DEPARTMENT OF THE ARMY
U.S. ARMY CONTRACTING COMMAND – NEW JERSEY
PICATINNY ARSENAL, NEW JERSEY 07806-5000

REPLY TO
ATTENTION OF

26 May 2020

Army Contracting Command – New Jersey
ACC-NJ, Building 9
Picatinny Arsenal, NJ 07806

SUBJECT: Technical Direction Letter for Medical CRBN Defense Consortium (MCDC), Request for Prototype Proposals (RPP) 20-07, Objective DET-20-07 for "A Rapid Point of Care Assay for the Detection of the Asymptomatic Carrier State of COVID-19" (New Horizons Diagnostics Corp.)

REF: Request for Updated Proposal Submitted in Response to RPP 20-07 under OTA W15QKN-16-9-1002 for Objective DET-20-07, dated 14 May 2020

Advanced Technology International
ATTN: (b) (6), Senior Contracts Manager
315 Sigma Drive
Summerville, SC 29486

Dear (b) (6),

The Army Contracting Command – New Jersey (ACC-NJ), in supporting the Joint Project Manager – Medical Countermeasure Systems (JPM-MCS), issued MCDC RPP 20-07 on 05 May 2020. Members of the MCDC submitted proposals in accordance with this RPP. The Government received and evaluated all proposal(s) submitted and a Basis of Selection has been executed, selecting New Horizons Diagnostics Corp. (NHD) as the awardee. The Government requests that a Firm-Fixed-Price Agreement be issued to NHD to award this proposal under Other Transaction Agreement W15QKN-16-9-1002, to be performed in accordance with the attached Government Statement of Work (SOW).

Based upon the acceptable update of NHD's proposal for "A Rapid Point of Care Assay for the Detection of the Asymptomatic Carrier State of COVID-19" and 1) The Project Agreement Recipient's concurrence with the requirements included in the Government SOW; 2) An acceptable milestone schedule that meets SOW requirements, and; 3) The Cost Proposal that has been analyzed and negotiated final by the Government, you are hereby directed to issue a Project Agreement to NHD for the subject project. The total project value has been determined fair and reasonable and NHD's proposal has been selected IAW the above referenced Basis of Selection.

The total approved cost to the Government for this effort is not to exceed (b) (4). The break-out of the costs is as follows: $1,448,215.00 to perform project efforts included in the SOW and (b) (4) for the Consortium Management Firm Administrative Fee. The effort currently has (b) (4) of available funding, comprised of $1,448,215.00 for the Project Agreement and (b) (4) for the Consortium Management Firm Administrative Fee of (b) (4).

This Project Agreement is anticipated to be incrementally funded. The Government reserves the right to award future milestones/fund additional months of project tasks. If the Government decides to do so, the MCDC member will be notified via ATI. The Government's liability will never exceed the current amount of funding obligated under the Project Agreement. The Project Agreement Holder shall notify ATI when they are approaching 75% of current funding obligated in incurred costs by written notice.

The prime contractor is considered a small business, nontraditional defense contractor, or nonprofit research institution and determined to be providing a significant contribution. The affirmation of business status certifications submitted as part of the proposal are hereby incorporated into the agreement. The contractor shall notify the MCDC CMF of any deviation from the final proposed affirmation of business status certifications that would affect the contributions of the small business, nontraditional defense contractor, or nonprofit research institution as proposed.

In accordance with 10.U.S.C. 2371b(f), and upon a determination that the prototype project for this transaction has been successfully completed, this competitively awarded prototype OTA may result in the award of a follow-on production contract or transaction without the use of competitive procedures.

Points of Contact:

Agreements Specialist:
(b) (6)
E-mail: (b) (6)
Phone: (b) (6)

Agreements Officer:
(b) (6)
E-mail: (b) (6)
Phone: (b) (6)

Regards,

X (b) (6)

(b) (6)
Agreements Officer
Signed by: (b) (6)

Attachments:
Attachment 1: Encl 3_MCDC2007-003 SOW_14May2020 revdpt2

Statement of Work
For
Development of Prototype Diagnostic Tests for the Rapid and Accurate Diagnosis of Human SARS-CoV-2 Infection

RPP #: 20-07
Project Identifier: MCDC2007-003
Consortium Member: New Horizons Diagnostics Corp. (NHD)
Title of Proposal: A Rapid Point of Care Assay for the Detection of the Asymptomatic Carrier State of COVID-19
Requiring Activity: Defense Threat Reduction Agency (DTRA), Diagnostics/Detection Division (CBA)

1.0 INTRODUCTION, SCOPE, AND OBJECTIVES

1.1 Introduction

In response to the ongoing global Coronavirus Disease 2019 (COVID-19) pandemic, the Defense Threat Reduction Agency (DTRA), Joint Science and Technology Office (JSTO), in conjunction with the Joint Program Executive Office (JPEO), is interested in the rapid development, testing, and fielding of reliable and accurate tests that can be used to identify exposure to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). This pandemic has become a national security issue, affecting Department of Defense (DoD) Service members and their operational readiness across the world.

Since the outbreak of this novel coronavirus began in the United States, the principal diagnostic testing regimen utilizes a molecular test prepared by the Centers for Disease Control (CDC). This high complexity assay requires nasal pharyngeal swab collection and transport to a laboratory, nucleic acid extraction, and subsequent analysis. Sensitive and precise, it detects the presence of the virus Ribonucleic Acid (RNA) in the patient. As of April 2020, many other molecular tests have achieved Emergency Use Authorization (EUA) from the Food and Drug Administration (FDA). The FDA has issued an EUA for molecular assays, including the Biofire COVID-19 test, and Cepheid's Xpert Xpress SARS-CoV-2 test—these approvals pave the way for inclusion of COVID-19 diagnostic testing on DoD's Next Generation Diagnostics System (NGDS) family of platforms, and accelerate the rollout of these testing capabilities across US military installations. Molecular testing will continue to be critical in the identification and control of COVID-19, in order to protect the health of the warfighter.

However, there are applications for which these existing molecular diagnostic tools are suboptimal. In situations when viral RNA is not detectable, molecular diagnostics alone are ineffective for identifying exposure to SARS-CoV-2. Serological tests (also called antibody tests) may complement molecular assays in these situations, to enhance diagnostic accuracy, especially late in infection. Serological assays measure the patient's immune response to an infection. Several days after initial infection, the body's adaptive immune response begins to produce antibodies. During the initial response, specific IgA and IgM (Immunoglobulins) molecules begin to circulate. (b) (4) offers protection, particularly for respiratory pathogens that enter through the lungs

or (b) (4) membranes. The presence of specific IgM is indicative of an ongoing infection and the body's attempt to clear the pathogen. In the days following the steep IgM rise, a class switching recombination to IgG subtypes is observed. The IgG antibodies tend to persist for a longer period of time and provide immunological "memory" to prevent re-infection. Certain groups of predominantly IgG antibodies are considered "neutralizing," as these are capable of binding and preventing viral infection of host cells. This is a novel Coronavirus, and current literature suggests that individual titers of immunoglobulins (IgA, IgM, IgG, and neutralizing antibodies) generated in response to SARS-CoV-2 infection, are highly variable. It is also currently unknown whether the presence of any of these antibodies confer protection from illness due to re-infection, and if so, what antibody titers are protective. In spite of these knowledge gaps, COVID-19 antibody tests are expected to support Force Health Protection by delivering critical information on burden of infection, disease pathogenesis, asymptomatic infections, basic reproduction number, and the overall mortality of the COVID-19 among military personnel. Additionally, point-of-care tests targeting SARS-CoV-2 antigens, or the antibody response, are expected to further support rapid diagnosis and screening. There is also a need for laboratory based confirmatory serological tests.

This virus is not only spread by those visibly sick, but also by individuals who are not aware they harbor the virus. In fact, in the state of Washington, the first significant outbreaks in the United States, more than half of the residents of a Seattle-area nursing home with an early outbreak of COVID-19 cases, who tested positive for SARS-CoV-2, were asymptomatic. Of the 76 residents of the nursing home, 48 (63%) tested positive; of the 48 who tested positive, 27 (56%) were asymptomatic at the time of testing. 24 residents subsequently developed symptoms with the median time to symptom onset of 4 days. Specimens from these 24 viral-positive patients who were pre-symptomatic at testing (71%), had viable virus culture 1 to 6 days before developing symptoms. Transmission from asymptomatic individuals infected with SARS-CoV-2, most likely contributed to the rapid and extensive spread of infection to other residents, staff and beyond.

In another example, USS Theodore Roosevelt from March to April 2020, a number of crew members became infected with COVID-19 during a shore-leave in Vietnam. Subsequently, the virus spread throughout the ship. From the testing of 4,900 crew (94% tested), 600 (12.5%) tested positive with 360 of those (60%) asymptomatic. This further underscores the threat that this virus may pose, and accentuates the need to easily and rapidly screen asymptomatic, or those with minimal symptoms of the virus. A further gap is the ability to triage those sick with the normal flu and COVID-19.

1.2 Scope

Throughout the industry, many have proposed the extensive use of serological, antibody-based assays. Most antibody tests detect IgG and IgM to determine if a person has previously been infected with COVID-19, an indication that they've had the virus and now may be immune to the virus (SARS-CoV-2). They may also be used for contact tracing. Many of these assays are not specific and do not determine immunity.

As previously mentioned, the most common assay to detect the virus in nasopharyngeal samples, is the real-time Reverse Transcriptase Polymerase Chain Reaction (PCR) (rRT-PCR). The PCR assay, however, requires sophisticated equipment and complex, expensive test reagents.

Additionally, the nasopharyngeal sample is not conducive to self-collection. A rapid and simple point of care assay which only requires a (b) (4) sample, which would offer convenience and ease of use, combined with accuracy, would provide significant benefit to disease management. The (b) (4) assay would allow for continuous and simple monitoring, determining presence of SARS-CoV-2, and allowing for the control of infected individuals and reduction in the spread of the COVID-19. This would be a state-of-the-art, rapid COVID-19 Point-of-Care (POC) viral screening assay.

