INDEPENDENT SCHOOL DISTRICT NO. 659
REGULAR SCHOOL BOARD MEETING

Monday, April 11, 2022 ~ Regular Board Meeting
Northfield District Office Boardroom
Zoom Link: https://northfieldschools-org.zoom.us/j/89571672000?pwd=akNhSkp3UG81dXFxNlFpekVaem0yQT09
Passcode: 070681

AGENDA

1. Call to Order

2. Agenda Approval/Table File

3. Public Comment

4. Announcements and Recognitions

5. Items for Discussion and Reports
   a. Budget Prioritization Update
   b. Superintendent Operations and COVID-19 Update
   c. Charter School Site Visit Reports

6. Consent Agenda
   a. Minutes
   b. Overnight Field Trip
   c. Personnel Items

7. Items for Individual Action
   a. Security Camera Bids for Procurement

8. Items for Information
   a. Enrollment Report
   b. School Board Work Sessions

9. Future Meetings
   a. Monday, April 25, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom
   b. Monday, May 9, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom
   c. Monday, May 23, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom

10. Adjournment

NORTHFIELD PUBLIC SCHOOLS
MEMORANDUM
Monday, April 11, 2022 ~ Regular Board Meeting
Northfield District Office Boardroom
Zoom Link: https://northfieldschools-org.zoom.us/j/89571672000?pwd=akNhSkp3UG81dXFxNlFpekVaem0yQT09
Passcode: 070681

TO: Members of the Board of Education
FROM: Matthew Hillmann, Ed.D., Superintendent
RE: Explanation of Agenda Items for Monday, April 11, 2022, Regular School Board Meeting

1. Call to Order

2. Agenda Approval/Table File

3. Public Comment
   Public comment for this school board meeting may be made in person at the beginning of the meeting and must comply with the district's public comment guidelines.

4. Announcements and Recognitions

5. Items for Discussion and Reports

   a. Budget Prioritization Update. Dr. Hillmann and Director Mertesdorf will present an update to the board on the district's budget. This will include a review of the district's budget prioritization process to date.

   b. Superintendent Operations and COVID-19 Update. Dr. Hillmann will provide an update about district operations, and local and county COVID-19 data.

   c. Charter School Site Visit Reports. Superintendent Hillmann will provide a report on his site visits to both Arcadia Charter School and Prairie Creek Community School.

6. Consent Agenda
   Recommendation: Motion to approve the following items listed under the Consent Agenda
   a. Minutes
      ● Minutes of the Regular School Board meeting held on March 28, 2022
      ● Minutes of the Closed School Board meeting held on March 28, 2022

   b. Overnight Field Trip
      Activities Director Joel Olson and Boys Lacrosse Coach Jeff Wright request board approval for NHS varsity boys lacrosse team overnight trip May 27-28, 2022.

   c. Personnel Items
      i. Appointments
         1. Joseph Ascencio Bravo, Recreation Program Assistant, beginning 4/2/22 through 5/31/22, $10.33/hour.
         2. Toby Grawe, Recreation Program Assistant, beginning 4/2/2022 through 5/31/2022, $10.33/hour.
         3. Jamie Jerdee, Middle School Head Golf Coach, beginning 4/4/2022. $2,987
         4. Blake Kane, Head Girls Soccer Coach, beginning 8/15/2022, $6,601.
         5. Chantal Kheirallah, Summer Targeted Services PLUS Teacher , beginning 7/5/2022 through 8/11/2022, lane/step.
         6. Justin Raabolle, Master Electrician, beginning 4/25/2022. Master Electrician salary plus step 4, prorated for the 2021-22 school year.
         7. Jonathan Singleton, Recreation Program Assistant, beginning 4/2/22 through 5/31/22, $11.00/hour.
         8. Dominic Sasser, Recreation Program Assistant, beginning 4/2/22 through 5/31/22, $11.00/hour.
      ii. Increase/Decrease/Change in Assignment

1. Mary Harrity-Davidson, 1.0 Middle School Boys Tennis Coach, change to .50 Head Coach and .50 Assistant Coach, effective 4/4/2022, $2,738.
2. Ann Jerdee, Middle School English Teacher, add Middle School Assistant Golf Coach, effective 4/4/2022, $2,489.
3. Jenny Link, Middle School Special Education Teacher, add Summer PLUS/BLAST teacher substitute, effective 7/3/2022 thorough 8/11/2022, lane/step.
4. Ryan Pietsch, Spring Elementary Phy Ed Teacher, add Middle School Head Golf Coach, effective 4/4/2022, $2,987.
5. Paul Stanaway, Middle School Phy Ed Teacher, add 1.0 MS Fitness Room Advisor for spring session, effective 4/4/2022.
6. Jeffrey Sullivan, High School Special Education Assistant, add High School spring weight room assistant, effective 4/5/2022, Level 3, $995.86 stipend.
7. Community Education Summer Brochure Instructors.

iii. <u>Leave of Absence</u>
1. Andrea Nelson-Walker, Benefits/Payroll Specialist, FMLA leave of absence beginning on 5/5/2022 through 5/18/2022.
2. Mohamed Nur, District Technology Specialist, FMLA leave of absence beginning on or about 4/13/2022 for 15 work days.

iv. <u>Retirements/Resignations/Terminations</u>
1. Karen Lane, Bridgewater Elementary Teacher, retirement effective 6/9/2022.

*Conditional offers of employment are subject to successful completion of a criminal background check and Pre-work screening (if applicable)

7. Items for Individual Action
   a. <u>Security Camera Bids for Procurement</u>. The district is seeking board approval to solicit bids for the District-Wide Security Camera Upgrade Project. This project includes a full replacement of the district camera management system along with the replacement of the analog cameras throughout the district. The project is scheduled to take place this summer. Director of Buildings and Grounds Cole Nelson will review the project manual and be available for any questions related to the project. The board will be asked to approve the winning bid at the May 9, 2022 board meeting.

   Superintendent's Recommendation: Motion to approve the district solicit bids for the District-Wide Security Camera Upgrade Project.

8. Items for Information
   a. <u>Enrollment Report</u>. Dr. Hillmann will review the April 2022 enrollment report.
   b. <u>School Board Work Sessions</u>: The board will determine a date in early June to discuss the high school master plan recommendations, and the recommendations will be finalized at a work session on June 13, 4:00 p.m. - 5:45 p.m.
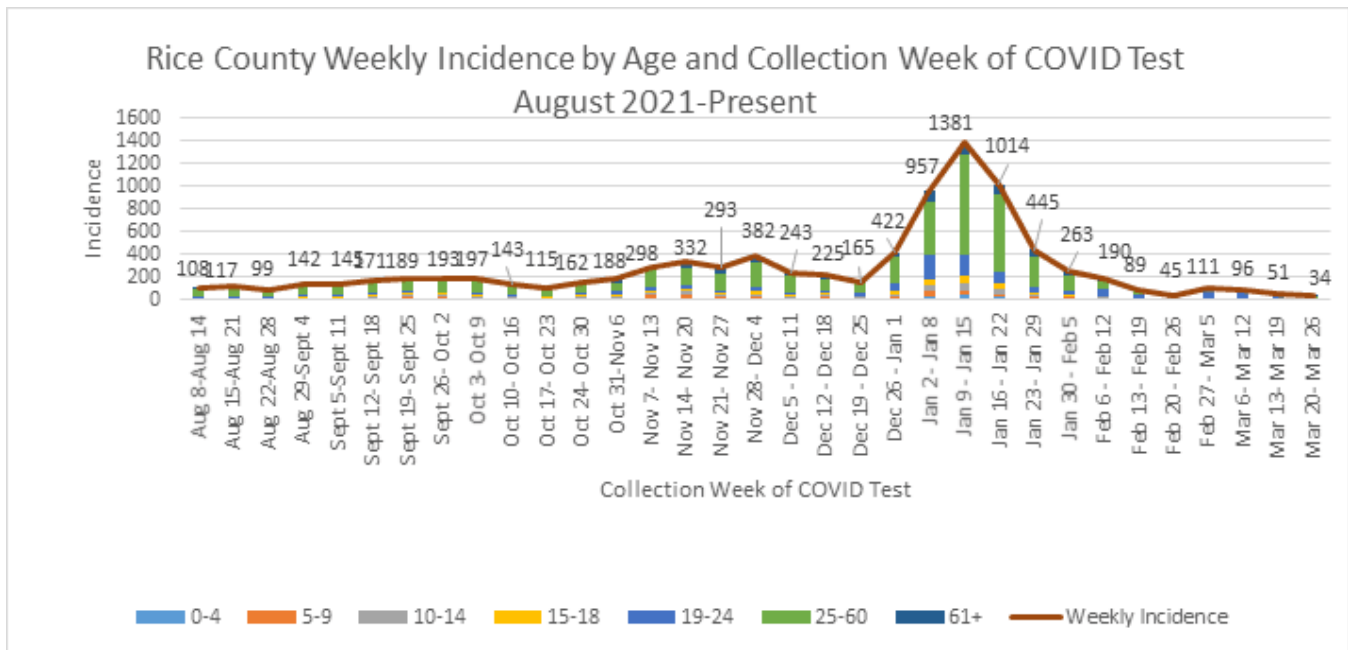
9. Future Meetings
   a. Monday, April 25, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom
   b. Monday, May 9, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom
   c. Monday, May 23, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom

10. Adjournment

Superintendent Operations and COVID-19 Update | April 11, 2022
Matt Hillmann, Ed.D.

Executive Summary: This report provides an overview of the district's operations, bright spots, anti-racism work, and response to COVID-19.

The graph below represents the COVID-19 cases in Rice County per week. The chart is from the Rice County Public Health website.

The district implemented its updated COVID-19 protocols in K-12 schools on Feb. 21. Newly reported cases have continued to decrease. On March 7, the district aligned the COVID-19 protocols at the Northfield Community Education Center (NCEC) with the protocols with K-12 schools. Face masks are recommended but optional across the entire school district. The vaccination requirement for volunteers has also been removed as of March 14. As of April 7, the district had 15 new COVID-19 cases reported in the previous 14 days. People can view the latest district data through the district's COVID-19 dashboard at:

https://northfieldschools.org/covid-19/reported-covid-19-cases-dashboard/

The influenza-like illness (ILI) rates have been excellent. During the week of March 28-April 1, five of seven schools averaged less than 1% of their students absent due to ILI symptoms. The district's CUE testing clinic is operational (with reduced hours) and has averaged 19 tests each week over the last four weeks.

Congratulations to HCI on 30 years of doing good things for kids!

On April 7, Northfield Healthy Community Initiative held a "drive through" event celebrating 30 years of making a difference in our community.

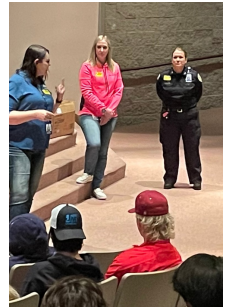Healthy Community Initiative is 30 years old

HCI is "...dedicated to building partnerships and encouraging community collaborations that support, value and empower youth. We do this by bringing together programs and individuals and providing necessary support so that they can best put their expertise and resources toward efforts that positively impact youth."

HCI makes significant contributions to Northfield Public Schools each day. Their support comes in a variety of ways. They are a key financial partner and, most importantly, a critical friend who helps catalyze change with a focus on student outcomes.

Northfield High School career speaker series
strategic commitment highlights: learner outcomes, partnerships

Northfield High School's career speaker series hosts professionals from industries the students have expressed interest in. Participating students have heard from professionals in construction, prosthetics, history, finance, elder care, recreation, counseling, politics, HVAC, and photography. Most recently, they learned about careers in corrections, which included two K9 workers. Thanks to all of the professionals who are taking the time to share their careers with our NHS students. Thanks to NHS special education teacher Jake O'Dell for organizing the speaker series during the high school's flex time!

Child Nutrition inventory system improvements
strategic commitment highlight: stewardship

Stewardship

We responsibly manage our personnel, finances, property, time and environmental impact.

Spring Creek Elementary School kitchen manager Lori Malecha takes her role seriously. She is intent on knowing every student who comes through the lunch line at Spring Creek so they feel valued. She also takes the district's commitment to stewardship seriously. Recently, she made suggestions about how to improve the district-wide inventory tracking system to Director of Child Nutrition Stephany Stromme. Lori wanted to ensure that we are leveraging the food inventory across the district in order to make more efficient use of resources, especially considering supply chain issues. Lori is a shining example of our commitment to continuous improvement, stewardship, and creating an environment where employees feel that they have a vested role in improving systems and processes.

Graduation rates announced
strategic commitment highlights: learner outcomes

Last week, the Minnesota Department of Education announced the graduation rates for 2021. Bucking the state trend, Northfield High School improved its four-year graduation rate, despite the impact of the pandemic. 96.7% of the school's 334 seniors graduated on time. Out of the ten students who are not graduating in four years, over half of them will continue towards their diploma. The state average graduation rate in 2021 was 83.3%.

Prairie Creek Charter School Authorizer Annual Site Visit Summary Report
Matt Hillmann, Ed.D., Northfield Public Schools (authorizer)
March 29, 2022

On March 29, 2021, Northfield Public Schools visited Prairie Creek Charter School for the annual authorizer site visit.

The purpose of the visit was to gather data on these four key questions:

- Is the educational program a success?
- Is the organization efficient and well run?
- Is the school meeting its legal obligations?
- Are strategies in place for sustaining success and continuing to improve over the next charter term?

Schedule

Time	Activity	Location / Notes
8:30 am	Welcome / Coffee with the Director - schedule review	Simon's Office
9:00 am	Classrooms	4/5 Team (Michelle, Amber, Ryan)
9:45 am	Classrooms	K/1 Team (Amy N, Amanda, Amy B)
10:30 am	Classrooms	2 / 3 Team (Molly, Nancy, Michelle)
11:15 am	BREAK	
11:45 am	Lunch with Faculty (classroom teachers and specialists)	Gym Box Lunch provided for Dr. Hillmann and faculty
12:15 pm	SpEd Team Meeting	Simon's Office (Kelsey, Michelle B, Cale and Anna Lisa)
12:45 pm	Parents	Simon's office Anthony Beteza Erin Johnson Jeff Damm Anatasia Stier
1:15 pm	BREAK	
1:30 pm	Board/ Finance Meeting	Simon's Office Christine Williams (Chair) Keith Johnson (CFO) Kelsey Fitschen (Board Member)
2:00 pm	Closing Conversation with Simon	Simon's Office

Is the educational program a success?

Prairie Creek continues to focus on a progressive education model. This model was observed in every classroom visited during the site visit. Students were applying knowledge in several ways:

- Grades K-1 students were working with model watersheds and simulating the exponential impact when pollution was washed down from higher elevations.
- Grades 2-3 students were preparing for theatrical performances around their social studies curriculum content.
- Grades 4-5 students were creating a restaurant plan as part of their mathematics unit. This project gave students the chance to take their mathematics instruction and apply it in a business plan model.

In their recent annual reports to our board, Prairie Creek students continue to outperform the state averages in mathematics, reading, and science.

Teachers feel supported in their efforts to build a progressive education model that balances direct instruction with project-based learning. Parents interviewed are more than pleased with their children's growth and development.

Despite not having significant racial diversity, the school has a clear dedication to racial equity training and including culturally competent instruction as part of their school culture.

Is the organization efficient and well run?

Evidence suggests that Prairie Creek is efficient and well run. Parents, teachers, board members, and administrators described a high level of competence in operating the organization.

The financial stability of the school is strong. The projected general fund balance for the end of the 2021-22 school year is 39%. The board has a goal of a 30% fund balance as projected three years into the future. Because the school is small, minor financial disruptions can have a dramatic and adverse impact.

The latest audit was "clean" and had minimal findings. More information about the audit and other Prairie Creek accountability measures are available at: https://prairiecreek.org/accountability/

Is the school meeting its legal obligations?

Based on the meeting with the board and executive director, it appears that Prairie Creek is meeting its legal obligations.

Are strategies in place for sustaining success and continuing to improve over the next charter term?

Prairie Creek has a commitment to continuous improvement. Regular PLC meetings, board reports, and their annual improvement plans presented to the board indicate they are on track to sustaining their success.

Arcadia Charter School Authorizer Annual Site Visit Summary Report
Matt Hillmann, Ed.D., Northfield Public Schools (authorizer)
March 31, 2022

On March 31, 2021, Northfield Public Schools visited Arcadia Charter School for the annual authorizer site visit.

The purpose of the visit was to gather data on these four key questions:

- Is the educational program a success?
- Is the organization efficient and well run?
- Is the school meeting its legal obligations?
- Are strategies in place for sustaining success and continuing to improve over the next charter term?

Schedule

Time	Meeting	Location
8:05-8:25 am	MS Morning Circles	MS Advisories
8:30-8:55 am	MS PWT	MS Advisories
9:00-9:25 am	School Board Panel	Conference Room: Kathleen Schmidt Rachel Matney George Cusack (virtual)
9:30-9:55 am	MS Student Panel	Conference Room Alina Mendoza-Garcia Oliver Born Eli Hollerung Ezra Warren Kendra Hall-Smith
10:00-10:15 am	Break	Conference Room
10:20-10:45 am	MS Classes	ROR: Language Arts 7 Lamarr: Math 6 Purple: PWT 8
10:50-11:15 am	HS Student Panel	Conference Room Kiara Anderson Grainne Beltramo-Dolan Willow Jo

		Cameron McMillan Leo Klement
11:20-12:05pm	HS PWT (Arts Residency) Time to explore independently	HS Advisories (Chris Koza Arts Residency, various locations)
12:05-12:35 pm	Lunch with staff in Green Advisory	Staff Room/Green Advisory (all staff welcome)
12:40-1:10 pm	Visit HS Classes (Arts Residency) Time to explore independently	Goodall: Adv. Bio Tubman: Writer's Circle Lamarr: Spanish 1 (Chris Koza Arts Residency, various locations)
1:10-1:25 pm	Break	Conference Room
1:25-1:50 pm	Check-in with the Special Education team	Conference Room Tamra Paulsen Kori Ryan (virtual) Cheryl Barnes
1:55-2:20 pm	Check in with families	Conference Room Amy Fields Jo Janssens Allison Klement
2:20-2:30 pm	Closing with Laura	Conference Room

Is the educational program a success?

Arcadia continues to recenter its core work around project-based learning.This work was evident throughout the visit. I observed teachers providing overviews of project-based learning skills and processes to students,

Arcadia substantially outperformed the state average on the MCA assessments in reading and science in 2021. The school performed below the state average in mathematics.

During my site visit, I was able to observe the first day of an artist-in-residence experience. The students were looking forward to the artist-in-residence and engagement in the introductory sessions were high. As part of this residency, I also observed a high school student teaching middle school students about the artist-in-residence program. The high school student was explaining how students could participate in a particular part of the residency. This is an appropriate example of how the project-based learning and student culture at Arcadia permeates the school.

Is the organization efficient and well run?

Parents, teachers, board members, and administrators described a high level of competence in operating the organization.

The school has rebuilt its fund balance, projected to be above 25% of expenditures and has made difficult staffing decisions to assist in its financial stability. In addition, the school has seen enrollment growth back (very close) to its desired student capacity. Discussion about compensation occurred in several groups, with an understanding of the realities of charter school resources but a desire to be more competitive with surrounding traditional public school districts.

The latest audit was "clean" and had minimal findings. Detailed finance committee reports are offered with each board meeting.

The school has a dedicated special education staff. There have been some challenges, however, this school year. They have operated for much of the school year with approximately half of the appropriate teaching staff positions filled and recently made a change in their special education director services. While the people who are on staff are performing valiantly, the sustainability of this situation is unlikely. Arcadia has already posted special education positions for next year and is hoping to recruit qualified teachers for the role.

Is the school meeting its legal obligations?

There was no data available to suggest that Arcadia is not meeting its legal obligations. The one note of caution is related to the special education situation described above. If adequate staffing is not secured, the ability to meet the requirements of the IEPs could be in jeopardy in the future. The authorizer has confidence that the school will overcome the challenges, but feels it necessary to emphasize this concern.

Are strategies in place for sustaining success and continuing to improve over the next charter term?

Yes, Arcadia's collaborative nature and dedication to continuous improvement gives the authorizer the confidence that they will sustain success over the next charter term.

NORTHFIELD PUBLIC SCHOOLS
School Board Minutes

March 28, 2022
District Office Boardroom

1. Call to Order
   Board Chair Claudia Gonzalez-George called the Closed meeting of the Northfield Board of Education of Independent School District No. 659 to order at 7:20 p.m. Present: Baraniak, Gonzalez-George, Goerwitz, Pritchard, Stratmoen, and Quinnell. Absent: Butler. Also present was Superintendent Dr. Matt Hillmann, Director of Human Resources Molly Viesselman, and Director of Finance Val Mertesdorf.

2. Item for Discussion and Reports
   a. Negotiation Strategy. The board discussed negotiation strategy.

3. Adjournment
   On a motion by Quinnell, seconded by Baraniak, the board adjourned at 8:08 p.m.

Noel Stratmoen
School Board Clerk

NORTHFIELD PUBLIC SCHOOLS
School Board Minutes

March 28, 2022
District Office Boardroom

1. Call to Order
   Board Chair Claudia Gonzalez-George called the Regular meeting of the Northfield Board of Education of Independent School District No. 659 to order at 6:00 p.m. Present: Baraniak, Gonzalez-George, Goerwitz, Pritchard, Stratmoen, and Quinnell. Absent: Butler. This meeting was open to the public, live-streamed and recorded, and access to the recording was posted to the school district website.

2. Agenda Approval/Table File
   On a motion by Quinnell, seconded by Goerwitz, the board approved the agenda.

3. Public Comment
   There was public comment.

4. Announcements and Recognitions
   - Greenvale Park Geckos have been participating in a STEAM experience led by St. Olaf physics students and professors. Each class participates in hands-on experiments between March 17 and April 14th. A team of Greenvale Park teachers, Robert Garcia, Betsy McLaughlin, Ada Leaphart and Kelly Johnson, collaborated with professor Eric Hazlett to organize this effort.
   - Rock'n Roll Revival was fantastic!

5. Items for Discussion and Reports
   a. <u>American Indian Parent Advisory Committee</u>. Superintendent Hillmann provided an update on the American Indian Parent Advisory Committee meeting held on Monday, March 21, 2022. This committee meets three times each school year and we have approximately 10-12 families that identify as American Indian. The committee affirmed a vote of concurrence for this school year.

   b. <u>Superintendent Operations and COVID-19 Update</u>. Dr. Hillmann shared the latest COVID-19 data, provided information about the latest racial equity training for teachers, and provided an update on the Northfield High School facility task force. COVID-19 positivity rates and ILI rate have dropped dramatically. The district continues its monthly PLC work through our partnership with Equity Alliance MN. The high school task force has met one time, and has been directed to consider recommendations for addressing the maintenance, efficiency, and educational adequacy issues through renovation and additions to the existing school. Rock'n Roll Revival completed its run on March 26 and involved approximately 130 students.

   c. <u>Budget Prioritization Update</u>. Dr. Hillmann and Director Mertesdorf provided an update on the budget prioritization process. The purpose of the budget prioritization process is to adjust Northfield Public Schools expenditures to align with reduced revenue resulting from a projected decline in enrollment of 400 students over the next ten years, and lack of inflationary adjustments from the legislature over the years.. Three teams, an elementary, a secondary, and a district services team, are making recommendations for a budget plan that includes an expenditure reduction of $4.5 million over two years. The board will receive a budget plan report that includes proposed reductions at the April 11, 2022 board meeting.

   d. <u>Legislative Update</u>. Superintendent Hillmann provided a legislative update, focusing on a concerted effort to have the legislature provide enough funds to eliminate the special education cross subsidy, and the tax equalization bill. The latest legislative recaps from SEE and MASA were briefly reviewed.

6. Committee Reports
   There were no committee reports.

7. Consent Agenda
   On a motion by Goerwitz, seconded by Baraniak, the board approved the consent agenda.

   a. Minutes
      ● Minutes of the Regular School Board meeting held on February 28, 2022
      ● Minutes of the Regular School Board meeting held on March 14, 2022

   b. Gift Agreements
      ● $3,000.00 from Dakota Electric Association for Dakota Electric Fund Scholarship
      ● $5,000.00 from Apple Autos Scholarship Fund of the Minneapolis Foundation for two scholarships
      ● $14,287.51 from Lucille Duesterhoeft Scholarship Fund of the Saint Paul and Minnesota Foundation for scholarships
      ● $5,012.95 from Saint Paul & Minnesota Foundation for TORCH Scholarship
      ● $5,000.00 from College City Beverage, Inc. for Tom Blaisdell Scholarship
      ● $4,094.40 from Thomas Blaisdell Scholarship Fund of the Saint Paul & Minnesota Foundation for Tom Blaisdell and Skip Boyum Scholarships
      ● $5,726.37 from Wayne R. Stickley and Jennifer A. Tuma Memorial Scholarship Fund of the Saint Paul and Minnesota Foundation for scholarships
      ● $1,000.00 from Jana Hirsch for NMS student council cancer fundraiser

   c. Personnel Items
      i. Appointments
         1. Correction: Daniel Foley, 1.0 FTE Long Term Substitute Second Grade Companeros Teacher at Spring Creek, beginning 3/15/2022-6/9/2022; MA20, Step 10
         2. Rebecca Hollister, .4 Assistant Girls Lacrosse Coach for 2 hours/day for 3 days/week at the High School, beginning 4/4/2022; Level 3 Assistant-$1,593 .4 FTE
         3. Sam Richardson, Recreation Building Supervisor with Community Ed, beginning 4/9/2022-5/31/2022; $17.41/hr.
         4. Alicia Sheehy, Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, beginning 7/5/2022-8/11/2022; MA30, Step 6
         5. Landon Shroyer, Recreation Building Supervisor with Community Education, beginning 4/2/2022-5/31/2022; $17.41/hr.
      ii. Increase/Decrease/Change in Assignment
         1. Adriana Bermudez, ECFE EA for 15.5 hours/week at the NCEC, change to ECFE EA for 15 hours/week at the NCEC, effective 3/28/2022.
         2. Scott Broughton, Teacher at the High School, add Assistant Track Coach for 2 hours/day at the Middle School, effective 4/1/2022. $2,489-stipend
         3. Natalie Deane, Teacher at Bridgewater, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; Lane/step
         4. Mariah Grisim, Gen Ed EA for 4 hours/day for 5 days/week at Bridgewater, change to Gen Ed EA for 5.50 hours/day for 2 days/week at Bridgewater, effective 3/21/2022-6/9/2022.
         5. Denise Halvorson, Teacher at the High School, add MSYC Teacher for up to 6 hours/week at the Middle School, effective 3/23/2022-5/5/2022; Year 2-$27.11/hr.
         6. Jenelle Mullin, CNA III at the High School, add Summer CNA for up to 5 hours/day Mon.-Thurs. at the High School, effective 7/6/2022-8/11/2022; $19.28/hr.**
         7. Diane Nagy, Teacher at Bridgewater, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day as needed Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; Lane/step
         8. Dawn O'Neill, Long Term Substitute Art Teacher at Greenvale Park, change start date from 4/4/2022-6/9/2022 to 4/18/2022-6/9/2022.
         9. Andrea Redder, ECFE Sib Care EA for 8 hours/week at the NCEC, change to ECFE Sib Care EA for 10 hours/week at the NCEC, effective 3/28/2022.
         10. Deb Russell, Teacher at Greenvale Park, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; Lane/step
         11. Anita Sasse, Third Grade Teacher at Spring Creek, add a 1/5 overload to teach Spanish for 30 minutes/day for Second Grade at Spring Creek, effective 3/15/2022-6/9/2022.

