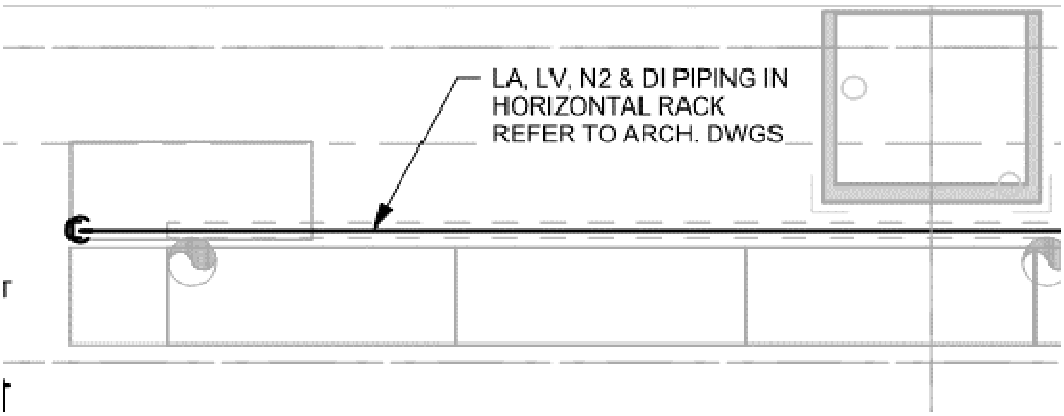
b. **Architectural:** The 4" Ducted exhaust is shown on the architectural plans.



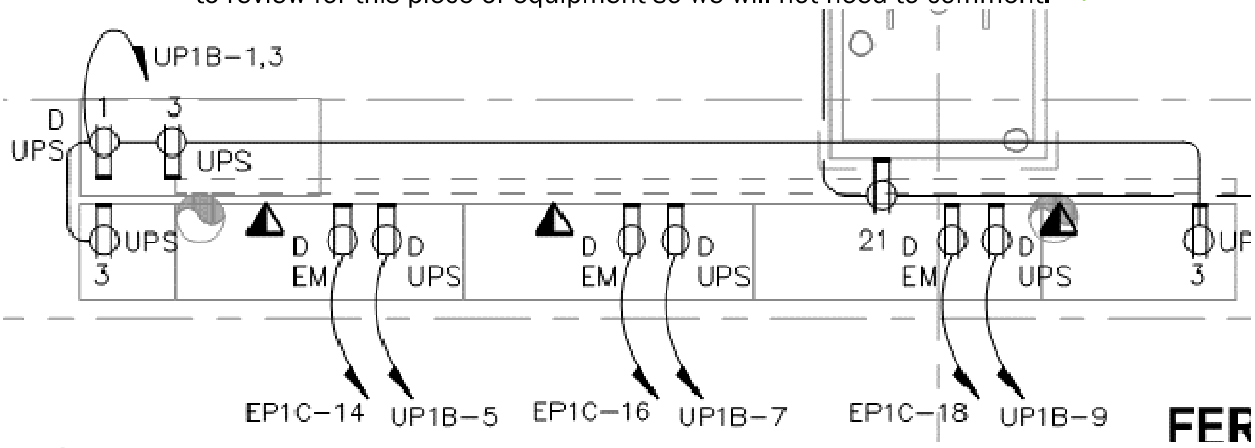
c. **Mechanical:** No ducted exhaust is shown on the mechanical plans. We should make a note of this.



d. **Plumbing:** All required plumbing is shown on the plumbing plans.



e. **Electrical:** The equipment matrix does not specify any specific electrical requirements to review for this piece of equipment so we will not need to comment.



4. If any utilities are missing from the design documents complete the "MEP Equipment Constructability Review" worksheet. An example is shown below.

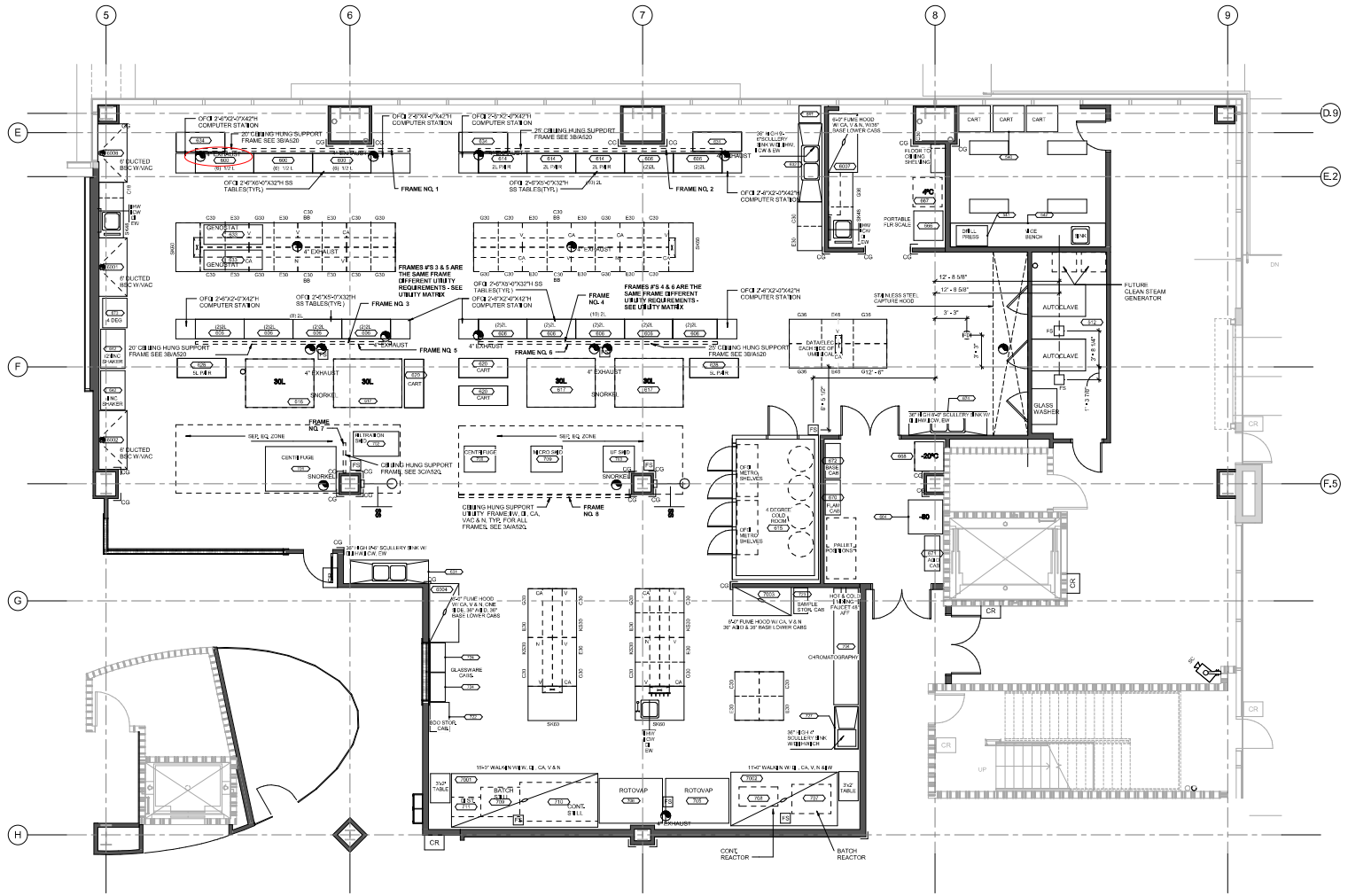
MEP Equipment Constructability Review

Equip #	Equipment Name	Comments
600	1/2 L Fermentor (bank of six)	Ducted exhaust only shown on architectual and DI water is required per the equipment list but is not shown on the plumbing sheets.

		Ownership					Equipment						Dimensions			Power				Network			Utilities												Process Utilities												
New Equip. No.	Responsibility	Current Grup	Current Bldg Location	New Room Location	Room Number	Bench, Cart, Floor, Table, Undercntr	Description	Brand	Model	Asset No.	General Assembly Dwg	Center of Gravity	Width (inches)	Depth (inches)	Height (inches)	Volt	Amp	Phase	E-power	UPS	Data	Monitoring /BMS	Process Alarm	IW	DI	CA	VAC	N2	Specialty Gas	Ducted Exhaust	Snorkel	Vac Pump Cabinet	Floor Sink, Floor Drain, Drain	RO	Soft Water	Chilled Water	Process	Plant Steam	Culinary	Biowaste	Clean-in-Place	Comments	QTY (now)	Total QTY (inc future)
600	OFOI	Fermentation Separation		Bench Scale	110	Bench	1/2 L Fermentor (bank of six)	Infors HT	Multifors				6'	24	34									-	Y	Y	Y	Y	Nitrogen Tank	Y						Y							1/2 L controls	3	3
601	OFOI	Fermentation Separation		Bench Scale	110	Bench	Strain gauge	custom made					3.5	8	9																											REMOVED FROM SCOPE	10	20
602	OFOI	Fermentation Separation		Bench Scale/TBD	110	Floor	Chiller (2)	vwr					15	34	24																						Y						REMOVED FROM SCOPE	2	3
603	OFOI	Fermentation Separation		Bench Scale	110	Bench	HMI Multifors control computer, monitor & keyboard	dell					24	24	16																												1 computer station per (6) 1/2L fermentors	3	3
604					110																																							
605	OFOI	Fermentation Separation	Ferm	Bench Scale	110	Bench	2 L Computer, Micro FIS I/O box	Sartorius					20	20	10	110	8		Y																										Input/output for up to (16) 2L Reactors	1	2
606	OFOI	Fermentation Separation		Bench Scale	110	Bench	2 L Fermentor, vessel & balance A+ units	sartorius					30	24	32																Y													Ducted exhaust to be 4" w/ blast gate	14	22
607	OFOI	Fermentation Separation		Bench Scale	110	Bench	BR control computer, monitor and keyboard	dell & apple					24	24	24																Y													1 control computer station per (4) 2L fermentors.	6	8
608					110																																							
609					110																																							
610	OFOI	Fermentation Separation		Bench Scale	110	Bench	Presens transmitter	Presens					10	12	5																												1 transmitter per (4) 2L fermentors on support frame above reactors	6	7
611	OFOI	Fermentation Separation		Bench Scale	110	Bench	Peristaltic pump (feed pumps	watson marlow					6	8	3.5																												1 pump below each 2L fermentor below	20	30
612	OFOI	Fermentation Separation		Bench Scale	110	Bench	mass flow controller boxes						10	11	6.5																												Controller on support frame above reactors	5	7
613	OFOI	Fermentation Separation		Bench Scale	110	Floor	Chiller	Lauda					18	22	32																												Process Chillers not required if house process chilled water system. 9 degree C (49 degree F) water	2	2
614	OFOI	Fermentation Separation		Bench Scale	110	Bench	2 L Fermentor (pair), vessels & balances B+ units	Sartorius					60	30	32											Y	Y	Y			Y						Y						Ducted exhaust to be 4" w/ blast gate	3	3
615	CFCI	Fermentation Separation	Separation	Pilot Plant	110A	Floor	4 degree Cold Room								11'-6"								Y										Floor Sink									Shared with Separation	1	1
616	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Floor	30L Fermentor #1 skid (steam jacketed)	Sartorius	Cplus				84	60	96	208	20	3	Y		Y			Y	Y	Y	Y	Y		Y	Y		Floor Sink			Y	Y					Accessible space all sides. Articulating arm snorkle exhaust	1	1
617	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Floor	30L Fermentor #2 skid (steam jacketed)	Sartorius	Cplus				84	60	75	208	20	3	Y		Y			Y	Y	Y	Y	Y		Y	Y		Floor Sink			Y	Y					Accessible space all sides. Articulating arm snorkle exhaust	1	3
620	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Floor	30 L Computer/Instrument Cart	n/A					36	40	63																												1 cart for each 30L Fermentor	1	2
620A	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	Brooks MFC Controller box	Brooks	Size 3				12	12	10	110	4		Y																								On cart item #320 or on support fame	1	1
620B	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	Micro FIS I/O box	Sartorius					20	20	10	110	8		Y																								On cart item #320 or on support fame	1	1
620C	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	Presens Trnsmitter	Presens					12	12	10	110	0.5		Y																								On cart item #320 or on support fame	1	1
620D	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	OPTEK Transmitter	OPTEK					12	12	10	115	0.5		Y		Y																						On cart item #320 or on support fame	1	2
620E	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	Network Switch						8	5	2	110	1		Y																								On cart item #320 or on support fame	1	1
620F	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	USB to Serial Converter						4	6	1	110	0.5		Y		Y																						On cart item #320 or on support fame	1	2
620G	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Cart	Desktop PC		B+ Twin				8	17	17				Y		Y					Y		Y			Y												On cart item #320 or on support fame	1	1
628	OFOI	Fermentation Separation	Pilot Lab	Pilot Plant	110	Bench	5 liter Fermentor (pair)	Sartorius					60	24	40	120	30		Y							Y	Y	Y			Y			Floor Sink			Y						Back-to-back with 2' run between. Group with 30L Bioreactors. Ducted exhaust to be 4" w/ blast gate	1	2
629	OFCI	Fermentation Separation	Pilot Lab	TBD	110	Floor	Boiler	Sussman					72	48	60	480V Power 120VC ontrol	44A Power 15A Control	3													Y			Floor Sink		Y							REMOVED FROM SCOPE	1	2
631	CFCI	Fermentation Separation	Pilot Lab	Bench Scale	110	Floor	Scullery Sink						114	30	36										Y	Y							Drain										DI & IW faucets both sides of sink basins.	1	1
632	CFCI	Fermentation Separation	Ferm	Pilot Plant	110	Floor	Scullery Sink						114	30	36										Y	Y							Drain										DI & IW faucets both sides of sink basins.	1	1
633	OFOI	Fermentation Separation	Evolution	Bench Scale	110	Bench	1/2 L Fermentors Genostats	Genomatica					144	36	36	110											Y	Y	Y			Y													1	2
634	OFOI	Fermentation Separation	Ferm	Bench Scale/PP	110	Bench	Offgas Mass Spec for all Fermentors (20 reactors per each MS)	Hiden Analytical					77	24	25	120	10		Y	Y							Y	Y	Y			Y			Y										Has UPS and is included in dimensions Can be re-arranged to shorter deeper dimension, or UPS under bench for 67" width. Prefe to have this in accessory room due to pump noise and heat	1	3
634A	OFOI	Fermentation Separation	Ferm		110	Bench	Proteus Valve for Mass Spec	Hiden Analytical								110	5		Y	Y																						Separated for power but dimensions included in Mass Spec above	1	3
640	OFOI	Fermentation Separation	Ferm		110	Floor	DCU 3 Controller for A+ Mass flow Controllers	sartorius	DCU3				32	28	37	110	6		Y	Y							Y		Y															In kneespace or on rack or with noisy equipment	1	1
641	OFOI	Fermentation Separation	Ferm	Equipment Wash	112	Floor	Top loader autoclave	Yamato	sm510				17	21	44	220	11		Y																								by 1/2 L Fermentors & sinks	1	2
642	OFOI	Fermentation Separation	Ferm	Bench Scale	110	Floor	Stackable incubator shakers (2 stack)	New Brunswick	I 26				50	34	55	110	30 (15A each)																										2 X 15 Amp. dimensions listed for 2 stacked units	1	1.5
643	OFOI	Fermentation Separation	Ferm	Bench Scale	110	Bench	micro fuge	Eppendorf					9	12	9	110	7																											2	3
646	OFOI	Fermentation Separation	Ferm	Bench Scale	110	Bench	Refrigerated micro fuge	Eppendorf					24	20	12	110	10																												1	1
647	OFOI	Fermentation Separation	Ferm	Bench Scale	110	Bench	YSI Glucose anlayzer	YSI					24	12	16	110	5																												2	3
650	OFOI	Fermentation Separation	Ferm	Bench Scale	110	Bench	Spectrophotometer	Thermo					12	19	10	110	5																												1	2

		Ownership					Equipment						Dimensions			Power					Network			Utilities										Process Utilities									
New Equip. No.	Responsibility	Current Group	Current Bldg Location	New Room Location	Room Number	Bench, Cart, Floor, Table, Undercntr	Description	Brand	Model	Asset No.	General Assembly Dwg	Center of Gravity	Width (inches)	Depth (inches)	Height (inches)	Volt	Amp	Phase	E-power	UPS	Data	Monitoring /BMS	Process Alarm	IW	DI	CA	VAC	N2	Specialty Gas	Ducted Exhaust	Snorkel	Vac Pump Cabinet	Floor Sink, Floor Drain, Drain	RO	Soft Water	Process Chilled Water	Plant Steam	Culinary	Biowaste	Clean-in-Place	Comments	QTY (now)	Total QTY (inc future)
652	**OFOI**	Fermentation Separation	Ferm	Bench Scale	110		Label printer	Brady					12	16	11	110	5																									**1**	**1**
653	**OFOI**	Fermentation Separation	Ferm	Pilot Plant	110	Floor	Tool box (undercounter)	Kobalt					30	20	34																											**2**	**2**
655	**OFOI**	Fermentation Separation	Ferm	Bench Scale	110	Floor	Lab cart						45	26	33																											**3**	**4**
659	**OFOI**	Fermentation Separation	Ferm	Bench Scale	110	Bench	FTNIR device	Bruker					24	36	24	110	5													Y											Similar to Mass Spec for sampling up to (6) reactors	**0**	**1**
660	**OFOI**	Fermentation Separation	Ferm	*****		Bench	Evolution Machine (Near Genostat)	Genomatica					21	17	21	110	5									Y		Y													Currently not being used by Fermentation	**4**	**7**
661	**OFOI**	Fermentation Separation	Ferm	*****		Bench	PC - Evolution Machine						11	16	4																										Currently not being used by Fermentation	**1**	**1**
662	**OFOI**	Fermentation Separation	Ferm	Bench Scale	110	Bench	Digital Density Meter						24	12	16	110																											
663	**OFOI**	Fermentation Separation	Ferm	Bench Scale	110	Bench	Osmometer																																				
664	**OFOI**	Fermentation Separation	Ferm	Raw Material	113	Floor	-80C freezer, (noisy)	Sanyo	MDF U74VC				48	44	80	208			Y																								
665	**CFCI**	Fermentation Separation	N	?	110	Floor	Small ice machine						24	24	48																												
666	**OFOI**	Fermentation Separation		Media Prep	111	Floor	Floor Scale						36	42																													
667	**OFOI**	Fermentation Separation		Media Prep	111	Floor	Refrig/4 degree freezer						36	36					Y																								
668	**OFOI**	Fermentation Separation		Raw Material Stor	113	Floor	Freezer -20 degree						36	36					Y				Y																				
669		Fermentation Separation		Raw Material	113	Floor	Freezer -20 degree						36	36																											Omitted at 12/06/12 review meeting w/ PP		
670	**CFCI**	Fermentation Separation		Raw Material	113	Floor	Flammable Storage Cabinet						43	18	69															Y													
671	**CFCI**	Fermentation Separation		Raw Material	113	Floor	Acid Storage Cabiet						43	18	69															Y													
672	**CFCI**	Fermentation Separation		Raw Material	113	Floor	Base Storage Cabinet						43	18	69															Y													
673	**OFOI**	Fermentation Separation		Bench Scale	110	Floor	Refrigerator 4 degree Freezer						36	36		110			Y				Y																				
674	**CFCI**	Fermentation Separation		Equipment Wash	112	Floor	Scullery Sink						96	30	36									Y	Y								Drain										
700	**OFOI**	Fermentation Separation	Separation	Separation	109	Cart	Centrifuge	GEA	CTC1-06-107				45	26	50	110			Y						y					Y			Floor Sink							Y	Includes a feed pump, speed and flow-rate controllers. Requirs near-by scullery sink for cleaning large carboys. This process generates biomass waste.		
701	**OFOI**	Fermentation Separation	N	Separation	109	Cart	Centrifuge (New)	TBD	TBD				90	45	50				Y						Y					Y			Floor Sink							Y	Includes a feed pump, speed and flow-rate controllers. Requirs near-by scullery sink for cleaning large carboys. This process generates biomass waste.		
702	**OFOI**	Fermentation Separation	N	Separation	109	Cart	Filtration Skid- Microfiltration (New)	GEA	L				51	28	58	230	15	3							Y					Y			Floor Sink							Y	controllers. Requires cold & hot water supply for heat exchangers. This process generates biomass waste.		
703	**OFOI**	Fermentation Separation	Separation	Separation	109	Cart	Filtration Skid - Ultra Filtration & Nano Filtration	GEA	L				51	28	58	230			Y						y								Floor Sink			Y				Y	Includes process pump and speed/rate controllers. Requires cold & hot water supply for heat exchangers. **Process Chillers not required if house process chilled water system.**		
704	**OFOI**	Fermentation Separation	Separation	Separation	109	Table	Chromatography	Ace Glass	50				168	36	96	110																									Includes process pumps and a pump for cerculating temperature control water. Requires cold & hot water supply for heat exchangers.		
705	**OFOI**	Fermentation Separation	N	Separation	109	Floor	Rotovap Evaporator (new)	Buchi Rotovap	R220				84	48	96	230			Y								Y			Y	Y		Floor Sink			Y					Requires chilled water and vacuum. Includes vacuum pump, controller and chiller. Need ducted exhaust for vac pump.		
706	**OFOI**	Fermentation Separation	E	Separation	109	Floor	Rotovap Evaporator	TBD					57	36	74	115	15		Y						-		Y	-	-	Y	Y		Floor Sink			Y					Requires chilled water and vacuum. Includes vacuum pump, controller and chiller. Need ducted exhaust for vac pump.		
707	**OFOI**	Fermentation Separation	Separation	Separation	109	Hood	Batch Reactor (in 10' walk-in fume hood)	Parr	4524				36	50	96	230	15								Y			y	Hydrogen	Y						Y					In walk-in hood #502. Shared, 2'x3' table for PC & controller. System includes a feed pump, and a balance vacuum pump.		
708	**OFOI**	Fermentation Separation	Separation	Separation	109	Hood	Continuous Reactor (in 10' walk-in fume hood)	Parr	5403				36	36	72													y		Y						Y					In walk-in hood #502. Shared, 2'x3' table for PC & controller. Includes a vacuum pump, a feed pump and chiller.		
709	**OFOI**	Fermentation Separation	Separation	Separation	109	Hood	Batch Still (in 15' walk-in fume hood)	H-S Martin					48	36	72	230					Y	Y			Y			y		Y						Y					In walk-in hood #501. Shared, 2'x3' table for PC & controller. System includes feed pumps (6), balances (4), vacuum pump and a chiller.		
710	**OFOI**	Fermentation Separation	Separation	Separation	109	Hood	Continuous Still (in 15' walk-in fume hood)	custom					96	48	96															Y						Y					In walk-in hood #501. Shared, 2'x3' table for PC & controller. System includes vacuum pump, heat transfer fluid ciculating bath/pump, feed pump and chiller.		