This prototype project will provide diagnostic and detection capability, in order to individually identify the causative agent of the COVID-19 via (b) (4) samples and IgA, IgM, and IgG from blood and sera, as well as other samples. The proposed diagnostics will have clinical sensitivity at or greater than 90%, with clinically relevant samples such as (b) (4) for the LFI, as well with Enzyme-Linked Immunosorbent Assay (ELISA) using whole blood, capillary blood, plasma, serum and others. For COVID-19, the utilization of (b) (4) has the potential to detect asymptomatic and symptomatic, including carriers of SARS-CoV-2. The utilization of (b) (4) with the LFI assay, allows for the simple POC use. The proposed diagnostic technology will be ready for pre-submission for FDA EUA clearance, at the conclusion of this project.

1.3 Objective

This prototype project seeks to develop a complementary diagnostic capability, to be used in conjunction with NGDS, in support of the Warfighter. The capability will be developed rapidly, in order for its benefits to impact the course of the current outbreak. In accordance with the Government's request, NHD's proposed diagnostic capability will complement the existing NGDS family of systems, to improve patient health outcomes and force health decisions, and align with JSTO's internal technology development strategy. NHD's development efforts may also produce reagents that enhance the development or accuracy of these desired diagnostic tests (e.g. high quality antigens, antibodies, or SARS-CoV-2 antigen assays that may be used at the point-of-care). The assays need to meet the current standards set by the FDA guidance for EUA for COVID-19 assays. These standards are evolving as the Government learns more about human immunological responses, and as more diagnostic tests are approved, and the promise and perils associated with their use is reported. NHD will provide assays for independent validation and verification to a federal laboratory identified by DTRA at the end of phase 1. In phase 2, NHD will also need to pursue FDA EUA authorization, and be prepared to scale up production of their diagnostic assays to meet the anticipated demands.

This is a prototype project because NHD will develop a Point of Care Lateral Flow Assay for detection of (b) (4) associated with the COVID-19, to evaluate the technical feasibility of using the assay to determine asymptomatic and symptomatic COVID-19 infection, by use of a simple, easy to obtain (b) (4) sample. This assay will allow for the triage of patients, as well as identify the asymptomatic potential carriers/spreaders of the SARS-CoV-2. This will assist in maintaining military readiness, control resources, and save lives.

(b) (4)

(b) (4) [redacted] This assay can be performed at home, work, forward deployed, etc. This is a typical Clinical Laboratory Improvement Amendments (CLIA)-like waived format.

Considering the (b) (4) [redacted] target is novel, there will be a need for clinical testing of a work-in-process first generation prototype. After challenged with the actual patient samples, there will be an opportunity for further optimization. After this modification, there will be further testing, now of the second generation prototype. This is the Go/No-Go point. If successful at detecting, then expanded testing for EUA submission can be performed. The initial first generation prototype will be provided after the first 2-3 months of development. Including further development with first and second generation testing, prior to scale up, the acceptable prototype (after 2nd generation) may be available after 3-5 months. Further testing in compliance with FDA requirements, as well as scale-up, will result in as much as 7-8 months of project schedule.

In accordance with 10.U.S.C. §2371b(f), and upon a determination that the prototype project for this transaction has been successfully completed, this competitively awarded prototype OTA may result in the award of a follow-on production contract or transaction without the use of competitive procedures. If follow-on production is desired by the Government, production would need to support approximately 20,000 advanced prototypes for testing and evaluation, and significant production to support the United States requirements to support the COVID-19 response, with potentially hundreds of thousands needed. This prototype project will be successfully completed if the contractor meets the key technical goals of the project, as listed within this document, meets the success metrics established by this agreement or, at the accomplishment of particularly favorable or unexpected results that justifies transition to production.

If there is a conflict between the Project Agreement and the Base Agreement, the Project Agreement language will supersede and control the relationship of the parties.

2.0 APPLICABLE REFERENCES

Documents incorporated as part of the requirements, include the current FDA Guidance: "Policy for Diagnostic Tests for Coronavirus Disease-2019 during the Public Health Emergency," Revised May 11, 2020.

3.0 REQUIREMENTS

For this prototype project, NHD will develop FDA-EUA authorized diagnostic lateral flow assays for the detection of (b) (4) [redacted], as an indication of COVID-19 infection in clinical (b) (4) samples. A second objective is NHD development of a standard ELISA format for detection of IgA, IgM, and IgG in blood and sera for a serological assay, for an indication of exposure and potential protection. Additionally, NHD will work to allow for detecting these targets in other clinical samples, as a potential field standard method.

Project Tasks and Risk -

1. NHD shall develop a lateral flow assay for the (b) (4) from (b) (4) samples.

Technical Task: (a) NHS shall optimize (b) (4) antibody detection in a lateral flow assay; Final lateral flow assay for IgA related targets direct from (b) (4) sample.

Risk: The (b) (4) antigens are available, and the initial (b) (4) has been utilized in a prototype serological assay. Several (b) (4) antibodies are available commercially. One of these antibodies has been utilized in serological assay. Conversely, if (b) (4) antibodies are needed, the (b) (4) has also been utilized in a lateral flow format. Other antibodies are also available. The various formats will be included in the first generation prototype testing, in order to determine the more sensitive and specific format selected for optimization.

2. NHD shall test and demonstrate clinical (b) (4) matrixes are suitable for the detection of (b) (4) in the diagnosis of COVID-19 in a lateral flow assay developed in objective 1.

Technical Tasks: (a) NHD shall use the lateral flow assay to detect clinically relevant concentrations of (b) (4) samples.

Risk: The (b) (4) Matrix will not meet detection requirements. Risk for (b) (4) is low, as there are commercially available (b) (4) collection kits, and there is significant 3rd party data supporting performance of (b) (4) as sample for (b) (4)

(b) NHD shall execute appropriate clinical trials of the (b) (4) lateral flow assay for COVID-19 diagnosis.

Risk: Lateral Flow Immunoassay will not meet requirements. The clinical trials will not be initiated unless parameters are met in the lab testing, and after the first generation prototype provides at least minimally acceptable results, in terms of detection. Historical experience with clinical samples with the LFI, minimizes overall risk.

3. NHD shall develop an ELISA test with antigens and antibodies against IgA, IgM, and IgG for the determination of immune response to the COVID-19 in whole blood, as well as detection of the targets in other samples.

Technical Task: (a) NHD shall develop an ELISA test for IgA, IgM, and IgG antibodies in sera or blood, with high specificity and sensitivity.

Risk: The ELISA is not sufficient or sensitive to detect the specific IgA, IgM, and IgG antibodies. The ELISA format is well-known and the antigens from (b) (4) have been evaluated in other formats with acceptable results. Other antigens and antibodies are commercially available.

4. NHD shall execute appropriate clinical trials of the ELISA for IgA, IgM, and IgG for determination of exposure to COVID-19 in blood or sera.

Risk: The ELISA format provides for unacceptable performance in development of assay, and would prevent clinical trials. Risk as stated above, is minimal. The assay will be evaluated during the first generation prototype testing.

Project Technical Tasks Summary -

1. NHD shall optimize antigens (b) (4) and antibody (b) (4) complex for LFI and IgA, IgM, and IgG for the ELISA format for the COVID-19. (NHD will determine the optimum antigens and antibodies)

2. NHD shall optimize the lateral flow assay for related antigens (b) (4) and antibodies for (b) (4) in buffer and simulated samples, and IgA, IgM, and IgG in ELISA. (NHD will transfer optimized antigens and antibodies in the formats)

3. NHD shall use the lateral flow assay and ELISA to detect clinically relevant concentrations of targets in buffer, simulated sample, whole blood samples or serum samples. (NHD will concurrently evaluate COTS (b) (4) collection kits)

4. NHD shall conduct a field trial of the lateral flow assay (separate LFI for (b) (4)) and ELISA IgA, IgM, and IgG for COVID-19 diagnosis/detection. (NHD will conduct appropriate clinical sample testing of first generation prototypes)

5. NHD shall optimize Lateral flow Immunoassay for the detection of (b) (4) and ELISA IgA, IgM, and IgG for high specificity and sensitivity.

6. NHD shall use the lateral flow assay to detect clinically relevant concentrations of (b) (4) samples and ELISA format to detect IgA, IgM, and IgG in blood, sera and other samples. (NHD will conduct appropriate clinical sample testing of second generation prototypes)

7. NHD shall conduct bench testing of the lateral flow assay for (b) (4) and ELISA for IgA, IgM, and IgG.

8. NHD shall conduct all activities to execute scale-up of the LFI and ELISA systems.

9. NHD shall conduct all activities required for submission of EUA of the LFI-(b) (4) and ELISA IgA, IgM, and IgG in sera and blood, as well as other samples for COVID-19.

Technical Strategy and Innovations -

1. Demonstrate and test clinical (b) (4) matrixes suitable for detection of (b) (4), for the diagnosis of COVID-19 with the lateral flow assay developed in objective 1.

Technical Solution: The (b) (4) sample matrixes will be tested as the clinical samples to apply to the assay. If necessary, a (b) (4) agent may be added to enhance presentation of the (b) (4) to the assay, and provide improved assay performance.

2. The LFI and ELISA require improved sensitivity and specificity.

Technical Solution: Review available (b) (4) as well as (b) (4) antibodies from the (b) (4) and other sources. Additionally, engage the use of (b) (4)

3. Improved sensitivity of LFI ((b) (4)

Technical Solution: NHD Standard Operating Procedures (SOP) will be used to (b) (4)

4. Improved binding and "clean results" (b) (4)).

Technical Solution: Using NHD SOP (b) (4)

Mandatory Reporting -

Quarterly Reports: The MCDC awardee shall prepare a Quarterly Report, which will include a Technical Status Report and a Business Status Report, in accordance with the terms and conditions of the MCDC Base Agreement.

Annual Technical Report: The MCDC awardee shall prepare an Annual Technical Report for projects whose periods of performances are greater than one (1) year, in accordance with the terms and conditions of the MCDC Base Agreement. This may be combined with the concurrent quarterly report.