12. Paula Seeberg, Long Term Substitute Teacher at Spring Creek, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022. Lane/step
13. Correction: Karleen Sherman, Teacher at Spring Creek, add Summer Targeted Services BLAST Teacher for up to 6.5 hours/day Mon.-Thurs. at the High School, effective 7/5/2022-8/11/2022; Lane/step
14. Allison Sweeney, Teacher at Spring Creek, add Summer Targeted Services BLAST Teacher for up to 7 hours/day Mon.-Thurs. at the High School, effective 6/20/2022-8/16/2022; Lane/step
15. Erik Swenson, Teacher at Bridgewater, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; Lane/step
16. Gina Swenson, Teacher at Spring Creek, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; Lane/step
17. LauraAnn Talbot Peterson, Teacher at the Middle School, add Summer Targeted Services PLUS Teacher for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; Lane/step
18. Ellen Trotman, Teacher at the Middle School, add Assistant Track Coach for 2 hours/day at the Middle School, effective 4/1/2022. $2,489-stipend
19. Cydney Ulvestad, EA at Greenvale Park, add Summer Targeted Services PLUS Site Assistant for up to 6 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; **Step 4-$15.48/hr.
20. Nancy Veverka, 1.0 FTE Assistant Principal at the High School, change to .9 FTE Assistant Principal at the High School, effective for the 2022-2023 school year.
21. Megan Zwolenski, EA at Greenvale Park, add Summer Targeted Services PLUS Site Assistant for up to 6.5 hours/day Mon.-Thurs. at Greenvale Park, effective 7/5/2022-8/11/2022; **Step 2-$14.48/hr.
22. Community Education Summer 2022 Brochure Instructors- see attached.

iii. <u>Leave of Absence</u>
1. Joanne Gilbert, CNA at the High School, Updated Leave of Absence, effective 2/16/2022-approximately 4/5/2022.
2. Deborah Rasmussen, Guidance Counselor at the High School, Family/Medical Leave of Absence beginning 4/20/2022-6/1/2022.
3. Kim Slegers, Teacher at the High School, Family/Medical Leave of Absence beginning 3/22/2022 and continue on an intermittent basis for up to 60 work days.
4. Taylor Strelow, Community School Coordinator, Family/Medical Leave of Absence beginning 3/17/2022-3/25/2022.

iv. <u>Retirements/Resignations/Terminations</u>
1. Kim Briske, Director of Technology, resignation effective 4/1/2022.
2. Bea Chang, Early Ventures Site Assistant with Community Education, resignation effective 3/25/2022.
3. Mark Johnson, Teacher at the Middle School, retirement effective 7/19/2022.
4. Sydney Larson, Teacher at the High School, resignation effective 6/9/2022.
5. Anna Rubin, Teacher at Bridgewater, resignation effective at the end of the 2021-2022 school year.

8. Items for Individual Action
a. <u>Resolution in Support of the Congressional IDEA Full Funding Act</u>. On a motion by Pritchard, seconded by Goerwitz, the board approved the Resolution in Support of the Congressional IDEA Full Funding Act. Minnesota School Boards Association (MSBA) suggested schools take a resolution advocating that Congress fully fund the Individuals with Disabilities Education Act (IDEA). Full funding of the promised 40% of total special education costs from the federal government will reduce the burden on states to address the special education cross subsidy. On a roll call vote, voting 'yes' were Baraniak, Goerwitz, Gonzalez-George, Pritchard, Quinnell and Stratmoen. No one voted 'no'. Absent: Butler.

b. <u>2022-2025 Achievement and Integration Plan</u>. On a motion by Baraniak, seconded by Pritchard, the board approved the 2022-2025 Achievement and Integration Plan. The Achievement and Integration (A&I) program was established to increase racial and economic integration of students and to increase student academic achievement by reducing academic disparities based on students' diverse racial, ethnic, and economic backgrounds. Achievement and Integration revenue is not administered as a grant. It is a 70 percent aid, 30 percent levy appropriation. A&I aid payments are made to districts through the state's education IDEAS aid system. Northfield School District qualifies because we adjoin a racially isolated district (Faribault). Our first three-year plan was submitted in 2019. Each year A&I districts are required to hold a public meeting to report progress to local communities and seek feedback on the plan in alignment with local strategic planning under the World's Best Workforce.

c. <u>2022 Resolution Establishing Combined Polling Places 03.28.2022</u>. On a motion by Baraniak, seconded by Goerwitz, the board approved the 2022 Resolution Establishing Combined Polling Places 03.28.2022. The Minnesota Supreme Court appointed a special redistricting panel to hear and decide challenges to the validity of state legislative and congressional districts based on the 2020 census, and the congressional and legislative redistricting plans have been filed with the Office of the Secretary of State. Although there are no changes to the resolution establishing combined polling places this school board approved in November 2021, the latest information provided by the Secretary of State indicates that polling places "should" be reestablished after redistricting, updating the date of the resolution. On a roll call vote, voting 'yes' were Baraniak, Goerwitz, Gonzalez-George, Pritchard, Quinnell and Stratmoen. No one voted 'no'. Absent: Butler.

9. Items for Information
   a. <u>Enrollment Report</u>. Dr. Hillmann reviewed the March 2022 enrollment report.
   b. <u>School Board Work Sessions</u>. There are several work sessions scheduled for the board. On either April 5 or April 6, 5:00 p.m. - 7:00 p.m., the board work session will focus on budget prioritization. Two work sessions will be scheduled regarding the high school master plan. The board will determine a date in early June to discuss recommendations. Recommendations will be finalized at a work session on June 13, 4:00 p.m. - 5:45 p.m. prior to the regular board meeting.

10. Future Meetings
    a. Tuesday, April 5 or Wednesday, April 6, 5:00 p.m., Work Session, DO Boardroom
    b. Monday, April 11, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom
    c. Monday, April 25, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom
    d. Monday, May 9, 2022, 6:00 p.m., Regular Board Meeting, Northfield DO Boardroom

11. Adjournment
    On a motion by Stratmoen, seconded by Goerwitz, the board adjourned at 7:16 p.m.

Noel Stratmoen
School Board Clerk

EXTENDED FIELD TRIP FORM

Staff Member(s) Responsible (Name and phone): Jeff Wright   612-208-5004

School and Program: NHS Lacrosse (Boys)

Date of Requested Trip: 5/27 - 28

1. What group is taking this trip?
   NHS Boys Lacrosse

2. Estimated # of Students: 36   # Adult Supervisors: 4

3. Destination: Duluth, MN

4. Date/Time of Departure: 3pm

5. Date/Time of Return: 10pm

6. State purpose and/or educational value of trip (attach information to form if needed).

   We play at Duluth Denfeld HS on 5/28 + would like to stay the night + take the following AM for team Bonding.

7. Name the manner of travel and the carrier.

   Northfield Lines

8. State housing arrangements (must include name, address and phone number of hotel).

   Hotel in Duluth (TBD)

9. List of coach, parent or guardian contact info.(Attach)

   Jeff Wright, Chaz Irrthum, Ian Klotz, Terry Herbig (Booster)
   Deric Selchow
   (Booster)

10. List participants (reminder to have participants complete parent/guardian permission form if applicable). (Attach)

Roster will be attached after tryouts

11. Indicate who will be in charge of supervising the trip (roles and responsibilities).

See Question #9 (Coaches/Boosters)

12. State the safety precautions and procedures for emergencies while on the trip.

First aid + medical box for emergencies + parents who are medical staff/occupation. Contact parents in case of emergency.

11. Give budget costs, how the trip will be funded and estimated cost per student.

- 1/2 Bus cost will be covered by school, 1/2 by boosters
- Hotel cost to be covered by family

12. List any proposed precautions, special needs, special concerns, student concerns, - if applicable.

NA

****

Signature of Staff Member Responsible: _____

Date field trip request was submitted to Principal: *3/29/22*

Principal/Administrator Signature and Date: *Joelle* *3/30/22*

Approved: ✓   Not Approved:

****

Superintendent Signature and Date: _____

Approved: _____   Not Approved: _____

****

School Board Review Date: _____

Approved: _____   Not Approved: _____

COMMUNITY EDUCATION	
Summer 2022 Brochure Instructors	
Alan Anderson	Kyle Scanlon
Raiders Fitness -Ashley Drobney	Northfield Arts Guild
Amanda Sieger	Northfield Skating School Staff
Doug Bengtson	Luke Bruihler
Kevin Dahle	Praire Fire Theatre
Heidi Streiff	Project Able Staff
Chris Kauffeld	Spark & Stitch Institute
Community Education Staff	Youth Enrichment League Staff
Cornerstone on the Vermillion	Victor Albrecht
Jacqui Dorsey	Shahar Fearing
Carey Tinkelenberg	Katherine Pickerign
Dave Gilmore	Linda Lemke
Drama Lab-Aaron Strawn	KidCreate Studio
Darrell Sawyer	Lori Hameister
Faribault Park and Rec	Go Solar! Kidz
Northfield Tennis Association	Tech Academy
Dan McHugh	Challenger Sports
Susan Shirk	Paul Eddy
River Bend Nature Center	Minnesota Twins
Dakota County 4H	Cannon River Sportsmen's Club
Tim Torstenson	Skyhawks
Jasmin Kotek	Sports Unlimited
Steve Hatle	Northfield Raider Basketball Coaching Staff
Anne Haddad	Northfield Raider Football Coaching Staff
YMCA Camp Pepin	Northfield Raider Cheer Team
LaVergne Adelmann	Sylvia Marccarelli
Northfield Volleyball Club	Peter Gittins
City of Faribault	Tyler Balow
Northfield Touchdown Club	Janet Smith
Strength & Conditioning Coaching Staff	Girls on the Run

Project Manual
Division 00 & 28

Northfield Public Schools District Wide Security Camera Upgrade

Independent School District #659
Northfield, Minnesota

Project Manual

Project Identification
Bidding Requirements
Conditions of the Contract
General Requirements and specifications for:
Northfield Public Schools District Wide Security Camera Upgrade

Independent School District #659
Northfield, Minnesota 55057

Bid Time: 2:00PM
Bid Date: Tuesday, May 3rd, 2022
Bid Place: Northfield District Office
201 Orchard Street South
Northfield, Minnesota 55057

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Division 00

Advertisement for bids

District Wide Security Camera Upgrade

Independent School District #659 Northfield Public Schools will receive sealed bids for the District Wide Security Camera Upgrade until **2:00 PM local time on May 3, 2022** at the Northfield Public Schools District Office, 201 Orchard Street North, Northfield, MN 55057, at which time and place all bids will be publicly opened and read aloud. Bids received after 2:00 PM will be returned unopened.

Envelopes containing bids must be sealed, marked on the lower left-hand corner "Sealed Bid Enclosed" with the name and address of the bidder and the date and hour of the opening and addressed as follows:

Project Name: District Wide Security Camera Upgrade
Name: Independent School District 659
Owner Address: 201 Orchard Street South
             Northfield, MN 55057

Bid Date: Tuesday, May 3, 2022
Bid Time: 2:00 PM
Contractor: [Your Company Name and Address] Bid

BID SECURITY
Each bidder must accompany his Proposal with a Cashier's Check, Bid Bond or Certified Check equal to 5% of the amount of the Proposal payable to the Owner as a guarantee of prompt execution of the Contract in accordance with the Proposal and Contract Documents, and that he will furnish bond acceptable to the Owner covering performance and payment of the Contract. Bids under $25,000 will not require a bid security. The successful bidder will be required to furnish satisfactory Labor and Material Payment Bond, and Performance Bond.

PROCUREMENT OF DOCUMENTS
Interested contractors may view and receive documents for bidding by contacting Cole Nelson at cnelson@northfieldschools.org. Bid notices will be available on the District's website and in the local paper.

To receive **Notices, Addendums, and Construction Bulletins, Shipped Order Confirmation, and Electronic Downloads** for this project, you must be present at the Pre-bid meeting on Friday April 22 at 10:00AM. The Pre-bid will begin at the District Office located at 201 Orchard Street South.

Proposal Documents may also be viewed during normal business hours at the offices of Northfield Public Schools.

Issuance of Contract Documents <u>does not</u> constitute acceptance or approval of any Contractor or product.

Documents will be ready for viewing April 12,2022.

BID WAIVER
Bids may not be withdrawn within thirty days after the scheduled closing time for receiving bids. The Independent School District 659, Northfield, Minnesota, reserves the right to reject any or all bids and to waive any irregularities in bids.

Northfield Public Schools
Independent School District 659
201 Orchard Street South
Northfield, MN 55057

INSTRUCTIONS TO BIDDERS

PART 1: GENERAL

1.01 BID INFORMATION

1. Bids will be received by the Owner at the time, date, and place stated in the Advertisement for Bids.

2. The bids must be submitted upon the Bid Form furnished in the Project Manual and enclosed in an envelope bearing the name of the project.

3. Bid Opening:
   - Proposals will be opened publicly and read aloud using an electronic format for viewing. If you wish to attend the opening, please enter Door 1 on the West side of the building. You will be escorted to the board room where the bid opening will occur.
   - Proposals received after the time set for receiving bids will not be accepted.
   - No telephone bids will be accepted.
   - No fax bids will be accepted.
   - No emailed bids will be accepted.
   - After opening of bids, no bid or any part thereof, shall be modified, withdrawn or canceled for the next 90 days. The Owner reserves the right to accept or reject any or all bids and to waive any informalities or irregularities in the bid process.
   - Modified or withdrawn proposal confirmation letter postmark must be an official post office postmark. A stamp machine date is not acceptable.

1.02 BID SECURITY

A. Each proposal shall be accompanied by bid security in the form of a surety bid bond, cashier's check or certified check, drawn on a state or national bank domiciled within the State of Minnesota in an amount not less than ten percent (5%) of the maximum base bid submitted, payable without condition to the Owner as a guarantee that the bidder will enter into a contract with the Owner for the work described.

B. The successful bidder's security will be retained by the Owner until bidder has provided a properly executed contract, required performance and payment bonds and an insurance certificate proving the minimum requirements have been met. The Owner reserves the right to retain the bid security of the next two contending bidders in each work category until the selected bidder enters into contract with the Owner or until the proposal expiration time set in the invitation to bid, whichever is shorter. All other bid security will be returned as soon as is practical.

C. If any bidder refuses or fails to execute and deliver the contract and bonds required within ten days after he/she received notice of acceptance of his/her proposal, the Owner will retain his/her bid security as liquidated damages, but not as a penalty.

1.03 BONDS

A. The successful bidder will be required to furnish and pay for a "Performance Bond" and "Labor and Materials Payment Bond" each in the full amount of the contract by a surety (or sureties) approved by the Owner.

1.04 BASIS FOR AWARD OF CONTRACT

A. Owner Considerations
   1. The Owner reserves the right to reject any or all proposals and to waive irregularities.
   2. The Owner reserves the right to accept any quote deemed to be in the best interest of the Owner.

   3. In the event the proposal of the lowest responsible bidder exceeds available funds for the project, the Owner may request additional alternates to reduce the total cost of the project to an amount acceptable to the Owner.

1.05 PROJECT SCHEDULE

A. Construction Start: Monday June 13th,2022
   Substantial Completion: August 12th, 2022
   Final Completion: Friday September 2nd, 2022

B. Liquidated Damages: Not applicable

C.   An extension of this completion time shall be allowed only by written approval (or by Change Order) of the Owner.

1.06   EXAMINATION OF DOCUMENTS

A.   Drawings, specifications, and other contract documents will be distributed beginning **April 12, 2022.**

B.   Questions regarding design and technical specifications may be addressed to Northfield Public Schools at cnelson@northfieldschools.org

1.07   PROCUREMENT OF DOCUMENTS BY BIDDERS

A.   Bidders/Contractors are responsible for obtaining copies of the construction documents for bidding and construction, and for any costs incurred therein.

C.   Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

D.   **Bid Notices, Bid Addendums, and Electronic Downloads** for this project will be distributed by Cole Nelson at cnelson@northfieldschools.org

E.   The issuance of this Advertisement for Bids is not a license to incur reimbursable expenses by the bidder(s) to seek, prepare or submit their bid (proposal). No bidding fee or expenses will be paid to any bidder by the Owner.

1.08   DEFINITIONS

A.   Project, Owner and Consultants as used in these documents shall be the same as stated on the "PROJECT DATA" sheet near the front of this Project Manual.

B.   "Provide": Under this contract, Contractor shall furnish and install item or system specified. Contractor shall perform all labor and furnish all materials and equipment necessary so that the item or system will be complete and operational in every respect.

C.   "Furnish": Under this contract, Contractor shall deliver to the site, unload and properly store item(s) specified, as well as additional specialized materials and/or accessories necessary for the use and operation of item(s) specified.

D.   "Install": Under this contract, Contractor shall uncrate, set in position, connect (including sub-assemblies furnished) and adjust for use. Contractor shall provide miscellaneous specialty items such as fasteners, hangers, etc., as obviously necessary for a complete and operating installation.

1.09   EXAMINATION OF DOCUMENTS AND SITE OF WORK

A.   Before submitting a quote, each bidder shall examine the Drawings carefully, shall read the Specifications and all other proposed Contract Documents, and shall visit the site of the work. Each bidder shall fully inform him/herself prior to bidding as to existing conditions and limitations under which the work is to be performed and shall include in his/her bid a sum to cover the cost of items necessary to perform the work as set forth in the proposed contract

documents. No allowance for extra compensation will be made to a bidder because of lack of such examination or knowledge. The submission of a quote will be considered conclusive evidence that the bidder has become fully informed of all such conditions and limitations.

C.   These Specifications as a whole are an integral part of the Bidding Documents. Items of work shown on the Drawings, but not described herein, shall become part of these specifications and vice versa. It is further to be understood that materials and finishes specified shall be furnished and applied on all similar portions of the building, whether they are specifically described on each corresponding detail or not.

D.   Bidders are expected to base their bids on materials and equipment complying fully with the Bidding Documents. In the event a bidder figures their quote with materials or equipment, which do not conform, the bidder will be responsible for furnishing materials and equipment, which fully conform at no change in his/her quote price.

1.10 PRE-BID CONFERENCE AND TOUR OF PROJECT SITE

A.   A pre-bid conference will be held at 10:00 AM CST on April 22, 2022. Location will be at the Northfield District Office located at 201 Orchard St S, Northfield, MN 55057. Please meet at the main entrance Door #1. **<u>Attendance is MANDATORY for this project.</u>**

1.11 QUESTIONS, INTERPRETATIONS OF DOCUMENTS

A.   Submit all questions about the Contract Documents immediately to Cole Nelson at cnelson@northfieldschools.org in writing. Discrepancies, ambiguities and omissions will be clarified by written addenda issued to all bidders of record and will become a part of the contract. The Owner will not be responsible for oral instructions. No Addenda will be issued later than 48 hours prior to the time set for receipt of proposals.

        1.   Failure of a bidder to receive any addendum shall not release the bidder from any obligations under his/her proposal, provided addendum was issued via same process as construction documents have been distributed.

        2.   In the event that such conflicts are not reported, or such clarifications, interpretations or decisions are not given, the most stringent (or most costly) course of action shall be followed unless otherwise agreed in writing with the Owner.

B.   Construction and work shown or indicated on one Contract Document and not shown or indicated on any other document shall be provided the same as if shown or indicated on all Documents.

1.12 SUBMITTAL OF BIDS

A.   Submit bids in a sealed envelope with Contractor's name and address and Project name clearly written or typed on envelope front.

        1.   Bids shall be made upon forms provided in the Contract Documents or identical reproduction thereof.

        2.   All information requested shall be provided and all blanks filled in by typing or manually in ink.

           a.   Bid amounts shall be stated in words and numerals with the written word governing in case of discrepancies.

           b.   All requested alternates shall be bid. If "no change" is the intent for an alternate it shall be so stated on the form.

        3.   Bids which are signed by others than individuals making them should have attached thereto Power of Attorney evidencing authority to sign the bid in the name of their person for whom it is signed.

        4.   Bids which are signed for a partnership should be signed in the firm name by at least one of the partners, or if by another party, there should be attached to the bid a Power of Attorney evidencing authority to sign the bid for the partners.

        5.   If bids are signed for a corporation or any other legal entity, evidence of authority of person signing for such legal entity should be attached to the bid

1.13 PRODUCT OPTIONS

A.   Materials, equipment, methods and services required by the Specifications establish the required standard of quality, function, dimension and appearance. Proprietary items are specified which have been proven by evidence satisfactory to the Owner to meet the required standard.

        1.   The Contractor's quotes shall be based <u>only</u> on products and systems specified in the Contract Documents.

1.14 SUBSTITUTION PROPOSALS

A.   Conditions: Substitutions which vary slightly from the requirements of the Drawings and Specifications, but will meet Project requirements for function, design and physical dimensions, may be submitted by a Prime Contractor.

        1.   A substitution must result in a reduction of the base proposal while meeting the standards of the specified product or system.

        2.   The burden of proof of the merit of the proposed substitution is upon the proposer.

        3.   Bidders are to submit requests for substitutes **BEFORE** bids are due directly to the owner.

B.   Substitution Proposals: Submit a separate written request of each Product, supported with a complete description of the proposed substitution, including product data, drawings, performance and test data and samples as appropriate, and with the following information:

1. Comparison of the qualities of the proposed substitution with those of the product specified.
2. Changes required in other components of the work because of the substitution.
3. Effect on the construction schedule and on the Contract Sum.
4. Cost data comparing the proposed substitution with the Product specified and including incidental cost of modification to related work.
5. License fees or royalties, if applicable.
6. Availability of maintenance service and source of replacement materials.

C. The decision of the owner's approval or disapproval of a proposed substitution shall be final. Bidder will be responsible to provide specified products or material in the event that a substitution is rejected.

D. Any additional cost in other work incurred as a result of a substitution proposed by a Contractor shall be borne by the Contractor, including all costs for modifying other related materials and the cost of any additional engineering or architectural design required to accommodate the substitution.

1.15 OWNER'S RIGHTS

A. The Owner reserves the right to reject any and all quotes, accept any quote it deems to be in its best interest, to waive informalities or irregularities in quotes submitted, and waive minor irregularities or discrepancies in quote procedure.

BID FORM

Address bids to:
Northfield Public Schools
Attn: Valori Mertesdorf
201 Orchard Street South
Northfield, MN 55057

Bid of:	
Bidder:	
Date:	
Address:	
Contact:	
Phone:	
Email Address:	

SALES TAX ACKNOWLODGEMENT
All bid packages submitting a proposal with this proposal form are to **include** all applicable sales and use tax.

Sales Tax Included: YES / NO (circle one)

The undersign do hereby declare that I/we have carefully examined the site of the proposed work; as well as the Contract and Bidding Documents, and do hereby agree to furnish all material transportation, equipment, labor and supervision, tools, taxes, and other items to do all work in strict accordance with the Contract Documents for the following lump sum amounts:

BASE BID

1. State Base Bid in both works and figures.
2. State individual bid amounts for each site and for Grand Total for entire project.

Per School Base Bid Amount	Bid written	Dollars $
Greenvale Park Elementary		$
NCEC		$
District Office/ALC		$
Middle School		$
Bridgewater Elementary		$
High School		$
Spring Creek Elementary		$
District Shop		$

GRAND TOTAL BASE BID AMOUNT		$

A Cashier's Check, Bid Bond, or Certified Check in the amount of _____Dollars ($_____) drawn to the order of the Treasurer, Independent School District #659, Northfield, Minnesota is attached hereto with the understanding that if this Proposal is accepted and the undersigned refuse, fail or neglect to execute the Contract and furnish bond within ten days of the date of acceptance of this Proposal, it is fully understood and agreed between the Independent School District #659, Northfield, Minnesota and the undersigned that _____Dollars ($_____) being amount of bid security above mentioned, shall be the liquidated damages occasioned by such failure, refusal or neglect and that thereupon said School District may realize on said bid security and use the proceeds in payment of said damages, and upon the further understanding that said bid security will be promptly returned upon the rejection of this Proposal or the signing of a Contract and furnishing of the Bond.

If the Base Bid Proposal is accepted, the bidder agrees to commence work immediately with non-disruptive work and to substantially complete work per the Project Schedule and subject to the provision of the Contract, accepted Alternates, Specifications and Instructions to Bidders.

The bidder agrees that if he is the apparent low bidder, he will submit a complete list of his proposed subcontractors and suppliers within 48 hours of the bid opening to the Owner for their approval. It is the bidders understanding that no Contracts will be awarded until this list is fully approved.

This Proposal is submitted after careful study of the plans and specifications and from a personal knowledge of the conditions both surface and subsoil, at the building site, which knowledge was obtained from the undersigned's own sources of information and not from an official or employee of Independent School District #659.

