

BAS Evaluation Report

Customer:	Air Metrx West Coast	Contact:	Mr. Scott Lee Owner
Telephone:	(909) 910-3084	Fax:	
Project Location:	101 Ash Street San Diego, CA 92101	Completion Date:	March 11, 2019

Scope of Work:	<p>J.D. Leaper of Plexus Technologies Inc. has been commissioned to evaluate the current condition, inventory and state of repair of the existing legacy Building Automation System (BAS) at the above location. The BAS being evaluated is the CSI/INET system. This inspection does not take into consideration any Sequences of Operation whatsoever. The building consists of 19 floors a basement Level A and a 20th floor mechanical equipment mezzanine.</p> <p>Produce a current condition report addressing the specific items listed above.</p>
----------------	--

Report Details/Findings	<p>After a thorough inspection and review of each floor we found the overall condition of the system to be in an extremely degraded condition. After reviewing the original system installation submittals, we discovered that much of the Control Systems International control hardware used was at end of life even when the system was installed over 25 years ago. This also holds true with many of the non-CSI hardware such as damper actuator motors, pressure transducers and other sensing devices. The entire system has been declared obsolete by the manufacturer well over 15 years ago.</p> <p>The CSI/I-NET 7 software is located on the 20th floor and is installed on a PC running Windows XP. The I-NET 7 software stopped being supported in 2002. The system has no connection to the internet and is connected to a functioning dot matrix printer.</p> <p>The CSI/INET 7 Graphical User Interface system pages show a completely different story of what is remaining in the building. These software issues will need to be addressed. There are such major discrepancies in the software it is impossible to know if or what equipment we are controlling, its location or if the data we are receiving is accurate. The graphics pages do not show any location for each data point nor do they provide detailed information. The data points need to be verified and the graphics modified with accurate information and location for each point. This will be necessary if you upgrade/ merge the system. All new BAS that can migrate or merge with a CSI/ INET 7 system (including but not limited to OPIX, Tridium and Schneider) cannot edit the graphics or information. CSI/ INET 7 graphics have their own proprietary extension and can only be edited in its own graphics editor. The new BAS can only import network properties and the existing data base. CSI/I-net 7 will be required for any future network or database changes. This means that the information on the CSI/ INET 7 software must be corrected before any transition or the new system will contain the same discrepancies that are on the original system. The discrepancies will be clarified in the later pages in this report.</p> <p>We could not verify the operational condition of most the system at the time of inspection as power was physically disconnected from all the controls equipment and we could not find anyone willing to take the responsibility to reconnect for the purposes of evaluation. Physical inspection of what was left of the system showed physical electrical damage to many of the</p>
-------------------------	--

Terminal box controls and actuators. Many of the temperature and duct static pressure transducers have been removed, relocated or are damaged beyond repair. It is likely that some of these parts were removed from floors that were not being utilized or had a lower priority and used to replace failed hardware on areas of greater importance as parts are not readily available. See supporting documentation later in this report

The devices in most of the control cabinets control multiple pieces of equipment simultaneously, contrary to its original design when the building was built. Many of the VAV units do not have their own discrete controller. If any of the boards should fail it can take down the entire floor. When the building had pneumatic controls each piece of equipment had its own controlling hardware. When the building went through its first so called automation upgrade it appears as though the installing contractor chose the least expensive route and ignored the significant consequences it would have on the ability to control the environment. This is no reflection on the original manufacturer Control Systems International as they were one of the best systems available at the time of the automation upgrade. This was just an extremely inadequate implementation.

After reviewing the gathered information and reading the buildings guide document titled Tower Floor Perimeter Air Conditioning, in the Electric Building Description of All Mechanical & Electrical Systems their functions, components and controls, page 15, Operation it states that “The building lighting will normally supply all of the heating requirements for the building.” As the fluorescent lighting is being changed out with LED the main heat source for this building is being removed. This issue is only exacerbated by the fact there is no heat except for FCU’s on most floors. This document also states on page 9, 3rd paragraph “The return air from the occupied spaces is drawn up through the slots in the ends of the fluorescent lighting fixtures” “This warm air will enter the space above the ceiling”, “part goes into the fresh air intake to the supply air portion of the system”. Also on page 19, Tower Floor Perimeter Air Conditioning, System Description, “a small amount of chilled air through the ceiling air bars to provide the necessary fresh air supply to each room” As the lights and ballasts are being changed and the ceilings being encapsulated due to asbestos this may cause an issue with supply and return air as well as the air quality.