Final Technical Report: At the completion of the project, the MCDC awardee will submit a Final Technical Report, which will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the project, in accordance with the terms and conditions of the MCDC Base Agreement. Once the MCDC management firm has informed the MCDC awardee that the Final Technical Report has been approved by the Government, the MCDC awardee shall forward a copy to the Defense Technical Information Center, Attn. DTIC-O, 8725 John J. Kingman Road, Suite 0944, Fort Belvoir, VA 22060-6218.

Final Business Status Report: At the completion of the project, the MCDC awardee will submit a Final Business Status Report, which will provide summarized details of the resource status of the project, in accordance with the terms and conditions of the MCDC Base Agreement.

Project Task Timeframe:

	Task	Timeframe
1	Assay Design: (b) (4) etc.:	2-4 weeks
	FDA EUA Preparation	
	Preliminary Design Review	
2	Antigen and Antibody Chemistries Development:	4-6 weeks
	COVID-19 Antigen Prototype Optimization	
	COVID-19 Antibody Prototype Optimization	
3	Assay and Sample Conditions: (can be concurrent with #s 1 & 2)	2-4 weeks
	Positive and Negative Controls Development	
4	First Generation Prototype Field Testing: (PCR, ELISA, Serological, & (b) (4)	2-3 weeks
	Optimize for Clinical Matrices	
5	Optimization of Device, Combining Chemistries into Assay System	1-3 weeks
	Bench Studies Meeting/Protocols Development	
6	Second Generation Prototype Testing and Revision	2-4 weeks
	Conduct Bench-Field Studies	
7	Production Scale up, Stability, Additional Analytical Testing	3-4 weeks
	Develop and Submit Bench Studies Reports	
8	FDA EUA	4-8 weeks
	FDA EUA Approval Phase Support	
9	Prototype Project Management and Reporting	35 weeks
10	FDA, Microbiology, and (b) (4) Consultant Support	35 weeks
11	Quality Control Inspection, Testing, and Monitoring	35 weeks
	Total Period of Performance:	**35 weeks**

Project Deliverable Tasks

Del. #	Deliverable Description	Due Date
3.1	FDA EUA Teleconference Meeting Minutes	6/15/20
3.2	Preliminary Design Specifications for LFI/ELISA	6/30/20
3.3	Preliminary Design Review Meeting Minutes	6/30/20
3.4	Draft Package Insert	7/31/20
3.5	First Prototype Pre-Clinical Testing Study Report	8/31/20
3.6	Risk Analysis Master Record	8/31/20
3.7	Second Prototype Selection Meeting Minutes	9/30/20
3.8	Design Transfer Meeting Minutes	9/30/20
3.9	Bench Study Meeting Minutes	8/31/20
3.10	Bench Study Protocols	8/31/20
3.11	Clinical Study Meeting Minutes	8/31/20
3.12	Design Verification Meeting Minutes	9/30/20

3.13	Monthly/Quarterly Progress and Financial Status Reports	6/30/20-12/31/20
3.14	Final Closeout Report - Due 30 days after Completion of Effort	1/31/2021
3.15	Draft Device Master Record	10/31/2020
3.16	Device History Record for Three (3) Lots	12/31/2020
3.17	Final Bench Study Protocols	10/31/2020
3.18	Limit of Detection/Matrix Comparison	10/31/2020
3.19	Bench Study Reports	9/30/2020
3.20	Final Clinical Study Protocol	10/31/2020
3.21	Second Prototype Clinical Study	10/31/2020

4.0 DELIVERABLES

Del. #	Deliverable Description	Due Date	Milestone Ref	SOW Ref	Gov't Role	Data Rights
4.1	FDA EUA teleconference meeting minutes	6/15/20	5.1	3.1	Review/ Comment	Govt purpose
4.2	Preliminary design specifications for LFI/ELISA	6/30/20	5.2	3.1	Review/ Comment	Govt purpose
4.3	Preliminary design review meeting minutes	6/30/20	5.2	3.1	Review/ Approve	Govt purpose
4.4	Draft package insert	7/31/20	5.4	3.5.1	Review/ Comment	Govt purpose
4.5	First prototype pre-clinical testing & study report	8/31/20	5.6	3.2.7	Review/ Comment	Govt purpose
4.6	Risk analysis master record	8/31/20	5.6	3.1	Review/ Comment	Govt purpose
4.7	Second prototype selection meeting minutes	9/30/20	5.8	3.1	Review/ Approve	Govt purpose
4.8	Design transfer meeting minutes	9/30/20	5.8	3.4.3	Review/ Comment	Govt purpose
4.9	Bench study meeting minutes	8/31/20	5.6	3.5.1	Review/ Comment	Govt purpose
4.10	Bench study protocols	8/31/20	5.6	3.5	Review/ Comment	Govt purpose
4.11	Clinical study meeting minutes	8/31/20	5.6	3.7.1	Review/ Comment	Govt purpose
4.12	Design verification meeting minutes	9/30/20	5.8	3.5	Review/ Comment	Limited

4.13	Monthly/Quarterly progress annual and financial status reports	6/30/20 - 12/31/20	5.3, 5.5, 5.7, 5.9, 5.11, 5.13	3.3	Review/ Approve	Govt purpose
4.14	Final closeout report - due 30 days after completion of effort	1/31/2021	5.16	3.3	Review/ Approve	Govt purpose
4.15	Device master record	10/31/2020	5.10	3.6.1	Review/ Comment	Limited
4.16	Device history record for three (3) lots	12/31/2020	5.16	3.6	Review/ Comment	Limited
4.17	Final bench study protocols	10/31/2020	5.10	3.5.2	Review/ Comment	Govt purpose
4.18	Limit of detection/matrix comparison	10/31/2020	5.10	3.5.5	Review/ Comment	Govt purpose
4.19	Bench study reports	9/30/2020	5.8	3.5.16	Review/ Comment	Govt purpose
4.20	Final clinical study protocol	10/31/2020	5.20	3.7.2	Review/ Comment	Govt purpose
4.21	Second generation clinical study	10/31/2020	5.10	3.7.9	Review/ Comment	Govt purpose

5.0 MILESTONE PAYMENT SCHEDULE

MS #	Task #	Milestone Description (Deliverable Reference)	Due Date	Total Program Funds
5.1	3.1	FDA EUA Discussions, Initial Team Teleconference, FDA EUA Teleconference Meeting Minutes; Deliverable 4.1	6/15/2020	(b) (4)
5.2	3.2 3.3	Initial LFI Prototype, Initial ELISA Prototype, Design Specifications; Deliverable 4.2 Preliminary Design Review Meeting Minutes; Deliverable 4.3	6/30/2020	(b)
5.3		Quarterly Report; Deliverable 4.13	6/30/2020	(b) (4)
5.4	3.2 3.3	Optimization Data, Revised Design Specifications, Revised Design Plan, Initial Positive/Negative Controls, Initial Clinical Matrices, Initial Draft Package Inserts; Deliverable 4.4	7/31/2020	(b)
5.5		Monthly Report; Deliverable 4.13	7/31/2020	(b) (4)
5.6	3.5 3.3	Bench Study Meeting Minutes; Deliverable 4.9 Bench Study Protocols; Deliverable 4.10	8/31/2020	(b)

		Optimize for Clinical Matrices; Deliverable 4.11 First Prototype Pre-Clinical Testing, Revised Draft Package Insert, Initiate Bench Study Reports; Deliverable 4.5 Risk Analysis Master Record; Deliverable 4.6		
5.7		Monthly Report; Deliverable 4.13	8/31/2020	(b) (4)
5.8	3.5 3.3	Remaining Bench Study Reports; Deliverable 4.19 Prototype Selection Meeting Minutes; Deliverable 4.7 Design Transfer Meeting Minutes; Deliverable 4.8 SOPs, Design Verification Meeting Minutes; Deliverable 4.12	9/30/2020	
5.9		Annual Report; Deliverable 4.13	9/30/2020	(b) (4)
5.10	3.5 3.4 3.3 3.2	Operator Training, Training AAR, Initiate FDA EUA Phase, Device Master Record; Deliverable 4.15 Final Bench Study Protocols; Deliverable 4.17 Limit of Detection/Matrix Comparison; Deliverable 4.18 Final Clinical Study Protocol; Deliverable 4.20 Clinical Study Report; Deliverable 4.21 Lot 1 - Initiate Production of 1,000 LFI Devices/100 ELISA Devices, Second Gen Clinical Study; 4.21	10/31/2020	
5.11		Monthly Report; Deliverable 4.13	10/31/2020	(b) (4)
5.12	3.6	Lot 2 - Initiate Production of 1,000 LFI Devices/100 ELISA Devices, Deliver 1,000 LFI Devices/100 ELISA Devices	11/30/2020	
5.13	3.3	Monthly Report; Deliverable 4.13	11/30/2020	(b) (4)
5.14	3.6	Lot 3 - Initiate Production of 1,000 LFI Devices/100 ELISA Devices	12/31/2020	
5.15		Quarterly Report; Deliverable 4.13	12/31/2020	(b) (4)
5.16	3.6 3.7	FDA EUA Submission Package, FDA Comments, FDA Response Document, Device History Record; Deliverable 4.16 Closeout Report; Deliverable 4.14	1/31/2021	(b) (4)
			Total Cost (FFP):	**$1,448,215**
			Period of Performance:	**8 Months**

*The Due Dates and Funding Amounts listed in this Milestone Schedule are contingent upon funds available. In accordance with Section 5, Incremental Funding, this Project Agreement is funded at the amount specified, and any work performed in excess thereof shall be at the Project Agreement Holder's risk.

6.0 SHIPPING PROVISIONS

The contractor shall submit Quarterly, Annual, and final reports in accordance with the Base Agreement to deliverables.mcdc.ati.org. All deliverables intended for the AOR shall be delivered in electronic format to the AOR and alternate AOR, as identified within this document.