The undersigned declares that this Proposal is made without improper connection with any other person or persons making a Proposal on this same Contract, and is in all respects fair and without collusion or fraud, and the undersigned further declares that no person or persons acting in any official capacity for Independent School District #659, Northfield, Minnesota, is directly or indirectly interested therein or in the supplies of works to which it relates or in any portion of the profits thereof.

It is understood and agreed that this Proposal cannot be withdrawn within thirty (30) days without the consent of the Independent School District #659, and that the said School District has the right to accept or reject any or all Proposals.

ADDITIONAL INCLUSIONS
The following items need to accompany this proposal form:
    D. Cashier's Check, Bid Bond, or Certified Check equal to 5% of the amount of the proposal.

ADDENDUM RECEIPT

The receipt of the following Addenda to the Specifications is acknowledged:

Addendum No. _____Date

Addendum No. _____Date

Addendum No. _____Date

(Legal Name of Person, Firm or Corporation)
By:
STATE OF _____)
) SS.

COUNTY OF _____)
Sworn to and subscribed to before me this _____day of _____, 20___.

Notary Public, _____County, State of

My   Commission   Expires:

LIST OF CONTRACT FORMS

1.01 PURCHASE AGREEMENTS / PRIME CONTRACTS

E.   Prime Contract Form: The Owner intends to award one prime contracts on a modified document equal to the AIA form *A101-2017 Standard Form of Agreement Between Owner and Contractor* in accordance with the bid documents.

F.   General Conditions of the Contract for Construction: *AIA Document A201 – 2017 General Conditions of the Contract for Construction* has be modified by the Owner to reflect project specific requirements.

1.02 OTHER FORMS

E.   The following is a list of forms and standards applicable to this Project.

- Bid Form: As bound in this Project Manual. Submit (2) copies of exact form.

- Bid Bond Form: The standard form of a surety, authorized to do business in Minnesota and meeting all requirements, will be acceptable. Standard AIA Document A-310 will be acceptable. Submit with Bid with proper Power of Attorney certificate and acknowledgment.

- Performance/Payment Bond: Form shall be standard AIA Document A312 Performance Bond and Payment Bond, 1984 edition, conforming to Minnesota statutes provided by Surety. Submit in two copies, with proper Power of Attorney and acknowledgment upon execution of contract agreement with Owner.

- MN Responsible Contractor Compliance Affidavit. Submit completed form with bid.

PROJECT SAFETY REQUIREMENTS

PART 1: GENERAL

1.01 SAFETY SUMMARY & OVERVIEW

G. The prevention of accidents or injuries on, about, or in the vicinity of the project site is the Contractor's responsibility. For purposes of this Exhibit, the term Contractor shall be deemed to include Contractors, subcontractors, and suppliers of all tiers. Contractor must perform its Work in a safe manner, must fully comply with safety measures of Contractor, and those imposed by the Contract Documents, and must adhere to the applicable industry standards, laws, ordinances, rules, regulations, codes and orders of public authorities bearing upon the safety of persons or property or their protection from damages, injury or loss. Contractor must abide with all Federal, State, OSHA (or equivalent) and Owner jobsite requirements relative to safety and the prevention of accidents or injuries. Contractor shall follow the most stringent safety standard where any inconsistency exists among those referenced in the preceding sentence. Contractor shall impose all obligations in this Exhibit on its subcontractors and suppliers of all tiers.

H. Contractor shall be solely responsible for the protection and safety of its employees, and the employees of its subcontractors and suppliers of all tiers, for the final selection of all safety methods and means, for required safety reports and records, for daily inspection of its Work area and its employees' safety equipment, and for the continual instruction of its employees on health and safety, including weekly safety meetings. Contractor must provide competent supervision on site at all times for its own workers and workers of all lower tier Contractors under its direction. This supervisor must be an employee of Contractor. Contractor must actively promote safe working performances and practices on the part of its employees and the employees of its Contractors and suppliers of all tiers. Contractor shall also provide to Owner a list of its Contractors they intend to use on site.

I. Contractor must establish and maintain a safety program implementing safety measures, policies and standards conforming, on a comprehensive basis, to its obligations under these paragraphs, which safety program shall include provisions for selection of safety methods and means, conveyance of information and instruction with regard to those safety methods and means to its employees, safety meetings of its employees at least once a week, maintenance of required safety reports and records, daily inspections of its Work area and equipment to detect and correct hazardous conditions, safety rule violations and unsafe Work practices, and enforcement of corrective actions as required. Contractor shall indemnify Owner for all damages, fines, penalties, costs, and expenses incurred as a result of Contractor's failure to comply with the requirements of this Exhibit.

1.02 SUBMITTAL OF SAFETY PLANS

A. Contractor agrees, in accordance with owner's directives to submit to owner its written Accident Prevention Plan and Site Specific Safety Plan. Such submittal shall be made prior to Contractor's mobilization to the site and shall be an express condition precedent both to Contractor's right to commence performance and its right to receive compensation. Any delays caused to owner or the project due to Contractor's failure to comply with these provisions shall subject Contractor to any and all damages incurred by owner or other affected parties. Receipt of Contractor's safety plans by owner does not constitute approval of said plans. Contractor is solely responsible for content of Safety Plans and for adhering to the same while performing its work.

1.03 ORIENTATION & SAFETY EDUCATION

F. Contractor is required to orientate and train its employees of the hazards and procedures required to perform their job (i.e., confined space, fall protection, respiratory protection, scaffold erection and dismantling, trenching and excavation, etc.).

G. Site specific orientation sheets must be signed and will be maintained on file.

H. A site-specific orientation will be conducted by the Owner. All personnel working on the project will be required to attend prior to starting work. The orientation will be conducted twice a week and the schedule will be determined by the project team.

I. Daily Safety Huddles will be completed by all contractor lead personnel and will be conducted daily at a time set by the project team.

J. Pre-task planning will be required to be completed daily by each contractor and turned into the Owner.

F. Crisis Management Plan must be communicated and the staging area identified.

1.04 SAFETY DISIPLINE

A. Contractor shall have and enforce a disciplinary action schedule conditioned upon the occurrence of any safety violations being discovered, which schedule should vary depending upon the severity of the violation. Whenever requested by owner, Contractor shall provide all necessary and pertinent information regarding any and all safety matters and violations to owner. Safety violations may result in disciplinary action up to and including permanent removal from the jobsite. Any worker can be removed from the project at any time at the sole discretion of the owner's onsite supervision.

1.05 VIOLATIONS FOUND DURING SAFETY INSPECTIONS

B. If a safety violation by Contractor is found during a owner inspection, Contractor's company name and employee(s) name will be noted on the violation report.

C. The Superintendent on site or authorized owner representative will explain the violation to Contractor's supervisor/representative.

D. The violation must be corrected immediately. In the event Contractor does not promptly correct any safety violation, owner may order Contractor to cease all operations on the jobsite until all violations are corrected. In the event Contractor fails to correct violations, Owner may correct the violations and charge all costs of compliance to Contractor.

E. Violation notices will be kept as part of the permanent project file. Violations and offenses are cumulative and may affect future work.

1.06 CONTRACTOR SAFETY NOTIFICATION PROCESS

D. The program is initiated when life threatening and/or repeat violations occur. The program is progressive in nature, ranging from written corrective warnings up to and including possible replacement of Contractor for default due to continued safety performance failures. The details are below:
- If Contractor's employees receive a combination of two (2) written warning notifications and/or employee injuries, defined as "requiring off site medical care," a meeting shall be held on site. At a minimum, the meeting shall include the following attendees: Contractor's Project Superintendent or Contractor's General Manager; and owner. The purpose of this meeting is to identify the corrective steps required and to agree upon the duration and implementation timelines necessary to reduce the possibility of any future hazards and/or injuries. Contractors are responsible for their employees and it is Contractor Management's responsibility to determine how they will control the behaviors of their own employees.
- If any additional written warning notification are issued or employee injuries occur within the timelines agreed to in the meeting, Contractor will immediately provide, at Contractor's expense a full time third party safety professional for the duration of the contract. Qualifications for the safety professional must be presented to owner for approval.

E. If subsequent Safety Violations occur, owner will have the option to replace the Contractor due to safety performance failure. Any cost associated with delays, etc. due to replacement of Contractor will be charged to the Contractor and any monies owed to the Contractor will be adjusted accordingly.

1.07 COORDINATION IN ENGLISH

C. If Contractor employs non-English speaking workers or non-English speaking lower tier-Contractors on site, Contractor will provide English speaking foreman on site for the duration of its work. Such Foreman will be able to communicate with and direct non-English speaking workers.

D. At least one English speaking representative of Contractor will attend all owner safety meetings and promptly communicate information discussed to all other Contractor employees and lower tier Contractors.

1.08 OWNER/OPERATOR OR WORKER

A. Contractor and lower tier Contractors that have company owners performing work on the jobsite shall adhere to all OSHA/State safety regulations that would apply to employees performing the same work. There are no exemptions from safety requirements for owners performing work on the jobsite, regardless of whether or not they are covered by State or Private Workmen's Compensation programs.

1.09 TOOLBOX SAFETY MEETINGS

A. Contractor must hold weekly toolbox safety meetings for all its employees and submit minutes of each meeting to owner. Contractors and their employees, when on site at the time of the meeting, will be required to attend owner's monthly all hands toolbox safety meeting. Any of the requirements of Government Safety Regulations not satisfied by owner's safety meetings shall be the responsibility of the Contractor. Contractors that employ non-English speaking persons must provide someone to verbally translate the weekly toolbox safety meetings into the language of the non-English speaking personnel. Contractors may conduct additional safety meetings for their crew as necessary to keep their crew members safe throughout the work.

1.10 CONTRACTOR SAFETY REQUIREMENTS

F. Owner is committed to the elimination of worker injury throughout our operations. Owner will not tolerate any injury to our owner's workers, or to the worker of any Contractor while engaged on owner's projects. Any lesser commitment conveys the erroneous message that accidents are inevitable and that some level of injuries are acceptable. Contractor must identify a project safety representative before work commences, which may be the Contractor's superintendent/foreman.   Contractor's competent person must: (i) have a valid OSHA 30 hour, be in the capacity to act as the Contractor's competent person as designated in writing by their employer, and be English-speaking. This person must be on site at all times while Contractor's work is in progress. If Contractor workforce exceeds forty (40) workers including sub-tier workers, Contractor must provide a full-time safety professional who has no other duties than managing the safety of all their workers. This individual must have a current OSHA 30-hour card and five (5) years' construction experience, at least one of which is in a safety capacity. Qualifications for full-time safety person must be submitted to Owner for approval. All OSHA cards must have been issued within the last five (5) years. The following is the minimum criteria to work on this project and is strictly intended for the purpose of eliminating accidents and injuries at the project.

G. General Safety Requirements
   • Contractors must observe and follow all posted safety signs.
   • There is no smoking allowed on school property
   • Any worker that is involved in an injury or loss event on the job must be drug tested at the expense of their employer and results cleared before they can continue working on the project.
   • Contractor must submit copies of employee training records to owner when requested. Daily equipment checklists including daily pre-task planning sheets must be submitted to owner supervisory personnel before work begins each day.
   • Contractors are expected to supply their own personal protective equipment (PPE).
   • Contractor must provide disposable cups and trash containers for all water stations provided for own employees.
   • Adequate ventilation must be provided when using vapor producing materials or creating high dust levels. Contractor must notify Owner twenty-four (24) hours in advance whenever work is being done that may generate any hazardous odors or dust.
   • Contractors may not, under any circumstances, operate or disconnect any device used to control building services until permission has been obtained from the Owner's project manager, communicated through Owner.
   • The following activities are prohibited on site and are causes for immediate dismissal:
      • Using alcohol or illicit drugs.
      • Fighting or horseplay.
      • Tampering with equipment.
      • Possession of firearms.
   • Contractors must investigate and report all work-related injuries and near misses to owner's Project Manager and/or Superintendent. Owner's Investigation Team will also investigate incidents. First aid treatment is the responsibility of Contractor. Contractor must have a first aid/CPR-trained foreman on site whenever work is being performed.
   • Site management/supervision will attend weekly Owner's site safety / progress meeting led by Owner's Superintendent. Attendance is also required at monthly all-hands site safety meetings. Contractor will have site safety representative participate on the jobsite Safety Leadership Team when requested by Owner.
   • Contractors must immediately notify the project superintendent of all work related injuries and near misses. Then submit their accident investigation report to project superintendent within 24 hours of the incident.
   • All workers will receive a site-specific orientation conducted by Owner. This must be completed before any worker can begin work on site.

   E. All workers are required to attend a mandatory site safety meeting while actively working on this site. This safety meeting will be held on a regularly scheduled time and day as established by Owner.
   F. Contractor will conduct weekly employee toolbox meetings and copy Owner with material covered and attendance record. This meeting is scheduled and led by a Contractor representative.
   G. No radios or headsets, including smart phones and earbuds, are allowed in work areas.
   H. Contractor must submit safety plans and hazard specific work plans to Owner prior to beginning work.
   I. All impalement hazards must be protected by square rebar caps or other OSHA compliant methods which eliminate the hazard. Impalement hazards include but are not limited to rebar, form stakes, conduit, etc.
   J. Mushroom caps are not allowed.
   K. Form stakes are to be capped immediately upon installation.
   L. Contractor's equipment, tools, and personnel must comply with OSHA Safety and Health Regulations for Construction (or State equivalent).
   M. No one under eighteen (18) years of age is allowed to work on or access to Owner's jobsites.

N. Contractor shall provide all required safety information of their sub tier Contractors as required by Owner or Owner's insurance provider.

O. Contractor must immediately correct any unsafe acts or practices brought to its attention.

E. Asbestos
- Contractor must notify the Owner if any material containing asbestos is encountered during performance of the Contractor's Work. Contractor is prohibited from storing or installing any equipment or material containing asbestos on the project site. Contractor is solely responsible for the prevention of asbestos containing material or equipment to be installed as part of its Work. The Site Asbestos survey is available upon request and will be maintained in the Owners project trailer or site office.

F. Silica
- The OSHA standard requires employers to limit worker exposures to respirable crystalline silica and to take other steps to protect workers. Employers can either use a control method laid out in Table 1 of the construction standard, or they can measure workers' exposure to silica and independently decide which dust controls work best to limit exposures to the PEL in their workplaces. Regardless of which exposure control method is used, all construction employers covered by the standard are required to:
    - Establish and implement a written exposure control plan that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur.
    - Designate a competent person to implement the written exposure control plan.
    - Restrict housekeeping practices that expose workers to silica.
    - Offer medical exams – including chest X-rays and lung function tests – every three years for workers who are required by the standard to wear a respirator for 30 or more days per year.
    - Train workers on work operations that result in silica exposure and ways to limit exposure.
    - Keep records of workers' silica exposure and medical exams.

G. Hazardous Material
- Contractor must notify the Owner if any Hazardous Material is encountered during performance of Contractor's Work. Contractor is prohibited from distributing, removing or storing of any equipment or materials deemed to contain hazardous material, unless required by the Contract Documents. Contractor is solely responsible for prevention of hazardous materials being installed as part of its Work. Contractor is responsible for all disposal of chemicals and containers used in the construction of their work on this project. Contractor will provide to Owner OSHA-required Master Chemical and Substance Inventory Lists including all safety data sheets (SDS) on all chemicals before they are delivered to the jobsite.
    - SDS's must be submitted to Owner prior to any chemical or hazardous material being brought on site.
    - All containers must be properly labeled & clearly stating the contents of the container.
    - If chemicals are transferred to a separate container, proper labeling must be on all containers.
    - Oil drips and other spills must be cleaned up immediately.
    - Hazardous waste must be disposed of correctly.

H. Personal Protective Equipment
    - A thorough Job Hazard Analysis (JHA) must be conducted as part of the pre-task plan each day to determine the appropriate PPE required for all tasks. This includes eye and face protection, head protection, foot and leg protection, hand and arm protection, body protection, and hearing protection. All employees must be trained in the proper care and use of all PPE. At a minimum, the following PPE requirements are in effect for all workers:
    C. 100% eye protection will be required on the project. Those individuals with prescription eyewear that are not Z-87 safety glasses must wear Z-87 rated goggles over their prescription glasses. Only clear glasses are allowed indoors or in low light work areas. Sunglasses are not acceptable eye protection at any time. Non Z-87 rated sunglasses are not acceptable.
    D. Hand protection is required of all workers. Select the proper glove for the job and its associated hazards. Follow manufacturer recommendations for glove use when using equipment and tools. If no specific glove is required for the work, an all-purpose construction work glove must be worn.
    E. Hard hats are required at all times. Hard hats must display company name and employee name.
    F. Employees must be properly clothed while working. Minimum attire will include long pants, T-shirt with minimum 4" sleeves and ankle supporting sturdy work boots. Shorts, tank tops and tennis shoes are not permitted.
    G. Safety harnesses, lanyards, face shields, hearing protection and all other PPE must be worn where it is warranted by the hazard exposure or when required. Training must be provided to all workers on the proper use of all PPE. Training records must be supplied to Owner when requested.
    H. Dust masks/respirators must be worn for all jobs that produce exposure to dust or hazardous fumes in concentrations greater than the permissible exposure limit. Contractor is responsible to make the determination. All dust masks/respirators must meet NIOSH approval.
    I. Personnel training for respirator utilization is required prior to use.

J.   Prior to respirator utilization, personnel must be medically evaluated and fit-tested.
K.   Hearing protection device (plug and/or muffs) must be worn when personnel are exposed to a hazardous noise level at or above 85 decibels.
L.   All workers must wear a Class II high visibility garment at all times. This can be a t-shirt, vest or jacket.

B.   Housekeeping and Waste Disposal
1.   All work areas, walkways, and passageways must be kept clean and debris free at all times.
2.   All non-hazardous wastes shall be placed in proper containers and removed from the site.
3.   Hazardous waste (flammable liquids and solids, corrosives, reactive, poisonous, or toxic material) must be disposed of in accordance with United States Environmental Protection Agency (EPA), and State's Department of Ecology (DOE) regulation(s).
4.   Scrap lumber must be piled in an orderly fashion with nails pulled or bent over to reduce hazards.
5.   Spills must be cleaned up or contained immediately. Contractor is responsible for proper notifications and disposal in accordance with EPA and DOE. This includes soil or other contaminated material resulting from a spill.
6.   Lunch and break areas shall be kept clean at all times. No food or drink containers shall be left anywhere.
7.   A covered trash container shall be provided at each break area and emptied on a regular basis.
8.   Smoking or chewing of tobacco products of any kind will not be allowed in any building at any time and may be used only in designated areas.

C.   Portland Cement
1.   Contractor must make washing facilities available for employees exposed to Portland cement. Washing facilities must provide clean water, non-alkaline soap, and clean towels. Such facilities must be readily accessible to exposed employees and adequate for the number of employees exposed.
2.   OSHA standards require employers to provide training to communicate the hazards of exposure to Portland cement to their employees.

D.   Fall Protection
1.   Contractor shall train employees in the nature, recognition, and avoidance of fall hazards in their work environment and the use and limitations of the fall protection systems utilized. Copies of training records must be submitted to Owner when requested.
2.   Unattended floor openings of 2-inches or more in the least dimension must be covered, marked/labeled as a 'Hole' and secured from displacement with planking or sheathing strong enough to support four times the intended load. Instead of a cover; guardrails, mid-rails and toe-boards may be installed.
3.   When working at heights greater than six (6) feet, fall protection must be used. In states that have more stringent fall protection requirements, fall protection must be used in accordance with state plan requirements. Acceptable methods include safety nets, guardrails or personal fall arrest systems.
4.   Safety monitor systems are not allowed on roofing work.
5.   Safety belts are NOT acceptable for fall arrest; a harness must be worn when using fall arrest equipment.
6.   Regardless of height, if a worker can fall into or onto dangerous machines or equipment (such as a vat or acid or a conveyor belt), Contractor must provide guardrails and toe-boards to prevent workers from falling and getting injured.
7.   Contractor competent person must determine the appropriate tie off points for workers wearing fall protection gear.
8.   All impalement hazards must be protected by square rebar caps or other OSHA compliant methods which eliminate the hazard. This includes but is not limited to rebar, form stakes, conduit, etc. Mushroom caps are not allowed.
9.   When work is being performed overhead, Contractor shall provide suitable barricades to protect the area below.

J.   Steel Erection
1.   Structural steel erection activities must comply with 100% Tie-Off Policy above six (6) feet.
2.   Each steel erection company must provide a steel erection plan to Owner's onsite supervision prior to beginning work.

K.   Scaffolding
1.   Contractor must identify a competent person who will be responsible for all scaffold operations.
2.   The competent person will supervise all erection and dismantling operations.
3.   Scaffolds will be erected to include proper ladder or stair access, guardrails, toe-boards in all locations, and decked fully. Cross braces cannot be used as a mid or top rail.
4.   The competent person will inspect scaffolds daily and provide copies of inspection checklists to Owner's.
5.   Scaffold access: Stair towers must be provided for scaffold access once the structure has exceeded 26 feet in height. Stair towers shall be exits from the scaffold and not dead-ends. A minimum of one stair tower per elevation shall be required. The number and location of stair towers will be determined by site conditions and building configuration. On rare occasions, jobsite conditions may require an adaptive change to this requirement. Requests for changes must be submitted in writing to the project team for review. Stair towers

must be built according to federal and state requirements. Stair towers must be inspected as part of the daily inspections required on all scaffold systems.

6. Rolling scaffold will be equipped with brakes on all casters and a diagonal brace for mobile scaffolds other than Baker scaffolds.
7. Scaffolds must be fully decked and guardrails provided, or workers must wear personal fall arrest system consisting of full body harness with appropriate lanyard and anchor connector.
8. Contractor competent person must determine the appropriate tie off (Anchor) points for workers wearing fall protection gear.
9. The competent person for scaffold erection and dismantling must determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Contractors are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.
10. Red "STOP" and Green "GO" tags will be placed at each access point so users will know if the daily inspection has been conducted. Each tag must have the day's date and signature of competent person. Any scaffold that is not tagged may not be used.
11. All scaffolds exceeding a height to minimum base dimension ratio of 4:1 will be secured. Anchoring, guying, tying off or bracing of scaffolds must be affixed to structurally sound components. It is crucial that ties be properly attached and able to carry both tension and compression loads.
12. All scaffolds installed on concrete or solid floors must have the manufacturer provided base plates for that system installed.
13. Mud sills are required when installing scaffold on dirt.
14. When scaffold plastic/wood sheeting is deemed necessary to allow for the protection of workers, the work being performed, or any area adjacent to the scaffold system, the plastic/wood sheeting will only be installed by the company responsible for erecting the scaffold.
15. The OSHA standard requires that "Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined that it is safe for employees to be on the scaffold and those employees are protected by personal fall arrest system.
16. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces imposed. It is the responsibility of the erecting employer to ensure that the addition of a tarp or plastic/wood sheeting to a scaffold does not overload the scaffold. The addition of a tarp or other sheeting material would add lateral loads to the scaffold, which may not have been accounted for in its design. Under OSHA standards, such an addition would therefore be "an occurrence which could affect a scaffold's structural integrity," requiring a competent person to inspect it and make an assessment. Owner will not install scaffold plastic/wood sheeting on any scaffold system that was not erected by Owner. All scaffold sheeting must be installed in accordance with OSHA standards and inspected daily along with the scaffold system.
17. Folding Bench or Step-up. Portable fold-up work platforms are permitted but cannot exceed twenty-one (21) inches in height. The top of the platform must be at least twelve (12) inches wide. All four (4) legs must have rubber feet attached. The manufacturer load capacity must not be exceeded.

L. Fire Protection
1. Fire exits, exit corridors, and fire extinguishers must not be obstructed or blocked.
2. Flammable liquids must be properly labeled, in OSHA approved cans and must be stored in approved locations. Plastic fuel containers are not allowed. Adequate ventilation must be present where flammable liquids are used or stored.
3. Contractor must supply its own fire extinguishers for hot work. Extinguishers must have annual tags and evidence of monthly inspections.
4. Fire retardant tarps may be required for spark-producing activities.
5. Smoking is allowed only in designated areas.
6. All flammable or combustible material shall be stored, dispensed, and used per the manufacturers' instructions, SDS recommendations, local regulations, and UFC (Unified Fire Code).
7. Where welding, cutting, brazing, or soldering is performed, Contractor must have fire protection equipment (fire extinguishers, fire blankets), and fire watch in the area before work begins.
8. Hot work permits must be completed once work commences in the occupied space.

M. Welding and Cutting
1. The following precautions must be taken for cutting and welding activities:
   a. Approved helmets, hoods, or hard hats with proper face shields must be worn to protect against arc, radiation or spatter exposures.
   b. Approved welding curtains must be provided to protect bystanders from exposure where necessary. Signs must be posted to warn personnel.
   c. Proper ventilation must be provided at all times and especially when working in confined spaces.
   d. Fire extinguishers must be provided by the Contractor for their work.
   e. Fire watch personnel may be required when welding or cutting inside the building in high-risk areas.
   f. Compressed gas cylinders must be secured at all times and the protective cap in place when not in use.

g. Cylinders must be properly stored once work is complete each day.

N. Electrical
1. All electrical tools and equipment must be properly grounded. Absolutely no defective tools may be used on site.
2. Extension cords are allowed to be used on a temporary basis only, and in conjunction with a GFCI.
3. All extension cords must be twelve (12) gauge or larger and rated for hard usage.
4. All extension cords must be labeled with the company name at both ends of the cord. Any cords found without identification will be confiscated.
5. Electrical panels (temporary or permanent) must not be obstructed.
6. Portable Class A ground fault circuit interrupters are required when using any portable and held power tool.
7. In accordance with NFPA 70e when working on or near live electrical components the following practices are required:
   a. Contractor's employees must be qualified to work on or near live equipment (Contractor supplies training).
   b. No conductive clothing or jewelry can be worn.
   c. Tools must be properly insulated.
   d. Exposed electrical components that could be a potential shock hazard to others in the area must be posted with a warning sign or barricaded.
   e. Permit for energized electrical work must be completed and submitted to Owner prior to work beginning.
8. Only properly trained and qualified personnel shall perform electrical work.
9. Contractor's written Lockout/Tagout/Tryout procedure must be on site and followed.
10. When Romex cable is used for temporary lighting, it must be hard wired to a circuit breaker in an electrical panel rather than to a temporary power distribution box.
11. Electrical cords, welding leads, hoses and similar must be suspended in corridors, hallways, stairways and other high traffic areas.