ID		Ownership				Hood							Dimensions			Utilities									Power						Network		
New Equip. No.	Responsibility	Current Group	Current Bldg Location	New Room Location	Room Number	Biosafety Cabinet, Fume Hood, Ventilated Enclosure, Weigh Enclosure, Glove Box	Bench, Floor, Table	Description	Brand	Model	Asset No.	Distillation Grid	Width	Depth	Height	IW	DI	CA	VAC	N2	Specialty Gas	Ducted, Recirculating	Vac Pump Cabinet	Drain	Volt	Amp	Phase	E-power	UPS	Grounding Buss	Data	Monitoring /BMS	Comments
4002	CFCI	Analytical	New	Instrument Lab	121	Fume Hood	Bench	8' Fume Hood	TBD				8'	36"				Y	Y	Y		Ducted								Y			48" Acid & Base lower cabinets
6001	CFCI	Fermentation Separation	New	Bench Scale	110	Biosafety Cabinet	Floor	Ducted BSC, Class II Type A2	TBD				6'	32"	84"				Y			Ducted			110	15.1		Y					Thimble connection, 70% recirculating
6002	CFCI	Fermentation Separation	New	Bench Scale	110	Biosafety Cabinet	Floor	Ducted BSC, Class II Type A2	TBD				6'	32"	84"				Y			Ducted			110	15.1		Y					Thimble connection, 70% recirculating
6003	CFCI	Fermentation Separation		Pilot Plant		Biosafety Cabinet	Floor	6' Ducted Biosafety Cabinet	Baker or comparable	80603			72	33	90				Y			Ducted			110	15.1		Y					Omitted at 11/20/12 review meeting w/ PP
6004	CFCI	Fermentation Separation	New	Bench Scale	110	Fume Hood	Bench	6' Fume Hood	TBD			Y	6'	36"	84"			Y	Y	Y		Ducted			110			Y		Y			Prefer dual power receptacles on both L/R. Gas service 1 side. 36" acid & base lower cabinets
6005	CFCI	Fermentation Separation		Bench Scale		Fume Hood	Bench	6' Fume Hood	Safeair or comparable				72	33					Y			Ducted			110			Y					Omitted at 11/20/12 review meeting w/ PP
6006	CFCI	Fermentation Separation		Pilot Plant		Fume Hood	Floor	6' Walk-in Fume Hood	Safeair or comparable				72	33					Y			Ducted			110			Y					Omitted at 11/20/12 review meeting w/ PP
6007	CFCI	Fermentation Separation	New	Media Prep	111	Fume Hood	Bench	6' Fume Hood	TBD				6'	36"	84"			Y	Y			Ducted			110			Y		Y			36" acid & base lower cabinets
6008	CFCI	Fermentation Separation	New	Bench Scale	110	Biosafety Cabinet	Floor	Ducted BSC, Class II Type A2	TBD				6'	32"	84"				Y			Ducted			110			Y					Thimble connection, 70% recirculating
7001	CFCI	Fermentation Separation	New	Separation	109	Fume Hood	Floor	15' Walk-in fume hood (for stills)	TBD				15'	5'-6"		Y	Y	Y	Y	Y		Ducted			110					Y	Y		15-ft walk-in hood will be for continuous still, batch still and SPD. Elec & gas both sides. Water 1 side
7002	OFCI	Fermentation Separation	E	Separation	109	Fume Hood	Floor	11' Walk-in fume hood (for reactors)					11'-3"	5'-3"		Y	Y	Y	Y	Y	Hydrogen	Ducted			230					Y			Existing 11-ft walk in hood will be for the two reactors. Elec & gas both sides. Water 1 side
7003	CFCI	Fermentation Separation	New	Separation	109	Fume Hood	Bench	6' Fume Hood	TBD			Y	6'	36"				Y	Y	Y		Ducted			230					Y			Wet-chemistry, converstion testing etc. 36" Acid & Base lower cabinets. Gas service 1 side.
8000	CFCI	Media	New	Media	230	Fume Hood	Bench	4' Fume Hood	TBD				4'	36"				Y	Y	Y		Ducted			110			Y		Y	Y		36" Acid & Base lower cabinets



1 L1-Fermentation & Separation Labs
1/4" = 1'-0"

CONSULTANTS

STAMP

NO.	DESCRIPTION	DATE

CLIENT

PROJECT

ADDRESS

PROJECT NO. 12137

SCALE 1/4" = 1'-0"

TITLE

ENLARGED LABORATORY PLANS

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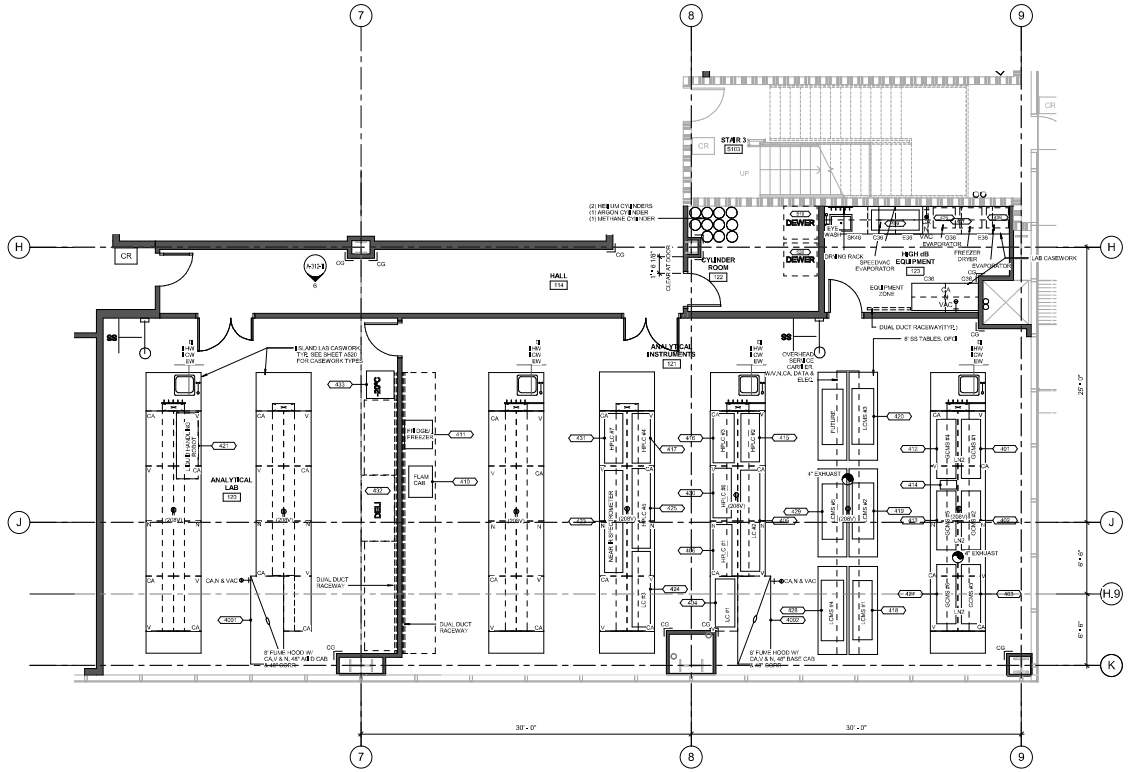

1 L1 Analytical Lab
1/4" = 1'-0"

CONSULTANTS

STAMP

NO. DESCRIPTION DATE

CLIENT

PROJECT

ADDRESS

PROJECT NO. 12137

SCALE 1/4" = 1'-0"

TITLE

ENLARGED LABORATORY PLANS

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AIR HANDLING UNIT SCHEDULE

UNIT NO.	MANUFACTURER & MODEL NO.	SUPPLY FAN		MIN OA (CFM)	COOLING COIL										HEATING COIL							ELECTRICAL					FILTER		OPER WEIGHT (LBS)	REMARKS
		CFM	ESP (IN)		CAPACITY SENSIBLE (MBH)	CAPACITY TOTAL (MBH)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	VEL (FPM)	AIR PD (IN)	GPM	WTR PD (FT/HD)	EWT (°F)	LWT (°F)	CAP (MBH)	RATED CFM	ENT AIR (°F)	AIR PD (IN)	GPM	WTR PD (FT/HD)	EWT (°F)	LWT (°F)	V/PH/HZ	HP	VFD	E POWER	SMOKE DETECTOR	PRE	FINAL		
AHU-S-1	ENERGY LABS	23,000	2.5	23,000	900	1,350	91	72	52.3	52.2	494	0.1	225	6.7	44	58	528	23,000	34	0.09	16	3.0	100	150	460/3/60	40	YES	NO	YES	30%	95%	15,000	BASE MOUNTED UNIT, INTERNALLY ISOLATED DIRECT DRIVE PLUG FANS WITH 2" DEFLECTION, TEFC PREMIUM MOTOR, COPPER/COPPER COOLING AND HEATING COILS, STAINLESS STEEL CASING, MOISTURE ELIMINATOR, DOUBLE SKIN INSULATED ACCESS DOORS WITH THERMAL BREAK, STAINLESS STEEL DRAIN PAN, AIR FLOW MONITORING STATION, THERMAL BREAK CONSTRUCTION IN COOLING SECTION AND ALL DOWN STREAM COMPONENTS, OUTDOOR CONSTRUCTION WITH TINTED ROOF, UNIT TO PROVIDE 21 LOW CFM AT STARTUP.
AHU-S-2	ENERGY LABS	28,200	2.5	28,200	1,167	1,756	91	72	52.3	52.2	516	1.2	250	9.1	44	58	740	28,200	34	0.1	20	3.0	100	150	460/3/60	50	YES	NO	YES	30%	95%	15,000	BASE MOUNTED UNIT, INTERNALLY ISOLATED DIRECT DRIVE PLUG FANS WITH 2" DEFLECTION, TEFC PREMIUM MOTOR, COPPER/COPPER COOLING AND HEATING COILS, STAINLESS STEEL CASING, MOISTURE ELIMINATOR, DOUBLE SKIN INSULATED ACCESS DOORS WITH THERMAL BREAK, STAINLESS STEEL DRAIN PAN, AIR FLOW MONITORING STATION, THERMAL BREAK CONSTRUCTION IN COOLING SECTION AND ALL DOWN STREAM COMPONENTS, OUTDOOR CONSTRUCTION WITH TINTED ROOF.

ROOFTOP PACKAGE HEAT PUMP SCHEDULE

UNIT NO.	MANUFACTURER & MODEL NO.	CAPACITY SENSIBLE (MBH)	CAPACITY TOTAL (MBH)	AMBIENT AIR TEMP (°F) DB	EAT DB (°F)	EAT WB (°F)	SA (CFM)	MIN OA (CFM)	ESP	SEER/ EER	HEATING CAPACITY (MBH)	COP/ HSPF	ELECTRICAL												FILTER		OPER WEIGHT (LBS)	REMARKS
													V/PH/HZ	COMPRESSOR			INDOOR FAN		OUTDOOR FAN		MCA	MAXIMUM SIZE FUSE	E POWER	SMOKE DETECTOR	SIZE	QUANT		
														QUANT	LRA	RLA	HP	FLA	QUANT	FLA								
HP-S-1	YORK XP036	30.5	35.9	95	80	67	1,200	105	0.5	13/11	34.8	~12.7	460/3/60	1	41.0	6.4	1.0	2.0	1	0.8	11.4	15	MO	NO	15x20x2 14x25x2	2 1	685	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-2	YORK XP036	30.5	35.9	95	80	67	1,200	105	0.5	13/11	34.8	~12.7	460/3/60	1	41.0	6.4	1.0	2.0	1	0.8	11.4	15	MO	NO	15x20x2 14x25x2	2 1	685	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-3	YORK XP048	39.7	34.9	95	80	67	1,800	145	0.5	~11	46.0	3.25A	460/3/60	2	41.0	6.9	3	5.3	1.0	0.8	22.4	25	NO	YES	24x16x2	4	925	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 4" SMOKE DETECTOR, 100% DIFF TEMPERATURE OSA ECONOMIZER
HP-S-4	YORK XP048	34.8	46.2	95	80	67	1,800	225	0.5	13/11	41.0	3.2/3.7	460/3/60	1	41.0	6.1	1.5	2.6	1.0	0.8	11.0	15	MO	NO	15x20x2 14x25x2	2 1	695	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-5	YORK XP060	44.6	60.7	95	80	67	2,000	115	0.5	13/11.5	56.5	3.2/3.7	460/3/60	1	52.0	7.7	1.5	2.6	1.0	1.3	13.5	20	MO	YES	15x20x2 14x25x2	2 1	680	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, SUPPLY AIR SMOKE DETECTOR, 0-50% OSA HOOD
HP-S-6	YORK XP060	44.6	60.7	95	80	67	2,000	135	0.5	13/11.5	56.5	3.2/3.7	460/3/60	1	52.0	7.7	1.5	2.6	1.0	1.3	13.5	20	MO	YES	15x20x2 14x25x2	2 1	680	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, SUPPLY AIR SMOKE DETECTOR, 0-50% OSA HOOD
HP-S-7	YORK XP048	34.8	46.2	95	80	67	1,800	135	0.5	13/11	41.0	3.2/3.7	460/3/60	1	41.0	6.1	1.5	2.6	1.0	0.8	11.0	15	MO	NO	15x20x2 14x25x2	2 1	695	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-8	YORK XP048	34.8	46.2	95	80	67	1,800	270	0.5	13/11	41.0	3.2/3.7	460/3/60	1	41.0	6.1	1.5	2.6	1.0	0.8	11.0	15	MO	NO	15x20x2 14x25x2	2 1	695	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-9	YORK XP060	44.6	60.7	95	80	67	2,000	545	0.5	13/11.5	56.5	3.2/3.7	460/3/60	1	52.0	7.7	1.5	2.6	1.0	1.3	13.5	20	MO	YES	15x20x2 14x25x2	2 1	680	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, SUPPLY AIR SMOKE DETECTOR, 0-50% OSA HOOD
HP-S-10	YORK XP048	34.8	46.2	95	80	67	1,800	275	0.5	13/11	41.0	3.2/3.7	460/3/60	1	41.0	6.1	1.5	2.6	1.0	0.8	11.0	15	MO	NO	15x20x2 14x25x2	2 1	695	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-11	YORK XP048	34.8	46.2	95	80	67	1,800	200	0.5	13/11	41.0	3.2/3.7	460/3/60	1	41.0	6.1	1.5	2.6	1.0	0.8	11.0	15	MO	NO	15x20x2 14x25x2	2 1	695	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-12	YORK XP060	39.7	34.9	95	80	67	1,800	310	0.5	~11	46.0	3.25A	460/3/60	2	41.0	6.9	3	5.3	1.0	0.8	22.4	25	NO	YES	24x16x2	4	925	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 4" SMOKE DETECTOR, 100% DIFF TEMPERATURE OSA ECONOMIZER, UNIT SERVING CONFERENCE ROOM TO BE PROVIDED WITH DEMAND CONTROL VENTILATION
HP-S-13	YORK XP060	44.6	60.7	95	80	67	2,000	510	0.5	13/11.5	56.5	3.2/3.7	460/3/60	1	52.0	7.7	1.5	2.6	1.0	1.3	13.5	20	MO	YES	15x20x2 14x25x2	2 1	680	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, SUPPLY AIR SMOKE DETECTOR, 0-50% OSA HOOD
HP-S-14	YORK XP060	44.6	60.7	95	80	67	2,000	110	0.5	13/11.5	56.5	3.2/3.7	460/3/60	1	52.0	7.7	1.5	2.6	1.0	1.3	13.5	20	MO	YES	15x20x2 14x25x2	2 1	680	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, SUPPLY AIR SMOKE DETECTOR, 0-50% OSA HOOD
HP-S-15	YORK XP060	44.6	60.7	95	80	67	2,000	110	0.5	13/11.5	56.5	3.2/3.7	460/3/60	1	52.0	7.7	1.5	2.6	1.0	1.3	13.5	20	MO	YES	15x20x2 14x25x2	2 1	680	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, SUPPLY AIR SMOKE DETECTOR, 0-50% OSA HOOD
HP-S-16	YORK XP048	34.8	46.2	95	80	67	1,800	185	0.5	13/11	41.0	3.2/3.7	460/3/60	1	41.0	6.1	1.5	2.6	1.0	0.8	11.0	15	MO	NO	15x20x2 14x25x2	2 1	695	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-17	YORK XP036	30.5	35.9	95	80	67	1,200	185	0.5	13/11	34.8	~12.7	460/3/60	1	41.0	6.4	1.5	2.6	1	0.8	11.4	15	MO	NO	15x20x2 14x25x2	2 1	685	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD
HP-S-18	YORK XP036	30.5	35.9	95	80	67	1,200	40	0.5	13/11	34.8	~12.7	460/3/60	1	41.0	6.4	1.5	2.6	1	0.8	11.4	15	MO	NO	15x20x2 14x25x2	2 1	685	PROVIDE WITH 14" CURB, BACNET COMMUNICABING THERMOSTAT, 0-50% OSA HOOD

SPLIT SYSTEM INDOOR FAN COIL SCHEDULE

UNIT NO.	MANUFACTURER & MODEL NO.	LOCATION	SERVICE	SA (CFM)	MIN OA (CFM)	ESP	COIL DATA				ELECTRICAL					FILTER (QUANT) SIZE	OPER WEIGHT (LBS)	REMARKS
							EAT DB (°F)	EAT WB (°F)	ROWS	AREA (SQ/FT)	HP	V/PH/HZ	MAXIMUM SIZE FUSE	E POWER	SMOKE DETECTOR			
FC-S-1	YORK NC060	1ST FLOOR	OFFICE	1,800	100	0.5	80	67	3	10.6	2	460/3/60	15	NO	YES	(4) 15x20x2	550	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-2	YORK AM070	1ST FLOOR	OFFICE	1,200	300	0.5	80	67	3	5.3	1/3	208/1/60	15	NO	NO	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-3	YORK AM250	1ST FLOOR	OFFICE	880	270	0.5	80	67	3	4.0	1/4	208/1/60	15	NO	NO	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-4	YORK AM250	1ST FLOOR	OFFICE	880	240	0.5	80	67	3	4.0	1/4	208/1/60	15	NO	NO	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-5	YORK AM370	1ST FLOOR	OFFICE	1,200	80	0.5	80	67	3	5.3	1/3	208/1/60	15	NO	NO	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-6	YORK AM250	1ST FLOOR	OFFICE	880	140	0.5	80	67	3	4.0	1/4	208/1/60	15	NO	NO	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-7	YORK AM370	1ST FLOOR	OFFICE	1,200	55	0.5	80	67	3	5.3	1/3	208/1/60	15	NO	NO	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-8	YORK AM630	1ST FLOOR	OFFICE	2,000	150	0.5	80	67	4	5.3	3/4	208/1/60	15	NO	YES	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT
FC-S-9	YORK AM630	1ST FLOOR	OFFICE	2,000	150	0.5	80	67	4	5.3	3/4	208/1/60	15	NO	YES	FIELD FABRICATED	155	PROVIDE WITH BACNET COMMUNICABING THERMOSTAT

SPLIT SYSTEM OUTDOOR HEAT PUMP SCHEDULE

UNIT NO.	MANUFACTURER & MODEL NO.	LOCATION	SERVICE	CAPACITY TOTAL (BTUH)	AMBIENT AIR TEMP (°F) DB	HEATING CAPACITY (MBH)	EER	HSPF	ELECTRICAL							MAXIMUM FUSE SIZE	OPER WEIGHT (LBS)	REMARKS
									V/PH/HZ	COMPRESSOR			OUTDOOR FAN		MINIMUM CIRC AMPS	E POWER		
										QUANT	LRA	RLA	QUANT	FLA				
⚠ CU-S-1	YORK PC060	ROOF	FC-S-1	62,000	95	62,000	11.0	3.1 COP	460/3/60	1	169	12.2	2	1.2	17.6	NO	25	450	PROVIDE WITH 3/8" ØCOLD LINE AND 1/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-2	YORK YJU36	ROOF	FC-S-2	36,000	95	32,800	11.0	3.7	460/3/60	1	34	4.5	1	0.8	7.2	NO	15	210	PROVIDE WITH 3/8" ØCOLD LINE AND 3/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-3	YORK YHJ024	ROOF	FC-S-3	23,000	95	32,000	11.5	3.7	208/1/60	1	43	8.3	1	0.8	11.2	NO	15	195	PROVIDE WITH 3/8" ØCOLD LINE AND 3/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-4	YORK YHJ024	ROOF	FC-S-4	23,000	95	32,000	11.5	3.7	208/1/60	1	43	8.3	1	0.8	11.2	NO	15	195	PROVIDE WITH 3/8" ØCOLD LINE AND 3/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-5	YORK YJU36	ROOF	FC-S-5	36,000	95	32,000	11.0	3.7	460/3/60	1	34	4.5	1	0.8	7.2	NO	15	210	PROVIDE WITH 3/8" ØCOLD LINE AND 3/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-6	YORK YHJ024	ROOF	FC-S-6	23,000	95	32,000	11.5	3.7	208/1/60	1	43	8.3	1	0.8	11.2	NO	15	195	PROVIDE WITH 3/8" ØCOLD LINE AND 3/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-7	YORK YJU36	ROOF	FC-S-7	36,000	95	32,000	11.0	3.7	460/3/60	1	34	4.5	1	0.8	7.2	NO	15	210	PROVIDE WITH 3/8" ØCOLD LINE AND 3/4" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-8	YORK YJD60	ROOF	FC-S-8	55,000	95	55,000	11.5	3.7	460/3/60	1	53	9.0	1	0.8	13.8	NO	20	280	PROVIDE WITH 3/8" ØCOLD LINE AND 7/8" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS
CU-S-9	YORK YJD60	ROOF	FC-S-9	55,000	95	55,000	11.5	3.7	460/3/60	1	53	9.0	1	0.8	13.8	NO	20	280	PROVIDE WITH 3/8" ØCOLD LINE AND 7/8" VAPOR LINE IN STALL PER MANUFACTURE'S RECOMMENDATIONS

EXHAUST FAN SCHEDULE

UNIT NO.	MANUFACTURER & MODEL NO.	LOCATION	SERVICE	TYPE	⚠ CFM	ARR	ESP (IN)	FAN RPM	ELECTRICAL				OPER WEIGHT (LBS)	REMARKS
									V/PH/HZ	HP	VFD	E POWER		
EF-1	GREENHECK GB-180-13	ROOF	RESTROOMS / GENERAL EXHAUST	DOWN BLOW	4,040	-	0.75	1,214	460/3/60	1 1/2	NO	NO	150	PROVIDE WITH 14" ROOF CURB WITH BACK DRAFT DAMPER
EF-S-1	GREENHECK 23-SWSI-21	ROOF	CONTROL AREA 2	SWSI	15,500	10	2.0	1,312	460/3/60	10	YES	YES	1,160	PROVIDE WITH WEATHER HOOD, STRUCTURAL BASE WITH 2" SPRING ISOLATION, HOUSING SEALED FOR OUTDOOR USE AND CORROSION RESISTANT PAINT. EF TO BE TYPE A SPARK PROOF CONSTRUCTION.
EF-S-2	GREENHECK 27-SWSI-21	ROOF	CONTROL AREA 1	SWSI	15,990	10	2.0	1,335	460/3/60	10	YES	YES	1,160	PROVIDE WITH WEATHER HOOD, STRUCTURAL BASE TO 2" SPRING ISOLATION, HOUSING SEALED FOR OUTDOOR USE AND CORROSION RESISTANT PAINT.
EF-S-3	GREENHECK 22-SWSI-21	ROOF	CONTROL AREA 5	SWSI	7,020	10	2.0	1,722	460/3/60	7 1/2	YES	YES	785	PROVIDE WITH WEATHER HOOD, STRUCTURAL BASE WITH 2" SPRING ISOLATION, HOUSING SEALED FOR OUTDOOR USE AND CORROSION RESISTANT PAINT. EF TO BE TYPE A SPARK PROOF CONSTRUCTION.
EF-S-4	GREENHECK 18-SWSI-21	ROOF	CONTROL AREA6	SWSI	4,690	10	2.0	1,830	460/3/60	5	YES	YES	580	PROVIDE WITH WEATHER HOOD, STRUCTURAL BASE TO 2" SPRING ISOLATION, HOUSING SEALED FOR OUTDOOR USE AND CORROSION RESISTANT PAINT.
EF-S-5	GREENHECK 33-SWSI-21	ROOF	CONTROL AREA 4	SWSI	15,800	10	2.0	1,016	460/3/60	15	YES	YES	1,250	PROVIDE WITH WEATHER HOOD, STRUCTURAL BASE WITH 2" SPRING ISOLATION, HOUSING SEALED FOR OUTDOOR USE AND CORROSION RESISTANT PAINT.
EF-S-6	GREENHECK 9-SWSI-21	ROOF	DUCTED BSC - CONTROL AREA 4	SWSI	1,660	10	2.5	2,880	460/3/60	1 1/2	YES	YES	250	PROVIDE WITH WEATHER HOOD, STRUCTURAL BASE WITH 2" SPRING ISOLATION, HOUSING SEALED FOR OUTDOOR USE AND CORROSION RESISTANT PAINT.

