SECTION 2

BOARD OF EDUCATION AGENDA

NOVEMBER 17, 2014

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Director, Secondary Education
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TO: Elliott Landon
FROM: James D'Amico
SUBJECT: New Course Proposals for Staples High School
DATE: November 17, 2014

Please find attached the proposals for new courses at Staples High school for the 2015-16 school year. The courses being proposed are AP Computer Science Principles, Animal Behavior, and Zoology from the Science department, and Lifeguard Training from the Physical Education and Health department.

While all of these courses are being proposed as we examine the future offerings of Staples High School in light of the upcoming changes to the State's high school graduation requirements, all of them expand the opportunities for our students to explore fields of study that emphasize real-world problem solving and applications.

Dr. A. J. Scheetz and Mr. David Gusitsch, the Chairs of the Science and Physical Education and Health departments, respectively, will be in attendance to discuss particular questions about these proposals.

AP COMPUTER SCIENCE PRINCIPLES

(AP CS PRINCIPLES)

COURSE OUTLINE FORMAT

Staples High School

Course Title: ***AP Computer Science Principles (AP CS Principles)***

Credit:
_____ .25 Quarter
_____ .50 Semester
__X__ 1 Year

Credit Area(s): *Science*

Course proposed by:
If the course has been suggested by an individual teacher, a student, or some other agent, it should have been reviewed and accepted by the department(s) before being presented to Collaborative Team.

_____ Administration	_____ Board of Education	_____ Students
_____ K-12 Curr. Review	__X__ Department	_____ Other

Prerequisite: *Successful completion of Introduction to Web Programming or enrollment 11th or 12th grade.*

Rationale:

1. How does this course contribute to the department goals and objectives?
   One of the main goals of our the science department is to teach students to be creative problem solvers and to think analytically. The new CS Principles course is designed to focus on those skills by being organized around seven "Big Ideas." These are that: computing is a creative process, abstraction facilitates focus on relevant concepts, data and information facilitate creation of knowledge, algorithms develop and express solutions to problems, programming leads to problem solving, human expression and the creation of knowledge, the Internet is a central component of modern computing, and finally, computing has global impacts.
2. What is the need this course addresses?
   This course provides another avenue for students to pursue their interest in STEM-related fields. Many students have taken the computer programming courses offered through the science department. These courses are designed to stand alone, but there are many students who would benefit from a broader understanding of computer science principles.
3. How does this course support the recommendation of the latest K-12 review?
   N/A

4. How does this course support Staples' mission statement?

   The mission statement focuses on three main themes, all of which are important for the AP CS course. For example, students need to use empathy when trying to solve a computing problem that is not just a theoretical issue, but something that other people will use and value. Integrity is central to the course in the sense that students will be producing "portfolio"-type artifacts that must represent their own work and will be evaluated by the College Board. Finally, community is important in this course because no programming is done in isolation. Students must tap into the large, vibrant and collaborative online programming community in order to take advantage of work done by others.

5. How does this course support the goals of the Westport 2025 initative?

   CS Principles is designed to make computer science and coding accessible to a wider range of students. It is not just about coding, rather it is a course designed to expose students to a range of principles about computers. As such, it is well aligned with all four of the major domains of the lens; Global Thinking in the sense that one performance task asks students to report on a technology that has had significant global impact, Critical Thinking in the sense that students will have to use computers to solve problems, Communication in the sense that the performance tasks ask students to communicate to others about the knowledge they generated via computing and finally and perhaps most significantly, Creative Thinking in the sense that ALL computer programming is essentially a creative endeavour in which a person engages.

<u>Staples Expectations for Student Learning Alignment:</u>

1. Academic Expectations
   - Students will think critically in a variety of contexts and situations.
   - Students will be competent problem solvers.
   - Students will use technology as a tool for learning in both accessing and analyzing information.
   - Students will effectively communicate their solutions and understanding using a variety of media.
   - Students will think creatively and will adapt their thinking in response to both critical feedback and changing demands.

2. Civic Expectations
   - Students will demonstrate a sense of ethics both in their words and their actions.
   - Students will consider their actions and solutions within the context of the global environment.

3. Social Expectations
   - Students will work collaboratively towards common goals.

Course Catalogue Description:
Prerequisite: *Successful completion of Introduction to Web Programming or good standing in 11th or 12th grade.*

The AP Computer Science Principles course is designed to be equivalent to a first-semester introductory college computing course. The key sections of this framework include; focus on creating computational artifacts, connecting computing to everyday life, abstracting problems to find solutions, analyzing both problems and solutions, communicating your thoughts and collaborating with peers and the larger computing community

Course Content

Students will learn about the impact computers have on our daily lives. They will learn how to write code that will serve useful functions. Students will explore how digital representations of phenomena can be generated and manipulated. Students will learn how to manipulate large data sets in order to extract meaningful and useful information from those data. Above all, students will learn that creativity is at the heart of computer programming.

Expectations for Student Learning (Outcomes)
The information below is derived from the College Board description of the course.

Skills:

Analyze the considerations involved in the computational manipulation of information.
Analyze computational artifacts.
Analyze how computing affects communication, interaction, and cognition.
Analyze the beneficial and harmful effects of computing.

Appropriately connect problems and potential algorithmic solutions.

Collaborate when processing information to gain insight and knowledge.
Collaborate to solve a problem using programming.
Collaborate in the creation of computational artifacts.

Communicate insight and knowledge gained from using computer programs to process information.

Connect computing within economic, social, and cultural contexts.

Develop an abstraction.
Develop an algorithm designed to be implemented to run on a computer.

Develop a correct program.

Employ appropriate mathematical and logical concepts in programming.

Evaluate a program for correctness.

Express an algorithm in language.
Explain how programs implement algorithms.

Use computing tools and techniques to create artifacts.
Use computing tools and techniques for creative expression.
Use models and simulations to raise and answer questions.
Use computers to process information to gain insight and knowledge.
Use computing to facilitate exploration and the discovery of connections in information.
Use large datasets to explore and discover information and knowledge.
Use computing tools and techniques for creative expression.
Use programming as a creative tool.
Use abstraction to manage complexity in programs.

Knowledge:
(What students need to know)
A creative process in the development of a computational artifact can include but is not limited to employing non-traditional, non-prescribed techniques; the use of novel combinations of artifacts, tools and techniques; and the exploration of personal curiosities.

Creating computational artifacts employs an iterative and often exploratory process to translate ideas into tangible form.

A computational artifact is anything created by a human using a computer and can be but is not limited to a program, image, audio, video, presentation, or web page file.

Creating computational artifacts requires understanding and using software tools and services.

Computing tools and techniques are used to create computational artifacts and can include but are not limited to programming IDEs, spreadsheets, 3D printers, or text editors.

Assessment:

Students are required to generate of at least two computational artifacts (the computational portfolio). These artifacts will be evaluated as part of the AP exam.

Equipment/Materials/Texts:

Access to computers and servers. Internet access.

ANIMAL BEHAVIOR (A LEVEL)

COURSE OUTLINE FORMAT

Staples High School

Course Title: ***Animal Behavior (A Level)***

Credit:
_____ .25 Quarter
__X__ .50 Semester
_____ 1 Year

Credit Area(s): *Science*

Course proposed by:
If the course has been suggested by an individual teacher, a student, or some other agent, it should have been reviewed and accepted by the department(s) before being presented to Collaborative Team.

_____ Administration	_____ Board of Education	_____ Students
_____ K-12 Curr. Review	__X__ Department	_____ Other

Prerequisite: *Successful completion of Biology (any level)*

Rationale:

1. How does this course contribute to the department goals and objectives?
   On of the main goals of the Science department is that of problem-solving. This course will explore the observation of animal behavior, and will teach students the basics, not only of animal behavior itself, but also ways in which the students can objectively observe the behavior and learn from it.
2. What is the need this course addresses?
   The study of animal behavior is a good fit for the (a) experiential, (b) naturalistic, and (c) interpersonal learners in the Staples community. The exploration of the social behavior of animals seems like an excellent fit for this group of learners, in that it focuses on (a) the observation and mimicry of the animal behavior, (b) the behavior in the context of both the physical and social environment, and (c) the interactions among the animals. In addition, given the CAPT, and other state, not to mention federal, curricular obligations, animal behavior is rarely explored in the science classroom, and it is an area of great interest to many students.
3. How does this course support the recommendation of the latest K-12 review?
   N/A
4. How does this course support Staples' mission statement?
   "The Staples High School community inspires learning, fosters integrity and nurtures empathy." Animal behavior has the benefit of being inherently interesting to many students, and this course will be a way to foster this in the students. In addition, empathy is an important part of the behavior of many animals, and an exploration of this behavior in animals will further the development of this in students themselves.
5. How does this course support the goals of the Westport 2025 initiative?
   The study of animal behavior supports the idea of CRITICAL THINKING, as students need to analyze behavioral patterns and discern the evolutionary advantages of those behaviors. The animal behavior course also fosters CREATIVE THINKING in that students have to design a

behavioral study, as well as ways to modify existing zoo enclosures to the benefit of the animals. The students will be COMMUNICATING their results with the class. Lastly, the students will use GLOBAL THINKING in their study of the effects of behavior on wildlife management.