It also should be noted that all the actuators in the building are currently set to either 0 or 100%. This does not fall under the current code requirements. If the existing installed hardware was 100% serviceable and programmed to its peak performance, it could still not adequately satisfy the zones throughout the space. Most of the VAV’s no longer utilize their pressure reading stations and are ganged together and downgraded to simple Terminal Unit Boxes with a damper actuator. We also noticed that the insulation on the windows is falling out or is no longer in place. This is most likely due to age as this was possibly installed during the original building construction.

Most of the hardware was installed over 25 years ago and has exceeded its life expectancy. Much of the hardware is no longer manufactured making it more difficult to source over time and driving up cost. As parts fail their replacements will be over 15 years in the best-case scenario. Due to its age and how the hardware was installed parts replacement will be a constant battle

To truly bring this system up to date, it will cost far more trying to resurrect this greater than 25-year-old obsolete and downgraded control system than it will be to replace it with a new state of the art engineered system. To do anything other would be against best practices and would result in never being able to reach any kind of tenant satisfaction.

<p>Non-Technical Report Details/Findings</p>	<p>After a thorough inspection and review of each floor we found the overall condition of the system to be in extremely poor condition. Once we had completed our physical inspection and the original system installation submittals, we discovered that much of the Control Systems International hardware used has not been made as of 1994. This was the same year they system was installed. This is true for many of the non-CSI hardware as well including but not limited to damper actuator motors, pressure transducers and other sensing devices. Most of system has not been made in over 15 years and much of the equipment over 25 years.</p> <p>The CSI/INET 7 software is located on the 20th floor and is installed on a PC running Windows XP. This system is not currently connected to the internet nor does not have the commuting power to run anything made in the last 20 years. It currently has a dot matrix printer for printing reports. Some of these reports could take as much as a full day to print on this outdated technology. Due to the age of the PC hardware and software the Building Automation System (BAS) is limited, it does not allow for immediate notification in the case of a building emergency. With new technology the Building Automation System would be able to notify the correct department or individual if one or multiple points falls outside of its set parameters. If the Building Automation System should receive data that falls outside the set parameters, it could contact the appropriate department or individual letting them know that something needs to be addressed. This could keep an easily fixable issue from turning into a catastrophic incident. With the current outdated system this is not an option.</p> <p>The CSI/INET 7 graphics pages show something completely different than what we verified in the building. There are such major differences that it is impossible to know what equipment is working, what hardware is attached to the system, what is being controlled, and the location of the equipment. For example, the CSI/INET 7 software graphics show data points for 10 VAV Temperature Sensors (TS), 7 (FCU) Temperature Sensors (TS), 7 (VAV) Actuator controls, 8 Relative Humidity (RH), and 15 (PSI) data points on a single floor. The actual count located 8. actuators, 0 Relative Humidity (RH) sensors, and 4 Pressure Transducers in total. We found such discrepancies on every floor.</p> <p>At a minimum we would need to verify all the hardware being controlled by each device. Most of the BAS hardware is controlling multiple TU/VAV/FCU. We also need to verify where the sensors are pulling data from and all their locations. Currently only the blueprints show where the sensors are located, and they don't always show what device they are connected too. There is no information showing if or what sensors are for informational purpose only of if their data has an influence on the operation of the BAS. Once we have accurate information the graphic pages must be modified to show the hardware type, location, data being received, and additional graphics should be added to show detailed information for each data point. This must be done even if the decision was made to keep the current system or if you upgrade/merge the system.</p> <p>Currently there are new systems (including but not limited to OPIX, Tridium and Schneider) that can import and integrate data from the current outdated CSI/INET 7 system. They vary greatly in price and what capabilities are included. It is important to understand that all these systems are limited to importing the existing CSI/INET 7 database. New graphics will need to be generated. The current graphics are not only inaccurate but CSI/INET graphics have their own</p>