SUPPLY FAN SCHEDULE

UNIT NO.	MANUFACTURER & MODEL NO.	LOCATION	SERVICE	TYPE	CFM	ARR	ESP (IN)	FAN RPM	ELECTRICAL					OPER WEIGHT (LBS)	REMARKS
									V/PH/HZ	HP	VFD	E POWER	SMOKE DETECTOR		
SF-1	GREENHECK LSB-14-7	ROOF	FAN COIL OSA	LOUVERED PENTHOUSE	2,000	-	0.75	997	460/3/60	3/4	YES	NO	YES	700	

GRILLES, REGISTERS AND DIFFUSER SCHEDULE

NO.	MANUFACTURER & MODEL NO.	TYPE	SIZE	DESCRIPTION
S1	TITUS PMC	T-BAR CEILING	SEE PLANS	ADJUSTABLE MODULAR CORE DIFFUSER, 4 CORES, SQUARE NECK, PERFORATED FLUSH FACE, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 3 BORDER FOR LAYIN CEILING
S2	TITUS PMC	GYP. CEILING	SEE PLANS	ADJUSTABLE MODULAR CORE DIFFUSER, 4 CORES, SQUARE NECK, PERFORATED FLUSH FACE, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1C BORDER FOR GYP CEILING
S3	TITUS FLOWBAR	GYP. CEILING	SEE PLANS	LINEAR SLOT DIFFUSER (1) 2" SLOTS, PROVIDE WITH INSULATED PLENUM , STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1B BORDER FOR GYP CEILING
S4	TITUS TMS	T-BAR CEILING	SEE PLANS	SQUARE DIFFUSER, 3 CONE DESIGN, ROUND NECK, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 3 FULL FACE BORDER FOR LAYIN CEILING
S5	TITUS TMS	GYP. CEILING	SEE PLANS	SQUARE DIFFUSER, 3 CONE DESIGN, ROUND NECK, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1 BORDER GYP CEILING
S6	PRICE HCF	T-BAR CEILING	SEE PLANS	HIGH CAPACITY, FLUSH FACE DIFFUSER, 3-WAY PATTERN, 24"x24" x 10" NECK, ALUMINUM CONSTRUCTION, STANDARD WHITE FINISH
S7	PRICE HCF	T-BAR CEILING	SEE PLANS	HIGH CAPACITY, FLUSH FACE DIFFUSER, 2-WAY PATTERN, 24"x48" x 10" NECK, ALUMINUM CONSTRUCTION, STANDARD WHITE FINISH
S8	TITUS TMR	T-BAR CEILING	SEE PLANS	ROUND CONE DIFFUSER, 3 CONES, ROUND NECK, STEEL CONSTRUCTION, STANDARD WHITE FINISH, DUCT MOUNTED
R1	TITUS PAR	T-BAR CEILING	SEE PLANS	PERFORATED FLUSH FACE, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 3 BORDER FOR LAYIN CEILING
R2	TITUS PAR	GYP. CEILING	SEE PLANS	PERFORATED FLUSH FACE, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1C BORDER FOR GYP CEILING
R3	TITUS 350FL	SURFACE MOUNT	SEE PLANS	LOUVERED RETURN GRILLE,3/4" BLADE SPACE, SINGLE DEFLECTION, BLADES HORIZONTAL, ALUMINUM CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1 BORDER FOR SURFACE MOUNT
RA	TITUS FLOWBAR	GYP. CEILING	SEE PLANS	LINEAR SLOT DIFFUSER (1) 2" SLOTS, PROVIDE WITH PLENUM , STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1B BORDER FOR GYP CEILING. MATCH S3 SUPPLY DIFFUSER
E1	TITUS PAR	T-BAR CEILING	SEE PLANS	PERFORATED FLUSH FACE, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 3 BORDER FOR LAYIN CEILING
E2	TITUS PAR	GYP. CEILING	SEE PLANS	PERFORATED FLUSH FACE, STEEL CONSTRUCTION, STANDARD WHITE FINISH, TYPE 1 BORDER FOR GYP CEILING

DUCT MATERIAL SCHEDULE

TYPE	DESCRIPTION	LOCATION	DUCT SIZE	MATERIALS	INSULATION	REMARKS
SUPPLY	GENERAL OFFICE/LAB - ROUND DUCT	INDOOR	UP TO 24"	GALVANIZED SPIRAL WOUND	EXTERNAL - R4.2 MIN	
SUPPLY	GENERAL OFFICE/LAB FLEX DUCT, 5' MAX LENGTH	INDOOR	UP TO 24"	ACOUSIFLEX	INTERNAL - R4.2 MIN	
SUPPLY	GENERAL OFFICE/LAB SQUARE DUCT	INDOOR	ALL	GALVANIZED	EXTERNAL - R4.2 MIN	
SUPPLY	GENERAL OFFICE/LAB SQUARE DUCT	OUTDOOR	ALL	DOUBLE WALL GALVANIZED, SCH 80 INTERNAL LINER	R8 MIN	SLOPE TOP OF DUCT TO PREVENT STANDING WATER
RETURN/EXHAUST	GENERAL OFFICE/LAB ROUND DUCT	INDOOR/OUTDOOR	UP TO 24"	GALVANIZED SPIRAL WOUND	INTERNAL - R4.2 MIN (RETURN ONLY)	SLOPE TOP OF CUT DOOR DUCT TO PREVENT STANDING WATER
RETURN/EXHAUST	GENERAL OFFICE/LAB SQUARE DUCT	INDOOR/OUTDOOR	ALL	GALVANIZED	INTERNAL - R4.2 MIN (RETURN ONLY)	SLOPE TOP OF CUT DOOR DUCT TO PREVENT STANDING WATER
EXHAUST	FUMEHOOD & BSC - BRANCH ROUND DUCT	INDOOR/OUTDOOR	UP TO 24"	PVC COATED SPIRAL WOUND	NONE	SLOPE TOP OF CUT DOOR DUCT TO PREVENT STANDING WATER
EXHAUST	FUMEHOOD & BSC BRANCH SQUARE DUCT	INDOOR/OUTDOOR	ALL	PVC COATED	NONE	SLOPE TOP OF CUT DOOR DUCT TO PREVENT STANDING WATER
EXHAUST	WET EXHAUST - BRANCH ROUND DUCT	INDOOR	UP TO 24"	304 STAINLESS STEEL, WELDED CONSTRUCTION	NONE	
EXHAUST	WET EXHAUST - BRANCH SQUARE DUCT	INDOOR	ALL	304 STAINLESS STEEL, WELDED CONSTRUCTION	NONE	

ALL DUCT SHALL BE FABRICATED, INSTALLED AND INSULATED PER SMACNA GUIDELINES, 2016 CALIFORNIA MECHANICAL CODE & 2016 CALIFORNIA TITLE 24 STANDARDS.

CONSULTANTS

NO. DESCRIPTION DATE

CLIENT

PROJECT

ADDRESS

PROJECT NO.

SCALE

TITLE

MECHANICAL - SCHEDULES

M0.2

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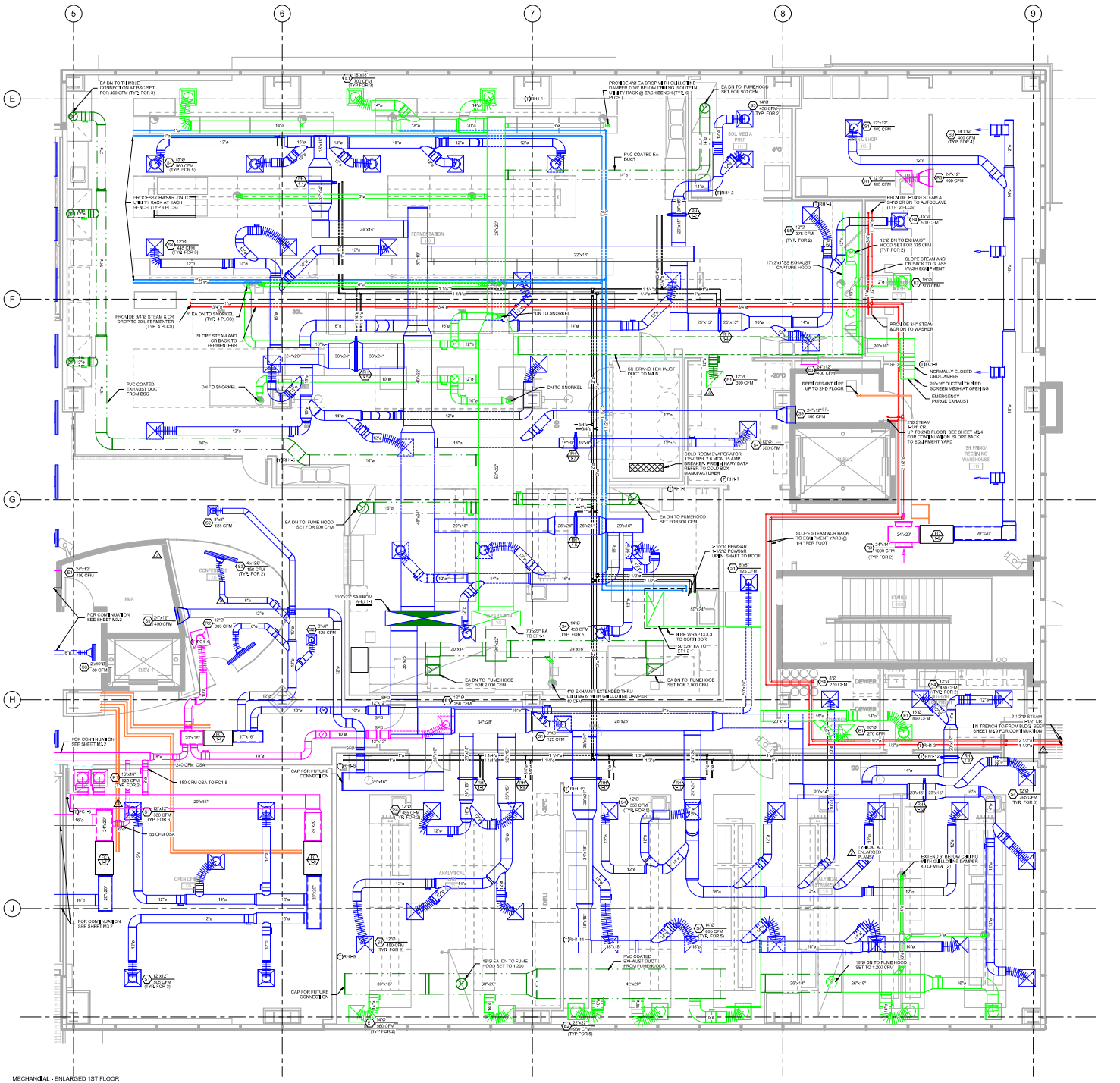

1 MECHANICAL - ENLARGED 1ST FLOOR PLAN - AREA A
1/4" = 1'-0"

GENERAL NOTES

1. SEE SHEET M0.1 FOR ADDITIONAL GENERAL NOTES.
2. CONTRACTOR TO PROVIDE COORDINATED SHOP DRAWINGS OF MECHANICAL DUCTWORK TO ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK.
3. PROVIDE AIR BALANCING DAMPERS AT ALL BRANCH CONNECTIONS TO SUPPLY, RETURN AND EXHAUST DIFFUSERS AND GRILLES. BALANCE DAMPERS SHALL BE CONSTRUCTED OF 22 GAUGE METAL, IN LAR TO SYSTEM THAT IT IS BEING INSTALLED IN. DAMPER SHALL BE SECURED TO DUCTWORK WITH BRACKET AND LOCKING NUT. DAMPER BLADE TO BE CONSTRUCTED OF 20 GAUGE MATERIAL WITH STRENGTHENING CRIMP ACROSS CENTER.
4. PROVIDE TURNING VANES IN ALL RECTANGULAR ELBOWS.
5. PROVIDE LOW LOSS TEES AT ALL BRANCH CONNECTIONS WHETHER SHOWN OR NOT.
6. CONTRACTOR TO BALANCE ALL PIPING AND DUCTWORK TO INDICATED FLOWS ON PLANS. PROVIDE TEST AND BALANCE REPORTS TO ENGINEER.
7. PROVIDE SPCO'S ON ALL DUCT PENETRATIONS THRU FIRE RATED WALLS AND/OR FLOORS. COORDINATE LOCATION WITH ARCHITECTURAL PLANS.
8. PROVIDE FIRESTOPPING AND FIRE CAULKING AT ALL PIPE PENETRATIONS THRU RATED WALLS AND/OR FLOORS.
9. SEE SHEET M5.0 FOR TYPICAL INSTALLATION DETAILS.

NORTH

CONSULTANTS

KEY PLAN

AREA OF WORK

NO.	DESCRIPTION	DATE

CLIENT

PROJECT

ADDRESS

PROJECT NO.

SCALE As indicated

TITLE

MECHANICAL - ENLARGED 1ST FLOOR PLAN - AREA A

M3.1

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PIPE MATERIAL SCHEDULE

SERVICE DESIGNATION	SERVICE DESCRIPTION	INSULATION	PIPING MATERIAL
RO	REVERSE OSMOSIS	N/A	POLYPROPYLENE
DI	DEIONIZED WATER	N/A	POLYPROPYLENE
LA	LAB AIR	N/A	TYPE L ACR COPPER TUBING, CLEANED FOR OXYGEN SERVICE
LV	LAB VACUUM	N/A	TYPE L COPPER TUBING, CLEANED FOR OXYGEN SERVICE
N2	NITROGEN	N/A	TYPE L ACR COPPER TUBING, CLEANED FOR OXYGEN SERVICE
LN2	LIQUID NITROGEN	VACUUM JACKETED	VACUUM INSULATED PIPING WITH JACKET
W	SANITARY WASTE	N/A	CAST IRON, ABS OR PVC
V	SANITARY VENT	N/A	CAST IRON, RUBBER ABOVE GRADE
IW	INDUSTRIAL WASTE	N/A	POLYPROPYLENE PIPE, SOCKET FUSION WELDED PIPING WITHIN FUMEHOODS SHALL BE PLENUM RATED
IV	INDUSTRIAL VENT	N/A	POLYPROPYLENE PIPE, SOCKET FUSION WELDED PIPING WITHIN FUMEHOODS SHALL BE PLENUM RATED
DCW	DOMESTIC COLD WATER	N/A	TYPE L COPPER, SOLDERED 95/5
DHW	DOMESTIC HOT WATER	1" THICK, R=4.2	TYPE L COPPER, SOLDERED 95/5
ICW	INDUSTRIAL COLD WATER	N/A	TYPE L COPPER, SOLDERED 95/5
IHW	INDUSTRIAL HOT WATER	1" THICK, R=4.2	TYPE L COPPER, SOLDERED 95/5
ISW	INDUSTRIAL SOFT COLD WATER	N/A	TYPE L COPPER, SOLDERED 95/5
ISHW	INDUSTRIAL SOFT HOT WATER	1" THICK, R=4.2	TYPE L COPPER, SOLDERED 95/5
CD	CONDENSATE PIPING	1/2" THICK, R=4.2	TYPE M COPPER, SOLDERED 95/5
G & MPG	NATURAL GAS PIPING (ABOVE GRADE)	N/A	UP TO 2", SCHEDULE 40 SLACK IRON, PIPE THREADED FITGS, 2 1/2" AND UP, SCHEDULE 40 BLACK IRON PIPE WELDED FITTINGS
G & MPG	NATURAL GAS PIPING (BELOW GRADE)	N/A	2" AND LESS, BLACK STEEL, FACTORY COATED WITH CONTINUOUS SEAM-LESS HDPE DENSITY POLYETHYLENE TYPE A MINIMUM THICKNESS OF 23 MILS

NOTE: NO CPVC PIPING WILL BE USED FOR POTABLE WATER SYSTEMS

COMPLIANCE NOTES

1. PIPING AND DUCTWORK SHALL BE INSULATED CONSISTENT WITH THE REQUIREMENTS OF SECTION 118, 123, AND 124 OF C.C.R. AND TABLE 6-A3 & 6-B OF THE 2010 C.M.C.
2. LAVATORY FAUCETS IN REST ROOMS SHALL BE THE SELF-CLOSING TYPE.
3. LAVATORY FAUCETS TO BE 0.5 GPM MAX.
4. NEW TOILETS TO BE ULTRA LOW FLUSH TYPE, 1.6 GPF.
5. SINK FAUCETS SHALL BE 2.2 GPM MAXIMUM.
6. URINALS TO BE 1.0 GPF MAX.
7. WATER CLOSETS SHALL BE THE ULTRA LOW FLOW TYPE, 1.6 GPF, MAXIMUM.
8. SHOWERS SHALL BE PROVIDED WITH MIXING VALVES PER SECTION 418 OF THE 2013 CPC.
9. CROSS-CONNECTION PROTECTION SHALL BE PROVIDED AT ALL POTABLE WATER SUPPLIED APPLIANCES AND EQUIPMENT (OTHER THAN THOSE LISTED IN INFORMATION BULLETIN 1003) AS REQUIRED TO CONFORM TO THESE CODES. WILL BE DONE AT PLUMBING ROUGH.
10. SEMI-SIZE WATER HEATING EQUIPMENT SHALL MEET ALL OF THE REQUIREMENTS OF THE APPLICABLE ENERGY STANDARDS AND SHALL BE CURRENTLY LISTED AS CERTIFIED BY THE C.E.C.
11. PROVIDE VACUUM BREAKERS AT HOSE BIBBS.
12. LABEL MEDIUM PRESSURE GAS PIPING EVERY 5 FEET.
13. STATE HEALTH CODE SEC. 17921.9 BANS THE USE OF CHLORINATED POLYVINYL CHLORIDE (CPVC) FOR INTERIOR WATER SUPPLY PIPING.
14. CHEMICAL WASTE PIPING SHALL COMPLY WITH SECTION 811.0 OF THE 2010 CPC.
15. FLOOR DRAINS OR SIMILAR TRAPS DIRECTLY CONNECTED TO THE DRAINAGE SYSTEM AND SUBJECT TO INFREQUENT USE SHALL BE PROVIDED WITH AN APPROVED AUTOMATIC MEANS OF MAINTAINING THEIR WATER SEALS.
16. SIZING OF DRAIN AND VENT PIPING MATERIALS SHALL COMPLY WITH 2010 CALIFORNIA PLUMBING CODE SECTIONS 703.0 AND 903.2
17. SEMI-SIZE WATER HEATING SYSTEMS AND EQUIPMENT SHALL COMPLY WITH ENERGY EFFICIENCY STANDARDS, SECTION 113.
18. WATER HEATER PRESSURE AND TEMPERATURE RELIEF DRAINS THAT TERMINATE OUTSIDE OF THE BUILDING SHALL COMPLY WITH SECTION 608.5 OF THE 2013 CALIFORNIA PLUMBING CODE.
19. PROVIDE EXPANSION TANK OR OTHER APPROVED METHOD OF RELIEVING PRESSURE PER SECTION 608.3 OF THE 2010 CALIFORNIA PLUMBING CODE.
20. EACH WATER HEATER SHALL BE ANCHORED OR STRAPPED TO RESIST HORIZONTAL DISPLACEMENT DUE TO EARTHQUAKE MOTION PER SECTION 508.2 OF THE 2013 CALIFORNIA PLUMBING CODE.
21. EACH NON-STORAGE INSTANTANEOUS WATER HEATER HAVING AN INSIDE DIAMETER OF NOT MORE THAN 3 INCHES, WATER HEATERS NOT EXCEEDING ONE GALLON SHALL BE PROVIDED WITH AN EXPANSION TANK OR OTHER APPROVED METHOD OF RELIEVING PRESSURE PER SECTION 608.3 OF THE 2013 CALIFORNIA PLUMBING CODE.
22. ADA WATER CLOSET, LAVATORY, AND SHOWER UNIT SHALL MEET THE AMERICAN DISABILITIES ACT GUIDELINES AND CALIFORNIA CODE TITLE 24.
23. THE HEIGHT OF ACCESSIBLE WATER CLOSETS SHALL BE A MINIMUM OF 17 INCHES AND A MAXIMUM OF 19 INCHES MEASURED TO THE TOP OF THE TOILET SEAT. CONTROLS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. CONTROLS FOR FLUSH VALVES SHALL BE MOUNTED ON THE WIDE SIDE OF TOILET AREAS, NO MORE THAN 44 INCHES ABOVE THE FLOOR. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 LBS.
24. WHERE URINALS ARE PROVIDED, AT LEAST ONE IN EACH MULTIPLE USER TOILET ROOM SHALL BE STALL TYPE OR SHALL BE WALL HUNG WITH THE RIM NOT MORE THAN 17 INCHES ABOVE THE FLOOR. SHALL BE PROVIDED WITH FLUSH CONTROLS LOCATED NOT MORE THAN 44 INCHES ABOVE THE FLOOR.
25. FLUSH CONTROLS SHALL BE HAND OPERATED AND SHALL BE MOUNTED NO MORE THAN 44 INCHES ABOVE THE FLOOR.
26. FAUCET CONTROLS AND OPERATING MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 LBS.
27. HOT WATER AND DRAIN PIPES UNDER LAVATORIES SHALL BE INSULATED OR OTHERWISE COVERED. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES.
28. FUME HOODS SHALL HAVE LINERS WITH LIPS TO PREVENT DRAINAGE OF FUME HOOD SURFACES INTO CUP SINKS.
29. ROUTING AND TERMINATION OF WATER HEATER FLUES SHALL COMPLY WITH CHAPTERS OF THE 2010 CALIFORNIA PLUMBING CODE.
30. A WATER HEATER PRESSURE AND TEMPERATURE RELIEF DRAIN THAT TERMINATES OUTSIDE THE BUILDING SHALL COMPLY WITH SECTION 608.5 OF THE 2010 CALIFORNIA PLUMBING CODE.
31. SAN TARY SYSTEM WASTE LINES SHALL BE SIZED BY AN APPROVED PLUMBING AGENCY.
32. POTABLE WATER PIPING MATERIAL SHALL COMPLY WITH SECTION 604.0 OF THE 2010 CALIFORNIA PLUMBING CODE.
33. GAS PIPING MATERIAL SHALL COMPLY WITH SECTION 1210.0 OF THE 2010 CALIFORNIA PLUMBING CODE.
34. ROUTING AND TERMINATION OF WATER HEATER FLUES SHALL COMPLY WITH CHAPTER 5 OF THE 2010 CALIFORNIA PLUMBING CODE.
35. COMBUSTION WASTE AND VENT SYSTEMS SHALL COMPLY WITH SECTION 801.0 AND APPENDIX A OF THE 2010 CALIFORNIA PLUMBING CODE.
36. CHEMICAL WASTE PIPING SHALL COMPLY WITH SECTION 811.0 OF THE 2010 CALIFORNIA PLUMBING CODE.
37. INSTALLATION OF FIXTURES SHALL COMPLY WITH CHAPTER 4 OF THE 2010 CALIFORNIA PLUMBING CODE.