Staples Expectations for Student Learning Alignment:

1. Academic Expectations
   - Students will think critically in a variety of contexts and situations.
   - Students will be competent problem solvers.
   - Students will use technology as a tool for learning in both accessing and analyzing information.
   - Students will effectively communicate their solutions and understanding using a variety of media.
   - Students will think creatively and will adapt their thinking in response to both critical feedback and changing demands.

2. Civic Expectations
   - Students will demonstrate a sense of ethics both in their words and their actions.
   - Students will consider their actions and solutions within the context of the global environment.

3. Social Expectations
   - Students will work collaboratively towards common goals.

Course Catalogue Description:
Prerequisite: *Successful completion of Biology (any level)*

This course concentrates on how animals behave, why animals behave the way they do and how scientists design experiments to study their behavior. Students will learn about the biology behind behavior, animal communication, feeding behavior, mating, predator-prey relationships, aggression, territorial behavior, social behavior and parental care. For the lab portion of this course, observation of actual animals, video, and out-of-classroom activities will be utilized.

Course Content

- Introduction to the animal behavior
  - hunting and feeding
  - competition for space
  - defense (individual and group)
  - courtship behavior
  - rearing of offspring
  - social behavior
  - dominance hierarchies
- How to observe animal behavior
  - avoiding anthropomorphism
  - qualitative methods
  - quantitative methods
- Evolution of animal behavior
  - Basic Evolutionary Mechanism
    - Variation
    - Competition

        - Large numbers of offspring
        - Natural Selection
        - Genetics
    - major adaptations (evolutionary problem solving)
- Major animal groups, and behaviors associated with them
    - Amphibians
    - Reptiles
    - Birds
    - Mammals
        - Large mammals
            - Herbivores
            - Carnivores
        - Wild vs. domestic cats
        - Wolves vs. domestic dogs
        - Primates
- Animals in Zoos
    - The purpose of zoos in the past.
    - The modern purpose of zoos
    - Disturbed behavior
    - Importance of environmental enrichment
    - Visiting a zoo to analyze enclosures, and to collect data on the animals.

Final Project: Design an independent exploration of animal behavior.

Expectations for Student Learning (Outcomes)

Skills:

- Ability to look at animal behavior objectively, without anthropomorphizing that behavior
- Ability to collect data on animal behavior through observation
- Ability to to represent that data in a quantitative format
- Ability to analyze and interpret quantitative information
- Ability to determine the best course of action, based on behaviors, for the care of animals in a zoo setting

Knowledge:

- Understand the evolutionary importance of animal behavior.
- Distinguish between proximate and ultimate causation and give examples of each.
- Understand the integration of genetics and neurology with ethology.
- Differentiate among instincts, non-associative learned and associative learned behaviors.
- Understand the evolutionary limitations of learning, classical, and operant conditioning.
- Define imprinting and sensitive phase to explain how behaviors develop.
- Understand the complications associated with the determination of cognitive behaviors in animals.
- Explain how information is communicated among group members of non-human and humans.
- Define migration and explain why and how migration patterns change over time.

- Discuss the concept of the stimulus/response chain as it relates to courtship behaviors. Explain why these behaviors are species specific.
- Understand the genetic basis for behavior among eusocial insect societies.
- Define behavioral ecology. Understand its association with adaptive significance and fitness.
- Compare foraging behaviors of generalists and specialists and understand how the optimal foraging theory explains foraging efficiency.
- Explain the need for territoriality in animals and the economic risks associated with such behavior.
- Understand the associations between parental investment and mate choice and how these interactions affect the evolution of mating systems.
- Explain how sexual selection and secondary sexual characteristics affect reproductive competition.
- Explain how inclusive fitness is related kin selection and under what circumstances it can lead to altruistic behavior.
- Explain the benefits of engaging in reciprocal altruism
- Define sociobiology. Cite advantages and disadvantages of living in social groups.
- Compare the complexity of vertebrate societies with that of eusocial insects. Understand the value of such activities as cooperative breeding and alarm calling in vertebrate societies.

Equipment/Materials/Texts:

Access to computers and servers. Internet access.

The Secret Language of Animals: A Guide to Remarkable Behavior, by Janine M. Benyus, Juan Carlos Barberis, Alexandra Horowitz, ISBN: 1579129684 (ISBN13: 9781579129682)

An Introduction to Animal Behaviour Paperback by Aubrey Manning and Marian Stamp Dawkins
ISBN-13: 978-0521165143 ISBN-10: 0521165148 Edition: 6th

Various David Attenborough videos will also be presented.
https://www.youtube.com/playlist?list=PLAhf89JbnzaI2iYesh4PyO3oo081NgDtj

Depending on the number of sections, the budgetary impact would involve class sets of the textbook, videos, and other resources, as well as the cost for at least two field trips to the Beardsley Zoo in Bridgeport for (1) initial general observation, and (2) data gathering for final student projects.

Projected Cost (from Department Chair's recommendation): $25,000

ZOOLOGY (A LEVEL)

COURSE OUTLINE FORMAT

Staples High School

Course Title: ***Zoology (A Level)***

Credit:
_____ .25 Quarter
__X__ .50 Semester
_____ 1 Year

Credit Area(s): *Science*

Course proposed by:
If the course has been suggested by an individual teacher, a student, or some other agent, it should have been reviewed and accepted by the department(s) before being presented to Collaborative Team.

_____ Administration	_____ Board of Education	__X__ Students
_____ K-12 Curr. Review	__X__ Department	_____ Other

Prerequisite: *Successful completion of Biology (any level)*

Rationale:

1. How does this course contribute to the department goals and objectives?
   This course arose out of the work of Mr. Lazaroff and a student of his, Josh Hauser.
2. What is the need this course addresses?
   Students with an interest in animal life can currently explore marine animals in our Marine Biology course, but that limits the creatures studied. As most students' experiences are terrestrial in nature, a course that explores terrestrial animals in general, and terrestrial vertebrates in particular, is needed.
3. How does this course support the recommendation of the latest K-12 review?
   N/A
4. How does this course support Staples' mission statement?
   "The Staples High School community inspires learning, fosters integrity and nurtures empathy." Zoology is a subject of fascination among many members of the Staples community, (as borne out by the success of Marine Biology, the aquatic counterpart to Zoology) at Staples, which will inspire learning in our students. Integrity will be fostered through the exploration of the various species, and the understanding that these animals require the preservation of their habitat. Empathy will be nurtured through the exploration of the interactions of these animals and their environment, as well as the negative effects of mankind's encroachment upon, and destruction of, their environments.
5. How does this course support the goals of the Westport 2025 initiative?
   The study of Zoology involves a great deal of CRITICAL THINKING, especially in terms of the integration of structure and function, and the evolutionary advantages of the many adaptations studied. Students will use CREATIVE THINKING in their fictional creation of an organism that would have evolved to survive in a specific environment. The students will be using COMMUNICATION skills in their sharing of their fictional creatures, as well as their presentation of what they discovered in their work in dissection. Lastly, GLOBAL THINKING

will be utilized as they explore and compare the great variety of environments in the world, and the amazing creatures who have evolved in them, not to mention the dangers (deforestation, pollution, climate change, etc.) these animals face as humans have blindly expanded their civilization.

Staples Expectations for Student Learning Alignment:

1. Academic Expectations
   - Students will think critically in a variety of contexts and situations.
   - Students will be competent problem solvers.
   - Students will use technology as a tool for learning in both accessing and analyzing information.
   - Students will effectively communicate their solutions and understanding using a variety of media.
   - Students will think creatively and will adapt their thinking in response to both critical feedback and changing demands.

2. Civic Expectations
   - Students will demonstrate a sense of ethics both in their words and their actions.
   - Students will consider their actions and solutions within the context of the global environment.

3. Social Expectations
   - Students will work collaboratively towards common goals.

Course Catalogue Description:
Prerequisite: *Successful completion of Biology (any level)*

Zoology is the study of animals. The structure and function, as well as the behavior, of animals, and how they have adapted to their environments, will be explored in detail. This scientific course is designed to teach students the basic principles of the diversity of life through the application of identification, classification, and laboratory investigation. *Dissections are required.*

Course Content

- Introduction to the animal kingdom (3 days)
  - What is an animal
    - multicellular
    - feeding
    - gas exchange
    - sensory systems
    - mobility
    - reproduction
  - Ectotherm vs. Endotherm
  - Terrestrial vs. Aquatic vs. Aerial
  - Arctic vs. Temperate vs. Tropical
  - Vertebrate vs. Invertebrate
  - Asexual vs. Sexual
  - Social vs. Nonsocial
- Introduce evolution of animal groups (4 days)
  - Basic Evolutionary Mechanism

        - Variation
        - Competition
        - Large numbers of offspring
        - Natural Selection
        - Genetics
    - Evolutionary tree
        - Cladistics
    - major adaptations (evolutionary problem solving)
    - divergent vs. convergent
- taxonomy (as bridge between evolution and major classifications) (2 days)
- Major vertebrate classes anatomy (7 weeks)
    - Body System Introduction (**S*L*IC M*E*N R RED**)
    - Amphibia - Frogs, Toads, Salamanders
        - Skeletal
        - Muscular
        - Integumentary - sensitivity of skin
            - Lake Titicaca Giant Frog and low O_2 levels in water
        - Respiratory - Skin & Lungs
        - Cardiovascular
            - wood frogs, dormancy and natural antifreeze
        - Excretory
        - Digestive
        - Nervous
        - Reproductive
    - Reptilia
        - Skeletal
        - Muscular
        - Integumentary
        - Respiratory
        - Cardiovascular
            - temperate turtle brumation
        - Excretory
        - Digestive
        - Nervous
        - Reproductive
    - Aves
        - Skeletal
        - Muscular
        - Integumentary
        - Respiratory - Air sacs &
        - Cardiovascular
        - Excretory
        - Digestive

        - Nervous
        - Reproductive
    - Monotremata
        -
    - Mammalia
        - Skeletal
        - Muscular
        - Integumentary
        - Respiratory
        - Cardiovascular
        - Excretory
        - Digestive
        - Nervous
        - Reproductive
- Behavior (7 weeks)
    - hunting and feeding
    - living space
    - defense
    - reproduction
    - intelligence
    - society
    - development
- What's next? (2 weeks)
    - Future is Wild
    - patterns in previous evolutionary history

Final Project: Design an animal to fit certain environmental requirements.