O. Equipment and Tools
1. Contractor's personnel must have proper training prior to equipment or tool use.
2. Tools and equipment must be inspected prior to use each day.
3. Pneumatically powered tools must be secured to the hose.
4. Only low velocity powder actuated tools are allowed on site. Operators must present evidence that they have been trained in the use of this equipment. Loaded equipment must never be left unattended.
5. All power equipment and machinery must be shut down when not in use; never leave machinery running unattended.
6. Any machine part, function, or process, which may cause injury, must be guarded. Where the operation of a machine or accidental contact with it can injure an employee, the hazard must be either controlled or eliminated.
7. Inspect all equipment and tools before each work shift for defects or damage. Damaged or defective equipment or tools must be removed from service by tagging "Do Not Use" or physically removing from the jobsite. All equipment and tools must be professionally maintained.

P. Stairways/ladders
1. Ladders must have nonconductive side rails. Aluminum ladders are not allowed on Owner's jobsites.
2. All ladders must have legible duty rating and safety stickers.
3. All ladders must be a minimum of Type IA with a duty rating of at least three hundred (300) pounds.
4. A stairway or ladder must be provided at all worker points of access where there is a break in elevation of nineteen (19) inches or more and no ramp, runway, embankment, or personnel hoist is provided.
5. When there is only one point of access between levels, it must be kept clear to permit free passage by workers.
6. Except during construction of the actual stairway, stairways with metal pan landings and treads must not be used where the treads and/or landings have not been filled in with concrete or other material, unless the pans of the stairs and/or landings are temporarily filled in with wood or other material.
7. Portable ladders with structural defects, such as broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, must immediately be marked defective or tagged with "Do Not Use" or similar language and withdrawn from service until repaired.
8. Ladders must be used properly. Stepladders shall not be used as an extension ladder. Ladders must have safety feet or a kick plate installed.
9. Pass through ladder gates must be utilized on the project
10. Workers must maintain three (3) points of contact while ascending and descending ladders. Tools and materials must be hoisted to the work location rather than carried up and down any ladder.

Q. Cranes
1. All cranes must be inspected annually by a competent person and daily by the operator.

2. Operators must be certified by a nationally accredited crane certification agency. Proof of operator qualification must be provided to Owner.
3. Riggers and signal persons must have proper certifications. Training records must be provided to Owner.
4. Always be sure the operator and signal persons are in direct and clear view, or in communication by phone or walkie-talkie.
5. A powerline proximity permit must be completed whenever work is being conducted adjacent to energized power lines and any risk of touching the lines is present.
6. Ground conditions must be evaluated to determine if the area of crane erection is stable enough to support the load.
7. Assembly of the crane must be supervised by a competent-qualified person.
8. Tag lines must be used to control all loads.
9. Cranes, booms, jibs and all other components must remain at a minimum of twenty (20) feet from overhead power lines or meet OSHA requirements for safe practices when encroaching closer than twenty (20) feet.
10. An adequate swing radius barricade will be in place at all times to prevent workers from entering the swing radius of the crane.
11. All cranes must have operational safety equipment in place at all times including a leveling indicator, boom stops, job stops, etc.
12. All cranes taken out of service must have a tag placed in the cab stating that the crane is out of service.

13. All crane signals whether by hand, radio, phone or verbal must be agreed upon between the crane operator and the signal person.
14. No modifications or additions on cranes are allowed without the manufacturer's approval.

R. Confined Space Entry
1. Personnel may not enter permit-required confined spaces without a confined space entry permit.
2. Personnel must be trained in confined space entry procedures as well as related procedures (e.g., use of respirators) prior to working in confined spaces.
3. Contractor must have industrial hygiene atmospheric monitoring equipment available on site.
4. Contractor must have rescue/retrieval equipment available at point of entry. Workers must be trained in rescue procedures and provide training records when requested.
5. Contractor shall conduct air monitoring of all confined space(s) to determine if the space is a permit-required confined space or non-permit required confined space.
6. Contractor shall coordinate entry operations with Owner's jobsite Superintendent.
7. Contractor shall inform Owner's jobsite Superintendent of the permit space program that will be utilized.
8. Contractor shall hold a debriefing conference at the completion of the entry operation or during the entry operation, if needed, to inform Owner of any hazards confronted or created.
9. Copies of all entry permits must be given to the Owner superintendent to be kept on site for the duration of the project.

S. Excavations and Trenching
1. Whenever Contractor performs trenching or excavating work, Contractor shall appoint and have on site a competent person who will be present throughout trenching and excavation work.
2. Competent person will inspect the excavation or trench daily and document.
3. An excavation/dig permit is required to be completed before any excavation or trenching work can begin each day. Separate permits are required for each piece of equipment and/or each location.
4. In trenches and excavations up to five (5) feet deep with vertical side, where there is no trench shoring, Contractor's personnel may work only if competent person allows it. In states that have more stringent requirements, excavation work must be conducted according to state plan requirements.
5. All excavations and trenches must be checked for hazardous atmospheres, when hazardous atmospheres might exist, prior to workers entering the excavation or trench.
6. All workers are forbidden from entering trenches and excavations over five (5) feet deep that are not shored, sloped or benched above the five (5) feet deep. In states that have more stringent requirements, excavation work must be conducted according to state plan requirements.
7. Trenches and excavations that are shored, sloped, or benched must be approved for entry of workers by a "Competent Person" as required by OSHA or state plan standards.
8. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is six (6) feet (1.8m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems. This includes all trenches and excavations. In states that have more stringent requirements, excavation work must be conducted in accordance with state plan requirements.
9. All excavations or trenches must be:
   a. Protected with barricades, flashers, signs or similar warnings.
   b. Equipped with ladders every twenty-five (25) feet for trenches.

10. A registered professional engineer must design any excavations that are greater than twenty (20) feet in depth.
11. Training must be conducted for all employees working near mobile earth moving equipment.

T.   Elevated work platforms - Aerial Lift, Scissor Lift, Boom Trucks
   1. Contractor will inspect all of its equipment per the manufacturer's instructions daily. Documentation of inspection checklists must be provided to Owner daily. Defective equipment will be removed from service until it has been repaired.
   2. Contractor will maintain all equipment in accordance with manufacturer's requirements.
   3. Contractor will have qualified operators on all equipment. Training records must be provided to Owner.
   4. Contractor will operate equipment within rated capacity.
   5. Working outside of basket is not allowed under any circumstance.
   6. No standing on any rails of any lift.

   7. Shock absorbing lanyards not allowed to be used in aerial lifts. Use of Self Retracting Life (SRL) lines or straight lanyards only.
   8. Powerline proximity permit is required when working adjacent to power lines and potential of touching exists.
   9. All material must stay within the side rails of all elevated work platforms.

U.   Heavy Equipment
   1. Heavy equipment is equipment operated on site such as forklifts, backhoes, track-hoes, crawlers, cranes, boom trucks, etc.
   2. A powerline proximity permit must be completed whenever work is being conducted adjacent to energized power lines and any risk of touching the lines is present.
   3. Contractor's personnel must be knowledgeable with the capacity and operational limitations of all equipment.
   4. Contractor will have qualified operators on all equipment. Training records must be provided to Owner when requested.
   5. All forklift operators must be trained and certified to operate the make and model of forklift being used. A certification card or some other means of training documentation must be with the operator at all times.
   6. Forklifts are not allowed to lift any personnel for any reason. Man baskets are not allowed on site at any time.
   7. All operators must wear seatbelts at all times.
   8. Equipment must never be left running unattended.
   9. Contractor will inspect all of its equipment per the manufacturer's instructions daily. Documentation of inspection checklists must be provided to Owner daily. Defective equipment must be pulled out of service until it has been repaired.
   10. Contractor will maintain all equipment in accordance with manufacturer's requirements.
   11. Contractor will operate equipment within rated capacity.
   12. Equipment must have working back-up alarms.
   13. Internal combustion-driven equipment cannot be used inside the building unless approved by Owner, proper gas monitoring system is used and adequate ventilation is provided. Contractor is required to provide proper gas monitor for type of equipment being used.
   14. All construction vehicles such as dump trucks, ready mix rigs, earth movers, forklifts, etc. must be equipped with audible alarms that sound a continuous warning as the vehicle is backing up. Seat belts must be used as required.

V.   Flaggers
   1. Contractor must provide trained and properly equipped (per OSHA/State) flaggers for all work in public right-of-ways, work affecting public right-of-ways or deliveries interrupting public right-of-ways.
   2. Flaggers need to be utilized when backing equipment or materials into the project.

W.   Material Handling and Storage
   1. Keep all solvent waste, oily rags, and flammable liquids in fire-resistant covered containers until removed from the work site.
   2. Inspect rigging equipment for material handling prior to use on each shift and as necessary during its use to ensure that it is safe. Remove defective rigging equipment from service.
   3. Make sure that all materials stored in tiers are stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse.

4. It is not the responsibility of Owner to supply warehouse space for materials supplied and installed by Contractor.
5. If materials are stored in the building, Contractor will neatly stack or store materials in an allotted location in a manner that will allow movement to perform any necessary work or travel in or around this area.
6. Contractor will be responsible for the protection of its materials from damage and/or loss.
7. If materials must be moved to allow work to be performed, the Contractor of the material will be responsible to move it.
8. Contractor will store bulk materials, such as pipe, conduits, duct board, sheet metal, wire, etc. outside of the building under construction, unless granted permission to otherwise by Owner.
9. Contractor will remove all extra material from the site as soon as possible.

X. Lockout/Tagout (LOTO)

1. Wherever applicable, lockout/tagout procedures must be followed to control hazardous energy and prevent the unexpected start-up of equipment or release of stored energy.
2. LOTO is required for all sources of hazardous energy including but not limited to: electrical, mechanical, thermal, liquid chemical, gas, pneumatic, hydraulic or radiation.
3. Contractor must provide proper training for all workers on lockout/tagout program.

Y. COVID-19 Response
1. The health and safety of all contractor employees are important to the Northfield Public School District. Employees who feel sick will not be allowed on site and must stay home. All contractors are expected to take their temperatures prior to starting work and before entering the project site. An email must be provided to the Owner by 9 AM each day indicating that the contractor's employees have passed the screening questions and daily temperature check. (Individual names should not be referenced).
2. Social distancing shall be maintained whenever possible while performing work on site.
3. Each Contractor is required to have a written business plan to address COVID-19 per Minnesota requirements. Contractor's COVID-19 plans shall be submitted to the Owner within (10) days of award.
4. This project will follow the Minnesota State and Center for Disease Control and Prevention Guidelines throughout the duration of this project as it relates to COVID-19.

QUALITY ASSURANCE
PROCEDURES

PART 1: GENERAL

1.01 SELECTION AND PAYMENT
The Owner will select, hire and pay for services of a special inspector to perform Special Inspections and Testing.

1.02 RESPONSIBILITY OF CONTRACTOR

L.   Be responsible for furnishing materials and construction in full conformance with Plans and Specifications.

M.   Pay for all tests, conducted by the testing laboratory that fail and also pay for all scheduled tests for which the pours are cancelled and a test field crew is on site before that particular pour is cancelled

1.03 COOPERATION OF CONTRACTOR

K.   Contractor: Cooperate with the Laboratory, and:

•   Make available, without cost, samples of all materials to be tested in accordance with applicable standard specifications.

•   Furnish such nominal labor and working space as is necessary to obtain samples at the Project.

•   Advise Laboratory of the identity of material sources and instruct the suppliers to allow test or inspections by the Laboratory.

•   Notify Laboratory sufficiently in advance of operations to allow completion of initial tests or inspections by the Laboratory.

1.04 REJECTION OF MATERIALS/INSTALLATION
A.
Laboratory: Notify the Owner and Contractor or his authorized representative of any materials or installation which are not in full conformance with the specifications.

1.05 FILING OF REPORTS
A.
Laboratory: File a copy of the inspection report with the Owner and Building Official.

PART 2: PRODUCTS – Not Applicable.

DIVISION 28
VIDEO SECURITY SURVEILLANCE MANAGEMENT SYSTEM

PART 1 GENERAL

1.1   SECTION INCLUDES

    A.   SECURITY CAMERAS
          1.   Indoor Dome Cameras
              a.   PND-A9081RV
              b.   QND-7082R
          2.   Outdoor Dome Cameras
              a.   XNV-C8083R
              b.   QNV-7082R
              c.   XNF-9010RV
          3.   Multi-Sensor Cameras
              a.   PNM-9000VD
              b.   PNM-9085RQZ
              c.   PNM-9031RV

    B.   SOFTWARE
          1.   WISENET WAVE VMS

1.2   REFERENCES

    A.   Code of Federal Regulations (CFR).

    B.   Institute of Electrical and Electronics Engineers (IEEE):
          1.   802.3 Ethernet Standards.

    C.   International Electrotechnical Commission (IEC).

    D.   International Organization for Standardization (ISO):
          1.   ISO / IEC 10918 - Information technology - Digital compression and coding of continuous-tone still images: Requirements and guidelines; JPEG.
          2.   ISO / IEC 14496-10 - Information Technology - Coding Of Audio-Visual Objects - Part 10: Advanced Video Coding; MPEG-4 Part 10 (ITU H.264).
          3.   ISO / IEC 23008-2 - High Efficiency Coding And Media Delivery In Heterogeneous Environments - Part 2: High Efficiency Video Coding; MPEG-H Part 2 (ITU H.265, HEVC).

    E.   European Standard (EN):
          1.   EN 50121 - Railway Applications. Electromagnetic Compatibility.
          2.   EN 50155 - Railway applications - Rolling stock - Electronic equipment.
          3.   EN 50130-4 - Alarm Systems. Electromagnetic Compatibility. Product Family Standard: Immunity Requirements For Components Of Fire, Intruder, Hold Up, CCTV, Access Control And Social Alarm Systems.
          4.   CE EN 50581 - Technical Documentation For The Assessment Of Electrical And Electronic Products With Respect To The Restriction Of Hazardous Substances.
          5.   EN 55022 Class A - Information Technology Equipment - Radio Disturbance Characteristics - Limits And Methods Of Measurement.

6. EN 61000-3-2-A2 - Electromagnetic Compatibility (EMC) - Part 3-2: Limits - Limits For Harmonic Current Emissions (Equipment Input Current: 16 A Per Phase).
7. EN 61000-3-3 - Electromagnetic Compatibility (EMC) - Part 3-3: Limits - Limitation Of Voltage Changes, Voltage Fluctuations And Flicker In Public Low-Voltage Supply Systems, For Equipment With Rated Current less than or equal to 16 A Per Phase And Not Subject To Conditional Connection.

F. European Union Safety Standards (CE).

G. Federal Communications Commission (FCC):
1. FCC Rules and Regulation of Title 47 of CFR Part 15 Subpart B Class A.

H. Open Network Video Interface Forum (ONVIF):
1. ONVIF - Profiles S Specification.

I. Underwriters Laboratories (UL):
1. UL listed.

J. United States Military Standard (MIL-STD):
1. MIL-STD-810F - Environmental Engineering Considerations and Laboratory Tests.

1.3   DEFINITIONS

A. Abbreviations:
1. ARP - Address Resolution Protocol.
2. DHCP - Dynamic Host Configuration Protocol.
3. DNR - Digital Noise Reduction.
4. DDNS - Dynamic Domain Name Server.
5. fps - frames per second.
6. GUI - Graphical User Interface.
7. HDD - Hard Disk Drive.
8. HTTP - Hypertext Transfer Protocol.
9. ICMP - Internet Control Message Protocol.
10. IGMP - Internet Group Management Protocol
11. IP - Internet Protocol.
12. iSCSI - Internet Small Computer System Interface.
13. JBOD - Just a Bunch of Disks.
14. JPEG - Joint Photographic Experts Group.
15. MJPEG - Motion JPEG.
16. MP - Megapixel.
17. MPEG - Moving Pictures Experts Group.
18. NAS - Network Attached Storage.
19. NTP - Network Time Protocol.
20. POS - Point of Sale.
21. PPPoE - Pont to Point Protocol over Ethernet.
22. RAID - Redundant Array of Independent Disks (Drives).
23. RTP - Real-Time Transport Protocol.
24. RTCP - Real-Time Control Protocol.
25. RTSP - Real-Time Streaming Protocol.
26. SMTP - Simple Mail Transfer Protocol.
27. SNMP - Simple Network Management Protocol.
28. SSL - Secure Sockets Layer.
29. TCP - Transmission Control Protocol.
30. UDP - User Datagram Protocol.
31. UPnP - Universal Plug and Play.
32. VMS - Video Management System.
33. PoS - Point of Sales.

34. VA - Video Analytics.
35. PnP - Plug and Play.
36. ARB - Auto Recovery Backup.
37. NVR - Network Video Recorder.
38. RAID - Redundant Array of Independent Disks.

B. Definitions:
1. JBOD: A collection of hard disks that have not been configured to act as a redundant array of independent disks (RAID) array.
2. GOV (Group of Video object planes): A set of video frames for H.264 and H.265 compression, indicating a collection of frames from the initial I-Frame (key frame) to the next I-Frame. GOV consists of 2 kinds of frames: I-Frame and P-Frame.
3. WiseStream: Smart Codec that controls quantization parameter in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required.
4. Dynamic GOV: Dynamic assignment of GOV length based on the complexity of the scene to efficiently manage bitrate of the video stream and reduce the storage required.
5. Dynamic fps: Dynamic assignment of frames per second based on the complexity of the scene to efficiently manage bitrate of the video stream and reduce the storage required.
6. ARB (Auto Recovery Backup): Automatic backup mechanism that enables WiseNet cameras to store videos on to SD card during failures and stream it to the storage device after recovery.
7. Failover: A feature that automatically switches to a redundant or standby device upon failure or unexpected shutdown of an active device.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Solution Proposal: System Integrator shall submit the Solution Proposal.

C. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Manufacturer's printed or electronic data sheets.
2. Manufacturer's installation and operation manuals.
3. Warranty documentation.

D. Shop Drawings: Include details of construction, interface of equipment, and relationship with adjacent construction.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.

B. System Integrator shall provide the following as part of the System Solution:
1. Complete product and technical data specification sheets that include all material and equipment and shall be available freely online.
2. List of all equipment with part numbers, manufacturer, firmware, and assigned IP addresses.
3. Locations and details for all components to be installed under this scope of work.
4. Placement Diagram showing the proposed location of all system hardware devices.
5. System Calculation of all network bandwidth and storage requirements for System Servers to ensure proper planning of computing and networking infrastructure.
6. Reporting – The manufacturer shall provide a tool that can generate a report including thumbnail view, MAC address, IP address, serial number and other camera settings.
7. Upon project completion, the owner shall sign off on all workmanship, camera views and system operation.

C. Installer Qualifications: Minimum 2 year experience installing similar products. Installers shall be trained and authorized by the Manufacturer to install, integrate, test, and commission the system.

1.6   PRE-INSTALLATION MEETINGS

    A.   Convene minimum two weeks prior to starting work of this section.

1.7   DELIVERY, STORAGE, AND HANDLING

    A.   Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

    B.   Handling: Handle materials to avoid damage.

1.8   PROJECT CONDITIONS

    A.   Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9   SEQUENCING

    A.   Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10   WARRANTY

    A.   The security system VMS software and labor furnished by the System Integrator including wiring, software, hardware and third party products shall be fully warranted for parts, materials and labor for a minimum of 1 year from date of the final acceptance of the Video Surveillance System.

    B.   Manufacturer shall provide a limited **5-year warranty** for the product to be free of defects in material and workmanship.

    C.   Software Licensing and Warranty:
        1.   Software licensing should be on a per device basis (e.g. 1 x license for 1 IP Camera or I/O device) with no base license for additional features or capabilities.
        2.   The VMS Software should be completely free for live streaming or playback of offline media files (images, videos).
        3.   Lifetime software upgrades shall be provided by the Manufacturer without cost and without the need for an annual maintenance agreement.

PART 2 PRODUCTS

2.1   MANUFACTURERS

    A.   Acceptable Manufacturer: Hanwha Techwin, which is located at: 500 Frank W. Burr Blvd.; Teaneck, NJ 07666; Toll Free Tel: 877-213-1222; Fax: 201-373-0124; Email:request info (customerservice@hanwha.com); Web:https://www.hanwhasecurity.com

    B.   Requests for substitutions will be considered. Please contact Northfield Public Schools for substitution request as defined in Division 00.

2.2   SECURITY CAMERAS

    A.   Indoor 4K Resolution Vandal Dome Camera w/AI
        1.   EQUIPMENT
            a.   Manufacturer: Hanwha Techwin http://www.hanwha-security.com/
            b.   Model   PND-A9081RV
            c.   Alternates: None
        2.   GENERAL DESCRIPTION

a. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
    1) H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
        a) H.265 and H.264 – maximum of 30/25fps(60Hz/50Hz) at all resolution
        b) MJPEG – maximum of 15/12fps(60Hz/50Hz)
    2) The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
    3) The camera shall be able to configure various resolution selections.
        a) 16:9 aspect ratio :   3840 x 2160, 3072 x 1728, 2688 x 1520, 2560 x 1440, 1920 x 1080, 1280 x 720, 800 x 448, 640 x 360
        b) 4:3 aspect ratio :   2592 x 1944, 2048 x 1536, 1600 x 1200, 1280 x 960, 1024 x 768, 800 x 600, 640 x 480
        c) 5:4 aspect ratio :   1280 x 1024, 720 x 576
        d) 3:2 aspect ratio :   720 x 480
    4) The camera shall support unicast video streaming up to 20 users.
    5) The camera shall support multicast video streaming up to 3 profiles.
    6) The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
    7) The camera shall provide WiseStream II, Dynamic GOV and Dynamic fps to efficiently manage bit rate of the video stream and reduce storage.

b. Camera – The camera device shall have the following physical and performance properties:
    1) IK10 rated for protection against impacts.
    2) True day/night operation with removable IR cut filter
        a) Low light level operation to 0.05 lux at F1.6 in color mode and 0.005 lux at F1.6 in black and white mode.
        b) Black and White mode operation to 0 lux with IR LED on.
    3) The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
    4) The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
    5) The camera shall be able to configure 6 privacy masking areas with rectangle.
    6) The camera shall have the defog feature to remove fogginess of scene which can be triggered automatically from the fog detection event.
    7) The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle, rotation and focus.

c. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
    1) Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
    2) Detection of logical events of specified conditions from the camera's video
        a) Classified object type : Person/Face/Vehicle/License plate with attributes, BestShot per object
        b) Analytics events based on AI engine : Object detection, Directional detection, Virtual line Enter/Exit, Loitering, Appear/Disappear,Digital autotracking,
        c) Analytics events : Defocus detection, Motion detection, Tampering,Audio detection, Sound classification, Shock detection
    3) Business Intelligence features based on AI engine
        a) Classified object type : People counting, Queue management, Heatmap
    4) Attributes
        a) Person   Gender   Female / MaleUpper/Lower (color) Black / Gray / White / Red / Orange / Yellow /   Green / Blue / Purple (up to 2 color at same time)Bag   Wear

               Bag or Not

        b)   Vehicle   Type   Car(sedan/SUV/Van) / Bus / Truck / Motorcycle / BicycleColor   Black / Gray / White / Red / Orange / Yellow /   Green / Blue / Purple (up to 2 color at same time)

        c)   Face   Gender   Female / MaleAge Child / Young / Middle / OldGlasses   Wear Glasses or Not

        d)   License plate

    5)   Detection and classification of the following sound.

        a)   Scream

        b)   Gunshot

        c)   Explosion

        d)   Crashing glass

d.   Interoperability – The camera shall be ONVIF Profile S / G and T compliant.

e.   The camera shall possess the following further characteristics:

    1)   Built-in web server, accessed via non-plugin browsers including Google Chrome, IE11, MS Edge, Mozilla Firefox and Apple Safari.

    2)   Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals

    3)   NAS recording option with configurable pre-alarm and post-alarm recording intervals

    4)   Alarms and notifications

        a)   alarm notification triggers:

            1)   Alarm input

            2)   Motion detection

            3)   Video & Audio analytics

            4)   Network disconnect

        b)   available notification means upon trigger:

            1)   File Upload via FTP and E-mail

            2)   Notification via E-mail

            3)   Local storage (SD / SDHC / SDXC) or NAS recording at event triggers

            4)   External output

    5)   Pixel Counter available in the web viewer.