A copy of all data deliverables shall be sent to:

usarmy.detrick.dod-jpeo-cbrnd.mbx.otadeliverable@mail.mil

7.0 DATA RIGHTS AND COPYRIGHTS

The contractor shall comply with the terms and conditions defined in the MCDC Base Agreement. The table below identifies pre-existing technical data and computer software with restrictions that may be used during performance of this Agreement. The Government shall receive a Government Purpose Rights license to all technical data and computer software developed and delivered under this Agreement, except for the pre-existing technical data and computer software that was previously developed exclusively at private expense and identified in the table below. To the maximum extent practicable, segregable portions of deliverables that will be restricted shall be clearly identified and labeled. If, after award, the contractor wishes to use any other internally developed technical data or computer software, or any other pre-existing proprietary information not identified in the table below, then the contractor shall disclose its intent in writing to the MCDC CMF prior to its use, and shall receive written approval from the Agreements Officer prior to proceeding. All technical data and computer software developed or delivered under this Agreement shall have appropriate data rights markings in accordance with DFARS 252.227-7013(f) and 7014(f). The contractor asserts that all contractor owned or background patents that affect the Government's rights in the deliverables anticipated under this Agreement are identified in the table below.

Technical Data to be Furnished with Restrictions	Basis for Assertion	Asserted Rights Category	Name of Corporation Asserting Restrictions	Deliverables Affected
Assay production methods	Developed at private expense	Limited rights	NHD Corp.	3.2, 3.3, 3.4, 3.4.4, 3.5, 3.6, 3.7, 3.8
(b) (4)	Developed at private expense	Limited rights	NHD Corp.	3.2, 3.3, 3.4, 3.4.4, 3.5, 3.6, 3.7, 3.8
Use of (b) (4) for detection of (b) (4) Covid-19	Developed at private expense	Limited rights	NHD Corp.	All

7.1 Government Rights

The Project Agreement Holder (PAH) agrees to the following:

a. The PAH will provide to the Government all data including top-line summaries and key conclusions from all studies supporting the regulatory filing and commercial approval to the extent

that such data, summaries, and conclusions are funded by this agreement. In addition, the PAH will offer the Government the opportunity to review and provide comments on a final draft of regulatory submissions which include data funded by this agreement. The Government will review any such submissions promptly upon receipt. The PAH will reasonably consider any comments provided by the Government, and prior to submission will provide notification to the Government of any additional edits or revisions. The PAH will keep the Government apprised of planned FDA meetings and post-meeting outcomes relating to activities funded by this agreement.

b. Communications. PAH will provide the Government with copies of all communications, both formal and informal, to or from FDA, regarding the Technology within 48 hours, and ensure that the Government representatives are invited to participate in any formal or informal Sponsor meetings with FDA;

c. Non-compliance with section (a. & b.) may result in termination of the agreement.

d. Product Development Failure. Certain product development failures may trigger certain remedies in Section "e." below for the Government advanced developer funding the development of this Technology. This remedy is not available to the Government for any cause outside of the following:

(i) if this agreement is terminated for nonperformance,

(ii) the PAH fails to obtain FDA approval within the operationally relevant timeframe determined by the Government after the award of this agreement (e.g., 3 years), when FDA approval is a requirement;

(iii) the PAH fails to commercially market or provide an acceptable life cycle plan for continued supply of the Technology within three (3) years after FDA approval, licensure or clearance;

(iv) the PAH gives notice, required to be submitted to the Government no later than thirty (30) business days, of any formal management decision to terminate this product development effort pre-market or to file for Federal bankruptcy protection.

e. If any of the product development failures listed in Section "d." occur, the PAH, upon the request of the Government:

(i) shall transfer possession, ownership and sponsorship or holdership of any Regulatory Application (including any associated expedited review designation, priority review voucher, or marketing exclusivity eligibility or award), regulatory correspondence, and supporting regulatory information related to the Technology, to the Government or its designee;

(ii) shall inform FDA of the transfer of sponsorship or holdership of the Regulatory Application transferred under section (e)(i) above;

(iii) shall negotiate in good faith a non-exclusive license, at customary industry rates and under reasonable terms and conditions, to any patent, copyright or other intellectual property owned or

controlled by the PAH, developed prior to or outside the scope of this agreement, or any technical data that is necessary for the Government to pursue commercialization of this technology with a third party for sale to the Government or otherwise.

f. This clause will survive the acquisition or merger of the PAH by or with a third party. This clause will also be included in any subcontracts/sub-agreements relating to the development of the Technology. This clause will survive the expiration of this agreement.

8.0 SECURITY

The security classification level for this effort is UNCLASSIFIED. The contractor shall comply with the terms and conditions defined in the MCDC Base Agreement, as applicable.

9.0 MISCELLANEOUS REQUIREMENTS (SAFETY, ENVIRONMENTAL, ETC.)

N/A

10.0 GOVERNMENT FURNISHED PROPERTY/MATERIAL/INFORMATION

N/A

11.0 AGREEMENTS OFFICER'S REPRESENTATIVE (AOR) AND ALTERNATE AOR CONTACT INFORMATION

AOR

Name: (b) (6)
Telephone: (b) (6)
E-mail: (b) (6)
Office Symbol: DTRA RD-CBA

Alternate AOR

Name: (b) (6)
Telephone: (b) (6)
E-mail: (b) (6)
Office Symbol: DTRA RD-CBA

DEPARTMENT OF THE ARMY
U.S. ARMY CONTRACTING COMMAND – NEW JERSEY
PICATINNY ARSENAL, NEW JERSEY 07806-5000

REPLY TO
ATTENTION OF

07 July 2020

Army Contracting Command – New Jersey
ACC-NJ, Building 9
Picatinny Arsenal, NJ 07806

SUBJECT: Technical Direction Letter for Medical CRBN Defense Consortium (MCDC), Request for Prototype Proposals (RPP) 20-07, Objective 20-07 Ceiling Increase Modification for "A Rapid Point of Care Assay for the Detection of the Asymptomatic Carrier State of COVID-19"

REF: Request for Updated Proposal Submitted in Response to RPP-20-07 under OTA W15QKN-16-9-1002 for Objective 20-07 Modification, dated 17 June 2020

Advanced Technology International
ATTN: (b) (6), Senior Contracts Manager
315 Sigma Drive
Summerville, SC 29486

Dear (b) (6)

The Army Contracting Command – New Jersey (ACC-NJ), in supporting the Joint Project Manager – Medical Countermeasure Systems (JPM-MCS), issued a Request for Proposal Update under MCDC RPP-20-07, Objective 20-07 on 17 June 2020 to Advanced Technology International, for distribution to New Horizons Diagnostics Corp. (NHD). This request would allow NHD to incorporate tasks for a protein microarray using synthetic peptides, representing protein antigens that capture the potential future diversity of the evolving novel Coronavirus (SARS-CoV-2). The Government received the proposal update on 29 June 2020, and evaluated the costs and documentation accordingly. Based on the acceptable update of NHD's proposal, the Government is increasing the Project Agreement ceiling value by $1,461,544.00, from $1,448,215.00 to $2,909,759.00. The Government is also increasing the MCDC CMF Administrative Cost Ceiling by (b) (4), from (b) (4) to (b) (4) Please see the below table for additional details.

	MCDC2007-003 Current Ceiling	MCDC2007-003 Proposed Increase	MCDC2007-003 Revised Ceiling
Member Ceiling	$1,448,215.00	$1,461,544.00	$2,909,759.00
MCDC Admin Cost	(b) (4)	(b) (4)	(b) (4)
MCDC Admin Fee	(b) (4)	(b) (4)	(b) (4)
Total	(b) (4)	(b) (4)	(b) (4)

Work will be performed in accordance with the SOW, entitled, "Encl 3_MCDC2007-003 rev DPTverJun8_ACCREV_SR Edit 6.22 v6 DPT4" (See Attachment 1). NHD should utilize the not-to-exceed existing obligation amount of $1,448,215.00 to continue work on the project. This Project Agreement is anticipated to be incrementally funded. The Government reserves the right to award future milestones/fund additional months of project tasks. If the Government decides to do so, the MCDC member will be notified via ATI. The Government's liability will never exceed the current amount of funding obligated under the Project Agreement. The Project Agreement Holder shall notify ATI when they are approaching 75% of current funding obligated in incurred costs by written notice.

The prime contractor is considered a small business, nontraditional defense contractor, or nonprofit research institution and determined to be providing a significant contribution. The affirmation of business status certifications submitted as part of the proposal are hereby incorporated into the agreement. The contractor shall notify the MCDC CMF of any deviation from the final proposed affirmation of business status certifications that would affect the contributions of the small business, nontraditional defense contractor, or nonprofit research institution as proposed.

In accordance with 10.U.S.C. 2371b(f), and upon a determination that the prototype project for this transaction has been successfully completed, this competitively awarded prototype OTA may result in the award of a follow-on production contract or transaction without the use of competitive procedures.

Points of Contact:

Agreements Specialist:
(b) (6)
E-mail: (b) (6)
Phone: (b) (6)

Agreements Officer:
(b) (6)
E-mail: (b) (6)
Phone: (b) (6)

Regards,

X (b) (6)

(b) (6)
Agreements Officer
Signed by: (b) (6)

Attachments:
Attachment 1: Encl 3_MCDC2007-003 rev DPTverJun8_ACCREV_SR Edit 6.22 v6 DPT4

Statement of Work
For
Development of Prototype Diagnostic Tests for the Rapid and Accurate Diagnosis of Human SARS-CoV-2 Infection

RPP #: 20-07
Project Identifier: MCDC2007-003
Consortium Member: New Horizons Diagnostics Corp. (NHD)
Title of Proposal: A Rapid Point of Care Assay for the Detection of the Asymptomatic Carrier State of COVID-19
Requiring Activity: Defense Threat Reduction Agency (DTRA), Diagnostics/Detection Division (CBA)

1.0 INTRODUCTION, SCOPE, AND OBJECTIVES

1.1 Introduction

In response to the ongoing global Coronavirus Disease 2019 (COVID-19) pandemic, the Defense Threat Reduction Agency (DTRA), Joint Science and Technology Office (JSTO), in conjunction with the Joint Program Executive Office (JPEO), is interested in the rapid development, testing, and fielding of reliable and accurate tests that can be used to identify exposure to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). This pandemic has become a national security issue, affecting Department of Defense (DoD) Service members and their operational readiness across the world.