TABLE 5.303.6 STANDARDS FOR PLUMBING FIXTURES AND FITTINGS

WATER CLOSETS (TOILETS) - FLUSHOMETER VALVE-TYPE SINGLE FLUSH, MAXIMUM FLUSH VOLUME	ASME A112.19.2/CSA B45.1 - 1.28 GAL
WATER CLOSETS (TOILETS) - FLUSHOMETER VALVE-TYPE DUAL FLUSH, MAXIMUM FLUSH VOLUME	ASME A112.19.14 AND ICC EPA WATERSENSE TANK-TYPE HIGH EFFICIENCY TOILET SPECIFICATION - 1.28 GAL
WATER CLOSETS (TOILETS) - TANK TYPE	ICC EPA WATERSENSE TANK-TYPE HIGH EFFICIENCY TOILET SPECIFICATION
URINALS, MAXIMUM FLUSH VOLUME	ASME A112.19.2/CSA B45.1 - 1.0 GALLONS
URINALS, NONWATER URINALS	ASME A112.19.19 PERFORMANCE AND 2012 NSF/ANSI 372/LEAD FREE
PUBLIC LAVATORY FAUCETS, MAXIMUM FLOW RATE	ASME A112.18.1/CSA B125.1
PUBLIC METERING SELF-CLOSING FAUCETS, MAXIMUM WATER USE	ASME A112.18.1/CSA B125.1

NOTES:
PLUMBING FIXTURES (WATER CLOSETS & URINALS) AND FITTINGS (FAUCETS AND SHOWERHEADS) SHALL MEET THE STANDARDS REFERENCED IN TABLE 5.303.6 OF SECTION 5.3 OF THE 2010 GREEN CODE.

PARTIAL PLUMBING SPECIFICATIONS

PART 1 - GENERAL

GENERAL AND SUPPLEMENTARY CONDITIONS AND OTHER DIVISIONS - 1 SPECIFICATION SECTIONS, APPLY TO WORK OF THIS SECTION.

WORK SHALL INCLUDE LABOR AND MATERIALS REQUIRED FOR THE COMPLETION OF A FULLY OPERATING PLUMBING SYSTEM INCLUDING BUT NOT NECESSARILY LIMITED TO: EXCAVATION, INSTALLATION, BACKFILLING, COMPACTION, REQUIRED TAXES, OBTAINING AND PAYING FOR REQUIRED LICENSES, PERMITS, FEES, INSPECTIONS, METERS AND CONNECTIONS, WATER DISTRIBUTION, VENTS AND WASTES, FIXTURES AND ROUGHING IN AND CONNECT CONDENSATE TO OWNER-FURNISHED AND MECHANICAL APPLIANCES.

DURING PROGRESS OF THE WORK, MAINTAIN AN ACCURATE RECORD OF CHANGES MADE FROM THE PLANS, PRESENT A PROFESSIONALLY DONE REPRODUCIBLE PLAN TO ARCHITECT REFLECTING CHANGES.

PART 2 - PRODUCTS

USE ONLY NEW FIRST CLASS MATERIALS. EQUIPMENT TO BEAR LABEL WITH NAMEPLATE. ELECTRICAL EQUIPMENT TO BE UL LISTED, WHERE REQUIRED TO BE STATE FIRE MARSHALL APPROVED.

INSULATION SHALL HAVE A FLAME SPREAD OF NOT MORE THAN 25 AND A SMOKE DENSITY NOT EXCEEDING 50.

SOIL, WASTE, AND VENT PIPING WITHIN BUILDINGS: SERVICE WEIGHT CAST IRON NO-HUB SOIL PIPE UNLESS OTHERWISE NOTED. MAKE UP WITH COMPRESSION TYPE FITTINGS AND STAINLESS STEEL CLAMP AND A SHIELD ASSEMBLIES AND NEOPRENE JOINTS.

HOT AND COLD WATER PIPING ABOVE FLOOR SHALL BE TYPE "L" HARD-DRAWN COPPER TUBE MADE UP WITH 95-5 SOLDER.

CONDENSATE DRAIN AND REJECT WASTE PIPING: ABOVE GRADE SHALL BE DWV COPPER WITH DWV DRAINAGE TYPE FITTINGS, PVC MAY BE USED AS APPROVED BY JURISDICTIONAL AUTHORITIES.

GAS PIPING SHALL BE SCHEDULE 40 BLACK STEEL PIPE (ASTM A120) WITH 150 PSI BLACK BANDED MALLEABLE IRON SCREWED FITTINGS AND PLAY PATTERN COUPLINGS. 1 1/4 INCHES AND LARGER PIPING MAY BE BUTT WELDED, COAT AND WRAP BURIED PIPING.

LOOSE KEY OPERATED, FINISHED WITH CHROME PLATE AND BRONZE OUTSIDE. ALL HOSE BIBS SHALL HAVE BRASS OR VACUUM BREAKERS. CRANE 232 GAS COCK SHALL BE USED.

PIPE SLEEVES SHALL BE "ADJUSTO-CRETE" OR EQUAL. PROVIDE BAC CHROME ESCUTCHEONS IN FINISHED AREAS.

HANGERS AND SUPPORTS SHALL BE GRINNEL OR EQUAL. PROVIDE LATERAL BRACING WHERE HANGERS 18" LONG, ISOLATE HANGERS AND SUPPORTS FROM PIPING WITH SIMCO TILE ISOLATORS, INSULATE AT OPENINGS OF STRUCTURE WITH 1/2" FELT WRAP.

VENT FLASHING AT EACH VENT THROUGH THE ROOF SHALL BE HEAVY ANC GALVANIZED SHEET METAL WITH LEAD CHROMATE COATING.

CLEANOUTS: FLOOR CLEANOUTS: SMITH 4023, 4042. GRADE CLEANOUTS: SMITH 4295. WALL CLEANOUTS: SMITH 4650 IN TILE WALLS AND TOILET ROOMS AND 4532 IN OTHERS.

UNIONS ISOLATE ALL DISSIMILAR METAL WITH TEPCOR DIALECTRIC UNIONS. PROVIDE NSBCO 623 FOR 2" AND SMALLER AND FOR LARGER.

ACCESS PLATES: ACCESS PLATES SHALL BE PROVIDED AT CONCEALED VALVES AND EQUIPMENT, MILCOR OR EQUAL, HINGED, RATED TO MATCH CONSTRUCTION, PRIME COATED STEEL (EXCEPT SSN TOILET ROOMS AS SELECTED BY ARCHITECT, EQUIPPED WITH KEY LOCKING DEVICE.

FIXTURES AND EQUIPMENT: FIXTURES AND EQUIPMENT SHALL BE AS SPECIFIED AND SHALL BE COMPLETE WITH ALL STOPS, SUPPLIES, BACKING DISCS, CHROME PLATED BRONZE TRIM AND OTHER ITEMS NECESSARY FOR A COMPLETE, OPERABLE FIXTURE.

INSULATE HOT WATER PIPE ABOVE GRADE PER ADA AND TITLE 24 REQUIREMENTS.

PART 3 - EXECUTION

CODES: PERFORM ALL WORK ACCORDING TO ALL APPLICABLE CODES AND REGULATIONS. OBTAIN AND PAY FOR ALL PERMITS, FEES AND INSPECTIONS REQUIRED BY GOVERNING AUTHORITIES. ADDITIONAL WORK REQUIRED TO CONFORM TO THESE CODES SHALL BE DONE AT NO ADDITIONAL CHARGE.

SLOPE WASTE, DRAIN AND SEWER PIPING AT 1/4 INCH PER FOOT UNLESS OTHERWISE NOTED OR PERMITTED.

CUTTING AND PATCHING: DO ALL DRILLING, CUTTING AND PATCHING REQUIRED FOR THE INSTALLATION OF THE SAME MATERIALS AND WORKMANSHIP AS THE ORIGINAL WORK.

VERIFY FIXTURE AND EQUIPMENT LOCATIONS AND SERVICES WITH THE ARCHITECTURAL PLANS AND FURNISH AND CONNECT FIXTURES AND EQUIPMENT SHOWN THEREON. EQUIPMENT SHALL BE SECURELY ANCHORED TO THE STRUCTURE.

WALL-HUNG FIXTURES ON STUD WALLS SHALL BE SECURELY ATTACHED TO A 1/2" THICK BY 9" WIDE STEEL PLATE WHICH SHALL EXTEND TO AT LEAST ONE STUD BEYOND THE FIRST AND LAST FIXTURE MOUNTING POINTS. PLATE SHALL BE SHOP DRILLED WITH HOLES 1/16" LARGER THAN STUD BOLTS SUPPLIED WITH FIXTURE OR FIXTURE ARMS SPECIFIED. A JAM NUT SHALL BE SET TIGHT AGAINST FACE PLATE TO SECURE STUD. FIXTURE HANGER OR ARM SHALL BE SUPPORTED FREE OF FINISHED WALL BY MEANS OF SECOND SET OF JAM NUTS. PLATES SHALL BE SECURELY BOLTED TO EACH STUD CROSSED WITH 1/4" DIAMETER BY 2" STEEL BACKUP PLATES. FIXTURES WITH BACK, SPUD AND WITH SUPPORTING ARMS, SHALL IN ADDITION TO THE ABOVE SPECIFIED PLATES, HAVE FIXTURE HANGERS SECURELY ATTACHED BY A 2" BY 6" WOOD BACKING.

EACH INDIVIDUAL FIXTURE SUPPLY SHALL BE PROVIDED WITH CHROME PLATED LOOSE KEY, IPS, STOP VALVE. DELIVER LOOSE KEYS TO THE OWNER.

NO RUBBER PADDING OR COMPOSITION SEAL SHALL BE INSTALLED. SUPPLIES SHALL BE METAL TO METAL ONLY.

PROVIDE PIPING CONNECTIONS TO EQUIPMENT PROVIDED UNDER THE AIR CONDITIONING SECTION.

AFTER PRELIMINARY FLUSHING OF THE SYSTEM CHLORINATE THE ENTIRE POTABLE WATER IN ACCORDANCE WITH THE CURRENT RECOMMENDATIONS OF THE AMERICAN WATER WORKS ASSOCIATION. USE CHLORINATE ONLY WHEN THE BUILDINGS ARE UNOCCUPIED. THEN THOROUGHLY FLUSH THE ENTIRE POTABLE WATER SYSTEM.

FLUSH WATER SYSTEMS CLEAN AND MAKE TESTS REQUIRED BY JURISDICTIONAL AUTHORITIES. MAKE ADJUSTMENTS REQUIRED TO ELIMINATE NOISE AND VIBRATION AS REQUIRED FOR APPROVAL BY THE ARCHITECT.

SEAL PENETRATIONS OF RATED BARRIERS BY PIPE AND WIRE WITH SMOKE BARRIER CAULK.

DAMAGED AND UNUSED MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE.

WATER PRESSURE CALCULATION

PRESSURE AT STREET	=	100	PSI
PRESSURE AFTER METER	=	90	PSI
PRESSURE AFTER BACKFLOW & REGULATOR	=	80	PSI
HIGHEST FIXTURE	=	25	FT
PRESSURE REQUIRED AT MOST REMOTE OUTLET	=	25	PSI
FURTHEST FIXTURE FROM METER	=	500	FT
$\frac{80\ PSI - [.25 \times (25' \times 2.43)] \times 100}{500}$	=	6.85 PSI/100 FEET (MAXIMUM ALLOWABLE PIPING PRESSURE LOSS)	

TABLE 5.303.2.3 PLUMBING FIXTURE FLOW RATES

FIXTURE TYPE	FLOW RATE	FLOW RATE
SHOWERHEADS	2.5 GPM @ 80 PSI	2.0 GPM @ 60 PSI
LAVATORY FAUCETS - NON RESIDENTIAL	0.5 GPM @ 60 PSI	0.4 GPM @ 60 PSI
KITCHEN FAUCETS	2.2 GPM @ 60 PSI	1.8 GPM @ 60 PSI
METERING FAUCETS	0.25 GALLONS/CYCLE	0.2 GALLONS/CYCLE
FLUSHOMETER VALVE WATER CLOSETS	1.6 GALLONS/FLUSH	1.28 GALLONS/FLUSH
URINALS	1.0 GALLONS/FLUSH	0.5 GALLONS/FLUSH

NOTES:
PER 2010 GREEN CODE SECTION 5.712.3.3 "WHEN A SHOWER IS SERVED BY MORE THAT ONE NEWLY INSTALLED SHOWERHEAD, THE COMBINED FLOW RATE OF ALL THE SHOWERHEADS CONTROLLED BY A SINGLE VALVE SHALL NOT EXCEED THE MAXIMUM FLOW RATE AT 20 PERCENT REDUCTION CONVERTED IN TABLE 5.303.2.3 OF THE SHOWERHEAD TO COMPLY WITH SECTION 5.4 THIS.

PLUMBING NOTES

THE PLUMBING SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL CONFORM TO THE LATEST ADOPTED CODES AND REGULATIONS HAVING JURISDICTION INCLUDING BUT NOT LIMITED TO, THE 2010 CALIFORNIA BUILDING, MECHANICAL AND PLUMBING CODES. IN CASE OF CONFLICTS WITH CODES, DRAWINGS OR SPECIFICATIONS, THE MOST STRINGENT REQUIREMENTS SHALL PREVAIL.

THESE DRAWINGS HAVE BEEN PREPARED WITH THE BEST STRUCTURAL AND ARCHITECTURAL INFORMATION AVAILABLE. IT SHALL BE UNDERSTOOD THAT EQUIPMENT LOCATIONS AND ROUTING OF PIPING MAY VARY FROM THAT SHOWN ON THE PLANS AS CONSTRUCTION PROCEEDS. IT IS THE CONTRACTORS RESPONSIBILITY TO:

A. NOTIFY THE PROJECT ENGINEER OF CONSTRUCTION RESTRICTIONS WHICH MAKE VARIATIONS FROM THE PLANS NECESSARY.

THESE DRAWINGS DO NOT INCLUDE NECESSARY SAFETY REQUIREMENTS. THE CONTRACTOR SHALL COMPLY TO THE SAFETY REQUIREMENTS AS SET FORTH BY THE GENERAL CONTRACTOR AND LOCAL AUTHORITIES HAVING JURISDICTION.

COORDINATE SHUT-DOWNS OF BUILDING SYSTEMS WITH OWNER'S REPRESENTATIVE AND GENERAL CONTRACTOR PRIOR TO WORK.

PLUMBING WORK SHALL BE INSTALLED SO AS TO AVOID INTERFERENCE WITH ELECTRICAL EQUIPMENT, MECHANICAL EQUIPMENT AND STRUCTURAL MEMBERS.

CONNECTION BETWEEN INCOMPATIBLE MATERIALS ABOVE GRADE AND INSIDE BUILDING SHALL BE MADE WITH TWO (2) DIELECTRIC UNIONS SEPARATED BY A TWELVE INCH (12") SECTION OF RED BRASS PIPE.

PIPING SHALL BE SUPPORTED WITH HANGERS AND BRACKETS WHICH PROVIDE ISOLATION FROM FRAMING, CONTACT BETWEEN PIPING AND SUPPORT SHALL BE LINED WITH PLASTIC OR FELT.

ROOF, FLOOR AND WALL PENETRATIONS SHALL BE SEALED WATERTIGHT.

SEE ARCHITECTURAL DRAWINGS FOR ACOUSTURE LOCATIONS AND MOUNTING HEIGHTS. INSULATE EXPOSED HOT WATER AND DRAIN PIPING BELOW HANDICAP LAVATORIES AND BENDS WITH INSULATING TAPE AND OFFSET P-TRAP AGAINST WALL.

WASTE, SOIL, VENT AND CONDENSATE PIPING SHALL SLOPE AT 2% UNLESS APPROVED OTHERWISE BY THE OWNER'S REPRESENTATIVE AND THE AHJ AND THE LOCAL AUTHORITIES HAVING JURISDICTION.

HORIZONTAL CONDENSATE DRAIN PIPING FROM AIR CONDITIONING UNITS SHALL BE INSULATED WITH 1/2" THICK ARMAFLEX OR FIBERGLASS REINSULATION. SLIP REINSULATION AND SEAL BUTT JOINTS.

HOT WATER PIPING SHALL BE INSULATED WITH 1-1/2" THICK FIBERGLASS MOLDED INSULATION WITH K=0.27 BTU-IN/H SQ. FT. °F, OR LESS.

BUILDING DRAIN AND VENT PIPING MATERIAL SHALL COMPLY WITH SECTION 701 AND 903 OF THE CALIFORNIA PLUMBING CODE.

SANITARY SYSTEM MATERIALS SHALL BE LISTED BY AN APPROVED TESTING AGENCY.

CROSS CONNECTION PROTECTION SHALL BE PROVIDED AT ALL POTABLE WATER SUPPLIED APPLIANCES AND EQUIPMENT (OTHER THAN THOSE LISTED IN INFORMATION BULLETIN 1003).

PROVIDE PERMANENT VACUUM BREAKERS ON ALL HOSE BIBBS.

PROVIDE ANGLE STOP VALVES AT EACH SUPPLY LINE TO EACH FIXTURE.

WATER CLOSETS SHALL BE LOW-CONSUMPTION 1.28 GPM FLUSH CYCLE.

PUBLIC LAVATORY FAUCETS SHALL BE THE SELF-CLOSING TYPE.

SINK FAUCETS SHALL RESTRICT FLOW TO 2.2 GPM.

LAVATORY FAUCETS SHALL RESTRICT FLOW TO 2.2 GPM AND .25 GALLONS PER CYCLE.

SHOWER HEADS SHALL RESTRICT FLOW TO 2.5 GPM AND SHALL BE PROVIDED WITH MIXING VALVE CONTROLS.

HOT WATER HEATER, CONTROLS, AND SYSTEM SHALL MEET THE REQUIREMENTS OF CALIFORNIA EFFICIENCY STANDARD P400-06-005, SECTION 113 (a) AND (b).

NO CPVC PIPING WILL BE USED FOR POTABLE WATER SYSTEMS.

INSULATE HOT WATER PIPING PER CALIFORNIA EFFICIENCY STANDARDS AND 2010 CPC.

WATER HEATERS SHALL BE SECURED AS REQUIRED BY THE 2010 CPC.

WATER PIPING SYSTEM SHALL BE DISINFECTED BY CHLORINATION PER SECTION 609.

WATER PIPING SYSTEM TESTING SHALL BE PERFORMED PRIOR TO OCCUPANCY.

FLOOR DRAINS OR SIMILAR TRAPS DIRECTLY CONNECTED TO THE DRAINAGE SYSTEM AND SUBJECT TO INFREQUENT USE SHALL BE PROVIDED WITH AN APPROVED AUTOMATIC MEANS OF MAINTAINING THEIR WATER SEAL.

STATE HEALTH & SAFETY CODE BANS THE USE OF CHLORINATED POLYVINYL CHLORIDE (CPVC) FOR INTERIOR WATER SUPPLY PIPING. NO CPVC PIPING WILL BE USED FOR POTABLE WATER SYSTEMS.

ROOF ACCESS LADDER SHALL COMPLY WITH SECTION 904.10.3 OF THE 2010 CMC.

COORDINATE FIXTURE REQUIREMENTS WITH ARCHITECT PRIOR TO BID. ARCHITECT SHALL APPROVE FIXTURES INCLUDING COLOR PRIOR TO ORDER.

VERIFY RIGHT HAND OR LEFT HAND FIXTURE CONNECTIONS AND WATER CLOSET LEVER REQUIREMENTS PRIOR TO WORK. INSTALL FIXTURES AND EQUIPMENT PER MANUFACTURERS RECOMMENDATIONS.

LABEL MEDIUM PRESSURE GAS PIPING EVERY FIVE FEET.

REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL REQUIREMENTS.

PLUMBING SYSTEMS AND COMPONENTS SHALL COMPLY WITH "INSTANCE STANDARD 61 DRINKING WATER SYSTEM COMPONENTS" AND WITH CALIFORNIA ASSEMBLY BILL 1953 MOST LEAD FREE STANDARD. PRODUCTS MUST BEAR NSF CERTIFICATION FROM AN INDEPENDENT AND APPROVED, THIRD-PARTY TESTING ORGANIZATION.

REFER TO ARCHITECTURAL DIMENSIONS PLANS TO LOCATE SINKS, FLOOR SINKS, VENTS AND SERVICE UMBILICALS.