Expectations for Student Learning (Outcomes)

Skills:

- Students should be able to communicate scientific design, results, analysis, & conclusions in a variety of formats.
- Students should be able to understand the relationship between structure and function.
- Students should understand and be able to discuss the scientific methods of inquiry and unifying themes of organization with respect to classification/evolution/taxonomy.
- The student is able to interpret and appraise the relationships in ecosystems- interactions between organisms and between organisms and the environment.
- The student is able to interpret and design models for complex systems.

Knowledge:

- demonstrate an understanding of the scientific method, specifically developing proficiencies on performing, documenting, and analyzing laboratory methods and experiments;
- understand the organization of life from molecules and cells to organisms and ecosystems and how the interactions of these levels have shaped life on earth, specifically:
    - a. recognizing and comparing the characteristics (anatomy and physiology, ecological niche, behavior, *etc.*) that optimize the ability of an animal to survive in its environment,
    - b. developing an appreciation of the ecological importance of animals;
- understand and describe the relationship between structure and function in the organization and survival of animals and each major animal group;
- understand and describe the principles of evolution and the evolutionary relationships among animal groups;
- develop an appreciation for animal diversity through the in-depth study of animal taxonomy, cladistics and systematics.
- Students will learn to recognize and be able to classify the major (common, economically or medically important, evolutionarily significant, or for other reasons) groups of animals.
- Students will learn specialized terminology and basic concepts of zoology.
- Students will learn evolutionary relationships among the different groups of animals.
- Students will learn basic, selected external and internal structure and associated biology/function for different kinds of animals.
- Students will learn quantitative measurement, and hypothesis formulation and testing in zoology.
- Students will come to appreciate and enjoy the subject of zoology (i.e., have fun) and be able to place the subject in the larger context of human knowledge and experience on a global scale.

Equipment/Materials/Texts:

Access to computers and servers. Internet access.

Integrated Principles of Zoology, by Jr., Cleveland Hickman, Susan Keen, Allan Larson, David Eisenhour ISBN-13: 978-0073040509 ISBN-10: 0073040509 Edition: 15th

Dissection specimens (1 specimen of each per every pair of students): Annelid (Earthworm), Arthropod (Crayfish), Snake (Anolis carolinensis), Bird (Pigeon), Mammal (Rat)

Various David Attenborough videos will also be presented.
https://www.youtube.com/playlist?list=PLAhf89JbnzaI2iYesh4PyO3oo081NgDtj

Depending on the number of sections, the budgetary impact would involve class sets of the textbook, videos, and other resources, as well as the cost for each of the 5 specimens above, with 2 students per specimen.

Projected Cost (from Department Chair's recommendation): $25,000

LIFEGUARD TRAINING

Staples High School
Course Proposal

Course Title: Lifeguard Training

Credit: ____ .25 Quarter
__X__ .5 Semester
_____ 1 Year

Credit Area(s):
The credits for this course would go toward satisfying the Physical Education and Health graduation requirements.

Prerequisites/Eligibility:
Students must be at least a junior in good standing who:

- is able to swim 300 meters (12 lengths of the pool) continuously using freestyle (100 meters), breaststroke (100 meters) and choice (100 meters).
- is able to swim twenty meters and do a surface dive to retrieve a diving block at a depth of approximately fourteen feet, before returning to the pool deck using a rescue kick.
- is able to tread water using various techniques.
- has participated in and passed grade 9 and grade 10 Aquatics in Physical Education.
- has earned a cumulative "B" average in Physical Education.
- is at least 15 years of age.

Course Development:
If the course has been suggested by an individual teacher, a student, or some other agent, it should have been reviewed and accepted by the department(s) before being presented to Collaborative Team.

Course proposed by

___Administration ____ Board of Education ____ Students

___ K-12 Curriculum Review __X__ Department ____ Other

I. Rationale:

The Staples High School Physical Education Department has recently reviewed its curriculum which included alignment with state and national standards, school and district initiatives, and a review of student survey responses. This course reflects student interest, aligns with the Lifetime Physical Education offering and meets local, state and national standards. Upon successful completion of the course, students will be qualified for and eligible to apply for employment opportunities that utilize their learned skill set.

II. Staples Expectations for Student Learning Alignment:

- Academic:
  - learn the skills necessary for preventing, responding to, and treating aquatic and non-aquatic injuries.
  - learn and successfully pass written and skill assessments based on content covered in the text and practical class work.
  - learn, follow and enforce aquatic safety rules.

- Civic/Social:
    - learn qualities of professionalism and the responsibilities of becoming a professional lifeguard.
    - learn to work as a team to successfully perform a variety of skills (i.e., CPR and back-boarding).
    - learn qualities of leadership and how to cooperate, control and manage people involved in aquatic and/or group activities.

III. Course Catalogue Description:

Lifeguard Training offers students an opportunity to learn the duties, responsibilities and requirements of becoming a lifeguard and how to carry these out in a responsible, professional manner. Students will learn a number of skills required for a lifeguard position including: advanced skills in swimming, proper use of lifesaving equipment, preventing disease transmission, using appropriate surveillance techniques, how to manage a spinal injury victim, and how to perform first aid and/or CPR on a victim; amongst others. Characteristics and responsibilities of a professional lifeguard, such as appropriate interactions with the public, accommodating patrons with disabilities, and addressing uncooperative patrons are also addressed. Students are eligible to earn certifications in the following: pool and waterfront lifeguard, automated external defibrillator (AED), CPR for the professional rescuer and first aid.

IV. Course Content (Themes, topics):

- learn the skills necessary to assist people in distress in a variety of situations in an aquatic emergency.
- learn CPR for the professional rescuer that will include material necessary to help adults, children, and infants.
- learn the First Aid needed to treat victims in a variety of situations
- learn how to treat victims of a spinal injury.
- learn the necessary steps to take during and after an emergency.

V. Educational experiences in this course will assure that students will:

- Skills (from district, state and national Physical Education standards):
    - Demonstrates competency in a variety of motor skills and movement patterns.
    - Exhibits responsible personal and social behavior that respects self and others.
    - Demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness.

- Knowledge
    - Applies knowledge of concepts, principles, strategies, and tactics related to movement and performance.
    - Recognizes the value of physical activity for health, enjoyment, challenge, self-expression and/or social interaction.

VI. Student Assessment:

- Students will be assessed using written and skill requirement assessments. Departmental protocol and guidelines are also expected to be followed.

VII. Materials/Texts:

- Certification $35 (upon successful completion of all requirements)
- Pocket mask(s) $20 (required)
- No text fee (online/free)

VIII. Required Resources and Budget:

- We are considering offering 1 section in the first semester and 1 section in the second semester. This would require a .2 FTE teaching assignment.
- Certification and required pocket mask(s) for each student (x18 student max per semester):
  - $990 per semester (maximum)
  - $1980 per year (maximum)
- American Red Cross Instructor Package with CPR monitor and additional "lung bags" **(one-time fee):**
  - $1400.00

Medical Health Insurance Fund
FY 14-15 Projections
Claims data as of October 31, 2014

	Estimates
Cash receipts	
General Fund Budget from line 210	$ 14,501,700
Other Fund Contributions	85,000
Employee Contributions (Active)	2,433,811
Flex Spending Accounts	-
Cobra Participants	26,008
Retirees under 65	365,701
State Teachers Retirement (TRB)	146,824
Life Insurance Premiums	25,000
Retirees over 65	421,847
Other Contributions (FMLA, Retiree Life, etc.)	-
Total cash receipts	18,005,891
Cash disbursements	
Medical	10,751,572
Prescription	1,988,348
Dental	1,007,255
Flex Spending Accounts	-
Contribution to HSA	1,329,000
Medical Adminsitrative	478,224
Network Access Fee	164,426
Individual Stop-Loss	681,912
Dental Adminsitrative	53,903
FSA Administrative	2,931
Consulting Fee	45,000
ERIP & Refunds Less Reimbursements	-
ACA Related Fees	112,258
Retirees over 65	675,000
Total cash disbursements	17,289,829
Change in cash balance	716,062
Beginning cash balance (unaudited)	930,839
Ending cash balance(deficit)-projection	1,646,901
Less: Incurred but not reported claims (carrying FY14)	(908,233)
Net Position(Deficit) end of year-projection	738,668