Since the outbreak of this novel coronavirus began in the United States, the principal diagnostic testing regimen utilizes a molecular test prepared by the Centers for Disease Control (CDC). This high complexity assay requires nasal pharyngeal swab collection and transport to a laboratory, nucleic acid extraction, and subsequent analysis. Sensitive and precise, it detects the presence of the virus Ribonucleic Acid (RNA) in the patient, by Real-Time Reverse Transcription Polymerase Chain Reaction (rRT-PCR). As of April 2020, many other molecular tests have achieved Emergency Use Authorization (EUA) from the Food and Drug Administration (FDA). The FDA has issued an EUA for molecular assays, including the Biofire COVID-19 test, and Cepheid's Xpert Xpress SARS-CoV-2 test—these approvals pave the way for inclusion of COVID-19 diagnostic testing on DoD's Next Generation Diagnostics System (NGDS) family of platforms, and accelerate the rollout of these testing capabilities across US military installations. Molecular testing will continue to be critical in the identification and control of COVID-19, in order to protect the health of the warfighter.

However, there are applications for which these existing molecular diagnostic tools are suboptimal. While the "Polymerase Chain Reaction" (PCR) detects the presence of RNA, it does not distinguish between living or dead. The RNA can reside in the body 1-2 months after viral clearance, indicating potential false positive results, if detected by the rRT-PCR test. In situations when viral RNA is not detectable, molecular diagnostics alone are ineffective for identifying exposure to SARS-CoV-2. Serological tests (also called antibody tests) may complement molecular assays in these situations, to enhance diagnostic accuracy, especially late in infection. Serological assays measure the patient's immune response to an infection. Several days after initial

infection, the body's adaptive immune response begins to produce antibodies. During the initial response, specific IgA and IgM (Immunoglobulins) molecules begin to circulate. (b) (4) offers protection, particularly for respiratory pathogens that enter through the lungs or (b) (4) membranes. The presence of specific IgM is indicative of an ongoing infection and the body's attempt to clear the pathogen. In the days following the steep IgM rise, a class switching recombination to IgG subtypes is observed. The IgG antibodies tend to persist for a longer period of time and provide immunological "memory" to prevent re-infection. Certain groups of predominantly IgG antibodies are considered "neutralizing," as these are capable of binding and preventing viral infection of host cells. This is a novel Coronavirus, and current literature suggests that individual titers of immunoglobulins (IgA, IgM, IgG, and neutralizing antibodies) generated in response to SARS-CoV-2 infection, are highly variable. It is also currently unknown whether the presence of any of these antibodies confer protection from illness due to re-infection, and if so, what antibody titers are protective. In spite of these knowledge gaps, COVID-19 antibody tests are expected to support Force Health Protection by delivering critical information on burden of infection, disease pathogenesis, asymptomatic infections, basic reproduction number, and the overall mortality of the COVID-19 among military personnel. Additionally, point-of-care tests targeting SARS-CoV-2 antigens, or the antibody response, are expected to further support rapid diagnosis and screening. There is also a need for laboratory based confirmatory serological tests.

This virus is not only spread by those visibly sick, but also by individuals who are not aware they harbor the virus. In fact, in the state of Washington, the first significant outbreaks in the United States, more than half of the residents of a Seattle-area nursing home with an early outbreak of COVID-19 cases, who tested positive for SARS-CoV-2, were asymptomatic. Of the 76 residents of the nursing home, 48 (63%) tested positive; of the 48 who tested positive, 27 (56%) were asymptomatic at the time of testing. 24 residents subsequently developed symptoms with the median time to symptom onset of 4 days. Specimens from these 24 viral-positive patients who were pre-symptomatic at testing (71%), had viable virus culture 1 to 6 days before developing symptoms. Transmission from asymptomatic individuals infected with SARS-CoV-2, most likely contributed to the rapid and extensive spread of infection to other residents, staff and beyond.

In another example, USS Theodore Roosevelt from March to April 2020, a number of crew members became infected with COVID-19 during a shore-leave in Vietnam. Subsequently, the virus spread throughout the ship. From the testing of 4,900 crew (94% tested), 600 (12.5%) tested positive with 360 of those (60%) asymptomatic. This further underscores the threat that this virus may pose, and accentuates the need to easily and rapidly screen asymptomatic, or those with minimal symptoms of the virus. A further gap is the ability to triage those sick with the normal flu and COVID-19.

1.2 Scope

Throughout the industry, many have proposed the extensive use of serological, antibody-based assays. Most antibody tests detect IgG and IgM to determine if a person has previously been infected with COVID-19, an indication that they've had the virus and now may be immune to the virus (SARS-CoV-2). They may also be used for contact tracing. Due to commonality between related viruses, many of these assays target less efficacious sites, which are not specific and do not determine immunity.

As previously mentioned, the most common assay to detect the virus in nasopharyngeal samples, is the rRT-PCR. The PCR assay, however, requires sophisticated equipment and complex, expensive test reagents. Additionally, the nasopharyngeal sample is not conducive to self-collection. A rapid and simple point of care assay which only requires a (b) (4) sample, which would offer convenience and ease of use, combined with accuracy, would provide significant benefit to disease management. The (b) (4) assay would allow for continuous and simple monitoring, determining presence of SARS-CoV-2, and allowing for the triage of infected individuals and reduction in the spread of the COVID-19. This would be a state-of-the-art, rapid COVID-19 Point-of-Care (POC) viral screening assay.

This LFI / Enzyme-Linked Immunosorbent Assay (ELISA) prototype project will provide diagnostic and detection capability, in order to individually identify the causative agent of the COVID-19 via (b) (4) samples and IgA, IgM, and IgG from blood and sera, as well as other samples. The proposed diagnostics will have clinical sensitivity at or greater than 90%, with clinically relevant samples such as (b) (4) for the LFI, as well with ELISA using (b) (4) plasma, serum and others. For COVID-19, the utilization of (b) (4) (b) (4) has the potential to detect asymptomatic and symptomatic, including carriers of SARS-CoV-2. The utilization of (b) (4) with the LFI assay, allows for the simple POC use. The proposed diagnostic technology will be ready for pre-submission for FDA EUA clearance, at the conclusion of this project.

Understanding the antibody response to SARS-CoV-2 proteins, may help identify biomarkers that can be used to detect and treat COVID-19 infection. However, only limited immuno-peptide microarray platforms exists that can perform such a broad based proteome-wide analysis.

This prototype Microarray, with multiple antigens targeting many different binding sites/antibodies on the virus, may be able to track any shifts in the virus, and with multiple variations on the array. Evolving over time, the pattern of mutation can be identified and detection and diagnostics strategies, as well as treatments, can be developed with this dynamic screening process. Currently, Microarrays are focused on the analysis of serum samples targeting IgG and IgM antibodies. There is currently no effort on the assessment of (b) (4) samples related to (b) (4) Also, there is only limited, if any, focus on (b) (4) in serum within Microarray systems. The NHD team will provide the only focus based project utilizing the (b) (4) samples with targets related to (b) (4) The selected microarray, both standard and developed, will provide a broad-based approach to understand the mutation of the SARS-CoV-2.

As previously discussed, the most common assay to detect the virus in nasopharyngeal samples, is the rRT-PCR. The PCR assay, however, requires sophisticated equipment and complex, expensive test reagents. Additionally, the nasopharyngeal sample is not conducive to self-collection. The state of the art serological assays utilize ELISA, Chemiluminescence, or other more sensitive and specific methods. The rapid and simple point of care assay, which only requires a (b) (4) sample, offers convenience and ease of use, combined with accuracy, would provide significant benefit to disease management.

Various institutes have developed and produced a new peptide microarray based on the SARS-CoV-2 viral genome. These are generally derived from the virus isolate Wuhan-Hu-1 (GenBank

ID: MN908947.3), and provide the SARS-CoV-2 Proteome Microarray, which gives researchers access to serologically screen 4,883 individual peptides spanning the entire viral proteome. However, there remains a need for (b) (4) sample analysis, as well as expansion of (b) (4) target sites. The NHD team will provide Peptide Microarray utilizing the (b) (4) samples with targets related to (b) (4) The selected microarray, both standard and developed, will provide a select-based approach.

This Microarray prototype project will provide for the expanded capability, in order to individually identify the active target sites for indicating current and evolving SARS-CoV-2. These peptide microarrays will focus on antibodies based (b) (4) for (b) (4) samples. The individual peptide proteins are printed on solid support, such as glass slides, which are probed with (b) (4) and analyzed on an imager to detect fluorescence patterns corresponding to SARS-CoV-2 seroreactivity. These arrays capture antibodies present in serum and (b) (4) from infected individuals, which are semi-quantified using fluorescent secondary antibodies. In this way, a comprehensive profile of targets that result after infection can be determined, that is characteristic of the latest SARS-CoV-2, both current and evolved, and the stage of disease. The differentially reactive antigens identified in this way, can be used to develop serodiagnostic and detection tests, as well as potential treatments and vaccines.

1.3 Objective

The LFI / ELISA prototype project seeks to develop a complementary diagnostic capability, to be used in conjunction with NGDS, in support of the Warfighter. The capability will be developed rapidly, in order for its benefits to impact the course of the current outbreak. In accordance with the Government's request, NHD's proposed diagnostic capability will complement the existing NGDS family of systems, to improve patient health outcomes and force health decisions, and align with JSTO's internal technology development strategy. NHD's development efforts may also produce reagents that enhance the development or accuracy of these desired diagnostic tests (e.g. high quality antigens, antibodies, or SARS-CoV-2 antigen assays that may be used at the point-of-care). The assays need to meet the current standards set by the FDA guidance for EUA for COVID-19 assays. These standards are evolving as the Government learns more about human immunological responses, and as more diagnostic tests are approved, and the promise and perils associated with their use is reported. NHD will provide assays for independent validation and verification to a federal laboratory identified by DTRA at the end of phase 1. In phase 2, NHD will also need to pursue FDA EUA authorization, and be prepared to scale up production of their diagnostic assays to meet the anticipated demands.