PLUMBING LEGEND

SYMBOL	ABBREV.	DESCRIPTION
	POC	POINT OF CONNECTION
S OR W	S OR W	SEWER OR WASTE ABOVE GRADE
S OR W	S OR W	SEWER OR WASTE BELOW GRADE
FCO	FCO	FLOOR CLEAN-OUT
WCO	WCO	WALL CLEAN-OUT
V	V	VENT
IW	IW	INDUSTRIAL LAB WASTE
IV	IV	INDUSTRIAL VENT
VAC	VAC	LAB VACUUM
DHW	DHW	DOMESTIC HOT WATER
DCW	DCW	DOMESTIC COLD WATER
ICW	ICW	INDUSTRIAL COLD WATER
IHW	IHW	INDUSTRIAL HOT WATER
IHWR	IHWR	INDUSTRIAL HOT WATER RETURN
N2	N2	NITROGEN
LA	LA	LAB COMPRESSED AIR
LN2	LN2	LIQUID NITROGEN
DIR	DIR	DEIONIZED WATER RETURN
DI	DI	DEIONIZED WATER SUPPLY
MPG	MPG	MEDIUM PRESSURE NATURAL GAS (5 PSI)
GAS	G	NATURAL GAS (LOW PRESSURE)
S.O.V.	S.O.V.	SHUT-OFF VALVE
		CHECK VALVE
	(E)	DENOTES EXISTING
	A/G	ABOVE GRADE
	B/G	BELOW GRADE
	FT	FLUSH TANK
	GPF	GALLONS PER FLUSH
	GPM	GALLONS PER MINUTE
	LAV	LAVATORY
	PSI	POUNDS PER SQUARE INCH
	QTY	QUANTITY
	TYP	TYPICAL
	VTR	VENT THRU ROOF

FIXTURE CALL OUT: FIXTURE TYPE / FIXTURE NUMBER

EQUIPMENT TAG: EQUIPMENT TYPE / EQUIPMENT ID

DETAIL CALL OUT: DETAIL NUMBER / SHEET NUMBER

FLOOR DRAIN/SINK QUANTITIES

TAG	DESCRIPTION	QUANTITY	REMARKS
FS-1 & FS-2	FLOOR SINK	20	
FD-1	FLOOR DRAIN	8	

COLD WATER PIPE SIZING CHART

PIPE SIZE	GPM	FIXTURE UNITS		VELOCITY
		FLUSH TANK	FLUSH VALVE	
3/4"	9	13	2.0	6 FPS
1"	17	24	3.75	6 FPS
1-1/4"	29	90	12.0	8 FPS
1-1/2"	40	86	25.0	8 FPS
2"	60	170	75.0	8 FPS
2-1/2"	120	180	360	8 FPS
3"	170	750	700	8 FPS

NOTES:
1. DO NOT SIZE ON FLOOR PLANS OR DIAGRAMS SHALL BE SIZED IN ACCORDANCE WITH THIS PIPE SIZING CHART (IPC, TABLE 709.1)
2. MAXIMUM FLOW VELOCITIES: 8 FT/SEC. FOR HOT WATER BRANCH PIPING AND BUILDING SUPPLY PIPING.

HOT WATER PIPE SIZING CHART

PIPE SIZE	GPM	FIXTURE UNITS	VELOCITY
		FLUSH TANK	
3/4"	7	9	5 FPS
1"	13	18	5 FPS
1-1/4"	19	28	5 FPS
1-1/2"	27	45	5 FPS
2"	45	103	5 FPS

NOTES:
1. DO NOT SIZE ON FLOOR PLANS OR DIAGRAMS SHALL BE SIZED IN ACCORDANCE WITH THIS PIPE SIZING CHART (IPC, TABLE 709.1)
2. MAXIMUM FLOW VELOCITIES: 8 FT/SEC. FOR HOT WATER BRANCH PIPING AND BUILDING SUPPLY PIPING.

PLUMBING SHEET INDEX

CONSULTANTS

NO. DESCRIPTION DATE

CLIENT

PROJECT

ADDRESS

PROJECT NO: 12317

SCALE: AS SHOWN

TITLE

PLUMBING LEGEND AND NOTES

P0.1

5/20/2016 4:08:05 PM

EQUIPMENT SCHEDULE

TAG	SERVICE	LOCATION	DESCRIPTION
WH 1	INDUSTRIAL HOT WATER	EQUIPMENT YARD	WATER HEATER: A.O. SMITH MODEL BTH-950, 100 GALLON STORAGE TANK, 320 GALLONS PER HOUR RECOVERY AT 90°F TEMPERATURE RISE, 250 MBH GAS INPUT. ELECTRICAL: 120V-1PH-60Hz
WH 1	DOMESTIC HOT WATER	SECOND FLOOR JANITOR'S CLOSET	WATER HEATER: A.O. SMITH MODEL BTH-950, 100 GALLON STORAGE TANK, 320 GALLONS PER HOUR RECOVERY AT 90°F TEMPERATURE RISE, 250 MBH GAS INPUT. ELECTRICAL: 120V-1PH-60Hz
CP 1	1ST FLR INDUSTRIAL HOT WATER RECIRCULATION	EQUIPMENT YARD	RECIRCULATION PUMP: GRUNDFOS MODEL UPS-43-44BF, BRONZE BODY, 3 SPEED PUMP WITH CHECK VALVE, 10 GPM @ 8 FT. H.D. (LOW SPEED), 10 GPM @ 13 FT. H.D. (HIGH SPEED). ELECTRICAL: 120 VOLTS, 1.8 AMPS, 1/6 HP MOTOR.
CP 2	2ND FLR INDUSTRIAL HOT WATER RECIRCULATION	EQUIPMENT YARD	RECIRCULATION PUMP: GRUNDFOS MODEL UPS-43-44BF, BRONZE BODY, 3 SPEED PUMP WITH CHECK VALVE, 10 GPM @ 8 FT. H.D. (LOW SPEED), 10 GPM @ 13 FT. H.D. (HIGH SPEED). ELECTRICAL: 120 VOLTS, 1.8 AMPS, 1/6 HP MOTOR.
CP 3	DOMESTIC HOT WATER RECIRCULATION	SECOND FLOOR JANITOR'S CLOSET	RECIRCULATION PUMP: GRUNDFOS MODEL UPS-43-44BF, BRONZE BODY, 3 SPEED PUMP WITH CHECK VALVE, 10 GPM @ 8 FT. H.D. (LOW SPEED), 10 GPM @ 13 FT. H.D. (HIGH SPEED). ELECTRICAL: 120 VOLTS, 1.8 AMPS, 1/6 HP MOTOR.
VP 1	1ST & 2ND LEVEL LABS	EQUIPMENT YARD	VACUUM PUMP: BUSCH MODEL TTMD-24LAB165, DUPLEX, (2) RA 0100 PUMPS AT 7.5 HP EACH, 117 ACFM, 22"Hg VACUUM, 200 GALLON TANK. COMPLETE WITH AUTO-PURGE FEATURE APPROX. WEIGHT = 1,200 LBS. ELECTRICAL: 460V-3-.-60Hz, (2) 7.5 HP MOTORS
AC 1 AND ST 1	1ST & 2ND LEVEL LABS	EQUIPMENT YARD	ENCLOSED SCROLL AIR COMPRESSOR: POWEREX MODEL SEO400740, 122 SCFM @ 100 PSIG, WITH SEPARATE HANSON 240 GALLON STORAGE TANK. APPROX. WEIGHT = 2,000 LBS. (AIR COMPRESSOR ONLY) ELECTRICAL: 460V-3'-60Hz, 40 HP MOTOR, 52 FLA.
RAD 1	1ST & 2ND LEVEL LABS	EQUIPMENT YARD	REFRIGERATED AIR DRYER: INGERSOLL RAND MODEL D212NC, 125 SCFM, 1.9 PSIG PRESSURE DROP, 1-1/2" INLET & OUTLET CONNECTIONS. APPROX. WEIGHT = 80 LBS. 120 VOLT-1PH-60Hz, 1.35 KW
AC 2	1ST & 2ND LEVEL LABS	EQUIPMENT YARD	RELOCATE OWNER'S EXISTING 25 HP AIR COMPRESSOR AND REFRIGERATED AIR DRYER TO NEW EQUIPMENT YARD AS SHOWN. AIR COMPRESSOR SHALL BE USED AS A BACK-UP SYSTEM. CONNECT INTO BUILDING COMPRESSED AIR SYSTEM AS SHOWN. EXISTING AIR COMPRESSOR IS AN INGERSOLL RAND MODEL IRN25H-5-CC, 208/230 VOLTS, 78.6 AMPS. REFRIGERATED AIR DRYER IS AN INGERSOLL RAND MODEL D212NC
DI 1 & RO 1	1ST & 2ND LEVEL LABS	EQUIPMENT YARD	DEIONIZED WATER SYSTEM: BY "PURETEC", THE SYSTEM SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING: A DUPLEX SOFTENER SYSTEM WITH BRINE TANK, (2) ACTIVATED CARBON BED EXCHANGE TANKS, 5 MICRON RO PRE-FILTER, 4 GPM RO SYSTEM WITH A 2 HP TYPE 304 SS MULTI-STAGE PUMP, 1,000 GALLON CONE BOTTOM STORAGE TANK WITH STEEL STAND, (2) 5 HP TYPE 316 SS DISTRIBUTION PUMPS, (8) 3.6 CU.FT. MIXED BED DI POLISHING TANKS, (2) POST POLISH DI FILTERS, A 254nm AMALGAM BULB ULTRA VIOLET STERILIZER, A 0.2 MICRON FINAL FILTER AND A MAIN CONTROL PANEL. ROTO METERS, QUALITY LIGHTS, SOLENOID VALVES, SENSORS, VALVES, TANK VENTS, LEVEL CONTROLS, FILTERS, FILTER CARTRIDGES, INTERCONNECTING PIPE AND FITTINGS AND CONTROL SYSTEM. ELECTRICAL DATA: RO SKID: 15 AMP DISCONNECT AT THE RO SYSTEM, 480V, 3 PHASE TO POWER RO PUMP WHICH DRAWS 5 AMPS AT 480V. DISTRIBUTION SKID: 30 AMP DISCONNECT AT THE CENTRAL CONTROL PANEL, 480V, 3 PHASE TO POWER DISTRIBUTION PUMP WHICH DRAWS 10 AMPS AT 480V. A SINGLE QUAD OR (2) DUPLEX 110V OUTLETS NEAR THE DI POLISH TANKS, WATER SOFTENER TANKS (RESIN & BRINE) AND THE CARBON EXCHANGE TANKS. POWER TO ONLY TO PROVIDE MINIMUM CONTROL POWER AND QUALITY LIGHTS (APPROX. 5 - 10 AMPS TOTAL)

LAB OUTLET SCHEDULE

TAG	DESCRIPTION
A 1	WATER SAVER GOOSENECK DEIONIZED WATER FAUCET MODEL L7853SC DECK MOUNT AND L7854SC PANEL MOUNT.
LV 1	WATER SAVER WITH NEEDLE VALVE, SINGLE HANDLE, REMOVABLE SERRATED HOSE NOZZLE, CHROME PLATED WITH COLOR COATED "VAC" BUTTON IDENTIFICATION
LA 1	WATER SAVER WITH NEEDLE VALVE, SINGLE HANDLE, REMOVABLE SERRATED HOSE NOZZLE, CHROME PLATED WITH COLOR COATED "AIR" BUTTON IDENTIFICATION
N2 1	WATER SAVER WITH NEEDLE VALVE, SINGLE HANDLE, REMOVABLE SERRATED HOSE NOZZLE, CHROME PLATED WITH COLOR COATED "N2" BUTTON IDENTIFICATION

PLUMBING FIXTURE SCHEDULE

TAG	DESCRIPTION	BRANCH PIPE CONNECTION SIZE				DESCRIPTION
		WASTE	VENT	CW	DHW	
WC 1	WATER CLOSET, ADA	3"	2"	1-1/4"	-	ZURN Z5615 ECO-VANTAGE HIGH EFFICIENCY TOILET (1.28 GPF), 17" RIM HEIGHT, VITREOUS CHINA, 1-1/2" TOP SPUD, 2" TRAPWAY, SIPHON JET ACTION, WALL MOUNTED, ZURN ZER6000 HIGH EFF. SENSOR OPERATED FLUSH VALVE AND Z5955SS-EL ELONGATED OPEN FRONT SEAT. PROVIDE WITH FIXTURE SUPPORT CARRIER, ADA COMPLIANT.
WC 2	WATER CLOSET	3"	2"	1-1/4"	-	ZURN Z5615 ECO-VANTAGE HIGH EFFICIENCY TOILET (1.28 GPF), 14" RIM HEIGHT, VITREOUS CHINA, 1-1/2" TOP SPUD, 2" TRAPWAY, SIPHON JET ACTION, WALL MOUNTED, ZURN ZER6000 HIGH EFF. SENSOR OPERATED FLUSH VALVE AND Z5955SS-EL ELONGATED OPEN FRONT SEAT. PROVIDE WITH FIXTURE SUPPORT CARRIER.
UR 1	ADA URINAL	2"	1-1/2"	3/4"	-	ZURN Z5798 ECOVANTAGE HIGH EFFICIENCY URINAL, VITREOUS CHINA, 3/4" TOP SPUD, 2"I.P.S. OUTLET WITH INTEGRAL TRAP. HIGH EFFICIENCY WASHOUT ACTION (1/8 GPF), VANDAL RESISTANT OUTLET STRAINER. ZER6000 BATTERY POWERED SENSOR TYPE FLUSHMETER VALVE, ADA COMPLIANT.
L 1	LAVATORY	2"	1-1/2"	3/4"	3/4"	ZURN Z5110, 20"x17" OVAL VITREOUS CHINA COUNTERTOP LAV, WITH Z6913-XL BATTERY POWERED ELECTRONIC SENSOR FAUCET. PROVIDE WITH NEW MIXING THERMOSTATIC MIXING VALVE, ACCESSORIES, GRID DRAIN, P-TRAP AND SUPPLIES.
SH 1	ADA SHOWER	2"	1-1/2"	3/4"	3/4"	SYMMONS MODEL H423-V ADA SHOWER WITH HAND SHOWER SPRAY HEAD, 5 FOOT FLEXIBLE METAL HOSE WITH IN-LINE VACUUM BREAKER AND WALL FLANGE, 30" VERTICAL BAR WITH ADJUSTABLE SLIDE. PROVIDE WITH FLOOR DRAIN AND SYMMONS S-4700 PRESSURE BALANCING MIXING VALVE AND SECONDARY VOLUME CONTROL LEVER WITH TRIM AND INTEGRAL SERVICE STOPS.
S 1	SINK	2"	1-1/2"	3/4"	3/4"	ELKAY MODEL PSLVR1917, 20 GAUGE, TYPE 304 STAINLESS STEEL, 19"x17", PROVIDE WITH SINGLE LEVER FAUCET FOR HOT & COLD WATER WITH 9" SPOUT, BASKET STRAINER, TAIL PIECE, P-TRAP, ANGLE STOPS AND SUPPLIES. IN-SINKERATOR 1/2 HP GARBAGE DISPOSER, PROVIDE AN IN-LINE WATER FILTER AND A SEPARATE DISPENSING FAUCET AT THE SINK, ALSO CONNECT ADJACENT COFFEE STATION TO FILTER.
S 2	SINK	2"	1-1/2"	3/4"	3/4"	ELKAY MODEL DLR332210, 18 GAUGE, TYPE 304 STAINLESS STEEL, 33"x22", DOUBLE BOWL, PROVIDE WITH SINGLE LEVER FAUCET FOR HOT & COLD WATER WITH 9" SPOUT, BASKET STRAINER, TAIL PIECE, P-TRAP, ANGLE STOPS AND SUPPLIES. IN-SINKERATOR 1/2 HP GARBAGE DISPOSER, PROVIDE AN IN-LINE WATER FILTER AND A SEPARATE DISPENSING FAUCET AT THE SINK, ALSO CONNECT ADJACENT COFFEE STATION TO FILTER.
EW 1	EYE WASH	-	-	3/4"	-	WATER SAVER FAUCET CO. MODEL EW849, DECK MOUNTED EYE WASH UNIT, 90° SWING-DOWN ACTIVATION, 2-GS-PLUS SPRAY HEADS WITH FLIP-TOP DUST COVERS, INTERNAL FLOW CONTROL AND FILTER TO REMOVE IMPURITIES, PLASTIC COVER AND LOCKING CLIP. TEST CARD IS CERTIFIED BY CSA TO MEET ANSI Z358.1. EYEWASH UNITS AT SCULLERY SINKS SHALL BE WATER SAVER MODEL EW848.
ESH 1	EMERGENCY SHOWER AND EYEWASH	2"	1-1/2"	1-1/4"	-	WATER SAVER FAUCET CO. MODEL SSBF2150, RECESSED SAFETY STATION WITH DRAIN PAN, STAINLESS STEEL SHOWER HEAD & ESCUTCHEON PLATE, HEAVY DUTY STAINLESS STEEL PANIC BAR WITH BLACK VINYL GRIP TO ACTIVATE SHOWER, 1" BRASS STAY-OPEN BALL VALVE WITH UNIONS ON INLET & OUTLET (2) FS-PLUS SPRAY HEADS, STAINLESS STEEL DRAIN PAN & CABINET, INTERNAL FLOW CONTROL AND FILTER TO REMOVE IMPURITIES, CERTIFIED BY CSA TO MEET ANSI Z358.1.
ESH 1	EMERGENCY SHOWER AND EYEWASH	-	-	1-1/4"	-	WATER SAVER FAUCET CO. MODEL SS902BC, SAFETY STATION WITH STAY-OPEN SHOWER AND EYE WASH VALVES, STAINLESS STEEL SHOWER HEAD AND CONNECTION ELBOW, STAINLESS STEEL BOWL WITH COVER, 1" BRASS STAY-OPEN BALL VALVE FOR SHOWER AND 1/2" FOR EYEWASH, (2) GS-PLUS SPRAY HEADS INTERNAL FLOW CONTROL AND FILTER TO REMOVE IMPURITIES, CERTIFIED BY CSA TO MEET ANSI Z358.1. PROVIDE WITH BLEED VALVE ON COLD WATER INLET.
LS 1	LAB SINK	2"	1-1/2"	3/4"	3/4"	ELKAY MODEL DLR122122, 31"x22"x12 DEEP, TOP MOUNT 18 GA., TYPE 316 STAINLESS STEEL, WITH WATER SAVER MODEL L4111VB-BH-WS SWING SPOUT FAUCET WITH VACUUM BREAKER, SERRATED HOSE NOZZLE AND ADDITIONAL STANDARD AERATOR, PROVIDE WITH TAIL PIECE, P-TRAP, ANGLE STOPS, SUPPLIES, COORDINATE SINK SIZE WITH LAB FURNISHING DRAWINGS.
LS 2	LAB SINK	2"	1-1/2"	3/4"	3/4"	ELKAY MODEL WNSF8248LR #14 GAUGE, TYPE 316 STAINLESS STEEL SINK, 96"x27"-1/2"x44"H OVERALL DIMENSIONS (36" TOP OF SINK), WITH TWO 24"x24"x14 DEEP BOWLS AND A 24"X24" LEFT AND 24"X24" RIGHT DRAIN BOARD. PROVIDE SINK WITH (2) LOW-FLOW FAUCETS AND (2) DI FAUCETS. PROVIDE WATER SAVER MODEL L7711VB-BH-WS SWING SPOUT FAUCET WITH VACUUM BREAKER, WRISTBLADE HANDLES, SERRATED HOSE NOZZLE AND ADDITIONAL STANDARD AERATOR. PROVIDE WITH TAIL PIECE, P-TRAP, ANGLE STOPS, SUPPLIES, SECONDARY FAUCET SHALL BE WATER SAVER MODEL PR1711-116WS POLISHED CHROME PRE-RINSE FAUCET WITH VACUUM BREAKER, 39" STAINLESS STEEL SPRING HOSE AND PRE-RINSE HAND HELD VALVE. WALL SUPPORT AND HOSE HOOK. COORDINATE SINK REQUIREMENTS WITH LAB FURNISHING DRAWINGS.
LS 3	LAB SINK	2"	1-1/2"	3/4"	3/4"	ELKAY MODEL WNSF8124L #14 GAUGE, TYPE 316 STAINLESS STEEL SINK, 49-1/2"x24"x24"H OVERALL DIMENSIONS (36" TOP OF SINK), WITH ONE 24"x24"x14 DEEP BOWL AND A 24"X24" LEFT DRAIN BOARD. PROVIDE WITH WATER SAVER MODEL L7711VB-BH-WS SWING SPOUT FAUCET WITH VACUUM BREAKER, WRISTBLADE HANDLES, SERRATED HOSE NOZZLE AND ADDITIONAL STANDARD AERATOR. PROVIDE WITH TAIL PIECE, P-TRAP, ANGLE STOPS, SUPPLIES, COORDINATE SINK REQUIREMENTS WITH LAB FURNISHING DRAWINGS.
CS 1	CUP SINK	2"	1-1/2"	3/4"	-	CUP SINK PROVIDED WITH FUME HOOD, BY OTHERS. PROVIDE A VACUUM BREAKER ON WATER INLET.
MS 1	MOP SINK	3"	2"	3/4"	3/4"	FIAT MSB-2424, 24"x24"x10" MOLDED STONE WITH AMERICAN STANDARD 8344.111 FAUCET WITH PAIL HOOK, 3/4" HOSE END, BRACE, VACUUM BREAKER, GRID DRAIN AND INTEGRAL STOPS AND STRAINER.
HB 1	HOSE BIBB	-	-	3/4"	3/4"	ACORN RECESSED HOT & COLD HOSE BOX MODEL 8156 WITH WALL FLANGE, BOX SHALL BE 18 GAGE TYPE 304 STAINLESS STEEL, VALVES SHALL BE CARTRIDGE-OPERATED WITH WHEEL HANDLE AND SCREWDRIVER STOPS. BOX SHALL HAVE HOT AND COLD WATER INLETS AND A SINGLE HOSE CONNECTION OUTLET WITH A VACUUM BREAKER.
HB 2	HOSE BIBB	-	-	3/4"	-	ACORN MODEL 8121 WITH VACUUM BREAKER AND LOOSE KEY HANDLE.
SS 1	SERVICE SINK	3"	2"	3/4"	3/4"	ZURN MODEL Z5888 24"x20" CAST IRON SERVICE SINK WITH 12" BACKSPLASH AND 8" CENTER FAUCET HOLES. PROVIDE WITH Z843M1 CHROME PLATED FAUCET WITH VACUUM BREAKER, PAIL HOOK, 3/4" HOSE END AND BRACE. PROVIDE SINK WITH HANGER PLATE, U-TYPE RIM GUARD, 3" CAST IRON EXPOSED TRAP STAND WITH CLEAN-OUT.
FS 1	FLOOR SINK	2", 3" OR 4"	2"	-	-	ZURN Z1902, CAST IRON FLOOR SINK, 12"x12"x10" DEEP, WITH GRATE. REFER TO PLANS FOR PIPE CONNECTION SIZE. UNLESS OTHERWISE NOTED, SIZE SHALL BE 3" MINIMUM AND CALCULATED BASED ON EQUIPMENT SERVED, WHICH EVER GREATER.
FS 2	FLOOR SINK	2", 3" OR 4"	2"	-	-	ZURN Z1900, CAST IRON FLOOR SINK, 12"x12"x6" DEEP, WITH GRATE. REFER TO PLANS FOR PIPE CONNECTION SIZE. UNLESS OTHERWISE NOTED, SIZE SHALL BE 3" MINIMUM AND CALCULATED BASED ON EQUIPMENT SERVED, WHICH EVER GREATER.
FS 3	FLOOR SINK	2"	2"	-	-	ZURN Z1910, CAST IRON FLOOR SINK, 6"x8"x6" DEEP, WITH GRATE. REFER TO PLANS FOR PIPE CONNECTION SIZE. UNLESS OTHERWISE NOTED, SIZE SHALL BE 2" MINIMUM AND CALCULATED BASED ON EQUIPMENT SERVED, WHICH EVER GREATER.
FD 1	FLOOR DRAIN	2"	1-1/2"	1/2"	-	ZURN ZN-415B-VP 2" CAST IRON ENAMELED WITH DOUBLE DRAINAGE FLANGE, WEEP HOLES, REVERSIBLE, ADJUSTABLE CLAMPING COLLAR, NICKEL BRONZE STRAINER THREADED COLLAR, BOTTOM OUTLET WITH TRAP PRIMER CONNECTION.
TD 1	TRENCH DRAIN	3"	2"	1/2"	-	ZURN CAST IRON WITH POLISHED BRONZE TOP. PROVIDE WITH 1/2" TRAP PRIMER FITTING AT TAILPIECE.
TP 1	TRAP PRIMER	-	-	1/2"	-	PRECISION PLUMBING PRODUCTS PRIME-RITE MODEL PR-500, AUTOMATICALLY ACTIVATED, CORROSION RESISTANT BRASS, 1/2" INLET & OUTLET, USE SS-4 SUPPLY TUBE AND DISTRIBUTION UNIT WHEN SUPPLYING MORE THAN ONE FLOOR DRAIN.