Claims Cash Draw Against Insurance Fund Account

	Medical/Rx	Dental	Flex	Other	Total	Avg. Monthly Claims	Variance
Jul 2014	$ 940,672	$ 94,171	$ 6,419	$ -	$ 1,041,262	$ 1,041,262	
Aug 2014	$ 1,551,384	$ 93,150	$ 396	$ -	$ 1,644,930	$ 1,343,096	$ 301,834
Sept 2014	$ 1,237,176	$ 110,586	$ 6,691	$ 119	$ 1,354,572	$ 1,346,921	$ 3,825
Oct 2014	$ 680,049	$ 68,680	$ 7,696	$ 1,156	$ 757,581	$ 1,199,586	$ (147,335)
Nov 2014					$ -		
Dec 2014					$ -		
Jan 2015					$ -		
Feb 2015					$ -		
Mar 2015					$ -		
Apr 2015					$ -		
May 2015					$ -		
Jun 2015					$ -		
	$ 4,409,281	$ 366,587	$ 21,202	$ 1,275	$ 4,798,345		
YTD/Estimate	34.6%	36.4%	n/a	n/a			
Theoretical YTD Spend Rate	33.0%	33.0%	n/a	n/a			
variance %	1.6%	3.4%					
variance $	$ 205,107	$ 34,193			$ 239,300		

WESTPORT PUBLIC SCHOOLS, WESTPORT CT

REQUEST FOR BID

INSTALLATION OF FIRE ALARM EQUIPMENT, PAGING EQUIPMENT AND MASS NOTIFICATION EQUIPMENT

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Westport Public Schools Westport, CT

I. Fire Alarm System / Paging System / Mass Notification System General Requirements

The contractor shall provide a complete integrated mass notification system, including all devices, equipment, wiring and conduit. Applicable codes for this project include NFPA, Connecticut Fire Safety Code, International Building code and the National Electrical Code. The system shall also comply with requirements of the National Board of Fire Underwriters', the Americans with Disabilities Act Accessibility Guidelines and all applicable state, local and federal codes. Where conflicts exist between code requirements, the more stringent requirement acceptable to the authority having jurisdiction shall be provided.

Scope of work includes upgrades and modifications to the existing Notifier Fire Alarm Voice Evacuation Systems and Public Address Systems for eight Westport Public Schools. Modifications will include additional fire alarm speakers or paging speakers for both the interior and exterior of all schools, amplifiers, speaker control cards, and power supplies. Additional mass notifications system messages will be provided for emergency lockdown system messages which will be in addition to the existing fire alarm emergency messages. New emergency lockdown buttons will be provided and installed within the administrative areas of all schools.

Mass notification system messages shall be activated by emergency lockdown buttons located in administrative areas which shall annunciate voice messages throughout all fire alarm speakers within a school in all areas simultaneously. In addition to activating messages throughout the fire alarm system lockdown, emergency messages shall also be distributed throughout all public address speakers, close all fire doors and activate emergency lockdown message at the Westport Police Department.

II. Materials & Methods

The following information summarizes the desired materials and methods for the fire alarm and system. Refer to specifications for additional information.

Wiring method throughout the facility will be Fire Alarm MC Cable. In certain areas subject to physical damage, conduit and wire shall be used as specified. Where wiring must be exposed in finished spaces, surface non-metallic raceway (Wiremold or approved equal) shall be utilized, and shall be colored to match the surface it is mounted on. Raceways should be concealed where possible. Existing conduits routed underground to outbuildings or equipment on site for fire alarm may be re-used if they are of adequate size, in good condition and contain only fire alarm wiring. Any new conduits required to be run to outbuildings or site equipment shall be routed

underground in rigid galvanized steel conduit at the code required burial depth.

All devices and equipment shall be listed UL for fire alarm and listed for the environment it is installed in. Devices located outdoors or in wet/damp environments shall be weatherproof type. All devices shall be located such that adequate serviceability is possible.

Where existing devices are removed and an empty box or hole remains, provide patching and a cover plate painted to match adjacent surfaces. All painting and patching due to demolition or physical damage caused during installation of new work shall be the responsibility of the electrical alarm contractor.

All fire stopping and sealing shall be the responsibility of the installation contractor.

III. Supplemental Installation Guidelines and Requirements

Contractors shall allow preliminary post contract award time for walk troughs at all schools to field determined location of all interior and exterior speakers, emergency lockdown buttons and ancillary equipment as required.

High School - 6 hours
Middle Schools - 4 hours
Elementary Schools - 2 hours

All exterior speakers will be an average of 80 foot spacing with a maximum of 100 foot spacing allowed.

All interior speakers will be an average of 40 foot spacing with a maximum of 60 foot spacing allowed.

New speaker quantities are to be provided as shown on building overview drawings.

New lockdown button quantities are to be provided as shown on building overview drawings.

Equipment wiring to be provided as shown on system riser diagrams.

INTELLIGENT REPORTING FIRE DETECTION SYSTEM / PAGING SYSTEM / MASS NOTIFICATION SYSTEM

PART 1.0 - GENERAL

1.1 DESCRIPTION:

A. This section of the specification includes the furnishing, installation, connection, testing and modifications to the existing microprocessor control, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Remote Control Panels, auxiliary control devices, transponders, annunciators and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

C. The fire alarm manufacturer shall be of the highest caliber and insist on the highest quality. The system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

D. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

E. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and shall be in compliance with the UL listing.

1.2 SCOPE:

A. The existing fire alarm voice evacuation system, fire alarm command centers and public address system shall be modified in accordance to the project specifications and site drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 6 (Class A) Signaling Line Circuits (SLC).

2. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style A) as part of an addressable device connected by the SLC Circuit.

3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.

4. Digitized electronic signals shall employ check digits or multiple polling.

5. A single ground or open on the system signaling line circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

6. Alarm signals arriving at the main FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

7. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone whichever is greater.

8. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.

9. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.

C. BASIC SYSTEM FUNCTIONAL OPERATION

When a fire alarm condition or lockdown condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system alarm LED on the FACP shall flash.

2. A local piezo electric signal in the control panel shall sound.

3. A backlit 640 character or 80 character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

4. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

5. Fire alarm voice evacuation messages shall be distributed to all fire alarm speakers throughout the facility.

6. Emergency lockdown voice evacuation messages shall be distributed to all speakers throughout the facility to include both fire alarm and paging speakers.

7. All fire doors shall close.

8. Fire alarm activation shall annunciate at fire department via digital dialer.

9. Lockdown activation buttons shall annunciate at police department via digital dialer.

1.3 SUBMITTALS

A. General:

1. Four copies of all submittals shall be submitted to the Consultant for review.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

3. Show annunciator layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.

2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications:

1. Provide the services of a Notifier factory trained NICET III authorized technician to perform all system software modifications, upgrades or changes.

2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

E. Certifications:

Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is a Connecticut authorized representative of the major equipment manufacturer. Include names and addresses in the certification. Provide certifications for NICET III Technicians.

1.4 GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5 APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards.

A. National Fire Protection Association (NFPA) - USA:

No. 12	CO2 Extinguishing Systems
No. 12A & 12B	Halon Extinguishing Systems
No. 15	Water Spray Systems
No. 16	Foam/Water Deluge and Spray Systems
No. 72-1993	National Fire Alarm Code
No. 101	Life Safety Code

B. Underwriters Laboratories Inc. (UL) - USA:

No. 268 Smoke Detectors for Fire Protective Signaling Systems
No. 864 Control Units for Fire Protective Signaling Systems
No. 268A Smoke Detectors for Duct Applications
No. 521 Heat Detectors for Fire Protective
No. 464 Audible Signaling Appliances
No. 38 Manually Actuated Signaling Boxes
No. 346 Waterflow Indicators for Fire Protective Signaling Systems
No. 1076 Control Units for Burglar Alarm Proprietary Protective Signaling Systems
No. 1971 Visual Notification Appliances

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

E. Distributor of fire alarm to be an approved UUJS certified company.

1.6 APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc.
FM Factory Mutual

B. The fire alarm control panel shall meet UL Standard 864 (Control Units) and UL Standard 1076 (Proprietary Burglar Alarm Systems).

PART 2.0 PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment proposed is based on Notifier. No other systems will be considered.

E. Integrated Technical Systems Wallingford, Connecticut shall provide the equipment and technical services to all bidding contractors.

2.2 CONDUIT/MC CABLE:

A. Conduit:

1. Conduit shall be in accordance with the National Electrical Code (NEC), local and state requirements.

2. All wiring in exposed areas which are not used for vertical risers shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. MC Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. MC Cable:

1. All wiring used for main riser cables shall be MC Cable as manufactured by AFC or equal.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63 mm) for notification appliance circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit must be MC Cable and shall have a fire resistance rating suitable for the installation as indicated in NFPA 70.

5. All field wiring shall be completely supervised.

C. Terminal Boxes, Junction Boxes and Cabinets:

All boxes and cabinets shall be UL listed for their use and purpose.

D. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

E. The fire alarm control panel and remote transponders shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power

distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.3 MAIN FIRE ALARM CONTROL PANEL:

A. The specification is based on modifying the existing Notifier Fire Alarm Voice Evacuation System Control Panels within eight separate schools. The system shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. Operator Control:

1. Acknowledge Switch:

A. Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 640-character LCD display to the next alarm or trouble condition.

B. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.