This is a prototype project because NHD will develop a Point of Care Lateral Flow Assay for detection of (b) (4) associated with the COVID-19, to evaluate the technical feasibility of using the assay to determine asymptomatic and symptomatic COVID-19 infection, by use of a simple, easy to obtain (b) (4) sample. This assay will allow for the triage of patients, as well as identify the asymptomatic potential carriers/spreaders of the SARS-CoV-2. This will assist in maintaining military readiness, control resources, and save lives.

(b) (4)

(b) (4) [redacted] This assay can be performed at home, work, forward deployed, etc. This is a typical Clinical Laboratory Improvement Amendments (CLIA)-like waived format.

Considering the (b) (4) target is novel, there will be a need for clinical testing of a work-in-process first generation prototype. After challenged with the actual patient samples, there will be an opportunity for further optimization. After this modification, there will be further testing, now of the second generation prototype. This is the Go/No-Go point. If successful at detecting, then expanded testing for EUA submission can be performed. The initial first generation prototype will be provided after the first 2-3 months of development. Including further development with first and second generation testing, prior to scale up, the acceptable prototype (after 2nd generation) may be available after 3-5 months. Further testing in compliance with FDA requirements, as well as scale-up, will result in as much as 7-8 months of project schedule.

The microarray prototype project seeks to develop a complementary capacity, to be used with other methods to support the warfighter. The capability will be developed rapidly, in order for its benefits to monitor any significant mutation or antigen drift with the virus, which may impact the course of current and future outbreaks. In accordance with the Government's request, NHD's proposed screening capability will complement the existing NGDS family of systems, to improve patient health outcomes and force health decisions, and align with JSTO's internal technology development strategy. NHD's development efforts will select identifying targets on the current virus, but may also, through the prior project phase, assist in selecting reagents that enhance the development or accuracy of desired diagnostic tests (e.g. high quality antigens, antibodies, or mutated SARS-CoV-2 antigen/antibody assays). The assays will be a tool to be used to create new assays or treatments. Although there are no current standards set by the FDA guidance for EUA for COVID-19 research assays, they will adhere to best practice standards. These standards are evolving, as the Government learns more about human immunological responses, and as more diagnostic tests are approved, and the promise and perils associated with their use is reported. NHD will provide assays for independent test development, validation, and verification to a federal laboratory identified by DTRA.

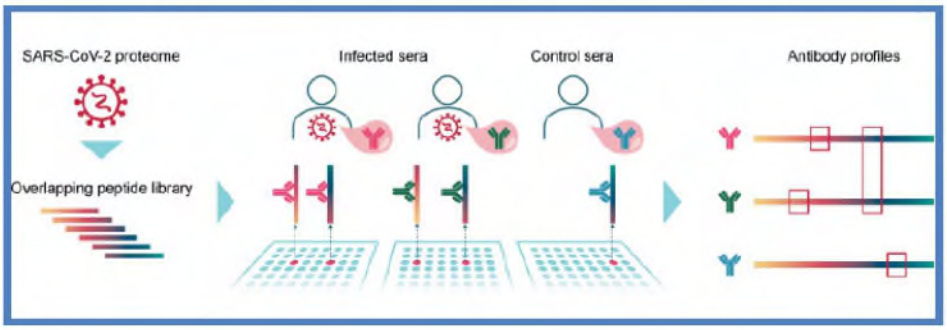
NHD's proposed peptide assay will be developed as an Antigen Microarray, in which select proteins derived from the (b) (4) and other select sites on the SARS-CoV-2, will be used to develop peptides which will printed on solid support, such as a glass slide or membrane, in the form of arrays. The individual peptides printed on these arrays, capture antibodies present in serum from infected individuals, which are then quantified using fluorescent secondary antibodies. Therefore, a comprehensive profile of antibodies that result after infection, can be determined, which will be helpful to determine the mutation or drift of the SARS-CoV-2. This may ultimately affect strategies for detection, diagnosis, or treatment, based on the "Old" or original virus. The differentially reactive antigens identified in this way, can be used to develop detection and diagnostic tests, or new treatments or vaccines. Initially, current peptide arrays will be evaluated for use with the initial viral serum and (b) (4) samples. As the virus mutates, modified peptide arrays will be developed, which will allow for the determination of mutated key sites on the new SARS-CoV-2. A total of 450 peptide array will be developed for sample testing.

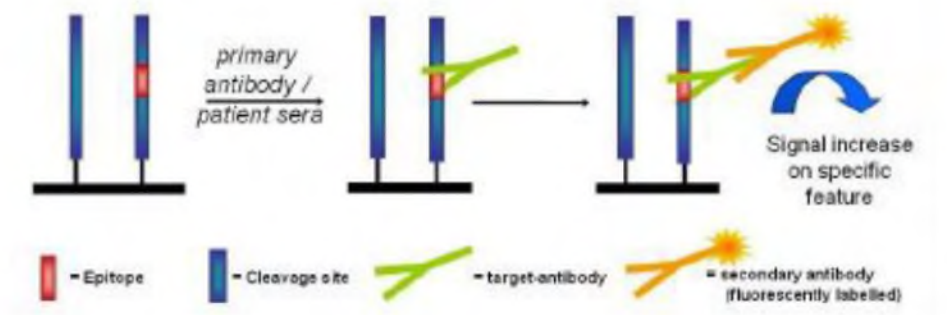
Organism Peptide Array:

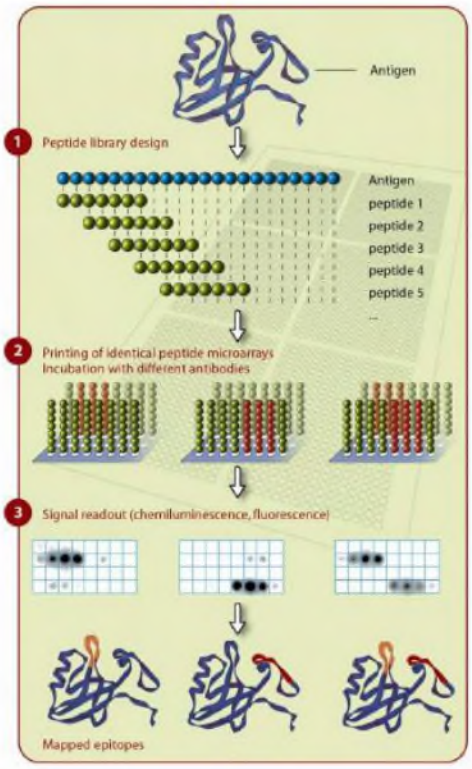
Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)

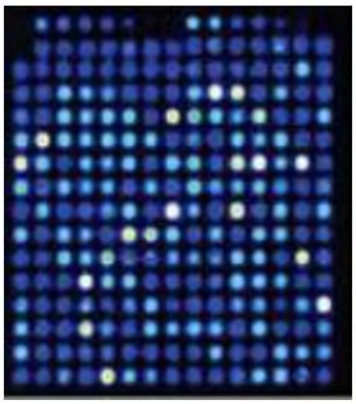
Content: Whole proteome of SARS-CoV-2 (GenBank ID: MN908947.3) translated into overlapping peptides.

Tests per Microarray: One (1) array with 4,883 peptides in duplicate.









Select peptides for the current SARS-CoV-2 are to be used on a peptide microarray for screening sera from patients. These arrays would be used at select centers as directed by DTRA (i.e. Nebraska/other, NHD, Singapore, or other) to periodically screen COVID-19 patient sera, in order to determine potential mutation or drift, as an alert to any changes in the virus, which may affect diagnostics or therapeutics / vaccines, and the medical/epidemiological strategies. Any significant mutation or drift may trigger NHD to produce revised peptide array slides, which would then be sent to the filed site(s) for testing and evaluation. This process may continue for several revisions of the peptide array slides.

The initial first generation peptide microarray prototype, will be provided after the first 2-3 months of development. The monitoring of sera at the designated field sites, will commence after validation of the first generation microarray prototype. Screening will occur every 2-3 months, as directed by DTRA. NHD will provide necessary microarray slides up to a maximum of 450 total prototype slides. As a significant drift is reported, NHD will develop a 2nd generation microarray. This second generation prototype will be made available after 2-3 months, after all information, including sequences and associated target data, is made available to NHD. The revised prototype will then be provided to the field for testing and evaluation. Once validated, the revised second generation peptide microarray prototype, will be provided to the designated field patient sample screening site for further serum screening, as directed by DTRA. A maximum of 450 total prototype slides will be provided. This process will continue as necessary, within the budget and schedule of the agreement.

In accordance with 10.U.S.C. §2371b(f), and upon a determination that the prototype project for this transaction has been successfully completed, this competitively awarded prototype OTA may

result in the award of a follow-on production contract or transaction, without the use of competitive procedures. If follow-on production is desired by the Government, LFI / ELISA production would need to support approximately 20,000 advanced prototypes for testing and evaluation, and significant production to support the United States requirements to support the COVID-19 response, with potentially hundreds of thousands needed. The peptide Microarray production would need to support approximately 2,000 advanced prototypes for testing and evaluation. This prototype project will be successfully completed if the contractor meets the key technical goals of the project, as listed within this document, meets the success metrics established by this agreement or, at the accomplishment of particularly favorable or unexpected results that justifies transition to production. The estimated Period of Performance for this effort should not exceed more than twelve (12) months from the date of award. Additional tasks with periods up to four (4) additional years, may be added to account for expanded tasks, product scale up, or to maintain a capability to continuously supply reagents and diagnostics.

If there is a conflict between the Project Agreement and the Base Agreement, the Project Agreement language will supersede and control the relationship of the parties.

2.0 APPLICABLE REFERENCES

Documents incorporated as part of the requirements, include the current FDA Guidance: "Policy for Diagnostic Tests for Coronavirus Disease-2019 during the Public Health Emergency," Revised May 11, 2020.