NOTES:
LAB SINKS SHALL BE TYPE 316 STAINLESS STEEL. COORDINATE LEAD TIME WITH MANUFACTURER.

CONSULTANTS

NO.	DESCRIPTION	DATE

CLIENT

PROJECT

ADDRESS

PROJECT NO 12317

SCALE AS SHOWN

TITLE

PLUMBING EQUIPMENT SCHEDULES

P0.2

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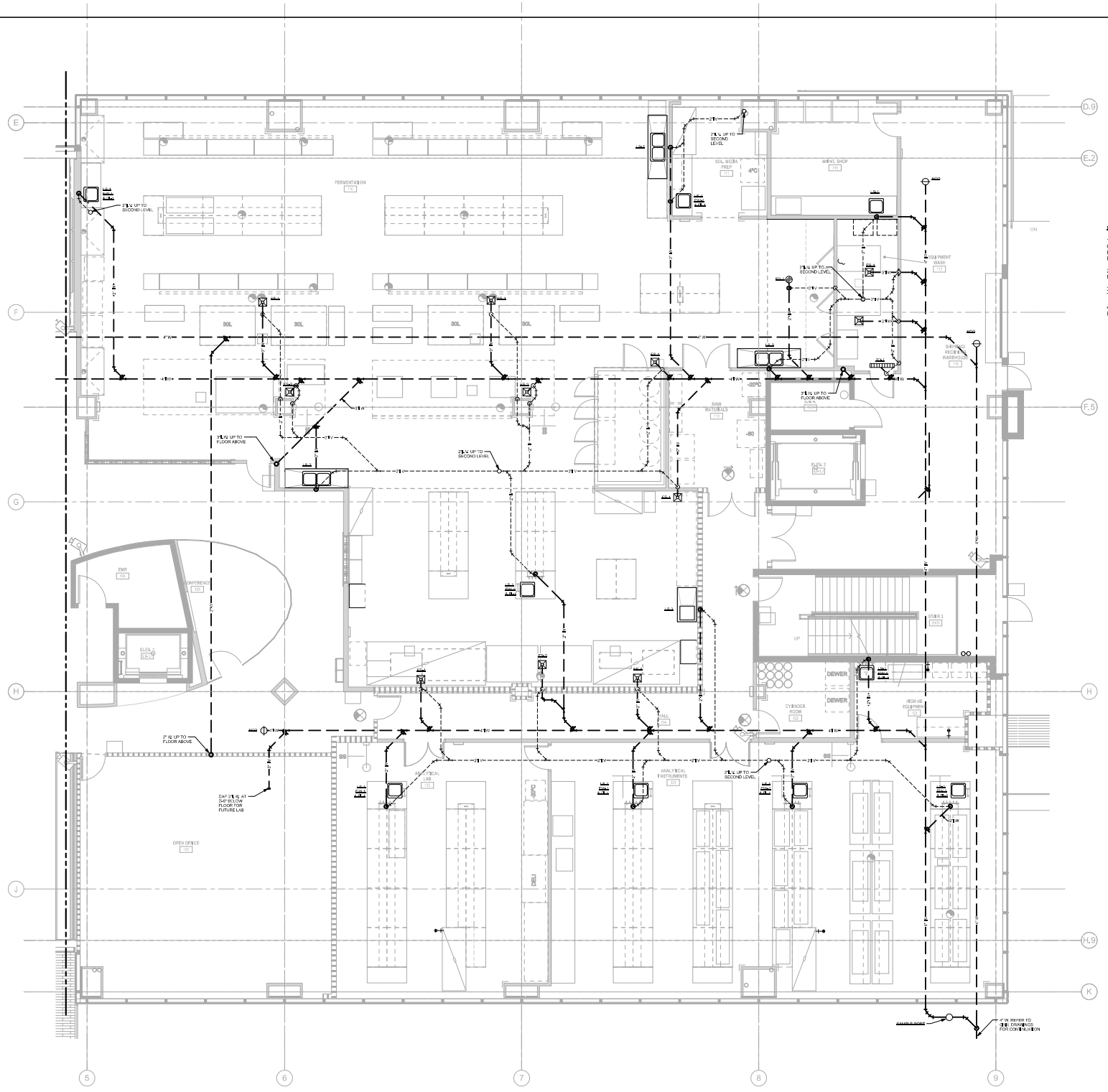
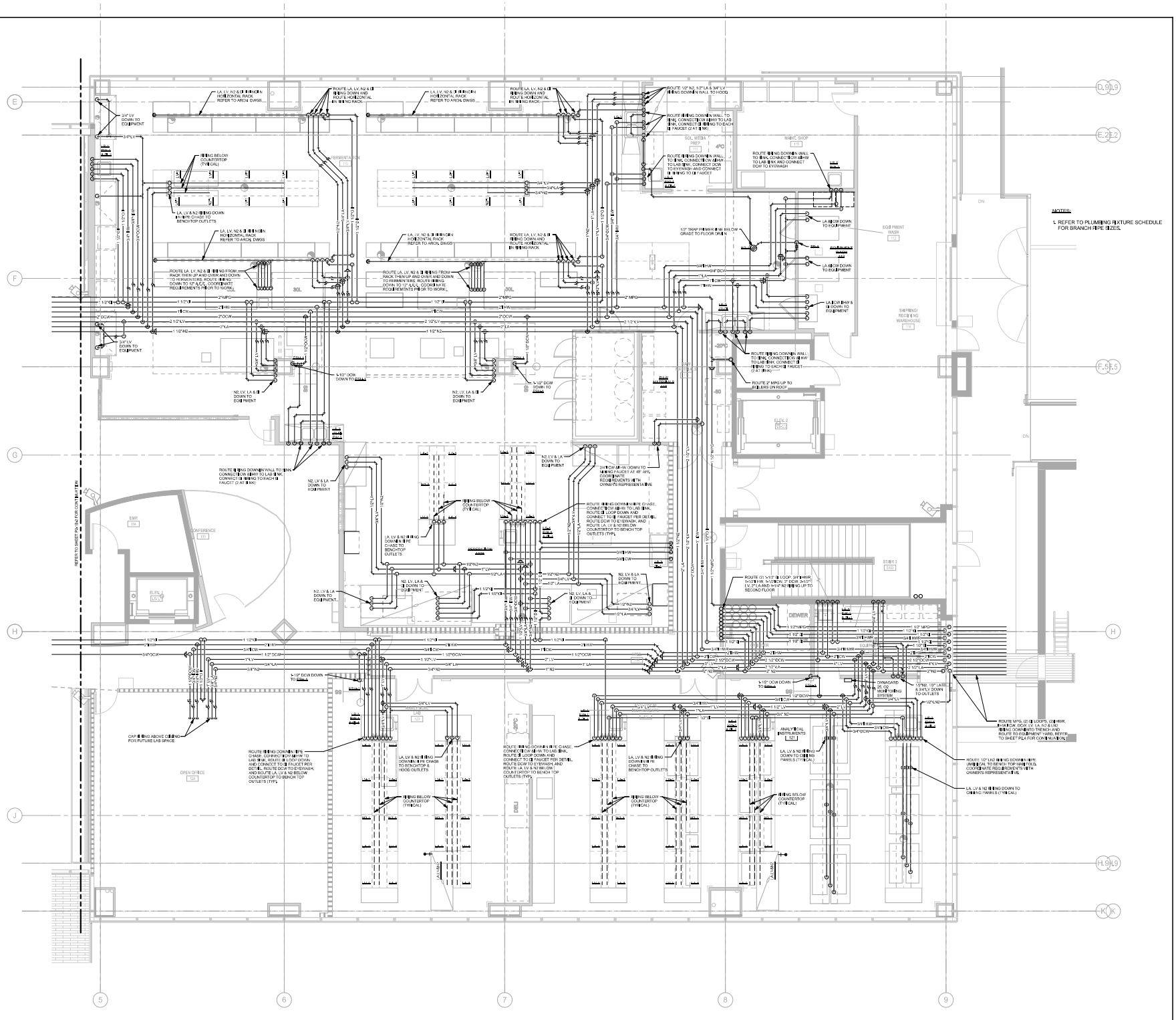

NOTES:
1. ROUTE A 3/4" CONDENSATE FROM EACH FAN COIL UNIT AND DISCHARGE INTO AN APPROVED RECEPTOR, REFER TO DETAIL ON SHEET P3.2 FOR PIPING CONNECTION.
2. REFER TO PLUMBING FIXTURE SCHEDULE FOR BRANCH PIPE SIZES.
3. EXTEND VENT PIPING FROM EACH FIXTURE TO VENT THRU ROOF.
4. PROVIDE WALL CLEAN-OUTS FOR EACH SINK, LAV AND URINAL.
2" W. UP TO SECOND LEVEL
2" W. UP TO FLOOR ABOVE
CAP 2" W. AT 24" BELOW FLOOR FOR FUTURE LAB
4" W. REFER TO CIVIL DRAWINGS FOR CONTINUATION
FERMENTATION
SOIL MEDIA PREP
MAINT. SHOP
EQUIPMENT WASH
SHIPPING RECEIVING WAREHOUSE
RAW MATERIALS
CONFERENCE
OPEN OFFICE
ANALYTICAL LAB
ANALYTICAL INSTRUMENTS
CYLINDER ROOM
HIGH-lB EQUIPMENT
DEWER
DELI
UP
DN
KEY PLAN
AREA OF WORK
CONSULTANTS
NO. DESCRIPTION DATE
CLIENT
PROJECT
ADDRESS
PROJECT NO. 12317
SCALE As indicated
TITLE
PLUMBING FIRST FLOOR WASTE & VENT PIPING - EAST
P2.1A.1
Plumbing First Floor Waste & Vent Plan - EAST
1/4" = 1'-0"
5/2/2016 4:03:08 PM


NOTES:
1. REFER TO PLUMBING FIXTURE SCHEDULE FOR BRANCH PIPE SIZES.
KEY PLAN
AREA OF WORK
CONSULTANTS
NO. DESCRIPTION DATE
CLIENT
PROJECT
ADDRESS
PROJECT NO 12317
SCALE As indicated
TITLE
PLUMBING FIRST FLOOR PIPING PLAN - EAST
P2.1B.1
1 Plumbing 1st Floor Piping Plan - EAST
1/4" = 1'-0"

ABBREVIATIONS AND DESCRIPTIONS

A	AMPERES	KCM	KILO – CIRCULAR – MIL
AC	ALTERNATING CURRENT	KS	KNEE SPACE
A/C	AIR CONDITIONING	KVA	KILO–VOLTAMPERE
AIC	AMPERES INTERRUPTING CAPACITY	KW	KILO–WATT
AFC	AVAILABLE FAULT CURRENT	KWH	KILO–WATT–HOUR
AFF	ABOVE FINISHED FLOOR		
AFG	ABOVE FINISHED GRADE	LBS	POUNDS
AF	AMP FRAME/AMP FUSE	LF	LINEAL FEET
ABV	ABOVE	LOC	LOCATION
AL	ALUMINUM	LT	LIGHT
ARCH	ARCHITECT OR ARCHITECTURAL	LTG	LIGHTING
AS	AMP SWITCH	LV	LOW VOLTAGE
AT	AMP TRIP		
ATS	AUTOMATIC TRANSFER SWITCH	MH	MOUNTING HEIGHT
AWG	AMERICAN WIRE GAUGE	MANUF	MANUFACTURER
		MAX	MAXIMUM
B/G	BELOW GRADE	MC	MECHANICAL CONTRACTOR
BKBD	BACKBOARD	MCC	MOTOR CONTROL CENTER
BEL	BELOW	MCP	MOTOR CIRCUIT PROTECTION
		MECH	MECHANICAL
C	CONDUIT WITH WIRE	MIN	MINIMUM
CATV	CABLE TELEVISION	MLO	MAIN LUGS ONLY
CCTV	CLOSED CIRCUIT TELEVISION	MTD	MOUNTED
CB	CIRCUIT BREAKER	MTG	MOUNTING
CLG	CEILING		
CLF	CURRENT LIMITING FUSE	N	NEUTRAL
CLR	CLEAR	NC	NORMALLY CLOSED
CO	CONDUIT ONLY WITH NYLON PULLCORD	NEC	NATIONAL ELECTRICAL CODE
COAX	COAXIAL CABLE	NIC	NOT IN CONTRACT
CONC	CONCRETE	NL	NIGHT LIGHT
CONN	CONNECT OR CONNECTION	NTS	NOT TO SCALE
CONT	CONTINUATION	NO	NORMALLY OPEN
CONTR	CONTRACTOR		
CPT	CONTROL POWER TRANSFORMER	OC	ON CENTER
CU	COPPER	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
CT	CURRENT TRANSFORMER	OFOI	OWNER FURNISHED OWNER INSTALLED
CW	COLD WATER		
		PB	PULLBOX
D	DEDICATED OUTLET	PC	PHOTOCELL CONTROL
DC	DIRECT CURRENT	PCTC	PHOTOCELL/TIMECLOCK CONTROL
DIA	DIAMETER	PE	PNEUMATIC–ELECTRIC
DISC	DISCONNECT	PH	PHASE
DIST	DISTRIBUTION	PIV	POST INDICATING VALVE
DL	DAMP LOCATION	PL	PILOT LIGHT
DB	DISTRIBUTION SWITCHBOARD	PLBG	PLUMBING
DWGS	DRAWINGS	PNL	PANEL
		PVC	POLYVINYL CHLORIDE
EA	EACH	PWR	POWER
EB	90–MINUTE BATTERY CONNECTED TO UNIT	PP	POWER POLE
EC	ELECTRICAL CONTRACTOR	PS	POWER SENTRY EMERGENCY BATTERY UNIT
EDF	ELECTRICAL DRINKING FOUNTAIN		
EG	CONNECTED TO EMERGENCY GENERATOR	Q	FIXTURE WITH QUARTZ RESTRIKE
EF	EXHAUST FAN	QTY	QUANTITY
EI	CONNECTED TO EMERGENCY INVERTER		
ELECT	ELECTRICAL	REC	RECESSED
ELEV	ELEVATOR/ELEVATOR	RECEPT	RECEPTACLE
EMER, EM	EMERGENCY	REF	REFRIGERATOR
ENT	ELECTRO–METALLIC TUBING	REQ	REQUIREMENTS
EQUIP	EQUIPMENT	RGS	RIGID GALVANIZED STEEL
EXIST, EX	EXISTING	RM	ROOM
F	DEGREES FAHRENHEIT	SB	STANDBY
FA	FIRE ALARM	SD	SMOKE DETECTOR
FF	FURNITURE FEED, FINISHED FLOOR	SPEC	SPECIFICATION
FFE	FINISH FLOOR ELEVATION	SQ FT	SQUARE FEET OR SQUARE FOOT
FIN	FINISH OR FINISHED	STRUCT	STRUCTURAL
FIXT	FIXTURE	SW	SWITCH
FLUOR	FLUORESCENT	SWBD	SWITCHBOARD
FT	FEET OR FOOT	SWGR	SWITCHGEAR
FTG	FOOTING		
FVNR	FULL VOLTAGE NON–REVERSING	TEMP	TEMPERATURE OR TEMPORARY
		TV	TELEVISION
G	GROUND BUS OR WIRE	TEL, TELE	TELEPHONE
GA	GAUGE	TC	TIMECLOCK
GALV	GALVANIZED	TRANSF	TRANSFORMER
GC	GENERAL CONTRACTOR	TYP	TYPICAL
GD	GARBAGE DISPOSAL		
GFI	GROUND FAULT INTERRUPTER	UGPS	UNDERGROUND PULL SECTION
GFR	GROUND FAULT RELAY	UL	UNDERWRITERS LABORATORIES
GG	GREEN GROUND	UNO	UNLESS NOTED OTHERWISE
GND	GROUND		
		V	VOLTS
H	HORIZONTAL	VA	VOLTAMPERE
HAZMAT	HAZARDOUS MATERIAL	VFD	VARIABLE FREQUENCY DRIVE
HR	HOUR		
HP	HORSEPOWER	W/	WITH
HOA	HAND–OFF–AUTOMATIC	WH	WATER HEATER
HT	HEIGHT	WP	WEATHER PROOF
HTR	HEATER	WT	WEIGHT
HZ	HERTZ		
		X	EXISTING
IG	ISOLATED GROUND	XFMR	TRANSFORMER
IMC	INTERMEDIATE METAL CONDUIT	XL	EXISTING TO BE RELOCATED
INCAND	INCANDESCENT	XN	NEW LOCATION OF RELOCATED FIXTURE
		XR	EXISTING TO BE REMOVED
J–BOX	JUNCTION BOX		

SINGLELINE SYMBOLS AND DESCRIPTIONS

	DRAWOUT CIRCUIT BREAKER	M	MOTOR OR EQUIPMENT AS NOTED
			USGPS LANDING LUGS
	CIRCUIT BREAKER	ATS, NEMA 1	AUTOMATIC TRANSFER SWITCH
	FUSED SWITCH	G	GENERATOR
	TRANSFORMER	DM	DIGITAL METER BY POWER MEASUREMENTS ION–7350
	GROUNDING ELECTRODE AND CONDUCTOR	LSIG	CIRCUIT BREAKER WITH ELECTRONIC SENSING, TIMING AND TRIPPING CONTROL WITH FIELD INTERCHANGEABLE TRIP UNITS. PROVIDE TRUE RMS FUNCTIONS WITH DESCRETE FIELD ADJUSTABLE SETTINGS INDEPENDENT OF OTHER ADJUSTMENTS. L: LONG TIME TRIP S: SHORT TIME OVERCURRENT TRIP I: INSTANTANEOUS TRIP G: GROUND FAULT TRIP, GROUND FAULT SENSING INTEGRAL WITH CIRCUIT BREAKER.
	EXTERNALLY OPERATED CIRCUIT BREAKER		
PANEL	PANELBOARD	LSI	CIRCUIT BREAKER WITH ELECTRONIC SENSING, TIMING AND TRIPPING CONTROL WITH FIELD INTERCHANGEABLE TRIP UNITS. PROVIDE TRUE RMS FUNCTIONS WITH DESCRETE FIELD ADJUSTABLE SETTINGS INDEPENDENT OF OTHER ADJUSTMENTS. L: LONG TIME TRIP S: SHORT TIME OVERCURRENT TRIP I: INSTANTANEOUS TRIP
		E	INSULATED CASE CIRCUIT BREAKER
PANEL, EB	THROUGH FED OR DOUBLE LUG PANELBOARD	SPD	SURGE PROTECTIVE DEVICE
		ST	SHUNT TRIP
		M	UTILITY METER WITH C.T.s.
	CURRENT TRANSFORMER	M	IN–LINE UTILITY METER–200A MAXIMUM

SIGNAL SYMBOLS AND DESCRIPTIONS

CR	CARD READER
DR	DOOR RELEASE SWITCH, PROVIDE JUNCTION BOX AND 3/4"C CONDUIT TO ACCESSIBLE CEILING SPACE.
CTV	CATV OUTLET PROVIDE JUNCTION BOX AND 3/4" CONDUIT TO ACCESSIBLE CEILING SPACE. +15" AFF UNO.
IC	INTERCOM PROVIDE JUNCTION BOX AND 3/4" CONDUIT TO ACCESSIBLE CEILING SPACE. +48" AFF UNO.
DB	DURESS BUTTON PROVIDE JUNCTION BOX AND 3/4" CONDUIT TO ACCESSIBLE CEILING SPACE. +48" AFF UNO.
SC	WALL MOUNTED SECURITY CAMERA AT 96" A.F.F. PROVIDE 3/4" CONDUIT TO ACCESSIBLE CEILING SPACE.
S	SPEAKER BACK BOX LOCATION
IC	INTERCOM J–BOX LOCATION
SPS	SECURITY POWER SUPPLY. PROVIDE 120V CIRCUIT FOR POWER SUPPLY FURNISHED AND INSTALLED BY OTHER.