propriety extension. They can only be viewed or edited within CSI/INET and their graphics editor. None of these systems new system will be able to modify, manage, change or alter the old CSI/INET database. The CSI/INET 7 server will need to be preserved if possible if any changes are expected to be made. This includes the replacement of failed parts. If any part of the CSI/INET 7 is to remain it will still need a point to point verification. If this is not done once the old CSI/INET 7 database is imported to the new system will contain the same discrepancies. This will make the new system just as ineffective as the old one. You might have a new looking system on the outside, but you would still have the same incorrect data and the same system hardware/ software issues.

The CSI/INET 7 server is also controlling the lighting on floor 17-19. The lighting controls for these floors should be migrated to one of the other lighting control systems already in use. The CSI/INET 7 cannot be completely abandoned until the entire Building Automation System (BAS), (hardware and software) has been replaced and the lighting controls merged to one of the other lighting systems. If new current hardware and software is installed there would be no need for costly and timely corrections to the CSI/INET 7 system (including but not limited to hardware/software data point checks, amendments to data, reconfiguration of graphics, additional graphics pages, and reconfigure of schedules). There would also be no need to keep the old CSI/INET 7 system server. A new system would take less time provide a completely new state of the art system, graphics, hardware, and in most cases a 2-year warranty.

We could not verify the working condition of the system at the time of inspection as the power was previously disconnected from all the controls equipment. We could not find anyone willing to take the responsibility to reconnect the system temporarily so we could evaluate the system further. A physical inspection of the system showed electrical damage to many of the Terminal box controls and actuators. Many of the temperature and duct static pressure transducers have been removed, relocated or are damaged beyond repair. Most of these parts are no longer available making it very likely that some of these missing parts were removed from floors that were not being used or had a lower priority and used to replace parts that failed on occupied floors. See supporting documentation later in this report. Once the system is brought back online it is likely that there will be additional hardware failures that will need to be replaced and recommissioned in the CSI/INET 7 software.

In 1994 when the building went through its first Building Automation System install each piece of equipment had its own discrete pneumatic controls. The current system devices in most of the panels control multiple pieces of equipment at the same time. This was not how things were engineered in the original design. It appears the installing contractor chose the least expensive route and ignored if the system would work adequately. Although the Control System International system was one of the best systems available at the time of the installation. The way this system was configured, installed, and the hardware used was done in such a way that it left the building in worse condition and less energy efficient then when the building was originally constructed in the early 60's.

Recommendations	<p>The minimum recommendation would use the current obsolete CSI/INET 7 hardware and software. Old BAS hardware will need to be sourced. All the current BAS hardware will be left in place. All this equipment would be in best case 15 years or older and would not be under manufacture warranty or support. This option would cost more upfront and on the back end. It would be difficult to continue upkeep and find replacement parts as they fail. The ceiling on this site will be encapsulated. This means each time a part fails the abatement team will need to be called out, work area sealed off, air quality checked, all this before, after and during any work being done. This option will work for a limited time but eventually parts will no longer be unavailable, and a full system replacement will be needed.</p> <p>Minimum Requirements</p> <ul style="list-style-type: none">• All TU's and FCU's should have their own discrete controllers• Temp Sensors should be connected to its respective controller• Additional sensors or controllers should be added where needed• Pressure reading stations on TU's should be utilized with discrete controllers bringing back VAV applications• Point to point verification of all hardware devices• Recommission software and verify all points are connected to the appropriate piece of equipment.• Update and add graphics with accurate information• There is no warranty on obsolete equipment <p>This recommendation will replace the entire BAS. All new part, software, and graphics will be installed. This option generally includes a 2-year warranty, support, and training.</p> <p>Recommended</p> <ul style="list-style-type: none">• Replace the entire BAS system including:• Front-end Server• Front-end System Software• New Controllers, Actuators, Sensors & Transducers• All new graphics• A minimum of a 2-year warranty is provided on newly manufactured hardware
-----------------	---