3.0 REQUIREMENTS

For this prototype project, NHD will develop FDA-EUA authorized diagnostic lateral flow assays for the detection of (b) (4) as an indication of COVID-19 infection in clinical (b) (4) samples. A second objective is NHD development of a standard ELISA format for detection of IgA, IgM, and IgG in blood and sera for a serological assay, for an indication of exposure and potential protection. Additionally, NHD will work to allow for detecting these targets in other clinical samples, as a potential field standard method.

3.1 LFI / ELISA Development (Phase 1)

Project Tasks and Risk -

1. NHD shall develop a lateral flow assay for the (b) (4) from (b) (4) samples.

Technical Task: (a) NHD shall optimize (b) (4) antibody detection in a lateral flow assay; Final lateral flow assay for IgA related targets direct from (b) (4) sample.

Risk: The (b) (4) antigens are available, and the initial (b) (4) (b) (4) has been utilized in a prototype serological assay. Several (b) (4) antibodies are available commercially. One of these antibodies has been utilized in serological assay. Conversely, if (b) (4) antibodies are needed, the (b) (4) has also been utilized in a

lateral flow format. Other antibodies are also available. The various formats will be included in the first generation prototype testing, in order to determine the more sensitive and specific format selected for optimization.

2. NHD shall test and demonstrate clinical (b) (4) matrixes are suitable for the detection of (b) (4) in the diagnosis of COVID-19 in a lateral flow assay developed in objective 1.

Technical Tasks: (a) NHD shall use the lateral flow assay to detect clinically relevant concentrations of (b) (4) samples.

Risk: The (b) (4) Matrix will not meet detection requirements. Risk for (b) (4) is low, as there are commercially available (b) (4) collection kits, and there is significant 3rd party data supporting performance of (b) (4) as sample for (b) (4)

(b) NHD shall execute appropriate clinical trials of the (b) (4) lateral flow assay for COVID-19 diagnosis.

Risk: Lateral Flow Immunoassay will not meet requirements. The clinical trials will not be initiated unless parameters are met in the lab testing, and after the first generation prototype provides at least minimally acceptable results, in terms of detection. Historical experience with clinical samples with the LFI, minimizes overall risk.

3. NHD shall develop an ELISA test with antigens and antibodies against IgA, IgM, and IgG for the determination of immune response to the COVID-19 in whole blood, as well as detection of the targets in other samples.

Technical Task: (a) NHD shall develop an ELISA test for IgA, IgM, and IgG antibodies in sera or blood, with high specificity and sensitivity.

Risk: The ELISA is not sufficient or sensitive to detect the specific IgA, IgM, and IgG antibodies. The ELISA format is well-known and the antigens from (b) (4) have been evaluated in other formats with acceptable results. Other antigens and antibodies are commercially available.

4. NHD shall execute appropriate clinical trials of the ELISA for IgA, IgM, and IgG for determination of exposure to COVID-19 in sera.

Risk: The ELISA format provides for unacceptable performance in development of assay, and would prevent clinical trials. Risk as stated above, is minimal. The assay will be evaluated during the first generation prototype testing.

Project Technical Tasks Summary -

1. NHD shall optimize antigens (b) (4) and antibody (b) (4) complex for LFI and IgA, IgM, and IgG for the ELISA format for the COVID-19. (NHD will determine the optimum antigens and antibodies)

2. NHD shall optimize the lateral flow assay for related antigens (b) (4) and antibodies for (b) (4) in buffer and simulated samples, and IgA, IgM, and IgG in ELISA. (NHD will transfer optimized antigens and antibodies in the formats)

3. NHD shall use the lateral flow assay and ELISA to detect clinically relevant concentrations of targets in buffer, simulated sample, whole blood samples or serum samples. (NHD will concurrently evaluate COTS (b) (4) collection kits)

4. NHD shall conduct a field trial of the lateral flow assay (separate LFI for (b) (4)) and ELISA IgA, IgM, and IgG for COVID-19 diagnosis/detection. (NHD will conduct appropriate clinical sample testing of first generation prototypes)

5. NHD shall optimize Lateral flow Immunoassay for the detection of (b) (4) and ELISA IgA, IgM, and IgG for high specificity and sensitivity.

6. NHD shall use the lateral flow assay to detect clinically relevant concentrations of (b) (4) samples and ELISA format to detect IgA, IgM, and IgG in sera and other samples. (NHD will conduct appropriate clinical sample testing of second generation prototypes)

7. NHD shall conduct bench testing of the lateral flow assay for (b) (4) and ELISA for IgA, IgM, and IgG.

8. NHD shall conduct all activities to execute scale-up of the LFI and ELISA systems.

9. NHD shall conduct all activities required for submission of EUA of the LFI-(b) (4) and ELISA IgA, IgM, and IgG in sera , as well as other samples for COVID-19.

Technical Strategy and Innovations -

1. Demonstrate and test clinical (b) (4) matrixes suitable for detection of (b) (4), for the diagnosis of COVID-19 with the lateral flow assay developed in objective 1.

Technical Solution: The (b) (4) sample matrixes will be tested as the clinical samples to apply to the assay. If necessary, a (b) (4) agent may be added to enhance presentation of the (b) (4) to the assay, and provide improved assay performance.

2. The LFI and ELISA require improved sensitivity and specificity.

Technical Solution: Review available (b) (4) as well as (b) (4) antibodies from the (b) (4) and other sources. Additionally, engage the use of (b) (4)

3. Improved sensitivity of LFI (b) (4)

Technical Solution: NHD Standard Operating Procedures (SOP) will be used to (b) (4)

(b) (4) [redacted]

4. Improved binding and "clean results" (b) (4) [redacted]

Technical Solution: Using NHD SOP (b) (4) [redacted]

Mandatory Reporting -

Quarterly Reports: The MCDC awardee shall prepare a Quarterly Report, which will include a Technical Status Report and a Business Status Report, in accordance with the terms and conditions of the MCDC Base Agreement.

Annual Technical Report: The MCDC awardee shall prepare an Annual Technical Report for projects whose periods of performances are greater than one (1) year, in accordance with the terms and conditions of the MCDC Base Agreement. This may be combined with the concurrent quarterly report.

Final Technical Report: At the completion of the project, the MCDC awardee will submit a Final Technical Report, which will provide a comprehensive, cumulative, and substantive summary of the progress and significant accomplishments achieved during the total period of the project, in accordance with the terms and conditions of the MCDC Base Agreement. Once the MCDC management firm has informed the MCDC awardee that the Final Technical Report has been approved by the Government, the MCDC awardee shall forward a copy to the Defense Technical Information Center, Attn. DTIC-O, 8725 John J. Kingman Road, Suite 0944, Fort Belvoir, VA 22060-6218.

Final Business Status Report: At the completion of the project, the MCDC awardee will submit a Final Business Status Report, which will provide summarized details of the resource status of the project, in accordance with the terms and conditions of the MCDC Base Agreement.

Project Task Timeframe:

	Task	Timeframe
1	Assay Design: (b) (4) [redacted] etc.:	2-4 weeks
	FDA EUA Preparation	
	Preliminary Design Review	
2	Antigen and Antibody Chemistries Development:	4-6 weeks
	COVID-19 Antigen Prototype Optimization	
	COVID-19 Antibody Prototype Optimization	
3	Assay and Sample Conditions: (can be concurrent with #s 1 & 2)	2-4 weeks
	Positive and Negative Controls Development	

4	First Generation Prototype Field Testing: (PCR, ELISA, Serological, & (b) (4)	2-3 weeks
	Optimize for Clinical Matrices	
5	Optimization of Device, Combining Chemistries into Assay System	1-3 weeks
	Bench Studies Meeting/Protocols Development	
6	Second Generation Prototype Testing and Revision	2-4 weeks
	Conduct Bench-Field Studies	
7	Production Scale up, Stability, Additional Analytical Testing	3-4 weeks
	Develop and Submit Bench Studies Reports	
8	FDA EUA	4-8 weeks
	FDA EUA Approval Phase Support	
9	Prototype Project Management and Reporting	35 weeks
10	FDA, Microbiology, and (b) (4) Consultant Support	35 weeks
11	Quality Control Inspection, Testing, and Monitoring	35 weeks
	Total Period of Performance:	**35 weeks**

Project Deliverable Tasks

Del. #	Deliverable Description	Due Date
3.1	FDA EUA Meeting Minutes	6/15/2020
3.2	Preliminary Design Specifications for LFI / ELISA	6/30/2020
3.3	Preliminary Design Review Meeting Minutes	6/30/2020
3.4	Draft Package Insert	7/31/2020
3.5	First Prototype Pre-Clinical Testing Study Report	8/31/2020
3.6	Risk Analysis Master Record	8/31/2020
3.7	Second Prototype Selection Meeting Minutes	9/30/2020
3.8	Design Transfer Meeting Minutes	9/30/2020
3.9	Bench Study Meeting Minutes	8/31/2020
3.10	Bench Study Protocols	8/31/2020
3.11	Clinical Study Meeting Minutes	8/31/2020
3.12	Design Verification Meeting Minutes	9/30/2020
3.13	Monthly/Quarterly Progress and Financial Status Reports	6/30/2020 - 12/31/2020
3.14	Final Closeout Report - Due 30 days after Completion of Effort	1/31/2021
3.15	Draft Device Master Record	10/31/2020
3.16	Device History Record for Three (3) Lots	12/31/2020
3.17	Final Bench Study Protocols	10/31/2020
3.18	Limit of Detection/Matrix Comparison	10/31/2020
3.19	Bench Study Reports	9/30/2020
3.20	Final Clinical Study Protocol	10/31/2020
3.21	Second Prototype Clinical Study	10/31/2020

3.2 Peptide Microarray Development (Phase 2)

Project Tasks and Risk -

1. NHD shall review current Microarrays for COVID -19, and if needed, develop additional Peptide Antigen Microarrays for SARS-CoV-2, binding targets from (b) (4) samples, which would indicate patient type specific antibodies that bind to specific SARS-CoV-2 linear epitopes, correlating this information with patient clinical and viral status, and thereby characterizing (b) (4) patterns with COVID-19 disease.

2. For drift or significant mutation change analyses, not single point mutations, sequencing may be required with supercomputing bio-informatic processing software, in order to delineate specific mutations and consequent antigenic drift occurrence.