LIGHTING SYMBOLS AND DESCRIPTIONS

	SEE LUMINAIRE SCHEDULE FOR ADDITIONAL FIXTURE SYMBOLS.
	ALL WIRE SIZES FOR EXTERIOR LIGHTING SHALL BE #12AWG 3/4"C, UNLESS OTHERWISE NOTED.
S	SWITCH, SINGLE POLE 20A, MTD 48" AFF. TO TOP DEVICE: WHITE COVERPLATE: WHITE. PROVIDE 3–1/2" DEEP SINGLE GANG BOX
S_{4B}	SWITCH, SINGLE POLE 20A, MTD 48" AFF TO TOP DESIGNATED TO CONTROL LIGHTING IN CIRCUIT LEGS, DEVICE: WHITE COVERPLATE: WHITE. PROVIDE MULTI–GANG BOX AS REQUIRED TO ACCOMMODATE SWITCH LEGS INDICATED. PROVIDE 3–1/2" DEEP BOX.
S^3	SWITCH, THREE WAY, 20A, MTD 48" AFF TO TOP DEVICES: WHITE COVERPLATE: WHITE PROVIDE 3–1/2" DEEP SINGLE GANG BOX.
S^4	KEYED SWITCH, SINGLE POLE 20A, MTD 48" AFF TO TOP DEVICE: WHITE COVERPLATE: WHITE. PROVIDE 3–1/2" DEEP SINGLE GANG BOX.
S^{DIM}	DIMMER SWITCH, MTD. 48" AFF TO TOP. PROVIDE 3–1/2" DEEP SINGLE GANG BOX.
S	SPECIALTY SWITCH AS DENOTED ON PLANS. DEVICE: WHITE COVERPLATE: WHITE MTD. 48" AFF TO TOP. PROVIDE 3–1/2" DEEP SINGLE GANG BOX.
MS	WALL MOUNTED MOTION CONTROLLED LIGHTING SWITCH WITH INTEGRAL RE–LEVEL SWITCHING, INFRARED TYPE DEVICE: WHITE MTD 48" AFF TO TOP.
RM, AB	WALL MOUNTED A/B SWITCHING MOTION CONTROLLED LIGHTING SWITCH WITH INTEGRAL RE–LEVEL SWITCHING, INFRARED TYPE DEVICE: WHITE MTD 48" AFF TO TOP
MS	MOTION SENSOR POWER PACK.
	CEILING MOUNTED ULTRASONIC MOTION SENSOR. DIRECTION OF COVERAGE INDICATED BY ARROWS DEVICE: WHITE
	LIGHTING CONTROL PANEL
LCM, A1	LOW VOLTAGE OVERRIDE CONTROL SWITCH, LETTER DESIGNATES ZONE AND NUMBER DESIGNATES SWITCH NUMBER. MTD. 48" AFF TO TOP. PROVIDE 3–1/2" DEEP SINGLE GANG BOX.
3W	3 GANG / MULTI–CHANNEL MASONRY WALLBOX DIMMER.
LTC, Xa, EB	LUMINAIRE CALLOUT:

UNIQUE LUMINAIRE SYMBOL
LUMINAIRE TYPE
LTC, Xa, EB
LIGHTING BRANCH CIRCUIT AND SWITCH LEGS
EMERGENCY POWER SOURCE
'EB' IS EMERGENCY BATTERY
'EI' IS EMERGENCY INVERTER
'EG' IS EMERGENCY GENERATOR

SYMBOLS AND DESCRIPTIONS

	DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: WHITE, COVERPLATE: WHITE
EM	DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. CONNECTED TO EMERGENCY SYSTEM. DEVICES: RED, COVERPLATE: RED
HS	HALF SWITCH DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: WHITE, COVERPLATE: WHITE
D	DEDICATED 20A RATED DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: GRAY, COVERPLATE: GRAY
GFI	GROUND FAULT INTERRUPTER DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. PROVIDED WITH DEDICATED NEUTRAL. DEVICES: WHITE, COVERPLATE: WHITE
WP	WEATHER PROOF DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: WHITE, COVERPLATE: GASKETED STAINLESS STEEL
	SURFACE MOUNTED DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: WHITE, COVERPLATE: STAINLESS STEEL
IG	ISOLATED GROUND DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: ORANGE, COVERPLATE: ORANGE
H	HORIZONTALLY MOUNTED DUPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: WHITE, COVERPLATE: WHITE
	208V 1PH 20A SINGLE RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: BLACK, COVERPLATE: WHITE
EC, E–XXX	SPECIALTY OUTLET, VERIFY NEMA CONFIGURATION AS NOTED ON PLANS MTD 15" AFF TO BOTTOM.
	FOURPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICES WHITE, COVERPLATE: WHITE
D	DEDICATED 20A RATED FOURPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: GRAY, COVERPLATE: GRAY
	SURFACE MOUNTED FOURPLEX RECEPTACLE MTD 15" AFF TO BOTTOM. DEVICE: WHITE, COVERPLATE: WHITE
WAP	WIRELESS ACCESS POINT ABOVE CEILING FOR WIRELESS LAN.
	TELECOMMUNICATIONS OUTLET WITH TRIM RING AND PULLSTRING TO ACCESSIBLE CEILING SPACE. MTD. 15" A.F.F. TO BOTTOM U.N.O.
S	SYSTEMS FURNITURE TELECOMMUNICATIONS OUTLET.
WP GFI, R	ROOF MOUNTED RECEPTACLE
	CEILING MOUNTED RECEPTACLE
	TELECOMMUNICATIONS OUTLET CEILING MOUNTED.
CATV	COMBINATION POWER & DATA FOURPLEX OUTLET, FLUSH FLOOR MOUNTED FOR SLAB ON GRADE INSTALLATION.
CATV	COMBINATION POWER & DATA FOURPLEX OUTLET, FLUSH FLOOR MOUNTED ON FIRE RATED POKE–THRU.
FT	SYSTEMS FURNITURE FLOOR FEED WITH 3/4" CONDUIT FOR POWER & 1–1/4" CONDUIT FOR SLAB ON GRADE INSTALLATION.
FT	SYSTEMS FURNITURE FLOOR FEED WITH 3/4" CONDUIT FOR POWER & 1–1/4" CONDUIT FOR TELE/DATA ON FIRE RATED POKE–THRU.
FT	SYSTEMS FURNITURE WALL FEED WITH 3/4" CONDUIT FOR POWER & 1–1/4" CONDUIT FOR TELE/DATA.
	CODE SIZED PULLBOX AS INDICATED ON PLANS.
	CODE SIZED PULLBOX OR SPLICE BOX AS INDICATED ON PLANS.
	INDICATES CONDUIT STUB–UP OR STUB–OUT LOCATION.
	CABLE TRAY, 12" WIDE ALUMINUM.
AV	AUDIO VISUAL RECESSED FLOOR BOX WITH 8 SINGLE GANG COMPARTMENTS FOR POWER, DATA, TELEPHONE AND AUDIO VISUAL OUTLETS.
AV	AUDIO VISUAL RECESSED POKE–THRU FLOOR BOX WITH 8 SINGLE GANG COMPARTMENTS FOR POWER, DATA, TELEPHONE AND AUDIO VISUAL OUTLETS.
	JUNCTION BOX, WALL MOUNTED.
	JUNCTION BOX, SURFACE MOUNTED, CONCEALED.
J	JUNCTION BOX, FLUSH FLOOR MOUNTED.
	CLOCK OUTLET, MOUNTED 96" A.F.F., U.O.N.
	WIREMOLD 4000 DUAL CHANNEL ALUMINUM RACEWAY MOUNTED AT +42".
	2 CIRCUIT PLUG STRIP MOUNTED AT UNDERSIDE OF LAB BENCH SHELF, OUTLETS 6" ON CENTER WITH CIRCUITS ALTERNATING.
SFD	SMOKE FIRE DAMPER
	PANELBOARD FLUSH MOUNTED
	PANELBOARD SURFACE MOUNTED
	SWITCHBOARD
T	TRANSFORMER
	FUSED DISCONNECT SWITCH
M1	FVNR COMBINATION MOTOR STARTER, H–O–A, AUXILIARY CONTACTS, OPT, PILOT LIGHTS, NEMA ENCLOSURE AS REQUIRED, WITH FUSED DISCONNECT SWITCH.
M	FVNR MOTOR STARTER WITH OVERLOADS, H–O–A, AUXILIARY CONTACTS, OPT, PILOT LIGHTS, NEMA ENCLOSURE AS REQUIRED.
VFD	VARIABLE FREQUENCY DRIVE
S^m	MOTOR HORSEPOWER RATED SWITCH.
	CONCEALED EMT CONDUIT WITH WIRE 2#12AWG + 1#12AWG GREEN GROUND, 3/4"C MINIMUM.
#10	CONCEALED EMT CONDUIT WITH WIRE 3#12AWG + 1#12AWG GREEN GROUND, 3/4"C MINIMUM.
#10	CONCEALED EMT CONDUIT WITH WIRE 3#10AWG + 1#10AWG GREEN GROUND, 3/4"C MINIMUM.
	UNDERGROUND CONDUIT AND #10 WIRE, UNO. 3/4"C MIN.
C	TELECOMMUNICATIONS CONDUIT ONLY, 1" TO ACCESSIBLE CEILING SPACE ON SAME FLOOR.
	HOMERUN
	HATCHED CONDUIT AND WIRE TO BE REMOVED
CATV	CABLE TV CONDUIT UNDERGROUND
FO	FIBER OPTIC CONDUIT UNDERGROUND
HV	HIGH VOLTAGE CONDUIT UNDERGROUND
T	TELEPHONE CONDUIT UNDERGROUND
EM	ELECTROMAGNETIC DOOR HOLDER 45 BOX WITH 8 SINGLE GANG COMPARTMENTS FOR POWER, DATA, TELEPHONE AND AUDIO VISUAL OUTLETS.

FEEDER SCHEDULE

600V BRANCH CIRCUITS 1ø 2W

LABEL	TYPE	SETS	PHASE	NEUTRAL	GROUND	CONDUIT
15A	15A–2W	1	2 #12	N/A	1 #12	3/4"
20A	20A–2W	1	2 #10	N/A	1 #10	3/4"
40A	40A–2W	1	2 #8	N/A	1 #10	3/4"
50A	50A–2W	1	2 #6	N/A	1 #10	3/4"

600V FEEDER SCHEDULE 1ø 3W

LABEL	TYPE	SETS	PHASE	NEUTRAL	GROUND	CONDUIT
20A	20A–3W	1	2 #12	1 #12	1 #12	3/4"
30A	30A–3W	1	2 #10	1 #10	1 #10	3/4"
40A	40A–3W	1	2 #8	1 #8	1 #10	1"
50A	50A–3W	1	2 #6	1 #6	1 #10	1"
60A	60A–3W	1	2 #4	1 #4	1 #10	1"
70A	70A–3W	1	2 #4	1 #4	1 #10	1 1/4"
80A	80A–3W	1	2 #3	1 #3	1 #8	1 1/4"
90A	90A–3W	1	2 #3	1 #3	1 #8	1 1/4"
100A	100A–3W	1	2 #1	N/A	1 #6	1 1/4"
125A	125A–3W	1	2 #1	N/A	1 #6	1 1/4"
150A	150A–3W	1	2 #1/0	N/A	1 #6	1 1/2"
175A	175A–3W	1	2 #2/0	N/A	1 #6	2"
200A	200A–3W	1	2 #3/0	N/A	1 #6	2"
225A	225A–3W	1	2 #4/0	N/A	1 #6	2"
250A	250A–3W	1	2 #250KCM	N/A	1 #6	2"
300A	300A–3W	2	2 #250KCM	N/A	1 #2	2"
350A	350A–3W	2	2 #350KCM	N/A	1 #2	2"
400A	400A–3W	2	2 #400KCM	N/A	1 #2	2"
450A	450A–3W	2	2 #500KCM	N/A	1 #2	2"
500A	500A–3W	2	2 #500KCM	N/A	1 #1/0	2"
600A	600A–3W	2	2 #600KCM	N/A	1 #2/0	2"
700A	700A–3W	3	2 #500KCM	N/A	1 #1/0	2"
800A	800A–3W	3	2 #600KCM	N/A	1 #2/0	2"
1000A	1000A–3W	3	2 #800KCM	N/A	1 #2/0	2"
1200A	1200A–3W	4	2 #800KCM	N/A	1 #2/0	2"
1600A	1600A–3W	5	2 #800KCM	N/A	1 #2/0	2"
2000A	2000A–3W	6	2 #800KCM	N/A	MP500MCM	2"
2500A	2500A–3W	8	2 #800KCM	N/A	MP500MCM	2"
3000A	3000A–3W	10	2 #800KCM	N/A	MP500MCM	2"

600V FEEDER SCHEDULE 3ø 4W

LABEL	TYPE	SETS	PHASE	NEUTRAL	GROUND	CONDUIT
20A	20A–4W	1	3 #12	1 #12	1 #12	3/4"
30A	30A–4W	1	3 #10	1 #10	1 #10	3/4"
40A	40A–4W	1	3 #8	1 #10	1 #10	1"
50A	50A–4W	1	3 #6	1 #8	1 #10	1"
60A	60A–4W	1	3 #4	1 #4	1 #10	1"
70A	70A–4W	1	3 #4	1 #4	1 #8	1 1/4"
80A	80A–4W	1	3 #3	1 #3	1 #8	1 1/4"
90A	90A–4W	1	3 #3	1 #3	1 #8	1 1/4"
100A	100A–4W	1	3 #1	1 #1	1 #6	1 1/4"
125A	125A–4W	1	3 #1	1 #1	1 #6	1 1/4"
150A	150A–4W	1	3 #1/0	1 #1/0	1 #6	1 1/2"
175A	175A–4W	1	3 #2/0	1 #2/0	1 #6	2"
200A	200A–4W	1	3 #3/0	1 #3/0	1 #6	2"
225A	225A–4W	1	3 #4/0	1 #4/0	1 #4	2 1/2"
250A	250A–4W	1	3 #250KCM	1 #250KCM	1 #4	2"
300A	300A–4W	1	3 #350KCM	1 #350KCM	1 #4	2"
350A	350A–4W	1	3 #350KCM	1 #350KCM	1 #2	2"
400A	400A–4W	1	3 #500KCM	1 #500KCM	1 #2	2"
450A	450A–4W	2	3 #250KCM	1 #250KCM	1 #2	2"
500A	500A–4W	2	3 #250KCM	1 #250KCM	1 #2	2"
600A	600A–4W	2	3 #350KCM	1 #350KCM	1 #2	2"
700A	700A–4W	2	3 #350KCM	1 #350KCM	1 #1/0	2"
800A	800A–4W	2	3 #400KCM	1 #400KCM	1 #1/0	2"
1000A	1000A–4W	3	3 #350KCM	1 #350KCM	1 #2/0	2"
1200A	1200A–4W	3	3 #500KCM	1 #500KCM	1 #2/0	2"
1600A	1600A–4W	4	3 #500KCM	1 #500KCM	1 #3/0	2"
2000A	2000A–4W	5	3 #500KCM	1 #500KCM	1 #4/0	2"
2500A	2500A–4W	6	3 #500KCM	1 #500KCM	MP500MCM	2"
3000A	3000A–4W	8	3 #500KCM	1 #500KCM	MP500MCM	2"
4000A	4000A–4W	10	3 #500KCM	1 #500KCM	MP500MCM	2"

ELECTRICAL CONSTRUCTION DOCUMENTS GENERAL INFORMATION

1. THE DRAWINGS CONTAINED WITHIN THESE CONSTRUCTION DOCUMENTS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND CLEARANCES PRIOR TO THE COMMENCEMENT OF WORK AND SHALL INCLUDE ALL COSTS, EQUIPMENT, MATERIALS, ETC. REQUIRED FOR A COMPLETE, FUNCTIONAL, AND CODE–COMPLIANT INSTALLATION.
2. THE CONTRACTOR SHALL COORDINATE ALL INSTALLATIONS WITH ALL OTHER TRADES.
3. FINAL LOCATIONS OF ALL DEVICES, LIGHT FIXTURES, EQUIPMENT, ETC. SHALL BE INDICATED ON THE ARCHITECTURAL DRAWINGS. ALL DIMENSIONAL INFORMATION SHALL BE OBTAINED FROM THE ARCHITECT. NO DIMENSIONAL INFORMATION SHALL BE OBTAINED FROM ELECTRICAL DRAWINGS.
4. THESE DRAWINGS ARE SUPPLEMENTED BY PRINTED DIVISION 16 OR DIVISION 26 ELECTRICAL SPECIFICATIONS. THE COMPLETE ELECTRICAL CONSTRUCTION DOCUMENT PACKAGE CONTAINS BOTH SPECIFICATIONS AND DRAWINGS. THE CONTRACTOR SHALL REVIEW AND REVIEW THE COMPLETE ELECTRICAL CONSTRUCTION DOCUMENT PACKAGE PRIOR TO THE COMMENCEMENT OF ANY WORK AND INCLUDE ALL COST IN THIS BID.
5. ALL WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES, NATIONAL ELECTRICAL CODE, STATE OF CALIFORNIA ENERGY CONSERVATION STANDARDS AND ALL REQUIREMENT OF THE AUTHORITY HAVING JURISDICTION (AHJ).
6. CONTRACTOR SHALL COORDINATE ALL EQUIPMENT LOCATIONS WITH ARCHITECTURAL, MECHANICAL, STRUCTURAL, PLUMBING AND ALL APPROPRIATE DISCIPLINES.
7. ANY DISCREPANCIES THAT OCCUR SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM AND/OR ENGINEER PRIOR TO THE START OF CONSTRUCTION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION AND REPAIR OF EXISTING SURFACES, EQUIPMENT AND PROPERTY THAT MAY BE DAMAGED AS A RESULT OF ANY ELECTRICAL DEMOLITION AND/OR NEW WORK.
9. PROVIDE WEATHERPROOF (NEMA 3R) JUNCTION BOXES, CONDUIT, FITTINGS AND ENCLOSURES AT ALL EXTERIOR LOCATIONS AND ALL WET OR DAMP INTERIOR LOCATIONS. ALL EXTERIOR LIGHTING FIXTURES SHALL BE UL LISTED FOR WET OR DAMP LOCATION AS APPROPRIATE FOR THE LOCATION
10. VERIFY UTILITY COMPANY REQUIREMENTS FOR ALL WORK INCLUDING MODIFIED OR NEW SERVICE ENTRANCES. AND INCLUDE ALL COST IN BID.
11. NOTIFY POWER UTILITY COMPANY OF ANY SIGNIFICANT LOAD INCREASE, SERVICE REVISION, SHUTDOWN OF SERVICE OR ANY RELATED WORK.
12. VERIFY EXISTING CONDITIONS PRIOR TO BID AND INCLUDE ALL COSTS AS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION.
13. THE CONTRACTOR SHALL REVIEW EQUIPMENT MANUFACTURER'S REQUIREMENTS AND PROVIDE FUSE SIZES AS INDICATED, RELAYS, CONTACTORS OR OTHER RELATED WORK TO COMPLETE THE ELECTRICAL SYSTEM.
14. ALL DEVICES AND EQUIPMENT SHALL BE INSTALLED IN COMPLIANCE WITH A.D.A. REQUIREMENTS.
15. CONTRACTOR SHALL CONCEAL ALL CONDUIT, FITTINGS, AND DEVICES FROM VIEW WHERE REASONABLY POSSIBLE.
16. CONTRACTOR SHALL ENSURE THAT ALL CONDUIT, FIXTURES, FITTINGS, AND DEVICES LOCATED IN PUBLIC AREAS ARE TAMPERPROOF AND PROTECTED FROM PHYSICAL DAMAGE.
17. ALL CURRENT CARRYING CONDUCTORS SHALL BE COPPER. INSULATION SHALL BE TYPE THHN/THWN FOR ALL BRANCH CIRCUITS UP TO AND INCLUDING SIZE #2AWG. INSULATION FOR CONDUCTORS OVER SIZE #2AWG SHALL BE XHHW.
18. ALL GROUND CONDUCTORS SHALL BE INSULATED COPPER.
19. ALL CONDUIT SHALL BE EMT (INSTALLED IN INTERIOR CONCEALED SPACES) OR SCHEDULE–40 PVC (INSTALLED UNDERGROUND) UNLESS OTHERWISE NOTED.
20. ALL AMPACITIES ARE BASED UPON TABLE 310.16 OF THE 2011 N.E.C.
21. FEEDER SCHEDULES INDICATE DATA FOR COPPER CONDUCTORS RATED UP TO 600V AT 75 DEGREES CELSIUS.
22. HEALTH CARE FACILITIES SHALL BE WIRED IN A METALLIC RACEWAY OR CABLING SYSTEM. CONTRACTOR SHALL PROVIDE A REDUNDANT GROUNDING METHOD WITH AN INSULATED GREEN GROUNDING CONDUCTOR INCLUDED.
23. ALL MULTI–WIRE BRANCH CONDUCTORS SHALL ORIGINATE FROM THE SAME PANELBOARD. THE GROUNDED AND UNGROUNDED CONDUCTORS SHALL BE GROUPED WITHIN THE PANELBOARD AND THEY SHALL BE PROVIDED WITH A MEANS THAT WILL SIMULTANEOUSLY DISCONNECT ALL UNGROUNDED CONDUCTORS. THE CONTRACTOR SHALL PROVIDE THE DISCONNECTING MEANS BASED UPON THE FINAL FIELD WIRING, CIRCUITING, HOMERUNS, ETC. AS REQUIRED TO SATISFY THIS REQUIREMENT.
24. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS, APPROVALS, LICENSES, ETC. AS NEEDED FOR THE COMPLETE ELECTRICAL INSTALLATION. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER FOR ALL FEES AND DATA NEEDED FOR THE ABOVE ITEMS.
25. ALL ROOF–MOUNTED EQUIPMENT SHALL BE SERVED BY CIRCUITS ROUTED BELOW THE ROOF STRUCTURE. DO NOT ROUTE CONDUITS EXPOSED ON THE ROOF. LIMIT FINAL CONNECTIONS TO ROOF EQUIPMENT FROM ROOF PENETRATION TO 10 FEET.
26. FOR ALL EXTERIOR CONDUITS EXPOSED TO DIRECT SUN EXPOSURE, THE CONTRACTOR SHALL ADJUST CONDUCTOR AMPACITY AND SIZES AS NECESSARY TO COMPLY WITH CODE–REQUIRED AMBIENT TEMPERATURE AMPACITY DE–RATING.

Sheet List Table

CONSULTANTS

CLIENT

PROJECT

ADDRESS

PROJECT NO. 12137

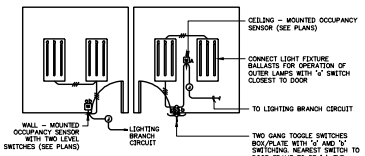
SCALE As indicated

TITLE

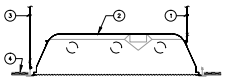
NOTE SHEET

E-001-TI

Z:\PROJ\12\1224\DWG\1224–E001_NS.DWG Wednesday, May 22, 2013 11:46:47 AM – rmatees



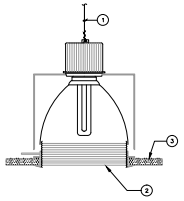
2 TYPICAL OFFICE LIGHTING
NO SCALE



KEY NOTES:

1. DENOTES FIXTURE SUPPORT WIRE (MINIMUM #10) ON TWO CORNERS ATTACHED TO BUILDING STRUCTURE.
2. DENOTES LUMINAIRE, 2'x4', 2'x2' OR 1'x4', WITH MINIMUM OF (4) RESTRAINT CLIPS, ATTACHING FIXTURES TO CEILING GRID.
3. DENOTES T-BAR CEILING SYSTEM SAFETY WIRE.
4. DENOTES CEILING MATERIAL.

3 RECESSED LUMINAIRE SEISMIC RESTRAINT
NO SCALE



KEY NOTES:

1. DENOTES FIXTURE SUPPORT WIRE (MINIMUM #10) FROM LUMINAIRE ATTACHED TO BUILDING STRUCTURE ABOVE.
2. DENOTES RECESSED INCADESCENT, FLUORESCENT OR H.I.D. DOWNLIGHT.
3. DENOTES T-BAR CEILING SYSTEM.