    6)   PoE capable including heater by PoE

    7)   IP52, IK10

3.   DETAILED SPECIFICATIONS

a.   Video

1)	Imaging device	1/1.8" 8MP CMOS
2)	Image Pixels	3864(H)x2180(V)
3)	Scanning	Progressive
4)	Minimum Illumination (IR LED on)	Color: 0.05Lux (F1.6, 1/30sec), B/W: 0 Lux
5)	S/N Ratio	50dB

b.   Lens:

1)	Focal length	4.5~10mm(2.2x) motorized varifocal
2)	Max. Aperture Ratio	F1.6(Wide)~2.65(Tele)
3)	Field of View	[Wide] H: 101.4˚, V: 53.6°, D: 120.7°[Tele] H: 45.5˚, V: 25.5°, D: 52.3°
4)	Min. Object Distance	0.5m (1.64ft)
5)	Focus Control	Simple focus
6)	Lens Type	DC Auto Iris, P-Iris
7)	Mount Type	Board-in Type

c.   Pan & Tilt & Rotate

1)	1. PTR Range	0˚~360˚ / -45˚~85˚ / 0˚~355˚

d.   IR Viewable Length   30m (98.42ft)

e.   Operational Functions

      1)   Camera Title   Off / On (Displayed up to 85 characters)

            a)   W/W   English / Numeric / Special characters

            b)   China   English / Chinese / Numeric / Special characters

            c)   Common   Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),Transparency, Auto scale by resolution

      2)   Day/Night Setting   Auto (ICR) / Color / B/W / External / Schedule

      3)   Backlight Compensation   Off / BLC / WDR

      4)   WDR   120dB

      5)   Contrast Enhancement   Off / On (SSDR)

      6)   Digital Noise Reduction   Off / On (SSNR5 : 2D+3D Noise filter)

      7)   Digital Image Stabilization   Off / On (built-in Gyro sensor)

      8)   Defog   Off / Manual / Auto

      9)   Motion Detection   Off / On (8ea, 8-point polygonal)

      10)   Privacy Masking   Off / On (6 zones, rectangle)- Color: Grey / Green / Red / Blue / Black / White- Mosaic

      11)   Gain Control   Off / Low / Middle / High

      12)   White Balance   ATW / AWC / Manual / Indoor / Outdoor(Including Mercury and Sodium)

      13)   Electronic Shutter Speed   Min / Max / Anti-flicker (1/5 ~ 1/12,000sec)

      14)   Digital PTZ   Support (Preset, Group)

      15)   Image Rotation   Flip: Off / OnMirror: Off / OnHallway view: 0˚ / 90˚ / 270˚

      16)   Alarm I/O   Input 1ea / Output 1ea / DC 12V Power(Max. 50mA) 1ea

      17)   Alarm Triggers   Alarm Input, Analytics, Network Disconnection

      18)   Alarm Events   File Upload via FTP and E-mail, Notification via E-mail,SD/SDHC/SDXC or NAS recording at event triggers,Alarm output, Handover

      19)   Pixel Counter   Support

      20)   Storage   Micro SD/SDHC/SDXC 512GB (256GB x 2 slots)

      21)   Intelligent Analytics with AI   Object detection(Person/Face/Vehicle/License plate with attributes, BestShot per object),Directional detection, Digital auto tracking, Enter/Exit, Loitering, Appear/Disappear, Virtual line

      22)   Business Intelligence with AI   People counting, Queue management, Heatmap

      23)   Intelligent Analytics   Defocus detection, Motion detection, Tampering,Audio detection, Sound classification, Shock detection

      24)   Video Out (Installation)   CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P)USB: Micro USB type B, 1280 x 720

      25)   Memory   4096MB RAM, 512MB Flash

f.   Video Streams

      1)   Video compression   H.265, H.264, MJPEG

      2)   Resolution   3840x2160, 3072x1728, 2592x1944, 2688x1520, 2560x1440,2048x1536, 1920x1080, 1600x1200, 1280x1024, 1280x960,1280x720, 1024x768, 800 x 600, 800 x 448, 720 x 576, 720x480,640x480, 640x360

      3)   Maximum Framerate

<div style="margin-left: 2em">

        a)   H.265 / H.264   Max. 30/25fps(60Hz/50Hz) at all resolutions

        b)   MJPEG   Max. 15/12fps(60Hz/50Hz)

4)   Smart Codec   Manual Mode (area-based : 5EA)

5)   WiseStream II   Support

6)   Bitrate Control Method   H.265 / H.264: CBR or VBRMJPEG: VBR

7)   Streaming Capability   Multiple streaming (Up to 3 profiles)

8)   Streaming method   Unicast / Multicast

9)   Simultaneous Users   20 maximum (Unicast)

10)   Profile set   Max. 10 ea

11)   Interoperability   ONVIF Profile S / G / T, SUNAPI(HTTP API), Open Platform

g.   Audio

    1)   Audio In   Built in Mic / Line-in / External MicSupply voltage: 2.5V DC(4mA), Input impedance: 2K Ohm

    2)   Audio Out   Line out, Max. output level 1Vrms

    3)   Audio Compression   G.711 / G.726 / AAC Selectable, G.711 u-law 8KHzG.726 (ADPCM) 16 / 24 / 32 / 40Kbps at 8KHz,AAC-LC: 48Kbps at 16KHz

h.   Electrical

    1)   Power

        a)   Input Voltage / Current   PoE+ (IEEE 802.3at), DC 12V±10%

        b)   Power Consumption   PoE+: Max 20.00W, typical 16.00WDC: Max 17.70W, typical 14.00W

i.   Mechanical And Environmental

    1)   Color/Material   White / Aluminum

    2)   RAL code   RAL9003

    3)   Dimensions (W x H)   Ø160 x H125mm (6.30" x 4.92")

    4)   Weight   1.6 kg (3.53 lb)

    5)   Mount type   Surface

    6)   Temperature

        a)   Operating   -25°C ~ +60°C (-13°F ~ +140°F)

        b)   Storage   -50°C ~ +60°C (-58°F ~ +140°F)

    7)   Humidity   Less than 90% RH

    8)   Ingression Protection   IP52

    9)   Vandal Resistance   IK10

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B.   Indoor 4MP Dome Camera w/varifocal Lens

    1.   EQUIPMENT

        a.   Manufacturer: Hanwha Techwin http://security.hanwhatechwin.com/

        b.   Model   QND-7082R

        c.   Alternates: None

    2.   GENERAL DESCRIPTION

        a.   Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.

            1)   H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously

                a)   H.265 and H.264 – frame rates to 30 fps

                b)   MJPEG – frame rates to 15 fpsMaximum frame rates are available at selected resolutions:H.265 and H.264: 30 fps is available at all resolutions.MJPEG: 15 fps is available at all resolutions.

            2)   The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.

            3)   Resolution selections

                1)   2560 x 1440, 1920 x 1080, 1280 x 960, 1280 x 720, 800 x

<div align="center">600,800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360</div>

        4)   Simultaneous unicast access by up to 6 users
        5)   Multicast or unicast capable
        6)   Dynamic DNS (DDNS) support.
        7)   WiseStream and Dynamic GOV to efficiently manage bitrate of the video stream.

  b.   Camera – The camera device shall have the following physical and performance properties:

        1)   True day/night operation with removable IR cut filter
           a)   Low light level operation to 0.095 lux (color) and 0 lux (black and white)
        2)   2D and 3D digital noise reduction
        3)   Integral IR illumination, providing effective visibility of 20m at 0 Lux when activated in Black & White mode.
        4)   6 privacy masking regions utilizing a 4 point polygon

  c.   Intelligence and Analytics – The camera shall have a suite of integral intelligent operations and analytic functions to include:

        1)   Motion detection with four definable detection areas, minimum / maximum object size definition and a learning algorithm that ignores false alarms such as trees and waves on water.
        2)   Detection of logical events of specified conditions from the camera's video input
           a)   camera tamper (scene change)
           b)   defocus detection
           c)   motion detection with metadata

  d.   Interoperability – The camera shall be ONVIF Profile S G and T compliant.

  e.   The camera shall possess the following further characteristics:

        1)   Built-in web server, accessed via standard browsers including Internet Explorer, Firefox, Chrome & Safari
        2)   Micro SD/SDHC/SDXC memory card and NAS recording options, with configurable pre-alarm and post-alarm recording intervals
        3)   Uni-directional audio
        4)   Alarms and notifications
           a)   alarm notification triggers:
               1)   motion detection
               2)   tampering detection
               3)   SD card error
               4)   NAS error
               5)   alarm input
               6)   defocus detection
           b)   available notification means upon trigger:
               1)   file upload via FTP and e-mail
               2)   notification via e-mail
               3)   record to local storage (SD card)
               4)   external output
        5)   Pixel Counter available in the plug-in viewer.
        6)   POE capable

3.   DETAILED SPECIFICATIONS

  a.   Video

        1)   Imager
           a)   Sensor: 1/2.8" 2 MP CMOS
               1)   pixels per sensor: 2560 (H) x 1440(V) total; 2560 (H) x 1440 (V) effective
               2)   scanning   :   progressive
           b)   Minimum illumination
                1)   Color mode: 0.095Lux (30IRE)
                2)   Black & white mode: 0Lux (IR LED on)

c) The following features with control settings shall be available:
1) Camera Title   Off / On (Displayed up to 20 characters per line)
   a) W/W: English / Numeric / Special characters
   b) China: English / Numeric / Special / Chinese characters
   c) Common: Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),Transparency, Auto scale by resolution
2) Day/night setting: True Day & Night
3) Backlight compensation (BLC):   Off / BLC / WDR
4) WDR   120dB
5) Digital Noise Reduction (DNR):   Off / On (Samsung Super Noise Reduction)
6) Motion Detection   Off / On (4ea polygonal zones)
7) Privacy Masking   Off / On (6ea rectangular zones)
8) Gain Control   Off / Low / Middle / High
9) White Balance   ATW / AWC / Manual / Indoor / Outdoor
10) LDC   Off / On (5 levels with min / max)
11) Electronic shutter speed:
   a) settings: min, max, anti-flicker
12) Image flip: Off / On
13) Image mirror: Off / On
14) Hallway view: Off / On
15) Alarm I/O   Input 1 / Output 1
16) Alarm Triggers   Defocus detection, Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line, Network disconnect, Alarm input
17) Alarm Events   File upload via FTP and e-mail, Notification via e-mail, SD/SDHC/SDXC or NAS recording at event triggers, Alarm output
18) Pixel Counter   Available in the plug-in viewer.
d) Lens: 3.2 ~ 10 mm (3.1x) motorized V/F
1) Max. Aperture Ratio F1.6(Wide)~F2.9(Tele)
2) Angle of view: H: 109.0° ~ 33.2° / V: 57.4° ~ 18.7 / D: 132.0~ 38.0°
3) Focus Control   simple focus
4) Lens Type   DC auto iris
5) Mount Type   Board Type

2) Pan/Tilt/Rotate Range   0˚~350˚ / 0˚~67˚ / 0˚~355˚
3) IR Viewable Length: 20 m (65.62ft)
4) Video Streams
   a) The camera shall be able to produce 10 video profiles, each of which

may have the following properties:
1) Encoding type:
   a) H.265
   b) H.264
   c) MJPEG
2) Resolution: 1920 x 1080, 1280 x 960, 1280 x 720, 800 x 600, 800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360
3) Maximum frame rate:
   a) H.265 and H.264: 30 fps at all resolutions
   b) MJPEG: 15 fps at all resolutions
4) Smart Codec WiseStream, Dynamic GOV
5) Bit rate control method:
   a) H.265 and H.264
      1) target bitrate level control
      2) constant bit rate (CBR) or variable bit rate (VBR)
   b) MJPEG
      3) quality level control
      4) variable bit rate (VBR)
5) Number of multi-streaming profiles: 3 maximum
6) Simultaneous users (total): 6 maximum (unicast)
7) Storage and Recording
   a) The camera shall have onboard SD card storage.
      1) Card type: Micro SD/SDHC/SDXC
      2) Capacity: Up to 128 GB per card
      3) Image content on the card shall have the ability to be downloaded to a selected destination.
   b) NAS
8) Interoperability - Video streams shall be capable of supporting ONVIF protocol, profiles S G and T.
9) Single Images - The camera shall support jpg file image screenshot and export.

b. Audio
1) Direction: uni-directional
2) I/O built-in mic
3) Compression:
   a) G.711 u-law/G.726 selectable
      1) G.726 (ADPCM) 8KHz, G.711 8KHz
      2) G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps

c. Electrical
1) Power
   a) Input Voltage / Current PoE (IEEE802.3af, Class3), 12V DC
   b) Power Consumption: <7.7 W (PoE), <6.5 W (12V DC)

d. Mechanical And Environmental
1) Material:
   a) Housing: Plastic
2) Dimensions (W x H): Ø119.8 x 98.8mm (Ø4.72 x 3.89"),
3) Weight 320g (0.705 lb.)
4) Temperature:
   a) Operating: -10° C to 55° C (14° F to 131° F)
   b) Storage -30° C to 60° C (-22° F to 140° F)
5) Humidity: 0-90%, non-condensing

C. Indoor/Outdoor 4K Fisheye Camera
   1. EQUIPMENT
      a. Manufacturer: Hanwha Techwin http://www.hanwha-security.com/
      b. Model XNF-9010RV
      c. Alternates: None

2. GENERAL DESCRIPTION
   a. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
      1) H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
         a) H.265 and H.264 – maximum of 30/25fps(60Hz/50Hz) at all resolution
         b) MJPEG – maximum of 30/25fps(60Hz/50Hz) at 1080x1080 resolution
      2) The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
      3) The camera shall be able to configure various resolution selections.
         a) Original view   (1:1): Max.3008x3008 ~ Min.480x480
         b) Double panorama(2:1): Max.3584x1792 ~ Min.640x320
         c) Single panorama (4:1): Max.3584x896 ~ Min.640x160
         d) Quad view   : Max.3584x2688 ~ Min.640x480
         e) Q1/Q2/Q3/Q4   (4:3): Max.1792x1344 ~ Min.640x480
      4) The camera shall support unicast video streaming up to 20 users.
      5) The camera shall support multicast video streaming up to 10 profiles.
      6) The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
      7) The camera shall provide WiseStream II, Dynamic GOV and Dynamic fps to efficiently manage bit rate of the video stream and reduce storage.
   b. Camera – The camera device shall have the following physical and performance properties:
      1) IK10 rated for protection against impacts for camera body.
      2) True day/night operation with scheduling and options for external devices.
         a) Low light level operation to 0.39 lux at F2.2 in color mode and 0 lux in black and white mode with IR illumination on.
      3) The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range.
      4) The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
      5) The camera shall be able to configure 32 privacy masking areas with polygonal zones.
      6) The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle, rotation and focus.
   c. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
      1) Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
      2) Detection of logical events of specified conditions from the camera's video
         a) Defocus detection
         b) Directional detection
         c) Motion detection
         d) Appear/Disappear
         e) Enter/Exit
         f) Loitering
         g) Tampering
         h) Virtual line
         i) Audio detection
         j) Sound classification
      3) Detection and classification of the following sound.
         a) Scream
         b) Gunshot
         c) Explosion
         d) Crashing glass

    d.   Interoperability – The camera shall be ONVIF Profile S / G and T compliant.

    e.   The camera shall possess the following further characteristics:

        1)   Built-in web server, accessed via non-plugin browsers including Google Chrome, MS Edge, Mozilla Firefox and Apple Safari.

        2)   The camera shall provide streaming to multiple smart phones with DDNS provided freely from the manufacturer. In addition, the application shall be available for both iOS and Adroid, free of charge with search keyword, 'Wisenet Mobile'.

        3)   Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals

        4)   NAS recording option with configurable pre-alarm and post-alarm recording intervals

        5)   Alarms and notifications

            a)   alarm notification triggers:

                1)   Analytics

                2)   Network disconnect

                3)   Alarm input

            b)   available notification means upon trigger:

                1)   File Upload via FTP and E-mail

                2)   Notification via E-mail

                3)   Local storage (SD / SDHC / SDXC) or NAS recording at event triggers

                4)   Alarm output

                5)   PTZ preset

                6)   Handover

                7)   Audio playback

        6)   Pixel Counter available in the web viewer.

        7)   PoE capable

        8)   IP66, IK10, NEMA4X

        9)   This device has been verified using STP cable. The use of appropriate GND grounding and STP cable is recommended to effectively protect your product and property from transient voltage, thunder stroke, communication interruption.

3.   Decoding performance in web viewer depends on CPU/GPU performance of user

4.   DETAILED SPECIFICATIONS

    a.   Video

1)	Imaging device	1/2.3" 12MP CMOS
2)	Scanning	Progressive
3)	Minimum Illumination 0Lux(IR LED On)	Color: 0.39Lux (F2.2, 1/30sec), B/W:

    b.   Lens

1)	Focal length	1.08mm fixed focal
2)	Max. Aperture Ratio	F2.2
3)	Field of View	H: 187°V: 187°D: 187°
4)	Min. Object Distance	0.5m(1.64ft)
5)	Focus Control	Simple focus

    c.   Operational Functions

1)	IR Viewable Length	10m(32.8ft), Wise IR
2)	Camera Title	Off / On (Displayed up to 85 characters)
	a) W/W	English / Numeric / Special characters
	b) China	English / Chinese / Numeric / Special characters
	c) Common	Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),Transparency, Auto scale by resolution
	d) Image	BMP 20x20 pixel
3)	Day/Night Setting	Auto (ICR) / Color / B/W / External /

Schedule
4) Backlight Compensation   Off / BLC / HLC / WDR
5) WDR   extremeWDR
6) Digital Noise Reduction (DNR)   Support (SSNR V)
7) Motion Detection   Off / On (8ea, 8-point polygonal)
8) Privacy Masking   Off / On (32 zones, rectangular)- Color: Grey / Green / Red / Blue / Black / White- Mosaic
9) Gain Control   Off / Low / Middle / High
10) White Balance   ATW / AWC / Manual / Indoor / Outdoor
11) Electronic Shutter Speed   Min / Max / Anti-flicker (1/5 ~ 1/12,000sec)
12) Image Rotation   Flip: Off / OnMirror: Off / On
13) Alarm I/O   2 configured I/O
14) Alarm Triggers   Alarm Input, Analytics, Network Disconnection
15) Alarm Events   File Upload via FTP and E-mail, Notification via E-mail,SD/SDHC/SDXC or NAS recording at event triggers,Alarm output, Handover, PTZ preset, Audio playback
16) Audio In   Selectable(mic in/line in/built-in mic)Supply voltage: 2.5VDC(4mA), Input impedance: 2K Ohm
17) Audio Out   Line out, Max. output level: 1Vrms
18) Pixel Counter   Support
19) Storage   Micro SD/SDHC/SDXC 1TB (2 slots x 512GB)
20) Analytics   Directional detection, Tampering, Virtual line,Motion detection, Appear/Disappear, Enter/Exit, Loitering, Audio detection, Sound classification
21) Memory   4GB RAM, 512MB Flash

d. Video Streams
1) Video compression   H.265, H.264, MJPEG
2) Resolution   Original view(1:1): 3008x3008~480x480, Double panorama(2:1): 3584x1792~640x320, Single panorama(4:1): 3584x896~640x160, Quad view: 3584x2688~640x480, Q1/Q2/Q3/Q4(4:3): 1792x1344~640x480
3) Maximum Framerate
    a) H.265 / H.264 30fps/25fps(60Hz/50Hz)   H.265/H.264: Max. 30fps/25fps(60Hz/50Hz)
    b) MJPEG   Max. 30/25fps(60Hz/50Hz)
4) Smart Codec   Manual Mode (area-based : 5EA)
5) WiseStream II   Support
6) Bitrate Control Method   H.265 / H.264: CBR or VBRMJPEG: VBR
7) Streaming Capability   Multiple streaming (Up to 10 profiles)
8) Streaming method   Unicast / Multicast
9) Simultaneous Users   20 maximum (Unicast)
10) Profile set   Max. 10 ea
11) Interoperability   ONVIF Profile S / G / T, SUNAPI(HTTP API), Open Platform

e. Electrical
1) Power
    a) Input Voltage / Current   PoE(IEEE802.3af, Class3), 12VDC
    b) Power Consumption   PoE: Max 12.95W, typical 11W12VDC: Max 11W, typical 9.1W

f. Mechanical And Environmental
1) Color/Material   White / Aluminum and Hard-coated dome bubble
2) RAL Code   White: RAL9003
3) Dimensions (W x H)   Ø 160x72mm(62.99x28.35")

        4)   Weight   1.1Kg(2.43lb)

        5)   Temperature
- a)   Operating   -40°C~+60°(-40°F ~ +140°F)
- b)   Storage   -50°C~+60°C (-58°F~+140°F)

        6)   Humidity
- a)   Operating   Less than 95% RH
- b)   Storage   Less than 95% RH

        7)   Ingression Protection   IP66, NEMA4X

        8)   Vandal Resistance   IK10

g.   DORI

        1)   Detect (25PPM/ 8PPF)   Wide: 34.9m(114.49ft)

        2)   Observe (63PPM/ 19PPF) Wide: 13.9m(45.60ft)

        3)   Recognize (125PPM/ 38PPF)   Wide: 7.0m(22.96ft)

        4)   Identify (250PPM/ 76PPF)   Wide: 3.5m(11.48ft)

        5)

D.   Indoor/Outdoor 4MP Dome Camera w/varifocal lens

    1.   EQUIPMENT
- a.   Manufacturer: Hanwha Techwin http://security.hanwhatechwin.com/
- b.   Model   QNV-7082R
- c.   Alternates: None

    2.   GENERAL DESCRIPTION
- a.   Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.

        1)   H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously
- a)   H.265 and H.264 – frame rates to 30 fps
- b)   MJPEG – frame rates to 15 fpsMaximum frame rates are available at selected resolutions:H.265 and H.264: 30 fps is available at all resolutions.MJPEG: 15 fps is available at all resolutions.

        2)   The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.

        3)   Resolution selections
- 1)   2560 x 1440, 1920 x 1080, 1280 x 960, 1280 x 720, 800 x 600,800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360

        4)   Simultaneous unicast access by up to 6 users

        5)   Multicast or unicast capable

        6)   Dynamic DNS (DDNS) support.

        7)   WiseStream and Dynamic GOV to efficiently manage bitrate of the video stream.

- b.   Camera – The camera device shall have the following physical and performance properties:

        1)   Dustproof, waterproof, and IP66 rated.

        2)   IK10 rated for protection against impacts.

        3)   True day/night operation with removable IR cut filter
- a)   Low light level operation to 0.095 lux (color) and 0 lux (black and white)

        4)   2D and 3D digital noise reduction

        5)   Integral IR illumination, providing effective visibility of 30m at 0 Lux when activated in Black & White mode.

        6)   6 privacy masking regions utilizing a 4 point polygon

- c.   Intelligence and Analytics – The camera shall have a suite of integral intelligent operations and analytic functions to include:

        1)   Motion detection with four definable detection areas, minimum / maximum object size definition and a learning algorithm that ignores false alarms such as

trees and waves on water.
- 2) Detection of logical events of specified conditions from the camera's video input
  - a) camera tamper (scene change)
  - b) defocus detection
  - c) motion detection with metadata
- d. Interoperability – The camera shall be ONVIF Profile S G and T compliant.
- e. The camera shall possess the following further characteristics:
  - 1) Built-in web server, accessed via standard browsers including Internet Explorer, Firefox, Chrome & Safari
  - 2) Micro SD/SDHC/SDXC memory card and NAS recording options, with configurable pre-alarm and post-alarm recording intervals
  - 3) Uni-directional audio
  - 4) Alarms and notifications
    - a) alarm notification triggers:
      - 1) motion detection
      - 2) tampering detection
      - 3) SD card error
      - 4) NAS error
      - 5) alarm input
      - 6) defocus detection
    - b) available notification means upon trigger:
      - 1) file upload via FTP and e-mail
      - 2) notification via e-mail
      - 3) record to local storage (SD card)
      - 4) external output
  - 5) Pixel Counter available in the plug-in viewer.
  - 6) POE capable

3. DETAILED SPECIFICATIONS
   - a. Video
     - 1) Imager
       - a) Sensor: 1/2.8" 2 MP CMOS
         - 1) pixels per sensor: 2560 (H) x 1440(V) total; 2560 (H) x 1440 (V) effective
         - 2) scanning   :   progressive
       - b) Minimum illumination
         - 1) Color mode: 0.095Lux (30IRE)
         - 2) Black & white mode: 0Lux (IR LED on)
       - c) The following features with control settings shall be available:
         - 1) Camera Title   Off / On (Displayed up to 20 characters per line)
           - a) W/W: English / Numeric / Special characters
           - b) China: English / Numeric / Special / Chinese characters
           - c) Common: Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),Transparency, Auto scale by resolution
         - 2) Day/night setting: True Day & Night
         - 3) Backlight compensation (BLC):   Off / BLC / WDR
         - 4) WDR   120dB
         - 5) Digital Noise Reduction (DNR):   Off / On (Samsung Super Noise Reduction)
         - 6) Motion Detection   Off / On (4ea polygonal zones)

       7)   Privacy Masking   Off / On (6ea rectangular zones)

       8)   Gain Control   Off / Low / Middle / High

       9)   White Balance   ATW / AWC / Manual / Indoor / Outdoor

       10)   LDC   Off / On (5 levels with min / max)

       11)   Electronic shutter speed:

              a)   settings: min, max, anti-flicker

       12)   Image flip: Off / On

       13)   Image mirror: Off / On

       14)   Hallway view: Off / On

       15)   Alarm I/O   Input 1 / Output 1

       16)   Alarm Triggers   Defocus detection, Directional detection, Motion detection, Enter/Exit, Tampering, Virtual line, Network disconnect, Alarm input

       17)   Alarm Events   File upload via FTP and e-mail, Notification via e-mail, SD/SDHC/SDXC or NAS recording at event triggers, Alarm output

       18)   Pixel Counter   Available in the plug-in viewer.

    d)   Lens: 3.2 ~ 10 mm (3.1x) motorized V/F

       1)   Max. Aperture Ratio F1.6(Wide)~F2.9(Tele)

       2)   Angle of view: H: 109.0° ~ 33.2° / V: 57.4° ~ 18.7 / D: 132.0~ 38.0°

       3)   Focus Control   simple focus

       4)   Lens Type   DC auto iris

       5)   Mount Type   Board Type

2)   Pan/Tilt/Rotate Range   0˚~350˚ / 0˚~67˚ / 0˚~355˚

3)   IR Viewable Length: 30 m (98.43ft)

4)   Video Streams

    a)   The camera shall be able to produce 10 video profiles, each of which may have the following properties:

       1)   Encoding type:

              a)   H.265

              b)   H.264

              c)   MJPEG

       2)   Resolution: 1920 x 1080, 1280 x 960, 1280 x 720, 800 x 600,800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360

       3)   Maximum frame rate:

              a)   H.265 and H.264:   30 fps at all resolutions

              b)   MJPEG: 15 fps at all resolutions

       4)   Smart Codec   WiseStream, Dynamic GOV

       5)   Bit rate control method:

              a)   H.265 and H.264

                   5)   target bitrate level control

                   6)   constant bit rate (CBR) or variable bit rate (VBR)

              b)   MJPEG

                   7)   quality level control

                   8)   variable bit rate (VBR)

5) Number of multi-streaming profiles: 3 maximum
6) Simultaneous users (total):   6 maximum (unicast)
7) Storage and Recording
 a) The camera shall have onboard SD card storage.
  1) Card type: Micro SD/SDHC/SDXC
  2) Capacity: Up to 128 GB per card
  3) Image content on the card shall have the ability to be downloaded to a selected destination.
 b) NAS
8) Interoperability - Video streams shall be capable of supporting ONVIF protocol, profiles S G and T.
9) Single Images - The camera shall support jpg file image screenshot and export.