2. Alarm Silence Switch:

Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silence able by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

3. Alarm Activate (Drill) Switch:

The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

4. System Reset Switch:

Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.

5. Lamp Test:

The Lamp Test switch shall activate all system LEDs and light each segment of the liquid crystal display.

C. System Capacity and General Operation:

1. The control panels shall provide a minimum of 1 - 10 SLC circuits and be capable of expansion from 318 to 3180 intelligent/addressable devices.

2. The system shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 3.0 amps @ 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable notification appliance circuits.

3. Output modules (signal, speaker, telephone, or relay), each with 6 circuits. These circuits shall be Class A (NFPA Style D) or Class A (NFPA Style Z) per the project drawings.

4. The fire alarm control panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.

5. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.

6. The system shall allow the programming of any input to activate any output or group of outputs. Systems which have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes.

7. The FACP shall provide the following features:

A.) Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.

B.) Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.

C.) Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.

D.) Nine sensitivity levels for alarm, selected by detector. The system shall also include up to nine levels of pre-alarm, selected as a percentage of the alarm level, in steps from 90% down to 50%.

E.) System status reports to display or printer.

F.) Alarm verification, with verification counters.

G.) PAS pre-signal, meeting NFPA 72 3-8.3 requirements.

H.) Rapid manual station reporting (under 3 seconds).

I.) Non-alarm points for general (non-fire) control.

J.) Periodic detector test, conducted automatically by the software.

K.) Self optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its pre-alarm level to just above normal peaks.

L.) Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.

M.) Walk test, with a check for two detectors set to same address.

N.) Control-by-time for non-fire operations, with holiday schedules.

O.) Day/night automatic adjustment of detector sensitivity.

P.) Device blink control for sleeping areas.

Q.) UL-1076 security monitor points.

8. The FACP shall be capable of coding notification circuits in march time (120 PPM), temporal (NFPA 72 A-2-2.2.2), and California code.

D. Central Microprocessor

1. The microprocessor shall be a state-of-the-art, high speed, 16 bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.

2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.

3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.

4. A special program check function shall be provided to detect common operator errors.

5. An auto-program (self-learn) function shall be provided to quickly install initial functions and make the system operational.

6. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download. This program shall also have a verification utility which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in compliance with the NFPA 72 requirements for testing after system modification.

E. Display

1. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

2. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.

3. The display shall include an 80-character back-lit alphanumeric Liquid Crystal Display (LCD). It shall also provide 8 Light-Emitting-Diodes (LEDs, that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM WARNING, SECURITY ALARM, SUPERVISORY SIGNAL, SYSTEM TROUBLE, DISABLED POINTS, and ALARM SILENCED.

4. The display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard. This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.

5. The display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.

F. Signaling Line Circuits (SLC)

1. The system shall include from one to ten SLC circuits. Each SLC interface shall provide power to and communicate with up to 159 intelligent detectors (ionization, photoelectric or thermal) and 159 intelligent modules (monitor or control) for a system capacity of 3180 devices. Each SLC loop shall be capable of NFPA 72 Style 6 (Class A) wiring.

2. The Loop Control Module (LCM) shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

3. The detector software shall meet NFPA 72, Chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.

4. The detector software shall allow manual or automatic sensitivity adjustment.

G. Serial Interfaces

1. The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Electronic Data Processing (EDP) peripherals.

2. One EIA-232 interface shall be used to connect an UL-Listed 40 or 80 column printer. Printers which are not UL-Listed are not considered acceptable substitutes.

4. The system shall include an EIA-485 port for the serial connection of optional annunciators and remote LCD displays.

5. The EIA-485 interface may be used for network connection to a proprietary receiving unit.

H. Notification Appliance Circuit (NAC) Module

1. The notification appliance circuit module shall provide six fully supervised Class A or B (NFPA Style Z or Y) notification circuits. An expansion circuit board shall allow expansion to eight circuits per module.

2. The notification circuit capacity shall be 3.0 amperes maximum per circuit and 6.0 amperes maximum per module.

3. The module shall not affect other module circuits in any way during a short circuit condition.

4. The notification circuit module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal strips shall be UL listed for use with up to 12 AWG wire.

5. Each circuit shall be capable of, through system programming, deactivating upon depression of the signal silence switch.

I. Control Relay Module

1. The control relay module shall provide six Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC. An expansion circuit board shall allow expansion to eight Form-C relays per module.

2. Each relay circuit shall be capable of being activated (change in state) by any initiating device or from any combination of initiating devices.

3. The control relay module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal blocks shall be UL listed for use with up to 12 AWG wire.

J. Voice Control Module

1. The voice control (speaker circuit) module shall provide three fully supervised Class A (NFPA Style Z) speaker circuits.

2. Each speaker circuit shall be capable of switching up to 30 watts maximum per circuit or 60 watts per four circuit module.

3. If a short-circuit trouble occurs on one of the circuits, that circuit will not activate on either manual or automatic command.

4. The voice control module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal strips shall be UL Listed for use with up to 12 AWG wire.

5. Each speaker circuit module may be programmed to activate on activation of the All-Call switch and to deactivate upon pressing the signal silence switch.

K. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

2. The back box and door shall be constructed of .060 steel with provisions for electrical conduit connections into the sides and top.

3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be selected for either right or left hand hinging.

L. Digital Voice Command Center (DVCC)

The Digital Voice Command Center (DVCC) shall contain equipment required for all audio control, telephone system control, signaling and supervisory functions. This shall include

amplifiers, tone generators, digital voice units, a microphone and a main telephone handset. The voice command center shall be an integral part of the fire alarm system. Systems which require separate, non integrated voice systems are not considered suitable substitutes.

Function: The voice command center equipment shall perform the following functions:

1. Operate as a supervised single channel or dual channel emergency voice communication system.

2. Provide automatic custom digital recorded voice message and tone generation.

3. Provide a hand held microphone with priority push-to-talk switch.

4. Provide an all-call switch and indicator to quickly activate all speaker circuits.

M. Power Supply:

1. The main power supply for the fire alarm control panel shall provide 6.0 amps of available power for the control panel and peripheral devices.

2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.

3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 55 AH or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.

4. The main power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators:

Ground Fault LED
Battery Fail LED
AC Power Fail LED

5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.

6. The main power supply shall provide a battery charger for 60 hours of standby using dual-rate charging techniques for fast battery recharge.

7. The main power supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.

8. The main power supply shall provide meters to indicate battery voltage and charging current.

9. All circuits shall be power-limited, per 1995 UL864 requirements.

N. Audio Amplifiers (Size amplifiers with a minimum spare capacity of 20% and provide a minimum of one backup amplifier for each transponder shown.)

1. The audio amplifiers will provide audio power (@ 25 Volts RMS) for distribution to the speaker circuits.

2. Multiple audio amplifiers may be mounted in the fire alarm control panel using additional cabinets if necessary.

3. The audio amplifiers shall include an integral power supply, and shall provide the following controls and indicators:

Normal Audio Level LED
Incorrect Audio Level LED
Brownout LED
Battery Trouble LED
Amplifier Trouble LED
Audio Amplifier Gain Adjust

4. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.

5. All terminal blocks for the connection of field wiring shall have a removable plug-in and be hardwired to allow for ease of field wire installation in a cabinet or at a remote location.

6. The amplifier shall include audio input and amplified output supervision, back-up input, and automatic switch-over to back up (if primary amplifier should fail).

7. Amplifiers shall be backed up in groups (one amplifier backs up several).

O. Prerecorded Voice - Audio Message Generator

1. The voice communication system shall be capable of transmitting a prerecorded voice message to all speakers in the building, or to any programmed group of speakers.

2. Actuation of any alarm initiating device shall cause a pre-recorded message to sound over the speakers. The message shall be repeated four times.

3. A built-in microphone shall be provided to allow paging through speaker circuits and shall have priority over the alarm message.

4. The message generator shall provide an interface to allow paging through telephone circuits.

5. The audio message generator shall have the following controls and indicators to allow for proper operator understanding and control.

Audio Level Normal LED
All Call LED
On-Line LED
Amplifier Trouble LED
Speaker Trouble LED
All Call Switch
Local Speaker Volume Control

6. The prerecorded message shall be stored on a non-volatile read only memory chip. The message shall be up to 24 seconds in length. An optional random access chip shall be available for a field programmable message. This message shall be programmed through the system's microphone or downloaded via a cassette recorder. Systems which utilize prerecorded memory storage other than on ROM type memory chips are not suitable substitutes.

P. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.

2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

3. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.

4. Point Read: The system shall be able to display or print the following point status diagnostic functions:

a. Device status
b. Device type
c. Custom device label
d. View analog detector values
e. Device zone assignments
f. All program parameters

5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.

6. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 1000 events. 200 events shall be dedicated to alarm and the remaining events are general purpose. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety.

The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.

7. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

8. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.

9. Software Zones: The FACP shall provide 99 software zones and 10 additional special function zones.

10. The fire alarm control panel shall include a walk test feature. It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system. Operation shall be as follows:

A. Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for 3 seconds.

B. Introducing a trouble into the initiating device shall activate the programmed outputs for 8 seconds.

C. Walk test shall be selectable on a per device/circuit basis. All devices and circuits which are not selected for walk test shall continue to provide fire protection and if an alarm is detected, will exit walk test and activate all programmed alarm functions.