4 RECESSED DOWNLIGHT RESTRAINT
NO SCALE

SYMBOL	TYPE	VOLTAGE	INPUT WATTAGE	FIXTURE DESCRIPTION	FIXTURE INFORMATION		LAMP INFORMATION					BALLAST MANUFACTURER/ CATALOG NUMBER	MOUNTING INFORMATION	NOTES
					MANUFACTURER #	CATALOG NUMBER #	QTY	TYPE	WATTS	COLOR TEMP.	MANUFACTURER & CATALOG NUMBER			
	F1	277	55	DIRECT/INDIRECT RECESSED 2X4 LINEAR FACETED REFLECTOR WITH SLOPED END PLATES WITH ADVANCE OPTIMUM PROGRAM START 0.88 NOMINAL BALLAST	LITHONIA	2AVDTBC3GMDR-MVOLTRS	2	T8	32	4100	OSRAM SYLVANIA 7332841/0/PS/ECO	OSRAM SYLVANIA (2) QHE 1X32T8/UNV PSN-MC	RECESSED	
	F2	277	84	RECESSED PRISMATIC LENSED 2X4 TROFFER, UL LISTED, 3 LAMPS BALLAST FOR 50% SWITCHING, NIGHT LIGHT	LITHONIA	2GTX-3-32-TYX-A12125-MVOLT-GSB10RS	3	T8	32	4100	OSRAM SYLVANIA 7332841/0/PS/ECO	OSRAM SYLVANIA (1) QHE 2X32T8/UNV PSN-MC (1) QHE 1X32T8/UNV PSN-MC	RECESSED	
	F2E	277	84	SAME AS FIXTURE TYPE F2, BUT CONNECTED TO EMERGENCY GENERATOR BRANCH CIRCUIT, NIGHT LIGHT										
	F3			NOT USED										
	F3E			NOT USED										
	F4	277	66	2X2 RECESSED DECORATIVE SKY LIGHT FIXTURE, UL LISTED, VERY FROSTED ACRYLIC BUILDING WITH ARCHITECT	LITHONIA	2AVDTB-2-13-MDR-MVOLT-SSNF	4	T8	17	4100	OSRAM SYLVANIA F017/841/0/PS/ECO	OSRAM SYLVANIA QHE 2X32T8/UNV PSN-MC	RECESSED	
	F5	277	45	6" WET LOCATION LENSED DOWNLIGHT, UL LISTED	LITHONIA	6WL-14ZTRT-P6LS-MVOLT	1	TRT CFL	32	4100	OSRAM SYLVANIA CF42DTE/N841/ECO	OSRAM SYLVANIA (1) QTP 2X26CF/UNV DM	RECESSED	
	F6	277	45	6" OPEN DOWNLIGHT, UL LISTED	GOTHAM	LMN 1402RT-MVOLT F90HA	1	TRT CFL	42	4100	OSRAM SYLVANIA CF42DTE/N841/ECO	OSRAM SYLVANIA (1) QTP 2X26CF/UNV DM	RECESSED	
	F6E			SAME AS FIXTURE TYPE F6, BUT CONNECTED TO EMERGENCY GENERATOR BRANCH CIRCUIT, NIGHT LIGHT										
	F7	277	45	6" DOWNLIGHT WITH DROP FROSTED CBK, UL LISTED	GOTHAM	AT-1402TRT-MA-SLD-MVOLT	1	TRT CFL	42	4100	OSRAM SYLVANIA CF42DTE/N841/ECO	OSRAM SYLVANIA (1) QTP 2X26CF/UNV DM	RECESSED	
	F7E	277	45	SAME AS FIXTURE TYPE F7, BUT CONNECTED TO EMERGENCY GENERATOR BRANCH CIRCUIT, NIGHT LIGHT										
	F8	277	110 PER 8' SECTION	LINEAR DIRECT/INDIRECT CONTINUOUS FIXTURE LOCATION GREEN OPTICS, UL LISTED, 1LAMP UP, 1 LAMP DOWN, SEE DRAWINGS FOR LENGTHS.	AMB	BB-F-ND-SH-ALK-T5-1-C-1-W-UNV-E-2A/B	2 PER 4'-0"	T8	32	4100	OSRAM SYLVANIA F017/841/0/PS/ECO	OSRAM SYLVANIA (2) QHE 2X32T8/UNV PSN-MC PER 8' SECTION	PENDANT: 6'-0" APP TO TOP OF FIXTURE	
	F8E			SAME AS FIXTURE TYPE F7A, BUT CONNECTED TO EMERGENCY GENERATOR BRANCH CIRCUIT, NIGHT LIGHT										
	F9H	277	32	RECESSED WALL WASHER, UL LISTED, 3 NDLE LAMP CROSS SECTION, RECESSED IN WOOD CEILING, LENGTH AS SHOWN	AMB	BMR-5-F-L-S15-3-N-L4-T5-1-W-UNV-E-RS-1-DS	1	T8	32	4100			RECESSED	
	F9T	277	32	RECESSED WALL WASHER, UL LISTED, 3 NDLE LAMP CROSS SECTION, RECESSED IN WOOD CEILING, LENGTH AS SHOWN	AMB	BMR-5-F-L-4-R-T5-1-W-UNV-ERS-1-TD3	1	T8	32	4100			RECESSED	
	F10	277	32	LINEAR CONTINUOUS PERIMETER FIXTURE, UL LISTED, 3 NDLE LAMP CROSS SECTION, SEE DRAWINGS FOR LENGTHS.	MARK LIGHTING	PRV-16-W-1-T5S-ESPR-277	1 PER 4'-0"	T8	32	4100		PER 8' SECTION	RECESSED	
	F11	120	40W MAX	SMALL SCALE DECORATIVE CONE PENDANT, MONOPOINT, NO FROSTED, HALF CLEAR, UL LISTED	SESA	100-SH-C-3407	1	INC	55		N/A	N/A	PENDANT	
	F12	24	3	CONTINUOUS LED TAPE LIGHT, 4100K, 190LM/FT, 70 CRI, MAFE, UL LISTED, SEE DRAWINGS FOR LENGTHS.	TUBE LIGHTING	DSN-VHO-24V-WS-X	N/A	LED	1.4/FT	6000	N/A	N/A	SURFACE COVE	CONTRACTOR SHALL INSTALL TAPE LIGHT TO BE CONTINUOUS WITH NO BREAKS IN LIGHT OUTPUT.
	F13	277	55	4'-0" STRIP FIXTURE WITH WHITE PAINTED STEEL HANGERS, UL LISTED.	LITHONIA	C-4-32-MVOLT-SSSW-S-HCS6-WGDN-HST	2	T8	32	4100			CHAIN HUNG	
	F13E			SAME AS FIXTURE TYPE F13, BUT CONNECTED TO EMERGENCY GENERATOR BRANCH CIRCUIT, NIGHT LIGHT.										
	F14			NOT USED										
	F15			NOT USED										
	F16	120	300	LARGE SCALE DECORATIVE PENDANT, UL LISTED.	LE SOURCE SUSPENSION	060CN-SQUARE-SQNH-WH	3X TX	T4 CB 70W MRQ 70W	350	4100	TBD	TBD		
	F17	120	120W MAX	SMALL SCALE DECORATIVE CONE PENDANT CLUSTER OF THREE, MONOPOINT, HALF FROSTED, HALF CLEAR, UL LISTED.	SESA	(3)XP-SH-C4407 w/ (1) 120L-SN	3	INC	40		N/A	N/A	PENDANT	
	F18	277	26	BRUSHED ALUMINUM WALL SCONCE, ADA COMPLIANT	LUMENART	AWL03-F26T3/827-277-V	1	CFL	26	4100	N/A	N/A	SURFACE	
	F19	277	55	SURFACE	LUMINPULSE	LOGH-R0-4VOLT-49-CT-10X134/A0E-HBSH-[DIMENSIONS]-[OPS]-XX	1	LED	39				SURFACE MTD CONFIRM LOCATION WITH ARCHITECT	
	F20	277	84	RECESSED PRISMATIC LENSED 2X4 TROFFER, WET LOCATION, UL LISTED, 2 LAMP2 BALLAST FOR 50% SWITCHING.	LITHONIA	2WRT-2-32-A12125-MVOLT-GSB10RS	3	T8	32	4100			RECESSED	
	F21	277	55	4'-0" STRIP FIXTURE WITH CLEAR PRISMATIC POLYCARBONATE LENS AND CHAIN HANGERS, WET LOCATION, UL LISTED.	LITHONIA	XWL232 MV	2	T8	32	4100			CHAIN HUNG	
	F22A	120	32	UNDER CABINET LIGHT	NAUTE	113-13ZT8-120V-15N-CFSS	1	T8	32	4100				
	F22B	120	32	UNDER CABINET LIGHT	LITHONIA	132MV T8 32 4100	1	T8	32	4100				
	F23	277	100	8" RECESSED 100W METAL HALIDE DOWNLIGHT	LITHONIA	AGL-8R1L-10ARA-277	1	INDUCTION	85					
	F24	277	450	8'X8' SQUARE BOARDROOM PENDANT WITH INTEGRAL COMBINS	AMB	C1-S-5-T5-3-W-D-D-277-D-S-10W-1-CASE-C-W90 RECESS-COMBINS (BOARDROOM)	8	T5	32					
	F25	277	84	LINEAR DIRECT/INDIRECT CONTINUOUS FIXTURE LOCATION GREEN OPTICS, UL LISTED, 1LAMP UP, 1 LAMP DOWN, SEE DRAWINGS FOR LENGTHS.	AMB	C1-S-5-T5-3-W-D-D-UNV-ERS-1-CASE-C	3	T5	32					
	F26-SF	277	5	X	LITHONIA	EDGR 1 G BL								

1 LUMINAIRE SCHEDULE
NO SCALE

CONSULTANTS

CLIENT

PROJECT

ADDRESS

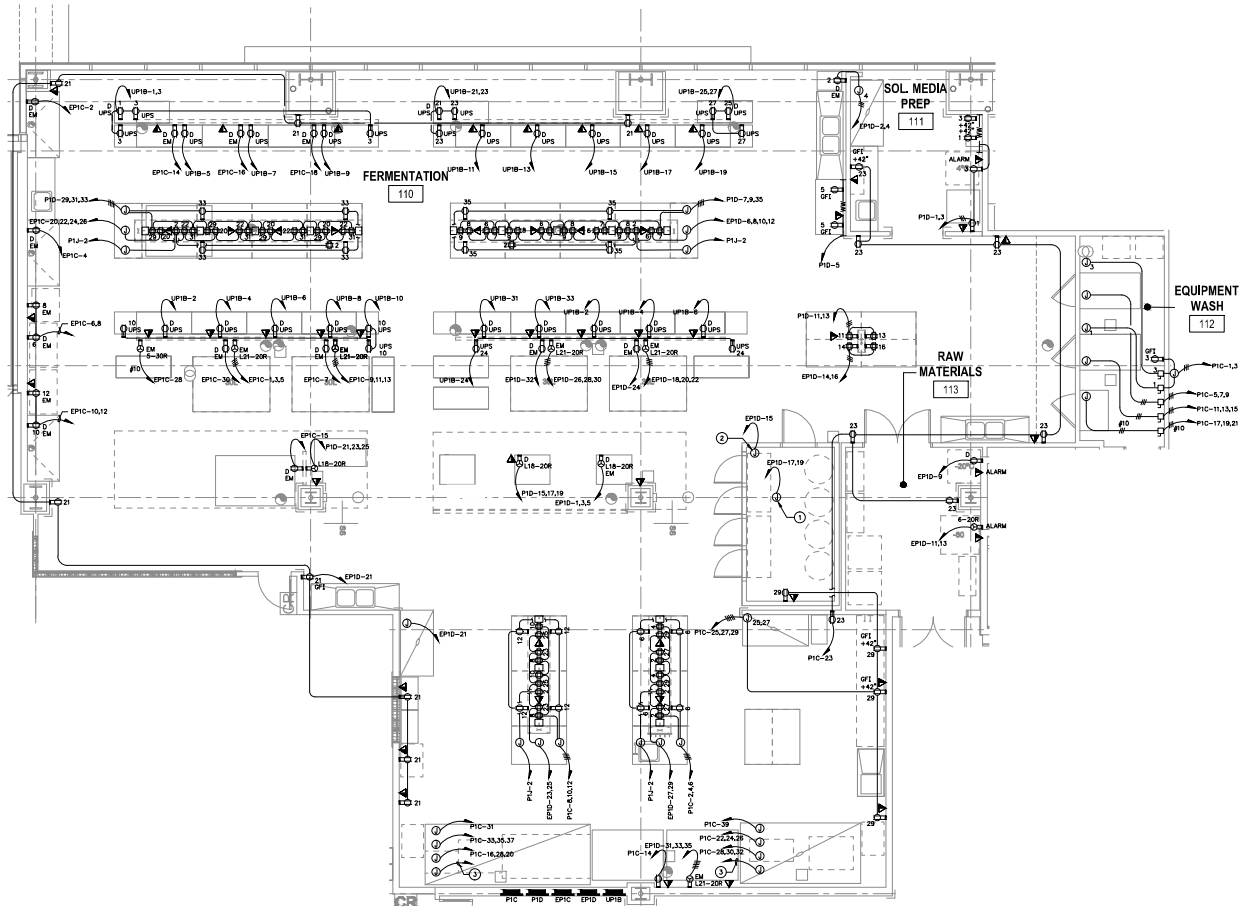
PROJECT NO. 12137

SCALE As indicated

TITLE

LUMINAIRE SCHEDULE

E-002-TI



KEY NOTES:

1. MAKE ELECTRICAL CONNECTION TO FAN COIL PROVIDED INTEGRAL AS PART OF THE COLD ROOM ASSEMBLY, COORDINATE WITH COLD ROOM SHOP DRAWINGS.
2. PROVIDE 120V, 20A SINGLE POINT CONNECTION FOR COLD ROOM CONTROLS AND LIGHTING.
3. PROVIDE 1" SPARE CONDUIT TO PANELBOARD 'EP1D'.

GENERAL NOTES:

1. ALL OUTLETS IN LAB SHALL HAVE STAINLESS STEEL COVER PLATES.
2. ALL EMERGENCY OUTLETS SHALL BE COLOR ORANGE.
3. ALL DEDICATED OUTLETS SHALL BE COLOR GREY.

1 ENLARGED LABORATORY PLAN
1/4" = 1'-0"

REF. NORTH

CONSULTANTS

CLIENT

PROJECT

ADDRESS

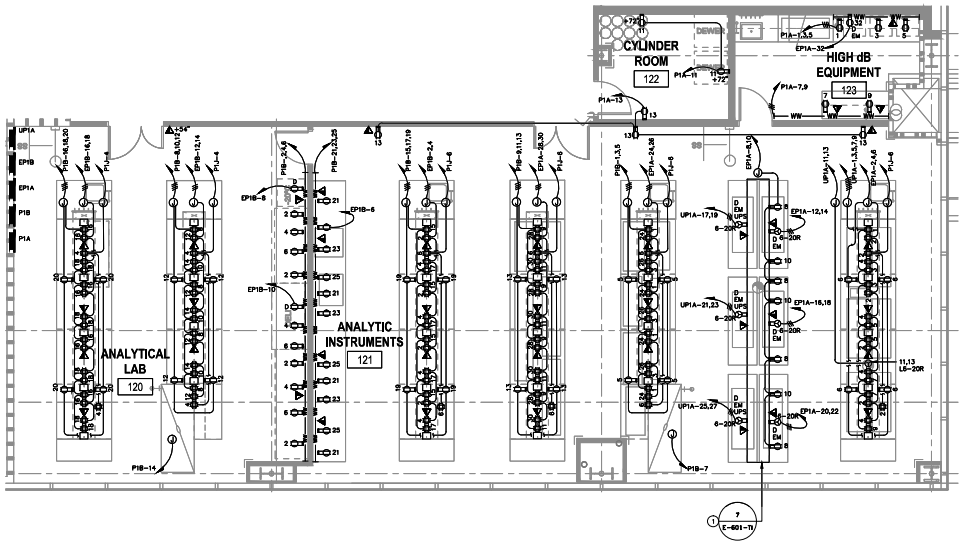
PROJECT NO. 12137

SCALE As indicated

TITLE

ENLARGED LABORATORY PLAN

E-402-TI



KEY NOTES:

1. OVERHEAD SERVICE CARRIER.
2. MOUNT ABOVE RACEWAY.

GENERAL NOTES:

1. ALL OUTLETS IN LAB SHALL HAVE STAINLESS STEEL COVER PLATES.
2. ALL EMERGENCY OUTLETS SHALL BE COLOR ORANGE.
3. ALL DEDICATED OUTLETS SHALL BE COLOR GREY.

1 ENLARGED LABORATORY PLAN
1/4" = 1'-0"

REF. NORTH

CONSULTANTS

CLIENT

PROJECT

ADDRESS

PROJECT NO. 12137

SCALE As indicated

TITLE

ENLARGED LABORATORY PLAN

E-403-TI

PROJECT: GATTACA
SCHOOL:

MEP Equipment Constructability Review

Equip #	Equipment Name	Comments

INSERT TAB:

"General Conditions (GC's)"

Module 5: General Conditions (GC's)

General Conditions Estimate Module

	Description	Notes
1	In this portion of the problem, you will be required to provide a general conditions estimate for your project. The General Conditions are a useful tool when determining whether or not the potential project is worth the risk.	
2	Labor Projection Worksheet: Use this sheet to determine the Project Management team, as well as durations of the personnel. The template only shows a three week schedule. Remember to tie this to the schedule you will be creating. Determine how you will staff the team. There is no right or wrong answer to how you staff your project. You must be able to defend how you will staff the project and the justify the costs to the owner. You do NOT need to utilize each line, or each type of staff member	****add and subtract as many personnel as needed for job completion. Project as far as the schedule determines****
3	The sheet labeled GCs is what you will use to calculate your general conditions. Be sure to note the duration of your project, to accurately forecast your cost. Note the loaded cells pull values from the Hourly Rates page. Make adjustments as necessary. Be sure to use the comments section for items that may need justification. For example, some items may be excluded due to the owner providing that item. Add and subtract as many line items you may need.	*****Some formulas may be incorrect or incomplete. It is Best Practice to always double check formulas when using an Excel Template*****
4	Hourly Rates sheet is used to populate your GCs.	
5	General Expenses Sheet is used for examples of standard items that are generally incorporated in a General Conditions estimate. Many times all will be used, and often less well be used. Use your judgement based off the scope of work.	****You may incorporate items that are not listed on the General expense sheet.**
6	Please use the Labor Projection Worksheet to determine durations of personnel on your project. Be sure they are shown on the "GC's Full Project" Template	
7	Once the General Conditions are populated. Please format and provide the GCs sheet in PDF **and** Excel format.	

Use the excel document in your USB drive to gain access to the estimate tool file. The file has multiple excel tabs which you will need for this module.

INSERT TAB:

"Schedule of Values (SOV)"

Module 6: Schedule of Values (SOV)


SOV Module Directions:

Goal:

Determine the Schedule of Values for your project.

Deliverables:

1. Complete your SOV spreadsheet, print to pdf and submit through email.

Method:

1. Find your Subcontractor bid documents and your Schedule of Value spreadsheet on your USB drive.
2. Review each subcontractor's bid forms. Review inclusions, exclusions, bid price, etc.
3. Select (1) subcontractor per construction trade.
4. Input the selected subcontractor's name, bid amount in the spreadsheet.
5. Under "Comments" list any information about the subcontractor that could pose a risk to DPR.
6. Input your Insurance percentage
7. Input your Fee percentage
8. Input your design/construction contingency percentage.
9. Sum up the costs and show them on your "Total Project Costs"
10. Format document, print to pdf, and send to your DPR executives.

INSERT TAB:

"Scenarios"

Module 7: Scenarios

Correspondence to you from your DPR Executive, Kegan Haerr:

ATTN: GATTACA Proposal Team

RE: URGENT - Upcoming Clarifications and Questions

As you probably remember from your last project proposal, throughout the day I'll be in constant communication with the client and design team working to finalize any last minute unknowns to make sure our proposal (should we decide to purse the project) is as up-to-date as possible.

This means I'll be reaching out to you all for updates, answers, clarifications, and responses that I can feed back to the architect and owner. The topics that could come up through the day range from soil abatement to value engineering to scope gaps and everything in between. In essence, all things under the sun related to construction of the GATTACA project.

I'll be acting as the communication facilitator and will try to provide as much assistance and backgrounds on the questions as I can. But as the proposal team, your in-depth knowledge of the scope of the project will be invaluable to provide the best responses to the client and designers.

Each of the emails sent out will have deadline associated with it, so please be sure to have a complete response returned to me prior to that time. That being said, there's no rush to get the emails answered before the deadline. So take your time to develop an intelligent and professional response that you would feel comfortable sending to the client or design team yourselves.

By working together as a team and using your combined knowledge to answer the emails in a timely manner, I know you'll be able to impress the client and help us out with another project win! Best of luck, and keep your eyes peeled for further updates.

We'll be in touch,

Kegan Haerr | DPR Construction
We Exist to Build Great Things.

INSERT TAB:

"Red Zone Go/No-Go"

Module 8: Red Zone "Go/No-Go"

Correspondence to you from your DPR Executive, Kegan Haerr:

ATTN: GATTACA Proposal Team

RE: Decision to Proceed

I would like to start by congratulating each of you on your work thus far. This job has been on our horizon as a potential target for years. However, now that GATTACA R&D has decided to move forward and presented us with a proposal opportunity, you have wasted no time getting pricing, evaluating the risks, building GCs, etc. It is excellent to see a team so focused on pursuing a project; in my experience, team enthusiasm builds trust with the client.

That being said, we are nearing the point where we should have enough information to make an educated decision to either 1) pursue the project through bid award or 2) decline the proposal invitation and focus our energies on other targets. In other words, a ***go / no go*** decision is needed.

This can be a rather trying decision to make without clear guidelines. As you already know, the criteria used to select whether or not to pursue a project is how closely it approaches DPR's ***Red Zone***. DPR developed the Red Zone criteria for selecting projects that combined passion, performance and economic return. Projects that fall into the Red Zone are those opportunities that meet all these requirements.

- Passion – We are passionate about working with engaged owners in a collaborative process.
- Performance – We perform best on technical projects that fall within our four core market sectors.
- Economic return – We focus on projects that optimize our annual returns.

Because the Passion and Performance are subjective criteria, the questions below my help guide your decision and start the ball rolling.

- Do we have an existing, positive relationship with the owner?
- Is this owner collaborative in nature?
- Would the owner appreciate the value DPR would bring to the project?
- Will this project result in an enduring relationship beyond a one-time transaction?
- Does the team share our Core Value – will it be fun?
- Do we have the right team available for this project?
- Does this project fall into DPR core markets?
- Is this project / owner strategically important?
- Is this project geographically in our area of operations?
- Is this a negotiated project or hard bid?
- Will self-performed work be very likely?

It is important to remember that these questions are only the tip of the iceberg when evaluating a project's risks and rewards. Factors such as schedule, subcontractors, project scope, contract language, etc. can all pose hazards to a team's success and must be scrutinized before a final go / no go decision can be made. Will we be able to achieve our ***Critical Success Factors***? Will the schedule allow us to complete the project scope safely and profitably? How will the outcome of this project affect our market and / or client reputation? Does the proposal budget allow for an acceptable fee and reasonable contingencies? Do we have experience with the geography, clients, and subcontractors in the region?

As the proposal team, we believe each of you are most qualified to answer these questions and make the final decision to pursue or decline this project. For presentation to the regional directors, please develop a narrative and provide sufficient back up supporting a ***go*** or ***no go*** decision for the GATTACA project you have been working on. This narrative must address items that affect your go / no go decision from each of the work modules throughout the day, but also include anything else that was influential.

Please compile this deliverable and turn it in at 10pm at the latest. As usual, feel free to look up any of the unknown phrases or terms written above on http://www.dpr.com/ to refresh your memory.

We look forward to your response,

Kegan Haerr | DPR Construction
We Exist to Build Great Things.

INSERT TAB:

"Mini Presentation"

Module 9: Mini Presentation

No information for this module is provided to you in the morning. You will learn about this module by email sometime during the day.

INSERT TAB:

"Final Presentation"

Module 10: Final Presentation

Final Presentation

On Friday your team will have the opportunity to present to the DPR management team. This is your chance to share your "go, no-go" decision on whether DPR should pursue this project. This decision should be a compilation of all the modules you worked on, gathering information on cost, schedule, logistics and all the intricacies that go into building a technical project.

While we don't expect you to go into detail for each module, we expect you to understand how each influenced your decision. Your presentation should touch on the following at a minimum:

- Contracts & Risk
- Logistics & scheduling
- General conditions & Schedule of values
- MEP Constructability Review
- Mini-Presentation
- Red Zone Analysis
- Scenarios
- Go, No-Go Decision

Remember, you work for DPR! Your team has been working on this job pursuit and this is your chance to present to *your* management team why DPR should or should not pursue this project further.