b. Audio
1) Direction: uni-directional
2) I/O   Selectable Mic in, Line in
3) Compression:
 a) G.711 u-law/G.726 selectable
  1) G.726 (ADPCM) 8KHz, G.711 8KHz
  2) G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps

c. Electrical
1) Power
 a) Input Voltage / Current   PoE (IEEE802.3af, Class3), 12V DC
 b) Power Consumption: <7.7 W (PoE), <6.5 W (12V DC)

d. Mechanical And Environmental
1) Material:
 a) Housing: Aluminum
2) Dimensions (W x H):   Ø137.0 x 106.1mm (Ø5.39 x 4.18")
3) Weight   710g (1.565 lb.)
4) Temperature:
 a) Operating: -30°C ~ +55°C (-22°F ~ +131°F)
       * Start up should be done at above -20°C
 b) Storage: -30° C to 60° C (-22° F to 140° F)
5) Humidity: 0 - 90%, non-condensing
6) Environmental Rating:
 a) Ingress Protection   IP66
 b) Mechanical(Vandal) Protection   IK10

E. Indoor/Outdoor 6MP Dome Camera w/AI
 1. EQUIPMENT
  a. Manufacturer: Hanwha Techwin http://www.hanwha-security.com/
  b. Model   XNV-C8083R
  c. Alternates: None
 2. GENERAL DESCRIPTION
  a. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
   1) H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
    a) H.265 and H.264 – maximum of 30/25fps(60Hz/50Hz) at all resolution
    b) MJPEG – maximum of 15fps/12fps(60Hz/50Hz)
   2) The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
   3) The camera shall be able to configure various resolution selections.
    a) 16:9+ aspect ratio: 2688x1520
    b) 16:9 aspect ratio : 3840x2160, 3328x1872, 3072x1728, 1920x1080,

1280x720, 800x448,640x360
- c) 4:3 aspect ratio : 2592x1944, 1600x1200, 1280x960, 1024x768, 800x600, 640x480,320x240
- d) 5:4 aspect ratio : 1280x1024, 720x576
- e) 3:2 aspect ratio : 720x480
4) The camera shall support unicast video streaming up to 20 users.
5) The camera shall support multicast video streaming.
6) The camera shall support multiple video streaming up to 10 profiles.
7) The camera shall support 3 virtual channel support.
8) The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
9) The camera shall provide WiseStream II/III, Dynamic GOV and Dynamic FPS to efficiently manage bit rate of the video stream and reduce storage.
10) The camera shall provide WiseNRII that working based on AI engine for reduce noise and blur on image.

b. Camera – The camera device shall have the following physical and performance properties:
1) IK08 rated for protection against impacts.
2) True day/night operation with scheduling and options for external devices.
- a) Low light level operation to 0.04 lux at F1.3 in color mode, 0.004 lux at F1.3 in black and white mode.
- b) Black and white mode operation to 0 lux with IR LED on.
3) The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
4) The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range.
5) The camera shall be able to configure 32 privacy masking areas with quadrangle zones.
6) The camera shall have the defog feature to remove fogginess of scene which can be triggered automatically from the fog detection event.
7) The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle, rotation and focus.

c. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
1) Analytics events based on AI engine : Object detection(Person/Face/Vehicle(car/truck/bus/bicycle/motorcycle)/License plate), IVA(Virtual line/Area, Enter/Exit, Loitering, direction, intrusion)
2) Analytics events : Defocus detection, Motion detection, Tampering, Fog detection, Audio detection, Sound classification, Shock detection, Appear/Disappear
- a) Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
- b) Detection and classification of the following sound.
  - 1) Scream
  - 2) Gunshot
  - 3) Explosion
  - 4) Crashing glass
3) Business Intelligence : People counting, Queue management, Heatmap(based on AI engine)

d. Interoperability – The camera shall be ONVIF Profile S / G and T compliant.
e. The camera shall possess the following further characteristics:
1) Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
2) NAS recording option with configurable pre-alarm and post-alarm recording intervals
3) Alarms and notifications

          a)   alarm notification triggers:
- 1) Analytics
- 2) Network disconnect
- 3) Alarm input
- 4) App event
- 5) Time schedule

          b)   available notification means upon trigger:
- 1) File upload(image) : e-mail/FTP
- 2) Notification : e-mail
- 3) Recording : SD/SDHC/SDXC or NAS recording at event triggers
- 4) Alarm output
- 5) Handover(PTZ preset, Send message by HTTP/HTTPS/TCP)
- 6) Audio clip playback

4) Pixel Counter available in the web viewer.
5) IP52/IK08
6) This device has been verified using STP cable. The use of appropriate GND grounding and STP cable is recommended to effectively protect your product and property from transient voltage, thunderstroke, communication interruption.

3. DETAILED SPECIFICATIONS
- a. Video
  - 1) Imaging device — 1/1.8" CMOS
  - 2) Scanning — Progressive
  - 3) Minimum Illumination — Color: 0.04Lux(F1.3, 1/30sec), B/W: 0.004Lux(F1.3, 1/30sec), 0Lux(IR ILED On)
  - 4) Video out — USB : Micro USB Type B, 1280x720 for installation
- b. Lens
  - 1) Focal length — 4.4~9.3mm(2.1x) motorized varifocal
  - 2) Max. Aperture Ratio — F1.3(Wide) ~ F2.15(Tele)
  - 3) Field of View — H: 112.1°(Wide)~47.5°(Tele)V: 58.0°(Wide)~26.6°(Tele)D: 137.5°(Wide)~54.6°(Tele)
  - 4) Min. Object Distance — 0.5m(1.64ft)
  - 5) Focus Control — Simple focus, Manual
  - 6) Lens Type — P-iris(IR corrected)
- c. Pan & Tilt & Rotate
  - 1) PTR Range — 0°~360° / -45°~75° / 0°~355°
- d. Operational Functions
  - 1) IR Viewable Length — WiseIR 40m(131.23ft)
  - 2) Camera Title — Off / On (Displayed up to 85 characters)
  - 3) Day/Night Setting — Auto (ICR) / Color / B/W / Schedule
  - 4) Backlight Compensation — Off / BLC / HLC / extremeWDR(120dB)
  - 5) Contrast Enhancement — SSDR
  - 6) Digital Noise Reduction — WiseNRII(Based on AI engine), SSNRV
  - 7) Digital Image Stabilization — Support (built-in gyro sensor)
  - 8) Defog — Support
  - 9) Motion Detection — Off / On (8ea, 8-point polygonal)
  - 10) Privacy Masking — Off / On (32ea, Quadrangle zones)- Color: Grey / Green / Red / Blue / Black / White- Mosaic
  - 11) Gain Control — Off / Manual / Max Gain
  - 12) White Balance — ATW / Narrow ATW / AWC / Manual / Indoor / Outdoor
  - 13) LDC — Support (Fill/stretch mode)
  - 14) Electronic Shutter Speed — Min / Max / Anti-flicker (2 ~ 1/12,000sec)Prefer shutter control (Based on AI engine)
  - 15) Image Rotation — Flip: Off / OnMirror: Off / OnHallway view (90°/270°)

	16)	Digital PTZ	Support
	17)	Alarm I/O	2 configurable I/O ports
	18)	Alarm Triggers	Analytics, Network disconnect, Alarm input, App event, Time schedule
	19)	Alarm Events	File upload(image): e-mail/FTP Notification: e-mailRecording: SD/SDHC/SDXC or NAS recording at event triggersAlarm outputHandover (PTZ preset, Send message by HTTP/HTTPS/TCP)Audio clip playback
	20)	Pixel Counter	Support
	21)	Storage	Micro SD/SDHC/SDXC 1slot 512GB
	22)	Analytics	Analytics events based on AI engine : Object detection(Person/Face/Vehicle (car/truck/bus/bicycle/motorcycle)/License plate), IVA (Virtual line/Area, Enter/Exit, Loitering, direction, intrusion)
	23)	Business Intelligence	Based on AI engine : People counting, Queue management, Heatmap
	24)	Analytics events	Defocus detection, Motion detection, Tampering, Fog detection,Audio detection, Sound classification, Shock detection,Appear/Disappear
	25)	Memory	4GB RAM, 512MB Flash

e. Video Streams

	1)	Video compression	H.265, H.264, MJPEG
	2)	Resolution	3328x1872, 3072x1728, 2592x1944, 2688x1520,1920x1080,1600x1200, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600,800x448, 720x576, 720x480, 640x480, 640x360, 320x240
	3)	Maximum Framerate	
		a) H.265 / H.264	Max. 30fps/25fps(60Hz/50Hz)
		b) MJPEG	Max. 15fps/12fps(60Hz/50Hz)
	4)	Smart Codec	Manual(5ea area), WiseStreamII,WiseStream III (Based on AI engine support)
	5)	Bitrate Control Method	H.265 / H.264: CBR or VBRMJPEG: VBR
	6)	Streaming Capability	Unicast(20 users) / MulticastMultiple streaming (Up to 10 profiles, 3 virtual channel support)
	7)	Streaming method	Unicast / Multicast
	8)	Simultaneous Users	20 maximum (Unicast)
	9)	Profile set	Max. 10 ea
	10)	Interoperability	ONVIF Profile S / G / T, SUNAPI (HTTP API), Wisenet Open Platform

f. Audio

	1)	Audio In	Selectable(mic in/line in)Supply voltage: 2.5V DC (4mA), Input impedance: 2K Ohm
	2)	Audio Out	Line out, Max. output level 1Vrms
	3)	Audio Compression	G.711 u-law /G.726 SelectableG.726 (ADPCM) 8KHz, G.711 8KHzG.726: 16Kbps, 24Kbps, 32Kbps, 40KbpsAAC-LC: 48Kbps at 16KHz

g. Electrical

	1)	Power	
		a) Input Voltage	PoE(IEEE802.3af, Class3), 12VDC
		b) Power Consumption	PoE: Max 12.95W, typical 11.2W 12VDC: Max 13.2W, typical 10.8W

h. Mechanical And Environmental

	1)	Color/Material	White / AluminumHard-coated dome bubble
	2)	RAL Code	RAL9003
	3)	Dimensions (W x H)	Ø160x118mm(Ø6.30x4.65")
	4)	Weight	1,450g(3.20 lb)
	5)	Compatible Conduit hole / Gangbox	1/2"(M20)Single, double, 4"

octagon, 4" square

6) Hanging Mount(Dome) SBP-167HMW
7) Weater Cap(Dome)   SBV-161WCW
8) Temperature
 a) Operating -40 °C ~ 55 °C(40°F ~ +131°F)* Maximum temperature: +60°C (intermittent)* Start up should be done at above -20°CNEMA TS-2: 74°C
 b) Storage -50°C ~ +60°C(-58°F ~ +140°F)
9) Humidity
 a) Operating Less than 95% RH (non-condensing)Humidity control /w GORE vent
 b) Storage Less than 90% RH (non-condensing)
10) Ingression Protection IP66/IP67/NEMA4X
11) Vandal Resistance IK10

 i. DORI
  1) Detect (25PPM/ 8PPF) Wide: 44.8m(147.02ft) / Tele: 151.3m(496.29ft)
  2) Observe (63PPM/ 19PPF) Wide: 17.9m(58.81ft) / Tele: 60.5m(198.52ft)
  3) Recognize (125PPM/ 38PPF) Wide: 9.0m(29.4ft) / Tele: 30.3m(99.26ft)
  4) Identify (250PPM/ 76PPF) Wide: 4.5m(14.7ft) / Tele: 15.1m(49.63ft)

F. Indoor/Outdoor 5MP Dual Camera w/Selectable Fixed Lens
 1. EQUIPMENT
  a. Manufacturer: Hanwha Techwin http://www.hanwha-security.com/
  b. Model PNM-9000VD
  c. Alternates: None
 2. GENERAL DESCRIPTION
  a. The camera shall provide multi directional view and produce video in various view mode.
  b. Video Compression and Transmission – The multi-directional camera shall have the following properties relating to the video signals it produces.
   1) H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously
    a) H.265 and H.264 – Maximum of 30 fps at all resolutions
    b) MJPEG – Maximum of 30 fps at all resolutions
   2) The multi-directional camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, bit rate, and other video settings.
   3) The multi-directional camera shall have two lenses and each lens shall provide the following resolutions.
    a) 16:9 aspect ratio : 2560x1440, 1920 x 1080, 1280 x 720, 800 x 448, 640 x 360
    b) 4:3 aspect ratio : 2560x1920, 1280 x 960, 1024 x 768, 800 x 600, 640 x 480, 320 x 240
    c) 5:4 aspect ratio : 1280 x 1024, 720 x 576
    d) 3:2 aspect ratio : 720 x 480
   4) The camera shall support unicast video streaming up to 20 users.
   5) The camera shall support multicast video streaming
   6) The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
   7) The multi-directional camera shall provide WiseStream II, Dynamic GOV and Dynamic fps to efficiently manage bit rate of the video stream and reduce storage.

     c.   Camera – The multi-directional camera device shall have the following physical and performance properties:

         1)   IK10 rated for protection against impacts.

         2)   IP66 for protection against dust and water.

         3)   The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.

         4)   The camera shall be able to configure 32 privacy masking areas with rectangle.

         5)   The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.

         6)   Supporting digital image stabilization the camera shall be able to measure movements in three axes and accurately enhance images from distortions caused by instability.

     d.   Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.

         1)   Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.

         2)   Detection of logical events of specified conditions from the camera's video

            a)   Tampering, Loitering, Directional Detection, Virtual Line, Enter/Exit, (Dis)Appear

            b)   Fog Detection, Motion Detection, Face Detection, Defocus Detection

     e.   Interoperability – The multi-directional camera shall be ONVIF Profile S and G compliant.

     f.   The multi-directional camera shall possess the following further characteristics:

         1)   Built-in web server, accessed via non-plugin browsers including Google Chrome, IE11, MS Edge, Mozilla Firefox and Apple Safari.

         2)   Micro SD/SDHC/SDXC memory card options, with configurable pre-alarm and post-alarm recording intervals

         3)   NAS recording option with configurable pre-alarm and post-alarm recording intervals

         4)   Alarms and notifications

             a)   alarm notification triggers:

                1)   Alarm input

                2)   Motion detection

                3)   Video & Audio analytics

                4)   Network disconnect

             b)   available notification means upon trigger:

                1)   File upload via FTP and e-mail

                2)   Notification via e-mail

                3)   Local storage (SD/SDHC/SDXC card) or NAS recording at event triggers.

         5)   Pixel Counter available in the plug-in web viewer.

         6)   PoE capable

         7)   IP66, IK10 capable

3.   DETAILED SPECIFICATIONS

     a.   Video

1)	Imaging device	1/1/8" 10MP CMOS(optional 3 different Lens)
2)	Image Pixels	Effective: 2616 (H) x 1976 (V)
3)	Scanning	Progressive
4)	Minimum illumination 0.16Lux (F1.6, 1/30sec, 30IRE)	Color: 0.16Lux (F1.6, 1/30sec, 30IRE),B/W:
5)	S/N Ratio	50dB

     b.   Lens:

1)	Focal Length	3.7mm for SLA-5M3700D4.6mm for SLA-5M4600D7.0mm for SLA-5M7000D
2)	Max. Aperture Ratio	F1.6 (for SLA-5M3700D, SLA-5M4600D,

SLA-5M7000D)

- 3) Field of View   H: 95.8°, V: 70°, D:123.6° for SLA-5M3700DH: 76.1°, V: 56.8°, D:96.8° for SLA-5M4600DH: 49.5°, V: 36.9°, D:62.2° for SLA-5M7000D
- 4) Lens Type   Fixed focal
- 5) Mount Type   M12 Lens module with main unit

c. Pan & Tilt & Rotate
- 1) Pan   -90° ~ +90 °(for SLA-5M3700D, SLA-5M4600D, SLA-5M7000D)
- 2) Tilt   +36° ~ +73°(for SLA-5M3700D)+21° ~ +85°(for SLA-5M4600D)+12° ~ +93 (for SLA-5M7000D)
- 3) Rotate   -180° ~ +180°(for SLA-5M3700D, SLA-5M4600D, SLA-5M7000D)

d. Operational Functions
- 1) Camera Title   Off / On (Displayed up to 85 characters)
  - a) W/W   English / Numeric / Special characters
  - b) China   English / Numeric / Special / Chinese characters
  - c) Common   Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),Transparency, Auto scale by resolution
- 2) Day/night Setting   Auto (Electrical) / Color / B/W / Schedule
- 3) Backlight Compensation   Off / BLC / HLC / WDR
- 4) WDR   120dB
- 5) Contrast Enhancement   Off / On (SSDR)
- 6) Digital Noise Reduction   Off / On (SSNR5 : 2D+3D Noise filter)
- 7) Digital Image Stabilization   Off / On (built-in Gyro sensor)
- 8) Defog   Off / Manual / Auto
- 9) Motion Detection   Off / On (8ea, 8-point polygonal)
- 10) Privacy Masking   Off / On (32 zones, polygonal)- Color: Gray / Green / Red / Blue / Black / White- Zoom ratio option for mask mode- Mosaic
- 11) Gain Control   Off / Low / Middle / High
- 12) White Balance   ATW / AWC / Manual / Indoor / Outdoor (Including Mercury and Sodium)
- 13) LDC   Off / On (5 Level with Min/Max)
- 14) Electronic shutter speed   Min / Max / Anti-flicker (2 ~ 1/12,000sec)
- 15) Digital zoom   Support
- 16) Image Rotation   Flip: Off / OnMirror: Off / OnHallway view(90°/270°)
- 17) Alarm Triggers   Analytics, Network disconnect
- 18) Alarm Events   File Upload via FTP and E-mail, Notification via E-mail,Local storage (SD/SDHC/SDXC) or NAS recording,Alarm output, Handover
- 19) Pixel Counter   Support
- 20) Storage   Micro SD/SDHC/SDXC 512GB (256GB x 2 slots) , NAS support
- 21) Intelligent video analytics Tampering, Loitering, Directional Detection, Fog Detection,Virtual Line, Enter/Exit, (Dis) Appear, Motion Detection, Face Detection, Defocus Detection

e. Video Streams
- 1) Video compression   H.265, H.264, MJPEG
- 2) Resolution   2560 x 1920, 2560 x 1440, 1920 x 1080, 1600 x 1200,1280 x 1024, 1280 x 960, 1280 x 720, 1024 x 768, 800 x 600, 800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360, 320 x 240
- 3) Maximum frame rate:
  - a) H.265 / H.264:   Max. 30fps at all resolutions

<table>
<tr><td></td><td>b)</td><td>MJPEG:</td><td>Max. 30fps at all resolutions</td></tr>
<tr><td>4)</td><td></td><td>Smart Codec</td><td>Manual mode (Area-based : 5ea)</td></tr>
<tr><td>5)</td><td></td><td>WiseStream II</td><td>Support</td></tr>
<tr><td>6)</td><td></td><td>Bitrate Control Method</td><td>H.265 / H.264: CBR or VBR MJPEG: VBR</td></tr>
<tr><td>7)</td><td></td><td>Streaming Capability</td><td>Multiple streaming (Up to 10 profiles)</td></tr>
<tr><td>8)</td><td></td><td>Streaming method</td><td>Unicast / Multicast</td></tr>
<tr><td>9)</td><td></td><td>Simultaneous Users</td><td>20 maximum (Unicast)</td></tr>
<tr><td>10)</td><td></td><td>Profile set</td><td>Max. 10 ea</td></tr>
<tr><td>11)</td><td></td><td>Interoperability</td><td>ONVIF Profile S / G , SUNAPI</td></tr>
<tr><td>12)</td><td></td><td>Webpage Language</td><td>English, Korean, Chinese, French, Italian, Spanish, German, Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungary, Greek</td></tr>
</table>

f. Electrical
  1) Power
     a) Input Voltage / Current   PoE
     b) Power Consumption   PoE : 12.95W, Typical : 12.00W
g. Mechanical And Environmental

<table>
<tr><td>1)</td><td>Color/Material</td><td>White / Aluminum</td></tr>
<tr><td>2)</td><td>Dimensions (W x H)</td><td>Ø197.6 x 84mm (7.78" x 3.31")</td></tr>
<tr><td>3)</td><td>Weight</td><td>1,250g (2.76 lb)</td></tr>
<tr><td>4)</td><td>Conduit hole</td><td>1/2"</td></tr>
<tr><td>5)</td><td>Temperature</td><td></td></tr>
</table>

     a) Operating   -40°C ~ +55°C (-40°F ~ +131°F)
     b) Storage   -50°C ~ +60°C (-58°F ~ +140°F)

<table>
<tr><td>6)</td><td>Humidity</td><td>Less than 90% RH</td></tr>
<tr><td>7)</td><td>Ingression Protection</td><td>IP66</td></tr>
<tr><td>8)</td><td>Vandal Resistance</td><td>IK10</td></tr>
</table>

G. Indoor/Outdoor Quad (4x 5MP) Camera w/PTrZ
  1. EQUIPMENT
     a. Manufacturer: Hanwha Techwin http://www.hanwha-security.com/
     b. Model   PNM-9085RQZ
     c. Alternates: None
  2. GENERAL DESCRIPTION
     a. The camera shall provide 360-degree field of view and produce video in quad view mode. It shall also provide digital PTZ along with automated video analytics to allow users to efficiently monitor large visual fields with capability to focus on certain areas when suspicious activity is observed.
     b. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
        1) H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
           a) H.265 and H.264 – maximum 30fps at all resolution
           b) MJPEG – maximum 30fps
        2) The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
        3) The camera shall be able to configure various resolution selections.
           a) 2560x1920, 2560x1440, 1920x1080, 1600x1200, 1280x1024, 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360, 320x240
        4) The camera shall support unicast video streaming up to 10 users.
        5) The camera shall support multicast video streaming up to 10 profiles
        6) The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.

       7) The camera shall provide WiseStream II, Dynamic GOV and Dynamic fps to efficiently manage bit rate of the video stream and reduce storage.
          a) Viewing composition: Quad view
    c. Camera – The camera device shall have the following physical and performance properties:
       1) True day/night operation with removable IR cut filter
          a) Low light level operation to 0.11 lux at F1.92 in color mode and 0 Lux for Black and White mode with IR LED on.
       2) The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
       3) The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
       4) The camera shall be able to configure 32 privacy masking areas with polygonal.
       5) The multi-directional camera shall be able to capture high contrast scenes with 120 dB multi-exposure wide dynamic range.
       6) The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle, rotation and focus.
       7) One touch (Simple) or manual focus controllable remotely via network. The camera shall have motorized varifocal lens.
       8) Advanced digital image stabilization with built in gyro sensor. The camera shall be able to measure movements in three axes and accurately enhance images from distortions caused by instability.
       9) The camera shall support Pan/Tilt/Rotate through Remote adjustment by 200 cycles.
    d. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
       1) Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
       2) Detection of logical events of specified conditions from the camera's video
          a) Defocus detection, Directional detection, Fog detection, Face detection, Motion detection
          b) Appear/Disappear, Enter/Exit, Loitering, Tampering, Virtual line
          c) Audio detection
    e. Interoperability – The camera shall be ONVIF Profile S and T compliant.
    f. The camera shall possess the following further characteristics:
       1) Built-in web server, accessed via non-plugin browsers including Google Chrome, IE11, MS Edge, Mozilla Firefox and Apple Safari.
       2) Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
       3) Alarms and notifications
          a) alarm notification triggers:
             1) Alarm input
             2) Motion detection
             3) Video analytics
             4) Network disconnect
          b) available notification means upon trigger:
             1) File Upload via FTP and E-mail
             2) Notification via E-mail
             3) Local storage (SD / SDHC / SDXC) at event triggers
             4) External output
       4) Pixel Counter available in the web viewer.
       5) HPoE capable
       6) IP66, IK10, NEMA 4X capable
3. DETAILED SPECIFICATIONS
    a. Video
       1) Imaging device   1/1.8" 5MP CMOS x 4ch

	2)	Image Pixels	2,616(H) x 1,976(V)
	3)	Scanning	Progressive
	4)	Minimum Illumination (IR LED on)	Color: 0.11Lux (F1.6, 1/30sec), B/W: 0Lux
	5)	S/N Ratio	50dB
b.		Lens:	
	1)	Focal length	4.13 ~ 9.4mm (2.3x) Motorized Varifocal
	2)	Max. Aperture Ratio	F1.92(Wide) ~ F2.67(Tele)
	3)	Field of View	[Wide] H: 87.58˚, V: 64.58°, D: 112.46°[Tele] H: 37.34˚, V: 28.04°, D: 46.85°
	4)	Min. Object Distance	1.2m (3.9ft)
	5)	Lens Type	DC Auto Iris
	6)	Focus Control	Simple Focus
	7)	Mount Type	Board-in Type
c.		Pan & Tilt & Rotate	
	1)	PTR Range	0˚~360˚ / 35˚~80˚ / 0˚~90˚
	2)	PTR Control	Motorized (Max. 200cycles)
d.		Operational Functions	
	1)	Camera Title	Off / On (Displayed up to 85 characters)
		a) W/W	English / Numeric / Special characters
		b) China	English / Chinese / Numeric / Special characters
		c) Common	Multi-line (Max. 5), Color (Gray/Green/Red/Blue/Black/White),Transparency, Auto scale by resolution
	2)	Day/Night Setting	Auto (ICR) / Color / B/W / Schedule
	3)	IR Viewable Lingth	30m
	4)	Backlight Compensation	Off / BLC / WDR / SSDR
	5)	WDR	120dB
	6)	Contrast Enhancement	Support (Level adjustment)
	7)	Digital Noise Reduction	Support (SSNR V: 2D+3D Noise filter)
	8)	Digital Image Stabilization	Support
	9)	Defog	Support
	10)	Motion Detection	Off / On (8ea, 8 point polygonal)
	11)	Privacy Masking	Off / On (32 zones, polygonal)- Color: Gray / Green / Red / Blue / Black / White- Mosaic
	12)	Gain Control	Off / Low / Middle / High
	13)	White Balance	ATW / AWC / Manual / Indoor / Outdoor(Including Mercury and Sodium)
	14)	Lens Distortion Correction	Support
	15)	Electronic Shutter Speed	Min / Max / Anti-flicker (2 ~ 1/12,000sec)
	16)	Digital Zoom	None
	17)	Digital PTZ	None
	18)	Image Rotation	Flip, Mirror, Hallway view (90˚ / 270˚)
	19)	Alarm I/O	Input 1ea / Output 1ea
	20)	Alarm Triggers	Video Analytics, Network Disconnection, Alarm input
	21)	Alarm Events	File Upload via FTP and E-mail, Notification via E-mail,Local storage (SD/SDHC/SDXC) at event triggersAlarm output, Handover
	22)	Pixel Counter	Support
	23)	Storage	Micro SD/SDHC/SDXC 256GB/1 slot (total 4 slots)
	24)	Intelligent Analytics	Defocus Detection, Directional Detection, Fog DetectionFace Detection, Motion Detection, Appear/Disappear, Enter/Exit, Loitering, Tampering, Virtual Line, Audio Detection

| 25) | Audio In | Selectable (Mic in/ Line in) |
| 26) | Audio Out | Line Out, Max output leve : 1Vrms |

e. Video Streams

| 1) | Video compression | H.265, H.264, MJPEG |
| 2) | Resolution | 2560 x 1920, 2560 x 1440, 1920 x 1080, 1600 x 1200, |

1280 x 1024, 1280 x 960, 1280 x 720, 1024 x 768,800 x 600, 800 x 448, 720 x 576, 720 x 480, 640 x 480, 640 x 360, 320 x 240

3) Maximum Framerate

a)	H.265 / H.264 resolutions	Max. 30fps/25fps (60Hz/50Hz) at all
b)	MJPEG	Max. 30fps/25fps (60Hz/50Hz)
4)	Smart Codec WiseStream II	Manual Mode (Area-based : 5EA),
5)	WiseStream II	Support
6)	Bitrate Control Method	H.265 / H.264: CBR or VBRMJPEG: VBR
7)	Streaming Capability	Multiple streaming (Up to 10 profiles)
8)	Streaming method	Unicast / Multicast
9)	Simultaneous Users	20 maximum (Unicast)
10)	Profile set	Max. 10 ea
11)	Interoperability Platform	ONVIF Profile S / T, SUNAPI, Open

f. Electrical

1) Power

| a) | Input Voltage / Current | HPoE (IEEE 802.3bt), 12VDC |
| b) | Power Consumption | Max 45W, Typical : 32W |

g. Mechanical And Environmental

1)	Color/Material	White / Aluminum
2)	Dimensions (W x H)	Total: Ø315 x 145.9mm (Ø 12.4" x 5.7")
3)	Weight	5.2Kg (11.4 lb)

4) Temperature

| a) | Operating | -40°C ~ +55°C(-40°F ~ +131°F) |

    * Start up should be above at -35°C

| b) | Storage | -50°C ~ +60°C (-58°F ~ +140°F) |
| 5) | Humidity | Less than 90% RH |

6) Environmental Rating:

| a) | Mechanical (Vandal) Protection | IK10 |
| | Ingress Protection | IP66, NEMA 4x |

H. Indoor/Outdoor Panoramic Camera 4x5MP

1. EQUIPMENT
   a. Manufacturer: Hanwha Techwin http://www.hanwha-security.com/
   b. Model   PNM-9031RV
   c. Alternates: None

2. GENERAL DESCRIPTION
   a. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
      1) H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
         a) H.265/H.264 – maximum of 20/20fps(60Hz/50Hz) at all resolution
         b) MJPEG – maximum of 15fps(60Hz/50Hz)
      2) The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.