D. All devices tested in walk test shall be recorded in the history buffer.

11. Waterflow Operation (Provide one FMM-1 for Each)

An alarm from a waterflow detection device shall activate the appropriate alarm message on the 640 character display, turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.

12. Supervisory Operation (Provide one FMM-1 for Each)

An alarm from a supervisory device shall cause the appropriate indication on the 640 character display, light a common supervisory LED, but will not cause the system to enter the trouble mode.

13. Signal Silence Operation

The FACP shall have the ability to program each output circuit (notification, relay, speaker etc.) to deactivate upon depression of the signal silence switch.

14. Non-Alarm Input Operation

Any addressable initiating device in the system may be used as a non-alarm input to monitor normally-open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.

2.4 SYSTEM COMPONENTS:

A. Speakers (Speaker/Strobes are to meet requirements of both paragraphs A and B)

1. All speakers shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.

2. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3m).

3. Frequency response shall be a minimum of 400 HZ to 4000 HZ.

4. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971, NFPA 2002 and shall meet the following criteria:

1. The pulse duration shall be between minimum of one second and maximum of two seconds.

2. Strobe intensity shall meet the requirements of UL 1971, NFPA 2002 and ADA.

3. All visual units shall be synchronized to meet ADA requirements using sync modules.

C. Alphanumeric LCD Type Annunciator

1. The alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (640) characters for alarm annunciation in clear English text.

2. The LCD annunciator shall display all alarm and trouble conditions in the system.

3. An audible indication of alarm shall be integral to the alphanumeric display.

4. The display shall be UL listed for fire alarm application.

5. It shall be possible to connect up to 32 LCD displays and be capable of wiring distances up to 6000 feet from the control panel.

6. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.

7. The system shall allow a minimum of 32 terminal mode LCD annunciators. Up to 10 LCD annunciators shall be capable of the following system functions: Acknowledge, Signal Silence and Reset which shall be protected from unauthorized use by a key switch or password.

8. Provide annunciator key switch to enable or disable operation of annunciator membrane control switches.

D. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

E. Field Wiring Terminal Blocks

For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for 18 to 12 AWG wire. Terminal blocks which are permanently fixed are not acceptable.

F. Annunciator Control Module

G. Transponders

1. Transponders shall be listed under UL category UOJZ as an independent, local fire alarm control unit as well as being listed as a critical component in a multiplex fire alarm system. Transponders shall be located where shown on the plans.

The transponder shall serve as the interface between initiating fire devices, controlled signaling devices, and each FACP node. The supervised multiplex communication port shall be an integral part of the transponder.

2. Each transponder shall be powered from a local power supply, and shall provide all power necessary for its own operation, including standby power.

3. Transponders shall communicate with, and be controlled by, the host FACP via a 2-wire communications loop. The communications loop shall operate as an NFPA Style 6.

4. Transponders shall be used to house amplifiers, batteries and power supplies to allow true distributed processing and amplification.

5. Each transponder shall have the following indicators and operator controls:

a. Alarm Acknowledge/Reset Switch
b. Power LED
c. System Alarm LED
d. System Trouble LED
e. Local Piezoelectric Signal
f. Red Alarm Per Initiating Device Circuit
g. Green On/Off LED Per Notification Appliance Circuit or Relay

6. Each transponder shall be capable of expansion of up to 36 field circuits per row of the following types in any mix:

A. Initiating Device Circuits (IDC): IDCs may be added to the transponder in groups of 6 Style D (Class A) circuits. Each circuit shall be capable of monitoring up to 30 compatible 2-wire smoke detectors, and/or any number of contact type initiating devices.

B. Fire Fighter's Telephone Circuits: Firefighter's telephone circuits may be added to the transponder in groups of up to 6 circuits.

C. Fire alarm speaker circuits: Fire alarm speaker circuits may be added to the transponder in groups of up to 8 circuits. Each circuit shall be cable of supervising the field circuit, and of transmitting up to 30 watts of audio power.

D. Auxiliary Control Relay Outputs: Auxiliary relay outputs may be added to the transponder in groups of eight individually controlled single Form-C circuits, or four dual Form-C circuits. All Auxiliary circuits shall be rated 2 A. @ 30 VDC.

2.5 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices - General

1. Addressable devices shall use simple to install and maintain decade (numbered 1 to 16) type address switches.

2. Addressable devices which use a binary address setting method, such as a Dip switch, are difficult to install and subject to installation error. This type of device is not an allowable substitute.

3. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel signaling line circuits.

4. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

5. Smoke detector sensitivity shall be set in the fire alarm control panel and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-of-day basis.

6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.

7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.

8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

11. Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LEDs shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

12. A magnetic test switch shall be provided to test each detector for 100% obscuration, reported to the FACP.

13. Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

14. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

B. Addressable Manual Pull Box

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.

4. Stations shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

C. Intelligent Photoelectric Smoke Detector

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

D. Intelligent Thermal Detectors

1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit. Up to 159 intelligent heat detectors may connect to one SLC loop.

E. Intelligent Duct Smoke Detector

1. The in-duct smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.

2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

F. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLC loops.

2. The monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box.

3. The IDC zone may be wired for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch x 1-1/4 inch x 1/2 inch. This version need not include Style D or an LED.

G. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual

notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.

3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

4. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, UL listed remote power supply.

5. The control module shall be suitable for pilot duty applications and rated for a minimum of .6 amps at 30 VDC.

PART 3.0 - EXECUTION

3.1 INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

3.2 TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

3. Verify activation of all waterflow switches.

4. Open initiating device circuits and verify that the trouble signal actuates.

5. Open and short signaling line circuits and verify that the trouble signal actuates.

6. Open and short notification appliance circuits and verify that trouble signal actuates.

7. Ground all circuits and verify response of trouble signals.

8. Check presence and audibility of tone at all alarm notification devices.

9. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

11. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3 FINAL INSPECTION:

A. At the final inspection, a factory trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

B. Upon final inspection and testing of the system an NFPA Final Completion Certificate shall be provided.

3.4 INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the owner.

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary.

1.2 SUMMARY

A. Section Includes:

1. Identification of power and control cables.
2. Identification for conductors.
3. Equipment identification labels.
4. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 FIRE ALARM MC CABLE AND CONDUIT IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

C. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.3 CABLE TIES

A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black.

B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.4 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend.

B. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

C. Locations of Underground Lines: Identify with underground-line warning tape for underground fire alarm system where applicable.

D. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to control panels, control stations, terminal cabinets, and racks of each system. Systems include signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

   a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
   b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
   c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:
   a. Enclosures and electrical cabinets.
   b. Access doors and panels for concealed electrical items.
   c. Fire alarm initiation device (address #).

END OF SECTION 260553

SECTION 280513 - CONDUCTORS AND CABLES FOR FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

A. Section Includes:

1. Fire alarm wire and cable.
2. Identification products.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.6 FIELD CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

PART 2 - CPRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 FIRE ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFC MC Cable

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

2.3 IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Brady Worldwide, Inc.
2. HellermannTyton North America.
3. Kroy LLC.
4. Panduit Corp.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

A. Install wiring in metal pathways and wireways.

1. Comply with requirements in Section 280528 "Pathways for Fire Alarm Sytems."

B. Install cable, concealed in accessible ceilings, walls, and floors when possible.

3.3 CONNECTIONS

A. Comply with requirements in Specifications: "Intelligent Reporting Fire Detection System" for connecting, terminating, and identifying wires and cables.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Prepare test and inspection reports.

END OF SECTION 280513

SECTION 280528 - PATHWAYS FOR FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Surface pathways.
3. Boxes.

1.3 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings.

PART 2 - PRODUCTS

2.1 SURFACE PATHWAYS

A. General Requirements for Surface Pathways:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Nonmetallic Pathways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color to match adjacent surface from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hubbell Incorporated; Wiring Device-Kellems Division.
b. Lamson & Sessions; Carlon Electrical Products.
c. Mono-Systems, Inc.
d. Panduit Corp.
e. Wiremold / Legrand.

2.2 BOXES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Adalet.
2. Cooper Technologies Company; Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. Hoffman; a Pentair company.
6. Hubbell Incorporated; Killark Division.
7. Lamson & Sessions; Carlon Electrical Products.
8. Milbank Manufacturing Co.
9. Molex, Woodhead Brand
10. Mono-Systems, Inc.
11. O-Z/Gedney; a brand of EGS Electrical Group.
12. RACO; a Hubbell Company.
13. Robroy Industries.
14. Spring City Electrical Manufacturing Company.
15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
16. Thomas & Betts Corporation.
17. Wiremold / Legrand.

B. General Requirements for Boxes:

1. Boxes installed in wet locations shall be listed for use in wet locations.

C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

H. Device Box Dimensions: As required.

I. Gangable boxes are allowed.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: Galvanized Rigid Conduit (GRC)
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: GRC.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: Surface non-metallic pathway in finished spaces, MC cable in unfinished spaces.
2. Exposed, Not Subject to Severe Physical Damage: surface non-metallic pathway in finished spaces; EMT in unfinished spaces.
3. Exposed and Subject to Severe Physical Damage: surface non-metallic pathway in finished spaces, EMT in unfinished spaces. Pathway locations include the following:

    a. Loading docks.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums

4. Concealed in Ceilings and Interior Walls and Partitions: MC cable or EMT.
5. Damp or Wet Locations: GRC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Pathway Size: 3/4-inch trade size.

D. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Complete pathway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run. Support within 12 inches (300 mm) of changes in direction.

G. Conceal MC cable and conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT or RMC for pathways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

L. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to conduit assembly to assure a continuous ground path.

N. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

O. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

P. Surface Pathways:

1. Install surface pathway for surface electrical outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch (50-mm) radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

Q. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.

R. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

T. Expansion-Joint Fittings:

1. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
    d. Attics: 135 deg F (75 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

V. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

W. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR FIRE ALARM SYSTEMS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Fire Alarm Systems."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 280528

SECTION 280544 - SLEEVES AND SLEEVE SEALS FOR FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

A. Section Includes:

1. Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized-steel sheet.
2. Minimum Metal Thickness:

   a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
   b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Advance Products & Systems, Inc.
   b. CALPICO, Inc.
   c. Metraflex Company (The).
   d. Pipeline Seal and Insulator, Inc.
   e. Proco Products, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD,

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Presealed Systems.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall have VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Silicone Foams: Multicomponent, silicone-based, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed..
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 280544

SPECIFICATIONS: RADIO SYSTEM DESCRIPTION

System Features **DRAFT**

General

The system shall provide reliable, efficient, radio functionality for Westport Board of Education's operational groups and shall accommodate Westport Board of Education's communications requirements between these operational groups. The Radio System shall be provided with the features, functions, and capabilities as described herein.

Required Features and Functions

The proposed Radio System and protocol shall support the following features and functions:

1. The system and/or user equipment must support digital transmissions on a 6.25 equivalent, 12.5 kHz TDMA channel. The system and/or user equipment must also support analog transmissions on 12.5 kHz channels.
2. The system and/or user equipment must follow ETSI DMR Tier 2 standards based operation.
3. The repeater/base station equipment must be able to manage two independent time slots on a single 12.5 kHz frequency using TDMA (Time Division Multiple Access) technology transmissions.
4. The system shall use a non-proprietary over the air signaling protocol for communications between the infrastructure and the subscriber radios.
5. All user portable radios must incorporate increased digital battery life over analog by operating in a TDMA digital mode.
6. All user portable radios must include battery technology for automatic maintenance and reconditioning.
7. All radio equipment must support the use of radio subscriber accessories for automatic gain control and noise suppression.

8. The system and/or user equipment must include imbedded digital forward error correction technology to increase clarity throughout range.

9. The system and/or user equipment must include imbedded software based privacy or scrambling to protect user privacy during communications. This imbedded scrambling must support at least 40-bit protection with multiple keys.

10. All user radios must include Emergency Declaration capability with single button activation. The Emergency Declaration shall provide visual and audible status notification to specified radios. The Vendor's Proposal shall include a detailed description of the Emergency Declaration features and programming options.

11. The system and/or user equipment must include imbedded GPS receivers in both the portable and mobile radios. Any additional external receivers or accessories shall not be required to receive or send GPS information. GPS shall be supported in a repeater and/or talk around mode.

12. The system and/or user equipment must include imbedded text messaging capabilities. Any additional external receivers or accessories shall not be required to receive or send text message information. The user equipment must support unit-to-unit canned and user creatable text messaging capability. The user equipment must support at least 140 scrolling characters. Text messaging shall be supported in a repeater and/or talk around mode.

13. The system and/or user equipment must include imbedded telemetry capabilities. Any additional external receivers or accessories shall not be required to receive or send telemetry information. Telemetry shall be supported in a repeater and/or talk around mode.

14. The system and/or user equipment must include intelligent channel steering capabilities to revert GPS traffic to alternate channels to control and manage data traffic more efficiently on the system.

15. Automatic Vehicle Location (AVL) information shall include vehicle identification, location, speed and time of transmission.

16. Voice shall take priority over data transmissions on radios transmitting both voice and data information.

17. The system user shall have the option of applying for licensure to detailed radio interface information. This information shall allow the radio user, if capable, to develop custom applications.

Multi-Site Capabilities:

1. The system shall be a multi-site, multi-channel radio network capable of supporting multiple interconnected user groups/fleets. Various entities and work groups must be able to communicate without regard to geographic location.

2. The system design should allow connection of any site in the network to any site in the network over IP (Internet Protocol) to achieve the required network connectivity between sites. The network infrastructure should allow the system operator the flexibility of being able to configure the network in a linear, star or mesh type of network configuration. Third party equipment shall not be required for this connection.

3. System capability should allow expandability to support additional and/or future sites, radio channels, and users. The network should have the capability of being expanded to at least 15 sites.

4. The system design should allow seamless roaming between sites. The system shall provide for automatic radio switching between network sites without any action by the user to provide communications without any message interruption throughout the designated coverage area.

Trunking Capabilities:

1. The system shall support the ability to trunk voice or data traffic to available system channels to maximize efficiency. The Trunking system shall automatically detect a P-T-T as a request to talk, and automatically select and assign a voice path for the communications of the selected talk group. Various entities and work groups must be able to communicate without regard to channel selection, radio site selection or geographic location.

2. The system Trunking protocol shall not require the use of a dedicated control channel, allowing voice/data to simultaneously trunk on all system channels.

3. While in trunked mode, the subscriber access time, defined as PTT to system access, shall not exceed 900 milliseconds when a trunked voice path is available.

4. The system must support the ability to simultaneously trunk twelve (12) voice paths.

5. The system must support twenty-four (24) additional data revert paths for additional data traffic needs.

6. The system shall be capable of supporting data communications that include GPS location services, text messaging, and a data interface for other customer specific and supplied applications including telemetry, system performance management, VoIP dispatch, AVL, work-order management, and email connectivity.

7. In the event of a repeater failure, the system shall continue to maintain its trunked operation, regardless of which repeater fails.

8. In the event of frequency interference, the system shall continue to maintain its trunked operation, regardless of the channel being interfered with.

9. The system shall provide a software application that allows the system administrator the ability to monitor and control the radio repeaters within the system. The Repeater Diagnostics and Reporting system shall provide the following capabilities:

    a. Repeater Diagnostics that include enabled-disabled station status, Transmitter power status, available channels and RSSI levels.

    b. Repeater Controls that include changing channels, transmitter power, station reset and repeater knockdown.

    c. Repeater Alarm Reporting including Receiver lock failure, transmit lock detect, station overheating, AC Power supply failure and detect and report of failure.

    d. The application shall operate over the IP network or locally via USB or GPIO connection.

User Equipment

General

All user radios proposed (portables, mobiles, and control stations) shall fully support all features and functions available for user radios in the proposed system. The pricing for user radios shall include all programming and installation services required for operation. At the appropriate time during the implementation process the Vendor will be expected to develop detailed programming personalities and talkgroup configurations with input and assistance from [CUSTOMER NAME]. User radio programming shall not be performed until [CUSTOMER NAME]'s Project Manger has approved the programming personalities and issued a written notice to proceed with radio programming.

All proposed portable, mobile, and control station radios shall conform to the minimum standards specified by TIA/EIA-603, Section 5 "Standards for Portables".

Portable Radios

The proposed portable radio should be rugged, reliable, and provide the following minimum features:

- Emergency button.
- 12.5 kHz analog channel bandwidth.
- 12.5 kHz TDMA (6.25e) digital channel bandwidth.
- Alphanumeric display.
- 32 Channels.
- Digital Signaling - PTT ID, Private Call, All Call, Call Alert, Escalating Alerts, Emergency, Radio Check, Radio Disable/Enable and Remote Monitor
- Analog Signaling - MDC1200: PTT ID, Emergency and Call Alert

- 16-position channel selector.
- Group scan.
- External microphone and speaker connections.
- Li-ion battery.
- Full line of optional accessories.
- Optional intrinsically safe model.
- 6 Programmable buttons (supporting both long and short press)
- Meets IP57 submersibility with or w/o accessory cover attached

Proposed portable radio units shall conform to applicable Portable Military Standards 810C, 810D, and 810E. The portable transmitters and receivers must further meet or exceed the following specifications.

Portable Transmitter

Frequency Range	403-512 MHz
Frequency Stability	+/- 1.5ppm (Non-GPS) +/- 0.5ppm (GPS)
RF Power Output	1 – 4 or 5 watts
Channel Spacing	12.5 kHz Analog / TDMA
Adjacent Channel Power	60 dB @ 12.5 kHz

Portable Receiver

Frequency Range	403-512 MHz
Channel Spacing	12.5 kHz Analog / TDMA
Analog Sensitivity (12 dB SINAD)	0.35 uV / .22uV (typical]
Digital Sensitivity	5% BER: 0.3 uV
Adjacent Channel Selectivity	60dB at 12.5 kHz @ (TIA603) 45dB at 12.5 kHz @ (TIA603C)
Spurious Rejection	70 dB
Audio Distortion	3%

Mobile Radios

The proposed mobile radio should be rugged, reliable, and provide the following minimum features:

- Emergency button.
- 12.5 kHz analog channel bandwidth.
- 12.5 kHz TDMA (6.25e) digital channel bandwidth.
- Alphanumeric display.
- 32 Channels.
- Digital Signaling - PTT ID, Private Call, All Call, Call Alert, Escalating Alerts, Emergency, Radio Check, Radio Disable/Enable and Remote Monitor
- Analog Signaling - MDC1200: PTT ID, Emergency and Call Alert
- Group scan.
- Full line of optional accessories.
- Optional high power unit (at least 40 watts).
- 4 Programmable buttons (supporting both long and short press)

Mobile and control station transmitters and receivers must further meet or exceed the following specifications.