3) The camera shall be able to configure various resolution selections.
    a) 6720x2240, 5952x1984, 4992x1664, 3840x1280, 3072x1024, 1920x640, 1152x384
4) The camera shall support unicast video streaming up to 20 users.
5) The camera shall support multicast video streaming.
6) The camera shall support multiple video streaming up to 3 profiles.
7) The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
8) The camera shall provide WiseStream II, Dynamic GOV and FPS to efficiently manage bit rate of the video stream and reduce storage.

b. Camera – The camera device shall have the following physical and performance properties:
1) IK10 rated for protection against impacts.
2) True day/night operation with removable IR cut filter
    a) Low light level operation to 0.1 lux at F1.6 in color mode and 0.01 lux at F1.6 in black and white mode. (F1.6, 1/30sec, 30IRE)
    b) Black and White mode operation to 0 lux with IR LED on.
3) The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
4) The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
5) The camera shall be able to configure 6 privacy masking areas with rectangular zones.
6) The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle and rotation.

c. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
1) Analytics events : Motion detection, Tampering detection, Defocus detection, IVA(Virtual line, Enter, Exit, Appear/Disappear), Audio detection
    a) Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
2) Business Intelligence : Heatmap

d. Interoperability – The camera shall be ONVIF Profile S / G and T compliant.

e. The camera shall possess the following further characteristics:
1) Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
2) NAS recording option with configurable pre-alarm and post-alarm recording intervals
3) Alarms and notifications
    a) alarm notification triggers:
        1) Analytics
        2) Network disconnect
        3) Alarm input
        4) App event
        5) Time schedule
    b) available notification means upon trigger:
        1) File upload(image) : e-mail/FTP
        2) Notification : e-mail
        3) Recording : SD/SDHC/SDXC or NAS recording at event triggers
        4) Alarm output
        5) Handover(PTZ preset, Send message by HTTP/HTTPS/TCP)
        6) Audio clip playback
4) Pixel Counter available in the web viewer.
5) IP66, IK10, NEMA4X
6) This device has been verified using STP cable. The use of appropriate GND grounding and STP cable is recommended to effectively protect your product

and property from transient voltage, thunderstroke, communication interruption.

3.   DETAILED SPECIFICATIONS

      a.   Video

1)	Imaging device	1/2.8" 5MP CMOS x 4
2)	Scanning	Progressive
3)	Minimum Illumination	Color: 0.1Lux (F1.6, 1/30sec, 30IRE), B/W: 0.004Lux (F1.6, 1/30sec, 30IRE),B/W: 0Lux (IR LED on)

      b.   Lens:

1)	Focal length	4.3mm fixed
2)	Max. Aperture Ratio	F1.6
3)	Field of View	H: 192˚, V: 56.6°
4)	Min. Object Distance	0.5m(1.64ft)
5)	Focus Control	Fixed

      c.   Pan/Tilt/Rotate Range

1)	Pan/Tilt/Rotate Rage	0°~360° / 0°~60° / -

      d.   Operational Functions

1)	IR Viewable Length	WiseIR 20m (65.6ft)

I.   4 independent zones with Auto/Manual level adjustment

1)	Camera Title	Off / On (Displayed up to 85 characters)
2)	Day/Night Setting	Auto (ICR) / Color / B/W / External / Schedule
3)	Backlight Compensation	Off / BLC / WDR(120dB)
4)	Contrast Enhancement	Off / On (SSDR)
5)	Digital Noise Reduction	Off / On (SSNRV)
6)	Motion Detection	Off / On (8ea, 8-point polygonal zones)
7)	Privacy Masking	Off / On (6ea, rectangular zones)- Color: Gray, Green, Red, Blue, Black, White
8)	Gain Control	Off / Low / Middle / High
9)	White Balance	ATW / AWC / Manual / Indoor / Outdoor
10)	Electronic Shutter Speed	Min / Max / Anti-flicker (2 ~ 1/12,000sec)Prefer shutter control
11)	Image Rotation	Flip: Off / OnMirror: Off / On
12)	Alarm I/O	2 configurable I/O ports
13)	Alarm Triggers	Analytics, Network disconnect, Alarm input, Time schedule
14)	Alarm Events	File upload(image) : e-mail/FTP Notification: e-mailRecording: SD/SDHC/SDXC or NAS recording at event triggersAlarm outputHandover (PTZ preset, Send message by HTTP/HTTPS/TCP)Audio clip playback
15)	Pixel Counter	Support
16)	Storage	Micro SD/SDHC/SDXC 2slot Max. 512GB (256GB x 2)
17)	Analytics	Defocus detection, Motion detection, Appear/Disappear, Enter, Exit, Tampering, Virtual line, Audio detection
18)	Business Intelligence	Heatmap
19)	Video Out (Installation)	Micro USB type B, 1280 x 720
20)	Memory	8GB RAM, 4GB Flash

      b.   Video Streams

1)	Video compression	H.265, H.264, MJPEG
2)	Resolution	6720x2240, 5952x1984, 4992x1664, 3840x1280, 3072x1024, 1920x640, 1152x384
3)	Maximum Framerate	
	a) H.265 / H.264	Max. 20/20fps(60Hz/50Hz) at all resolutions
	b) MJPEG	Max. 15fps(60Hz/50Hz)

	4)	Smart Codec	Manual(5ea area), WiseStreamII
	5)	Bitrate Control Method	H.265 / H.264: CBR or VBRMJPEG: VBR
	6)	Streaming Capability	Multiple streaming (Up to 10profiles)
	7)	Streaming method	Unicast / Multicast
	8)	Simultaneous Users	Max. 20 users (Unicast)
	9)	Interoperability	ONVIF Profile S / G / T, SUNAPI(HTTP API),

c. Audio
   1) Audio In   Mic-in / Line-inSupply voltage: 2.5V DC(4mA), Input impedance: 2K Ohm
   2) Audio Out   Line out, Max. output level 1Vrms
   3) Audio Compression   G.711 u-law /G.726 SelectableG.726(ADPCM) 8KHz, G.711 8KHzG.726: 16Kbps, 24Kbps, 32Kbps, 40KbpsAAC-LC: 48Kbps at 16KHz

d. Electrical
   1) Power
      a) Input Voltage / Current   PoE+ (IEEE 802.3at, Class4), DC 12V
      b) Power Consumption   PoE+: Max 23.5W, typical 18.0W12VDC: Max 20.5W, typical 16.0W

e. Mechanical And Environmental
   1) Color/Material   White / Aluminum, Hard-coated dome bubble
   2) RAL code   RAL9003
   3) Dimensions (W x H)   Ø253x170mm
   4) Weight   2.6Kg
   5) Temperature
      a) Operating   Normal: -40°C ~ +55°C (-40°F ~ +131°F)Intermittent: -40°C ~ +60°C (-40°F ~ +140°F), 8Hrs* Start up should be above -30°C
      b) Storage   -50°C ~ +60°C (-58°F ~ +140°F)
   6) Humidity
      a) Operating   Less than 95% RH(non-condensing)
      b) Storage   Less than 90% RH
   7) Ingression Protection   IP66, NEMA4X
       Vandal Resistance   IK10

2.3   Video Management System SOFTWARE

A.   WISENET WAVE VMS
   1.   VMS Software Components
      a.   The System shall be comprised of four (4) applications which work together seamlessly.
         1)   Cloud - a cloud application that enables simple remote connectivity, viewing, and management of an unlimited number of systems and users.
         2)   Server - a media server responsible for discovering, connecting to, and managing system users, devices, and associated data.
         3)   Desktop - a desktop application for Windows and Mac capable of acting as a stand-alone media player or as a client application for connecting to and managing systems.
         4)   Mobile - a mobile application for iOS and Android devices that allows users to connect to, view, search, and control IP cameras over Wifi or Data networks.
   2.   VMS Developer & Integration Tools
      a.   The VMS shall have built-in developer tools which are accessible from any System Server's Web Admin Interface (compatible with all major browsers) and should include, at a minimum:

       1)   A Generic Events Generator - a tool which helps build HTTP Generic Event calls, a method of sending events from 3rd party systems to the VMS, which can be used to trigger system actions in the VMS.

       2)   Server API – SUNAPI implementation that gives developers the ability to access every system feature available.

       3)   API Change Log - list of breaking changes in API from version to version

       4)   Video Source Integration SDK - provides the ability to integrate virtually any live or recorded video source (IP Cameras, NVRs, DVRs, etc) into the VMS with methods for discovering, displaying, analyzing and recording video, as well as integrating device I/O ports and related motion detection information.

       5)   Storage SDK - provides the ability to integrate potential storage into System. It allows developers to read from or write to any storage location: local, remote, and even cloud one. Creating a storage plugin requires implementing standard functions such as: I/O stream, if file exist, delete file, list of files in the folder, etc.Storage SDK also contains an example for using an FTP server as a storage location.

3.   VMS System Architecture

    a.   The VMS shall have a Server Hive Architecture wherein:

       1)   All servers in a system are equal and synchronize system databases in real-time

       2)   A user can connect to any system server to see and manage the entire system

       3)   Servers support automatic camera failover to ensure limited loss of video recording in the event of hardware or network failure.

       4)   Servers will use a SQLite - a free database technology - included in the installation package

    b.   The VMS shall support one-click system wide updates.

       1)   System Administrators shall be able to upgrade an entire system via a single button in the Desktop Application.

       2)   System Administrators shall be able to upgrade on demand to the latest release or specific builds with specific functionality or bug fixes

       3)   System Administrators shall be able to apply an OTA (over-the-air) update

       4)   System Administrators shall be able to generate a URL to download a portable system- specific update package in .zip file format which can be used to update servers without an active Internet connection.

    c.   The VMS will use secure technologies for inter-application communication and security.

       1)   OpenSSL for network connections - deprecated and insecure protocols and use only TLS v1+.

       2)   Server to Client (Mobile, Desktop, Web) Communications – Option to force encryption between Client and Server for API data.

       3)   Option to force HTTPS video traffic encryption between Client and Server.

       4)   HTTPS Email notification - TLS / SSL - TLS is the default option for Email Server communications.

       5)   Salted/Hashed Passwords - Local Credentials will be protected using a salted MD5 hash, Cloud Credentials should use a complex multi-level hash

    d.   The VMS will not require any licenses to increase the number of supported devices, users, or servers.

    e.   The system shall support scaling to support the maximum recommended system sizes shown below. The system shall support exceeding these recommended maximums by consulting with engineering support.

       1)   The system shall support a maximum of 100 Servers in a system.

       2)   The system shall support a maximum of 10,000 resources in a system.

       3)   The system shall support a maximum of 1,000 concurrent users in a system.

4.   - VMS Server Application

B.   Supported Operating Systems-The VMS Server application shall be able to run on any of the following operating systems.

1. Operating System   VersionsMicrosoft Windows   Windows 7,8,8.1,9, 10Windows Server 2012, 2012 R2, 2016 (Long-term servicing channel) 1607   Windows 10 Enterprise Ubuntu Linux   Ubuntu 16.04 LTS: "Xenial Xerus"Ubuntu 18.04 LTS NVIDIA Jetson Support   NVIDIA Tx1 and Tx2

C.   Minimum Compatible Computing Hardware
     1.   The VMS Server application will be capable of operating on any hardware able to run a compatible operating system.
     2.   The VMS Server will be capable of recording 128 dual-streaming IP cameras (256 streams) on a single core of an Intel Core i3 processor.

D.   Initial Installation & Setup
     1.   The VMS Server application installer should not exceed 100 MB (megabytes).
     2.   The VMS Server application should be a publicly available, free download.
     3.   The VMS Server application should require no prerequisite proprietary or 3rd party software and database technologies during installation.
     4.   The VMS Server installation process should require no user input once initiated
     5.   After installation is complete the VMS server setup process will allow system administrators to create a new system or to merge newly installed server(s) with existing systems.

E.   Features
     1.   The VMS Server Application shall automatically discover, stream, and record any ONVIF Profile S IP camera located on the same subnet as the server application.
     2.   The VMS Server Application shall manually discover, stream, and record RTSP, HTTP, or UDP (multicast, unicast) streams.
     3.   The VMS Server application shall support up to 1000 concurrent TCP connections
     4.   The VMS Server application shall record and stream video of any resolution and frame rate, limited only by hardware.
     5.   The VMS Server application shall support automatic camera failover without any additional licenses. 6. The VMS Server application will support an unlimited number of users and custom user roles

F.   The VMS Server application shall support any type of storage medium - HDD's, SSD's, SD cards, DAS, NAS, or other network-attached storage devices or locations.

G.   The VMS Server application shall support LDAP / Active Directory / Open LDAP integration for user login credential management

H.   The VMS Server application shall record and stream H.264, H.265, and MJPEG streams

I.   The VMS Server application shall record and stream AAC, PCM (Mu-Law, A-law), g726, and MP3 audio

J.   The VMS Server application shall transcode streams on demand for delivery to 3rd party systems or devices in H.265, H.264, MJPEG or WebM codecs.

K.   The VMS Server application shall be able to provide pass-through high or low-res HLS streams from connected devices.

L.   The VMS Server application shall store archive indices in the same location as recorded video files

M.   The VMS Server application shall allow system administrators to recover archives from any storage medium using a re-index archive feature.

N.   The VMS Server application will contain a boolean events engine allowing operators to program and trigger system actions based on system, connected device, or HTTP events sent from 3rd party system

or device.

O. The VMS Server application shall be able to send HTTP PUT or GET requests to 3rd party systems or devices.

P. The VMS Server application shall support IPv4 or IPv6 addressing

Q. The VMS Server application shall allow operators to set custom network routing configurations for system servers to optimize network routing and usage.

R. The VMS Server application shall allow operators to monitor the CPU, RAM, NIC, and HDD usage in real time.

S. The VMS Server application shall track all operator actions to allow audits

T. The VMS Server application shall generate automatic crash files every time there is an unexpected crash of the Server application.

U. The VMS Server application shall allow operators to change the size of reserved disk space for storage drives.

V. The VMS Server application shall automatically disable any system drive (drive containing the operating system) in computing hardware with more than one drive to ensure the operating system drive does not become full.

W. The VMS Server application shall support configuration and events from binary I/O contacts on supported devices - including IP cameras and I/O devices.

X. The VMS Server application shall support sending email notifications via SMTP using TLS, SSL or unsecured connections.

Y. The VMS Server application shall support scheduled backup of recording archives to local, networked, or cloud storage locations.

Z. The VMS Server application shall allow on-demand backup of recording archives to local, networked, or cloud storage locations.

AA. The VMS Server application shall allow concurrent-recording of all connected cameras / streams to two (2) servers in real-time.

BB. The VMS Server application will allow server-side, CPU-based motion analysis for all connected IP cameras with no perceptible increase (<3%) in CPU usage.

CC. The VMS Server application will require no dedicated GPU in order to perform at maximum capacity.

DD. The VMS Server application will have a web administration interface that allows users to view live or recorded video from a single camera at a time in high or low resolutions.

EE. The VMS Server application will have a web administration interface that allows system administrators to view real-time server health monitoring statistics (CPU, NIC, and HDD usage).

FF. The VMS Server application will have a web administration interface that allows operators to cloud merge two systems together or disconnect the VMS Server from the VMS cloud application.

GG. The VMS Server application will have a web administration interface that allows users to view all available servers in the system.

HH. The VMS Server application will have a web administration interface that allows operators to switch

between server interfaces.

II. The VMS Server application will have a hidden advanced page that gives system administrators the ability to modify advanced system settings.

JJ. The VMS Server application will support any RAID configuration of storage medium
1.   - VMS Desktop Application

KK. Supported Operating Systems

LL. Operating System   VersionsMicrosoft Windows
Windows 7,8,8.1,9, 10Windows Server 2012, 2012 R2, 2016 (Long-term servicing channel) 1607   Windows 10 Enterprise Ubuntu Linux
Ubuntu 14.04 LTS   Ubuntu 16.04 LTS: "Xenial Xerus"Ubuntu 18.04 LTS   Apple/Mac
OSX 10.11 "El Capitan"   OSX 10.12 "Sierra"   OSX 10.13 "High Sierra"

MM. Minimum Hardware Requirements
1.   The VMS Desktop application will be capable of operating on any hardware able to run a compatible operating system with a CPU that supports OpenGL 2.1 and Intel HD Graphics 3000 (or higher).
2.   The VMS Desktop application shall not require any dedicated graphics drive to work at full capacity (64 streams on a 64 bit OS) and shall use the CPU for all video decoding and rendering.

NN. Installation & Configuration
1.   The VMS Client application installer should not exceed 100 MB (megaybytes).
2.   The VMS Client application should be a publicly available, free download.
3.   The VMS Client application should require no prerequisite proprietary or 3rd party software and database technologies during installation.
4.   The VMS Client installation process should require no user input once initiated.

OO. Features

PP. The VMS Desktop application will have the following basic structure:
1.   Navigation Panel - with a main menu button, an interactive cloud-login icon, tabbed layouts, minimize and maximize icons, a contextual help icon, and a close application icon.
2.   Resource Panel (Left) - contains all system resources (Servers, Devices, Users, Layouts, Offline files, etc.) with collapsible structure and a keyword search mechanism to allow operators to quickly search for a display live streams / cameras, offline video and image files, or any combination thereof.
3.   Notifications Panel (Right) - shows all system or rules-engine generated notifications which can be clicked on to display relevant resource in the Viewing Grid
4.   Timeline Panel (Bottom) - allows for navigation and search of recorded video files
5.   Viewing Grid (Main Viewing Area) - a flexible adaptive grid interface which allows operators to create and share customized layouts of system resources.

QQ. The VMS Desktop application shall allow operators to view and interact with the following types of media:
1.   Live Streams: H.265, H.264, MJPEG
2.   Offline Media: AVI MKV MP4 MOV TS M2TS MPEG MPG FLV WMV 3GP JPG PNG GIF BMP TIFF
3.   I/O Devices: Status and Triggers
4.   Servers: Real-Time Server Health Monitoring Status

RR. The VMS Desktop application shall allow the operator to scroll to zoom in to any part of the Viewing Grid.

SS. The VMS Desktop application shall allow operator to drag & drop to reassign cameras from one server to another server.

TT. The VMS Desktop application will have a flexible timeline that allows operators to view the dates of any and all archived video in the System for a specific camera, or groups of cameras.

UU. The VMS Desktop application will allow operators to manually create bookmarks - with a start time, end time, name, description, and tags - for later search. Bookmarks shall also be able to be created using the Rules engine.

VV. The VMS Desktop application shall allow operators to create Soft Triggers - programmable, customizable buttons which sit on top of streams in the Viewing Grid - to trigger any available system action.

WW. The VMS Desktop application shall have icons located on the top of live camera streams which allow operators to dewarp fisheye cameras, control PTZ cameras, apply client-side image enhancement, execute smart motion search, create zoom windows, rotate items to any orientation, and activate stream or file info.

XX. The VMS Desktop application shall allow operators to create Zoom Windows (up to 63 zoom windows on a single item in a 64 bit OS) - a magnified view of a part of a live stream, recorded videos, or static images.

YY. The VMS Desktop application shall allow operators the ability to execute a Smart Motion search by selecting a subset of a live camera stream with results shown in red on the flexible timeline. Smart Motion search should be able to search a year (12 months, 365 days) of archived video in less than one (1) second.

ZZ. The VMS Desktop application will allow users to search live cameras by name, manufacturer, IP address, MAC address, and status (e.g. live).

AAA. The VMS Desktop application shall allow operators to search video archives by date and time with a responsive, adaptive timeline.

BBB. The VMS Desktop application will allow operators to customize the background image of the application with supported image types.

CCC. The VMS Desktop application will support digital mapping by allowing operators to add and customize background images - including opacity and number of grid points.

DDD. The VMS Desktop application will utilize adaptive scaling technology to automatically switch between high and low resolution streams during live and recording playback to optimize CPU and network usage.

EEE. The VMS Desktop application will allow operators to log in to the Cloud application in order to quickly connect to any shared system.

FFF. The VMS Desktop application will allow operators to quickly switch between previously connected or cloud-accessible systems using searchable tiles that show system name and status.

GGG. The VMS Desktop application will have a Storage Analytics feature allowing operators to analyze storage capacity of the system based on available drives and real-time and historical bandwidth analysis.

HHH. The VMS Desktop application will allow management and configuration of all System devices, users,

and resources in a single unified interface.

III. The VMS Desktop application will allow fast-forward and fast-reverse of archived video up to 16x normal speed.

JJJ. The VMS Desktop application will show operators which system server they are connected to.

KKK. The VMS Desktop application will allow operators to connect to previous versions by automatically downloading and switching to compatible versions.

LLL. The VMS Desktop applications will automatically discover available systems on the same network as the computer running the Desktop application.

MMM. The VMS Desktop application will automatically recover and reconnect to a system in the instance the server the operator is connected to becomes inaccessible for any reason.

NNN. The VMS Desktop application will allow operators to show or hide adaptive thumbnails in the timeline panel.

OOO. The VMS Desktop application will allow operators to synchronize all items on a layout or disable synchronization to view live and recorded video at the same time.

PPP. The VMS Desktop application will have adaptive settings dialogs, allowing operators to switch dialog content while the dialog is open by clicking on a resource.

QQQ. The VMS Desktop application will allow batch configuration of camera recording schedules, fps, and quality.

RRR. The VMS Desktop application will allow operators to drag and drop multiple system resources onto the Viewing Grid at the same time.

SSS. The VMS Desktop Application will allow administrators to modify time synchronization settings for the system to utilize online resources (NTP servers) or to set a dedicated local time server.

TTT. The VMS Desktop Application will allow system administrators to view a full list of system cameras and devices in a single dialog.

UUU. The VMS Desktop application will allow operators to view, search and export all system events.

VVV. The VMS Desktop application will allow operators to view, search and export all system bookmarks.

WWW. The VMS Desktop application will allow operators to view, search, and export system logs.

XXX. The VMS Desktop application will allow operators to view, search, and export an audit trail of all operator actions and replay related video.

YYY. The VMS Desktop application will allow administrators to backup and restore the system database.

ZZZ. The VMS Desktop application will allow administrators to create an unlimited number of custom user roles.

AAAA. The VMS Desktop application will allow administrators to create and share lockable layouts.

BBBB. The VMS Desktop application will allow administrators to update layouts in real time.

CCCC. The VMS Desktop application will allow users to record their screen in full resolution and up to 30fps.

DDDD. The VMS Desktop application will allow users to add a local folder to add local files for search

and playback.

EEEE.	The VMS Desktop application will have a Video Wall mode which will allow operators to control the application remotely.