Mobile/Control Station Transmitter

Frequency Range	403 - 470 MHz
Frequency Stability	+/- 1.5ppm (Non-GPS)
	+/- 0.5ppm (GPS)
RF Power Output	40 or 45 watts
	(high power model)
Channel Spacing	12.5 kHz Analog / TDMA
Adjacent Channel Power	60 dB @ 12.5 kHz

Mobile/Control Station Receiver

Frequency Range	403 - 470 MHz
Channel Spacing	12.5 kHz Analog / TDMA
Analog Sensitivity (12 dB SINAD)	0.30 uV / .22uV (typical]
Digital Sensitivity	5% BER: 0.3 uV
Adjacent Channel Selectivity	65dB at 12.5 kHz (w / TIA603) 50dB at 12.5 kHz (w / TIA603C)
Spurious Rejection	75 dB
Audio Distortion	3%

Desktop Control Station Radios

Desktop control station radios will be installed at locations to be determined at a later date. The Proposal should include per unit pricing including standard installation for a recommended control station including the radio, power supply, external speaker, desktop microphone, and antenna. The following minimum features should be supported by the proposed control station radio:

- Emergency button.
- 12.5 kHz analog channel bandwidth.
- 12.5 kHz TDMA (6.25e) digital channel bandwidth.
- Alphanumeric display.
- 1000 Channels.
- Digital Signaling - PTT ID, Private Call, All Call, Call Alert, Escalating Alerts, Emergency, Radio Check, Radio Disable/Enable and Remote Monitor
- Analog Signaling - MDC1200: PTT ID, Emergency, and Call Alert
- Group scan.
- Full line of optional accessories.

- Optional high power unit (at least 40 watts).
- 4 Programmable buttons (supporting both long and short press

XPR8400 Repeaters

Base Station Transmitter

The base station transmitters shall conform to the minimum standards specified by TIA/EIA-603, Section 4.2, and the Code of Federal Regulations 47, Part 90, Subpart I. The transmitters shall further meet or exceed the following specifications.

Frequency Range	403-470 MHz
Frequency Stability	+ / - 0.5 ppm
RF Power Output	25-40 watts (continuous)
Channel Spacing	12.5 kHz Analog / TDMA
Audio Distortion	3%

Base Station Receiver

The base station receivers shall conform to the minimum standards specified by TIA/EIA-603, Section 4.1. The base station receivers shall further meet or exceed the following specifications.

Frequency Range	403-470 MHz
Analog Sensitivity (12 dB SINAD)	0.30 uV / .22uV (typical]
Digital Sensitivity	5% BER: 0.3 uV
Adjacent Channel Selectivity	65dB at 12.5 kHz @ (TIA603) 50dB at 12.5 kHz @ (TIA603C)
Spurious Rejection	75 dB
Audio Distortion	3%

OVERVIEW OF THE IP SITE CONNECT SYSTEM: DRAFT

A critical piece of an emergency plan is communication. Within a school system there must be communication to emergency response personnel, between the schools and throughout the school grounds. To achieve this communication goal we have proposed a Motorola Mototrbo Digital IP Site Connect System for the Westport Public School System. This solution uses the internet (radio over IP) to extend the school(s) radio coverage resulting in "wide" area communications.

The IP Site Connect System wide area uses the schools existing connectivity network that Westport already has in place. Presently, Westport Public Schools uses "local" radio communications only meaning each school communicates among themselves.

Westport will be adding digital radio equipment into each school which consists of digital repeaters and portable radios. The repeaters will be connecting to the schools with the fiber which will complete the build out of the "wide" area communications network. This network will allow for emergency communications from a single radio carrier to the PD as well as emergency contact from the BOE office.

The IP Site Connect System uses TDMA digital technology which provides the schools with two talk paths to the user 1)local communication at each school and 2)wide area communication which will be used for mass notification. The Westport Public Schools will designate one talkpath as the "Emergency Channel". The other talkpath will be used for "local" daily communication at the individual schools.

Designating an "emergency talkpath" will allow the Police Department and Fire Department's Dispatch Centers to monitor this channel. There will be no communications on this channel except for emergency. By a turn of the channel knob an educator can notify the PD/FD that there is a situation at their school. Digital radio communications is the future and the future is here now. The system proposed has the ability to grow within the district.

The system proposed consists of the following:

A. Digital Repeaters - will be installed as to provide all of the Westport BOE Schools (Staples High School, Bedford Middle, Coleytown Middle, Coletown, Greens Farms, Kings Highway, Long Lots, Saugatuck Schools and Board of Education Office) with appropriate coverage.

1. Staples High existing repeater will be reprogrammed for digital. Staples will be using 2 digital repeaters giving them four talk paths (1)emergency, (2)facilities, (3)administration, and (4)nurse/aids.

2. A combination of external and internal antenna will be installed to complete the RF requirements of each building. Small schools do not need the power of the outside antennas. These needs will be determined by the walk through.

B. Two Control Stations with emergency encode--Police Department, Fire Department and Board of Education Offices. The Superintendent has the capability of sending out an emergency alarm with voice to follow to all portable radios. The PD and FD Dispatch Center will be listening for emergency communications only.

C. Portable Radios:

1. Each school will have new digital portable radios.

D. Mobile Radios:

1. Five mobile radios will be needed--these radios can be installed into Security/Facility/BOE vehicles. Additional radios maybe needed. These radios give the drivers the capability to use the radio system.

NOTE: a future consideration can be to add the bus radios to the system

Westport Public Schools Responsibilities:

1. System requires a connectivity link to each school.
2. IP connection at the repeater location.
3. Provide - IP Address/Subnet for each repeater located at the schools.
4. Provide - IP Addresses for 109 Portable Radios and Mobile Radios

QUALIFIERS: DRAFT

MUST BE:

1. Have State of CT V9 License
2. Minimum ten (10) R-2 Certified Technicians
3. Motorola Certified Service/Sales Center
4. Minimum three (3) R56 Certified Journeyman
5. Motorola MCC5500 Trained and Certified Technicians - minimum three (3) (FD and PD dispatch)
6. Within a 45 mile/response time for repair
7. 24 hr/7 day repair - non-business hour response procedure in place
8. Provide name of Project Manager that will be assigned to this job
9. Minimum of five (5) IP Site Connect Systems Installed - please provide references

PRICING SHEET:	DRAFT			
				Extended
Quantity	**Part #**	**Equipment**	**Vendor**	**Unit Price**	**Price**
A) Mototurbo Equipment					
1	FCC	Application/Coordination	?		
		(8repeater pair and 2 modify coordinations)			
1	Maps	Coverage Mapping	?		
10	AAM27QPR9JA7BN	XPR8400 UHF40watt	Motorola		
		Repeaters			
10	HFE8401	DS6336A2N UHF Duplexer	Motorola		
		450 to 470			
20	112004804	Cables for duplexer to	Motorola		
		pre-selector			
10	0112004U04	Cables for duplexer to	Motorola		
		Repeater			
10	HEF8459	UHF-Preselectors	Motorola		
10	PMLE4476	Wall Mount Kitsw/bracket	Motorola		
B)Battery Back-UP					
10	L1884	Battery Reverting Charger	Motorola		
		Battery Back-up			
10	Z692	Cable Interface, Battery	Motorola		
		to Charger			
10	Z691	Cable Interface, Station	Motorola		
		to Charger			
10	824A	Batteries	?		
10	THIN6701	30" Cabinet	Motorola		

C)Mototurbo Control Stations for Voice Transmit									
3		AAM27QPH9LA1_N		XPR4550 UHF 40-watt ch	Motorola				
				with alphanumeric IP					
				Encode/Decode					
2		305637		Power Supply and Cable	?				
1		RMN-5050		Desktop Microphones	Motorola				
1		HKN-9557		Antenna Pigtails	Motorola				
D)Antenna Systems									
TO BE DETERMINED AT WALK THROUGH									
E)Mototurbo Portable Radios									
190		AAH55QDC9LA1_N		XPR6350 UHF portable	Motorola				
				radios no display,impress					
				charger with standard					
				accessories with					
				emergency encode					
F)Mototurbo Mobile Radios									
5		AAH56RDC9KA1_N		XPR7350 UHF 40-watt	Motorola				
				32 channel Mobile Radio					
5		HAE-4003		UHF 1/4 wave antenna	Motorola				
5		TMB-34		Trunk Mount L Brackets	?				
G)Dispatch Consoles MCC5500 Add-ons									
2		L3358		Console Electronic Shelf II	Motorola				
2		L3550		DAP II for analog, Astro	Motorola				
				interface incl.2 licenses					

H)Installation Services										
Man/Hr		TO BE DETERMINED BY EACH CONTRACTOR FILLING THIS OUT								
I)Option-Contractor to supply a link capacity plus system in place of a IP Site Connect										
	Provide the software upgrade for each location									
	TOTAL COST _____									
J)NOTE										
	1)Contractor will be supplying the Westport PD and FD with a Control Station which will be									
	added to their MCC5500									
	2)Connectivity to each school location will be supplied by Town of Westport									