FFFF.	The VMS Desktop application will have a Media Player mode which will allow operators to use the application as a media player.

GGGG.	The VMS Desktop application will remember past system connections and user credentials and will allow operators to quickly search for and switch between systems.

HHHH.	The VMS Desktop application will allow operators to adjust the aspect ratio and streaming quality (high resolution or low resolution) of items displayed on the viewing grid.

IIII.	The VMS Desktop application will display I/O devices as an individual item on the viewing grid and allow operators to create custom names for inputs and output.

JJJJ.	The VMS Desktop application will allow users to customize the layout of I/O panels on the item in the viewing grid including indicators for inputs and buttons for outputs.

KKKK.	The VMS Desktop application will allow users to de-warp any fisheye lens using automatic calibration or manual calibration without the need for any third (3rd) party SDKs.

LLLL.	The VMS Desktop application will allow users to create fully customizable viewing tours which include any combination of live video streams, offline videos, images, websites (or URLs), I/O devices, and Server health monitoring status.

MMMM.	The VMS Desktop application will allow system administrators to modify and save a shared layout to affect an instantaneous change to that layout on the VMS Desktop application of any user connected to the system viewing that layout (when the system administrator saves the layout the layout will update in real time for any user viewing that layout).

NNNN.	The VMS Desktop application will support two-way audio between operators and supported devices.

OOOO.	The VMS Desktop application will support audio alerts as an action that can be played on users' computers or connected system devices.

PPPP.	The VMS Desktop application will support PTZ presets and tours.

QQQQ.	The VMS Desktop application will support PTZ presets and tours in fisheye cameras using de-warp mode.

RRRR.	The VMS Desktop application will allow operators to schedule recording for connected cameras and devices with options to force minimum and maximum storage durations.

SSSS.	The VMS Desktop application will allow operators to configure pre and post recording for motion events.

TTTT.	The VMS Desktop application will allow operators to optimize camera streaming quality from connected devices automatically using low, medium, high, best quality selectors or manually in the camera.

UUUU.	The VMS Desktop application will allow users to export video by selecting an area on the timeline and right clicking to export.

VVVV.	The VMS Desktop application will support single video export in .avi, .mp4, or .mkv formats and will offer the option to transcode any client-side effects (image enhancement, de-warping,

timestamps) as part of the exported video.

WWWW. The VMS Desktop application will support multi-video export in an executable format to create a fully portable version of the VMS Desktop application including all exported video files.

XXXX. The VMS Desktop application shall have a rapid review export feature which will allow operators to compress any length of video into a short video (e.g. export 8 hours of archives into a 30 second video clip).

YYYY. The VMS Desktop application shall allow system administrators to activate or deactivate system licenses on Internet connected systems.

ZZZZ. The VMS Desktop application shall allow users to force open an alarm layout triggered by any system or 3rd party event with one or many associated cameras or resources.

AAAAA. The VMS Desktop application will have a hidden configurable method of increasing the amount of items allowed on the viewing grid.

BBBBB. The VMS Desktop application shall allow users to adjust configuration of devices.

CCCCC. The VMS Desktop application shall support keyboard shortcuts to control various interface options including PTZ mode, Smart Search mode, & layout control.

DDDDD. VMS will allow analytics from Wisenet and other supported device with analytics (Axis, DW, Hikvision)

EEEEE. The VMS Desktop application will force users to set an initial password for Wisenet camera upon enrollment, for best cyber security practices.
1. - Mobile Application

FFFFF. Supported Operating Systems
1. Operating System VersionsGoogle Android
Android 8.0, 8.1: "Oreo"
Android 9.0Apple iOS iOS 11.4, 12.1, 12.2, 12.3

GGGGG. Installation
1. The VMS Mobile application will be available as a free download from Google Play or Apple iTunes stores.

HHHHH. Features
1. The VMS Mobile application will automatically discover available Systems on a local area network (LAN).
2. The VMS Mobile application will store past system connections and credentials and will allow users to quickly search for switch between systems.
3. The VMS Mobile application will have adaptive streaming and automatically adjust the stream being displayed based on network speed.
4. The VMS Mobile application will allow users to adjust streaming resolutions manually.
5. The VMS Mobile application will allow users to search for cameras by name.
6. The VMS Mobile application will allow fisheye de-warping of any fisheye lens without the need for any 3rd party SDK.
7. The VMS Mobile application will allow users to view live video from one system.
8. The VMS Mobile application will allow users to log in to the VMS Cloud layer in order to view and access all systems shared with a user.
9. The VMS Mobile application will allow users to control the display of any connected "Lite Clients" in the system.
10. The VMS Mobile application will utilize a custom media player to render and display live thumbnails and video.

11. The VMS Mobile application will allow users to search video using a calendar.
12. The VMS Mobile application will allow users to search video using a flex timeline.
13. The VMS Mobile application will allow "Smart Motion Search" to search archived video by selecting an entire video or specific area.

IIIII. Supported Browsers
1. The VMS Cloud application will allow users to log in from any modern web browser (Google Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.) from any type of device (mobile, pc, etc.)

JJJJJ. Features
1. The VMS Cloud application will be an optional add-on to the VMS requiring no additional licensing.
2. The VMS Cloud application will allow users to connect an unlimited number of systems to a single user account.
3. The VMS Cloud application will allow system administrators to share access to a system using only an email address.
4. The VMS Cloud application will allow system administrators to assign custom user roles when sharing system access.
5. The VMS Cloud application will allow users to quickly search for and connect to cloud-connected systems by name.
6. The VMS Cloud application will allow operators to view live or recorded video from one camera at a time on any cloud-connected system.
7. The VMS Cloud application will first attempt a direct connection to system servers using NAT Traversal technology and will be able to proxy traffic to ensure access to a system in the case of ISP or routing issues.
8. The VMS Cloud application will allow an unlimited number of connected users and systems with no additional licensing.
9. The VMS Cloud application will utilize secure networking technologies (OpenSSL, HTTPS) and a complex Salted MD5 hash for any stored passwords.

1.1 The VMS Cloud application will allows two systems to be merged together to operate as one system without the need for port forwarding or local access. SERVERS

A. Rackmount Servers:
1. Wisenet WAVE WRR-P-S201W Network Video Recorder ("NVR"):
   a. Record Video and Audio: 470 Mbps.
   b. Send data from video cameras to a hard disk array of 1 to 8 HDDs within a rack mountable format and enable playback of video and audio from the hard disk array.
      1) Pre-configured with Wisenet WAVE VMS.
      2) Pre-loaded with four professional licenses ensuring quick and easy development minimizing setup time.
      3) Remote monitoring environment for video and audio over network using a remote computer.
      4) SQLite, a free database technology included in the installation package.
   c. General Properties:
      1) Camera Search and Discovery: Search network for connected compatible cameras via Onvif Profile S or Hanwha Techwin's native driver.
         a) Cameras are Searched or Discovered:
            b) Cameras automatically registered and current camera information (fps, days of recording) displayed.
            c) Ability to selectively register as many as cameras can be found.
      2) Support WiseStream, Wisestream II and Dynamic GOV, a smart codec used by WiseNet IP cameras.
      3) Support dual monitor out.

4) Support server backup if multiple servers are in the hive for failover for redundancy.

5) Recording and Playback Functions:

    a) Support recording 128 dual streams (256 streams) from 352 x 288 (CIF) up to 4000 X 3000 (12 MP) per channel.

    b) 470 Mbps network camera recording throughput.

    c) Simultaneous Playback Capability: 128 video channels.

    d) Compression Support: H.265, H.264, and MJPEG.

    e) NVR to record and stream AAC, PCM, g726, and MPS audio.

    f) View status of internal connected storage hardware.

    g) Set recording schedules.

    h) Set up triggered recording based on:

        1) Sensor (input) detection.

        2) Camera event, analytics based in Wisenet Cameras.

        3) Motion Detection.

        4) Video loss detection.

    i) Available recording settings by channel for standard and event-based recording types:

        1) Compression type.

        2) Resolution.

        3) Images per second.

        4) Quality.

        5) Data transfer limit.

        6) Pre-event and post-event record duration.

        7) I-frame and full frame recording.

    j) Available actions upon reaching full HDD storage capacity:

        1) Stop recording.

        2) Overwrite.

    k) Search recorded data by time, event trigger, motion alarms, events.

6) Storage: Four, 8 TB HDDs in JBOD configuration for a maximum of 32TB.

    a) USB connection for memory/storage device for video clip backup and settings export.

7) Live View:

    a) Remote monitoring using Wisenet WAVE supplied viewer.

    b) Streams: H.265, H.264, MJPEG.

    c) Offline Media: AVI, MKV, MP4, MOV, TS, M2TS, MPEG, MPG, FLV, WMV, 3GP, JPG, PNG, GIF, BMP, and TIFF.

    d) Configure and exercise functions for connected PTZ cameras, including functionality with compatible USB joystick.

    e) Capture and save snapshot images.

    f) Record current video in AVI format.

8) Remote Access:

    a) Multicast or Unicast: Simultaneous access is unlimited.

    b) Mobile Device:

        1) Supported Platforms:

            a) Andriod.

            b) IOS.

        2) Supported Remote Users: Unlimited amount either live or playback.

        3) Dynamic DNS (DDNS) support.

9) VGA and High Definition (HDMI) local monitor outputs live viewing, playback, and backup functions.

        10) ONVIF Profile S compliance.
        11) Alarm Connections: None on server. Use of I/O software module to support I/O control.
- d. System:
  1) Processor: Intel Core i5-7500 3.4 GHz.
  2) Memory: 8 GB DDR4.
  3) Operating Systems: Windows 10 IoT Enterprise.
  4) USB Ports: 4x USB 3.0(rear), 1x USB 3.0 Type-C (rear), 2x USB 2.0(front).
  5) Video Output: 2x HDMI (rear), 1x DVI (rear).
  6) Wi-Fi: IEEE 802.11ac.
  7) Other Ports: 1x PS2, 2x Wi-Fi Antennas, 3.5 mm audio in/out, 1x SPDIF out.
  8) Keyboard and Mouse: Included.
- e. RAID Support: None.
- f. Video Compression: H.265, H.264, and MJPEG.
- g. Recording:
  1) Channel Capability: No limit but recommended to use Wisenet WAVE Calculator.
  2) Bit Rate: 470 Mbps.
  3) Resolution Range: 352 x 288 to 4000 X 3000.
- h. Events and Response Actions:
  1) Triggers:
     a) Motion.
     b) Video loss.
     c) Event defined by camera.
  2) Response Actions:
     a) Record.
     b) E-mail.
     c) Activate PTZ preset.
     d) Event Trigger program.
     e) Sound output.
- i. Playback:
  1) Number of simultaneous channels: Not limited.
  2) Bandwidth: 470 Mbps.
- j. OS Drive: OS Drive Bays: 1, 256 GB SSD internally mounted.
- k. Storage:
  1) Internal:
     a) Number of HDDs Bays: 1 to 8 Bays
     b) Capacity: 1 to 8 TB per HDD.
  2) External Types: USB HDD/Flash drive for backup of video clips, firmware update, settings backup/restore, log export.
- l. Network:
  1) Connectivity: 1000 Base-T Ethernet, 2 x RJ-45 connectors.
  2) Protocols Supported:
     a) Transmission Control Protocol (TCP), Internet Protocol (IP) v4 and v6, User Datagram Protocol (UDP).
     b) Configuration: Dynamic Host Configuration Protocol (DHCP).
     c) Web Services: Hypertext Transfer Protocol (HTTP), Secure HTTP (HTTPS).
     d) Network Services: Address Resolution Protocol (ARP), Domain Name System (DNS), Internet Control Message Protocol (ICMP): Network Time Protocol (NTP), Simple Network Management Protocol (SNMP v1/2c/3 – MIB-2), Universal Plug and Play (UPnP).

e) Media: Real-Time Transport Protocol (RTP), Real-Time Control Protocol, Real-Time Streaming Protocol (RTSP).

f) Multicast: Internet Group Management Protocol (IGMP).

g) Notifications: Simple Mail Transfer Protocol (SMTP).

h) Remote Access: Point-to-Point Protocol over Ethernet (PPPoE).

3) DDNS: Support DDNS services offered by the Manufacturer and other publicly available service offerings.

4) Security Features:

a) User password protection with group restrictions.

b) IP address filtering, list of allowed or blocked IP addresses.

c) HTTPS(SSL) login authentication.

d) User access log.

e) 802.1x authentication.

f) Restriction of network access/web viewer access.

5) Discovery: Manufacturer shall offer a discovery program to identify all devices of his manufacture on the network, as well as ONVIF Profile S conformant devices.

m. Alarm/Sensor Interface:

1) Input (0): NO or NC, selectable.

2) Output (0): NO or NC, selectable.

3) Use of I/O software module to support I/O control.

n. Audio:

1) Direction: Bi-directional.

2) Compression: AAC (16/48KHz), G.711 u-law, G.726 selectable.

3) Output: Line level (RCA).

4) Output: Line level (RCA).

o. Electrical:

1) Power:100 to 240 VAC.

2) Power Supply: 800 W Redundant.

p. Mechanical and Environmental:

1) Color: Black / metal.

2) Front Bezel and lock.

3) Form Factor2U Rack Mount Chassis. Sliding rails included.

4) Mouse and Keyboard: Included.

5) Dimensions (W x H x D): 17.2 x 3.5 x 26 inch (438 x 87.0 x 660 mm)

6) Weight: 30.86 lbs. (14kg).

7) Temperature; Operating and Storage: 32 to 122 degrees F (0 to 50 degrees C)

8) Humidity: 5 to 85 percent, RH non-condensing.

PART 3 EXECUTION

3.1 PREPARATION

A. System Integrator: Confirm the solution proposal planning and design with the installing contractor.

B. The network design and configuration to be verified for compatibility and performance with the input/output devices.

C. Network Configuration: Tested and qualified by Contractor prior to remote device installation.

D. Equipment to be tested and configured in accordance with instructions provided by the System Integrator prior to installation.

E.   All firmware found in products to be the latest and most up-to-date provided by the manufacturer, or of a version as specified by the provider of the Video Management Application (VMA).

F.   All equipment requiring users to log on using a password to be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed.

G.   Confirm hardware will be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

3.2   VIDEO SURVEILLANCE SYSTEM INSTALLATION, NECESSARY MOUNTING ACCESSORIES, AND PROGRAMMING

A.   Provide and install all equipment, software, materials, and labor to include system programming for a completely operational video management system described herein an included on the Project Drawings. These specifications and project drawings are complementary in describing the design intent of the security video management system.

B.   Before programming, meet with the project owner to determine system programming parameters, camera mounting location, desired field of view, analytics configuration and other system settings required to meet the owners' needs.

C.   Install cameras and other appurtenances level and plumb for a high quality, workman like installation.

D.   Provide and install all necessary mounting accessories to include caps, mounts, brackets, pendants, etc. as necessary for the environment to accommodate field of views required by the owner. Please find the appropriate options here: https://www.hanwhasecurity.com/mount-selector/

E.   Install power supplies and other auxiliary components at control stations unless otherwise indicated.

F.   If applicable, set PTZ/PTRZ pan unit and pan-and-tilt until stops to suit final camera position and to obtain the field of view required for the camera. Connect all controls and alarms, and adjust.

G.   Aim cameras as directed by engineer and/or owner. Optimize system settings both day and night for exact field of view, WDR, Day/Night, analytics, etc.

H.   Program camera system head end. Provide unique on-screen camera identification for all cameras with the following nomenclature:
      1.   Camera title, date, and time
      2.   Tours and Salvos (if required)
      3.   On screen display feature tiles.
      4.   Individual user settings and rights.

I.   Program all systems analytics and AI system parameters as directed by the engineer and/or owner.

J.   Unique individual user login settings and/or Active Directory integration as required.

3.3   CYBER SECURITY PROTECTION

A.   All equipment requiring users to log on using a password to be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed. Contractor shall implement all camera manufacturer's cyber security recommendations and configurations, following industry best practices per the camera manufacturer Cyber Hardening Guide.

B.   Document that all cameras do not have a default password.

C. Document that all cameras have the latest firmware installed.

D. Back up all camera settings and provide file to owner.

E. Document that all servers and workstations have current version or Operating System (OS).

F. Document that latest VMS version is installed on all servers and work stations.

G. Set user permissions and rules in VMS.

3.4 INSTALLATION

A. Install products per manufacturer's recommendations and approved submittals.
   1. Comply with documentation provided by the System Integrator to insure all steps have been taken to provide a reliable, easy-to-operate system.

B. Contractor personnel must comply with all applicable state and local licensing requirements.

C. ALL Buildings will be occupied throughout the project. Contractor is responsible for coordinating with each building to accommodate occupants and summer programs. Owner will assist in this coordination and make sure all spaces are available at some point during the project schedule.

D. Contractor must demo ALL existing security camera cabling within each of the buildings.

E. Contractor shall salvage all existing IP cameras to owner.

F. Contractor to include (1) new CAT 6A cable connection for each camera location. Existing connections may be used if it meets current specs, but contractor will be responsible for ensuring the integrity of the cable and ensuring proper function.

G. Contractor to include all conduit locations that are 6' or less in overall length per camera location.

H. Owner to provide conduit raceway for locations that **EXCEED** 6' per camera location. Contractor to coordinate with owner on schedule.
   1. Approximately 900 LF conduit across all of the buildings.

I. Before permanent installation of the system, the Contractor will test the system in conditions simulating the final installed environment witnessed by the System Integrator. Adjust as required until proper operation is achieved.

END OF SECTION

	September	September	September	October	November	December	January	February	March	April	May	End of Year
						2021/22						
School and Grade Level	**9th**	**17th**	**24th**	**1st**	**1st**	**1st**	**3rd**	**1st**	**1st**	**1st**	**2nd**	**6/9/22**
NCEC												
Early Childhood	117	108	110	108	115	120	116	127	123	137		
Total	**117**	**108**	**110**	**108**	**115**	**120**	**116**	**127**	**123**	**137**	**0**	**0**
Portage												
Grade K-2034	2	2	2	2	1	1	2	2	3	3		
Grade 1-2033	3	3	3	3	3	3	3	3	3	3		
Grade 2-2032	5	5	5	5	3	3	4	5	5	5		
Grade 3-2031	9	9	9	8	8	8	8	9	8	8		
Grade 4-2030	4	4	3	3	2	2	2	2	2	2		
Grade 5-2029	9	9	9	9	7	7	8	7	7	7		
Grade 6-2028	6	7	5	5	5	4	4	4	5	5		
Grade 7-2726	11	10	11	11	12	13	13	16	17	17		
Grade 8-2026	6	7	8	8	8	8	8	11	12	12		
Grade 9-2025	3	4	3	4	4	8	8	8	8	8		
Grade 10-2024	10	12	13	13	13	16	15	15	15	16		
Grade 11-2023	12	11	11	12	12	14	14	22	25	24		
Grade 12-2022	17	21	23	23	22	27	25	28	28	28		
Total	**97**	**104**	**105**	**106**	**100**	**114**	**114**	**132**	**138**	**138**	**0**	**0**
Greenvale Park												
Grade K-2034	88	88	88	88	88	88	89	86	87	86		
Grade 1-2033	76	76	77	78	78	78	78	79	79	79		
Grade 2-2032	77	78	78	78	78	78	79	77	77	78		
Grade 3-2031	71	71	71	71	72	72	71	71	74	75		
Grade 4-2030	84	84	84	84	86	86	86	86	85	85		
Grade 5-2029	64	64	64	64	66	66	66	65	64	64		
Total	**460**	**461**	**462**	**463**	**468**	**468**	**469**	**464**	**466**	**467**	**0**	**0**
Spring Creek												
Grade K-2034	70	70	70	70	72	72	71	71	71	71		
Grade 1-2033	62	63	63	63	64	64	64	63	62	62		
Grade 2-2032	74	74	73	73	73	73	74	74	75	75		
Grade 3-2031	87	86	86	86	86	87	89	89	90	90		
Grade 4-2030	76	76	76	76	76	76	77	77	78	78		
Grade 5-2029	82	81	81	81	82	82	82	82	81	80		
Total	**451**	**450**	**449**	**449**	**453**	**454**	**457**	**456**	**457**	**456**	**0**	**0**
Bridgewater												
Grade K-2034	83	83	83	83	84	84	83	83	82	83		
Grade 1-2033	89	89	89	89	89	90	88	88	88	88		
Grade 2-2032	91	91	91	91	92	91	91	91	91	91		
Grade 3-2031	100	100	99	99	98	98	98	98	98	100		
Grade 4-2030	93	93	93	93	93	94	93	93	93	93		
Grade 5-2029	93	94	94	94	95	95	95	94	94	94		
Total	**549**	**550**	**549**	**549**	**551**	**552**	**548**	**547**	**546**	**549**	**0**	**0**
Middle School												
Grade 6-2028	304	303	303	304	304	307	308	308	307	307		
Grade 7-2027	305	302	299	298	294	295	293	290	290	291		
Grade 8-2026	299	294	294	295	297	299	299	299	297	291		
Total	**908**	**899**	**896**	**897**	**895**	**901**	**900**	**897**	**894**	**889**	**0**	**0**
High School												
Grade 9-2025	344	344	342	342	343	337	335	334	334	334		
Grade 10-2024	343	340	337	333	336	333	331	325	324	322		
Grade 11-2023	291	289	291	286	282	278	275	264	262	260		
Grade 12-2022	319	317	316	315	314	309	308	306	302	301		
Total	**1297**	**1290**	**1286**	**1276**	**1275**	**1257**	**1249**	**1229**	**1222**	**1217**	**0**	**0**
ALC												
Grade 9-2025	1	1	1	1	1	1	2	3	4	10		
Grade 10-2024	5	5	5	5	7	9	6	9	12	13		
Grade 11-2023	10	10	11	11	26	29	20	21	25	27		
Grade 12-2022	57	55	53	57	86	82	54	53	48	52		
Total	**73**	**71**	**70**	**74**	**120**	**121**	**82**	**86**	**89**	**102**	**0**	**0**
Grand Total	**3952**	**3933**	**3927**	**3922**	**3977**	**3987**	**3935**	**3938**	**3935**	**3955**	**0**	**0**
Full Time only (excluding EC and Part-time/Independent Study ALC)	3835	3824	3816	3810	3816	3816	3809	3792	3790	3785		

Northfield Public Schools Enrollment Report

Greenvale Park

Grade	Teacher		
K	Flicek	18	
K	Hagberg	17	
K	Kortbein	16	
K	Shroyer	18	
K	Ziemann	17	
1	Nivala	20	
1	Russell	20	C
1	Schultz	20	
1	Zach	19	
2	Amundson	20	C
2	Feldman	19	
2	Kelly	20	
2	Kohlbeck	19	
3	Alvarez, C.	20	C
3	Dimick	19	
3	Timerson	19	
3	Youngblut	17	
4	Collins	21	
4	Garcia	25	C
4	Hetzel	19	
4	McLaughlin	20	
5	Harding	18	
5	Sickler	23	
5	Tacheny	23	C
	TOTAL	**467**	

Spring Creek

Grade	Teacher		
	Berkvam		
K	Peter	17	
K	Heil, G	18	
K	Matson	18	
K	Rud	18	
1	Born	20	C
1	Craft	20	
1	Rodgers	22	
2	Benhart	19	C
2	Soderlund	18	
2	Spitzack	19	
2	Swenson	19	
3	Guggisberg	16	
3	Healy	18	
3	Hruby	16	
3	Jandro	16	
3	Sasse	24	C
4	Fox	21	
4	Hehr	20	
4	Kodada	20	
4	McManus	17	C
5	Baragary	18	
5	Malecha	19	
5	Ostermann	21	C
5	Stulken	22	
	TOTAL	**456**	

Bridgewater

Grade	Teacher		
K	Cade	20	
K	Danielson	21	
K	Peterson	20	
K	Tran	22	
1	Charlton	21	
1	Haley	19	
1	Hall	23	
1	Lanza	25	C
2	Ellerbusch	18	
2	LaVoy	18	
2	Lofquist	18	
2	Rubin	19	C
2	Schwaab	18	
3	Larson	23	C
3	Polzin	25	
3	Sickler	26	
3	Truman	26	
4	Robertson	23	
4	Ryan	23	
4	Schuster	23	
4	Swenson	24	C
5	DeVries	18	C
5	Duchene	25	
5	Holden	26	
5	Kohl	25	
	TOTAL	**549**	

Middle School

	Total
Grade 6-2028	307
Grade 7-2027	291
Grade 8-2026	291
TOTAL	**889**

High School

	Total
Grade 9-2025	334
Grade 10-2024	322
Grade 11-2023	260
Grade 12-2022	301
TOTAL	**1217**

ALC

	F/T	**P/T	**I/S	Total
Grade 9-2025	4	0	6	10
Grade 10-2024	10	1	2	13
Grade 11-2023	22	0	5	27
Grade 12-2022	33	0	19	52
TOTAL	**69**	**1**	**32**	**102**

	Regular	Portage	Total
Early Childhood**	137		137
Kindergarten-2034	240	3	243
Grade 1-2033	229	3	232
Grade 2-2032	244	5	249
Grade 3-2031	265	8	273
Grade 4-2030	256	2	258
Grade 5-2029	238	7	245
Total K-5	**1609**	**28**	**1637**
Total Middle School	**889**	**34**	**923**
Total High School	**1217**	**76**	**1293**
GRAND TOTAL	**3715**	**138**	**3853**
ALC 9-12			102
GRAND TOTAL w/ALC and Portage			3955
Full Time only (excluding EC and Part-time/Independent Study ALC)			3785

Early Childhood**

Dorey	12
Gross	12
Kremin	18
Kruse	7
Lattener	15
Matthews	14
O'Connor	8
Roth	9
Schlim	9
Schnorr	15
Waters	13
Webster	5
TOTAL	**137**

Portage

Grade	Teacher	
K	Bulfer	3
1	Bulfer	3
2	Weber	5
3	Weber	8
4	Haar	2
5	Haar	7
6	Holz	5
7	Holz	17
8	Holz	12
9	Holz	8
10	Schultz	16
11	Schultz	24
12	Schultz	28
	TOTAL	**138**