Technical Task: NHD shall obtain selected, optimized, and printed peptides on microarrays consistent with linear epitopic binding areas of the current SARS-CoV-2 RNA encoded genome; to be used in an appropriate instrument within a SARS-CoV-2 peptide Antigen Microarray system. The final peptide Antigen Microarray will be for defining specific targets from COVID-19 individual patients' samples. These will include isotype and (b) (4) and targets of (b) (4)

Risk: The selected peptides will not bind with the needed targeted sites, with sufficient binding to provide acceptable performance in samples. These peptides will be included in the first generation prototype microarray system.

3. NHD shall test and demonstrate that clinical sample (b) (4) matrixes are suitable for the identification of the needed binding targets, and correlate that with sera targets in a Peptide Antigen Microarray developed in objective 1.

Technical Task: (a) NHD shall use the Peptide Antigen Microarrays to detect clinically relevant binding targets, and determine defining patterns of patients' antibody to the SARS-CoV-2 peptides present in (b) (4) samples. Also, as needed, data in serum (b) (4) samples, to provide information to correlate with (b) (4) patterns.

Risk: The peptide microarray will not meet specificity and detection requirements.

Technical Task: (b) There is a risk that the peptide array may not be sufficiently reproducible in the binding or broadly encompassing, since it lacks conformational epitopes to identify all needed targets/markers. The NHD team, through genomic and previous viral mutation expertise, will modify peptide arrays to address specificity and detection requirements, focusing on peptides indicative of significant mutational changes, as opposed to single point mutation events.

Project Technical Tasks Summary –

1. NHD shall conduct initial prototype design and testing/monitoring protocol with ELISA and other toolsm if needed, utilizing technologies developed within the initial prototype project phase.

2. NHD shall determine selected linear targets on the SARS-CoV-2 RNA encoded peptides, and select/produce linear peptides of the entire viral-encoded genome.

3. NHD shall select microarray slide producer and subcontract for supply, as well as sample virus inactivation protocols.

4. NHD shall select/lease microarray readers and equipment.

5. NHD shall perform verification of initial prototype arrays in NHD.

6. NHD shall perform verification studies of initial prototype arrays at other site(s).

7. NHD shall produce/supply microarray slides to other site(s) for monitoring, as per monitoring protocol.

8. NHD shall perform field screening of (b) (4) & serum with initial microarrays.

9. NHD shall review data/information, as per protocol.

10. NHD shall modify target peptides, based upon data/information from on-going monitoring.

11. NHD shall produce revised second peptide microarray slides.

12. NHD shall perform verification studies in NHD of revised peptide microarray slides.

13. NHD shall supply revised peptide microarray slides to field users for verification and use.

14. NHD shall review data/information, as per protocol / prepare additional slides peptide microarray for field use.

15. NHD shall provide data/information to other agencies, as required.

Project Task Timeframe:

	Task	Timeframe
1	Initial Prototype Design and Testing/Monitoring Protocol with ELISA and Other Tools (if needed)	2-4 weeks
2	Determine Targets on the SARS-CoV-2 and Select/Produce Peptides	2-4 weeks
3	Select Microarray Readers and Equipment	2-4 weeks
4	Preliminary Design Review	4-8 weeks
5	Perform Verification Studies in NHD	6-10 weeks
6	Perform Verification Studies at Other Site(s)	9-12 weeks
7	Produce/Supply Microarray Slides to Other Site(s) for Monitoring (as per monitoring protocol)	12-15 weeks
8	Perform Field Screening of (b) (4) and Serum with Initial Microarrays	16-28 weeks
9	Review Data/Information (as per protocol)	24-30 weeks
10	Modify Target Peptides Based Upon Data/Information from On-Going Monitoring	30-32 weeks
11	Produce Revised Second Prototype Peptide Microarray Slides	33-35 weeks

12	Perform Verification Studies in NHD of Revised Peptide Microarray Slides	36-37 weeks
13	Supply Revised Peptide Microarray Slides to Field Users for Verification and Use	38-45 weeks
14	Review Data/Information (as per protocol)/Prepare Additional Slides Peptide Microarray for Field Use	44-46 weeks
15	Prepare, Evaluate, and Supply Modified Microarrays (as needed, based upon mutations)	46-51 weeks
16	Provide Data/Information to Other Agencies (as required (continuous))	24-51 weeks
17	Prepare Final Reports	51-52 weeks
	Total Period of Performance:	**52 weeks**

Project Deliverable Tasks

Del. #	Deliverable Description	Due Date
3.1	Initial Prototype Design and Testing / Monitoring Protocol with ELISA and Other Tools (if needed)	7/31/2020
3.2	Determine Targets on the SARS-CoV-2 and Select/Produce Peptides	7/31/2020
3.3	Select Microarray Readers and Equipment	7/31/2020
3.4	Preliminary Design Review	8/31/2020
3.5	Perform Verification Studies in NHD	9/30/2020
3.6	Perform Verification Studies at Other Site(s)	9/30/2020
3.7	Produce/Supply Microarray Slides to Other Site(s) for Monitoring (as per monitoring protocol)	10/31/2020
3.8	Perform Field Screening of (b) (4) and Serum with Initial Microarrays ((b) (4)	11/30/2020-1/31/2021
3.9	Review Data/Information (as per protocol)	2/28/2021
3.10	Modify Target Peptides Based Upon Data/Information from On-Going Monitoring	3/31/2021
3.11	Produce Revised Second Prototype Peptide Microarray Slides	4/30/2021
3.12	Perform Verification Studies in NHD of Revised Peptide Microarray Slides	4/30/2021
3.13	Supply Revised Peptide Microarray Slides to Field Users for Verification and Use	5/31/2021
3.14	Review Data/Information (as per protocol) / Prepare Additional Slides Peptide Microarray for Field Use	5/31/2021
3.15	Prepare, Evaluate, and Supply Modified Microarrays (as needed, based upon mutations)	5/31/2021
3.16	Provide Data/Information to Other Agencies (as required (continuous))	5/31/2021
3.17	Prepare Monthly/Quarterly Progress and Final Reports	7/31/2020-6/31/2021

4.0 DELIVERABLES

4.0 LFI / ELISA (Phase 1) and Peptide Microarray (Phase 2)

Del. #	PHASE	Deliverable Description	Due Date	Milestone Ref	SOW Ref	Gov't Role	Data Rights
4.0.1	1	FDA EUA meeting minutes	6/15/2020	5.0.1	3.1	Review/ Comment	Govt purpose
4.0.2	1	Preliminary design specifications for LFI/ELISA	6/30/2020	5.0.2	3.1	Review/ Comment	Govt purpose
4.0.3	1	Preliminary design review meeting minutes	6/30/2020	5.0.2	3.1	Review/ Approve	Govt purpose
4.0.4	1, 2	Monthly/Quarterly progress annual and financial status reports	6/30/2020-12/31/2020	5.0.3, 5.0.6, 5.0.10, 5.0.14, 5.0.18, 5.0.22 5.0.10	3.1 3.2	Review/ Approve	Govt purpose
4.0.5	2	SOW Meeting Minutes	7/15/2020	5.0.4	3.2	Review/ Comment	Govt purpose
4.0.6	1	Draft package insert LFI	7/31/2020	5.0.5	3.1	Review/ Comment	Govt purpose
4.0.7	2	Initial prototype design and testing/monitoring protocol with ELISA and other tools, if needed	7/31/2020	5.0.4	3.2	Review/ Comment	Govt purpose
4.0.8	2	Determine targets on the SARS-CoV-2 and select/produce peptides	7/31/2020	5.0.7	3.2	Review/ Comment	Govt purpose
4.0.9	2	Select microarray readers and equipment	7/31/2020	5.0.7	3.2	Review/ Approve	Govt purpose
4.0.10	1	First prototype pre-clinical testing & study report LFI/ELISA	8/31/2020	5.0.9	3.1	Review/ Comment	Govt purpose
4.0.11	1	Initial master	8/31/2020	5.0.9	3.1	Review/	Govt

		Device record LFI/ELISA				Comment	purpose
4.0.12	1	Bench study meeting minutes LFI/ELISA	8/31/2020	5.0.9	3.1	Review/ Comment	Govt purpose
4.0.13	1	Bench study protocols LFI/ELISA	8/31/2020	5.0.9	3.1	Review/ Comment	Govt purpose
4.0.14	1	Clinical study meeting minutes LFI/ELISA	8/31/2020	5.0.9	3.1	Review/ Comment	Govt purpose
4.0.15	2	Preliminary design review	8/31/2020	5.0.11	3.2	Review/ Comment	Govt purpose
4.0.16	1	Second prototype selection meeting minutes LFI/ELISA	9/30/2020	5.0.13	3.1	Review/ Approve	Govt purpose
4.0.17	1	Design Review meeting minutes LFI/ELISA	9/30/2020	5.0.13	3.1	Review/ Comment	Govt purpose
4.0.18	1	Design verification meeting minutes	9/30/2020	5.0.13	3.1	Review/ Comment	Limited
4.0.19	1	Bench study reports LFI/ELISA	9/30/2020	5.8	3.1	Review/ Comment	Govt purpose
4.0.20	2	Perform verification studies in NHD Microarray	9/30/2020	5.0.15	3.2	Review/ Comment	Govt purpose
4.0.21	2	Perform verification studies at other site(s) Microarray	9/30/2020	5.0.15	3.2	Review/ Comment	Govt purpose
4.0.22	1	Updated Device master record	10/31/2020	5.10	3.1	Review/ Comment	Limited
4.0.23	1	Final bench study protocols LFI/ELISA	10/31/2020	5.10	3.1	Review/ Comment	Govt purpose
4.0.24	1	Limit of detection/matrix comparison LFI/ELISA	10/31/2020	5.10	3.1	Review/ Comment	Govt purpose
4.0.25	1	Updated clinical	10/31/2020	5.10	3.1	Review/	Govt

		study protocol				Comment	purpose
4.0.26	1	Second generation clinical study	10/31/2020	5.10	3.1	Review/ Comment	Govt purpose
4.0.27	2	Produce/supply microarray slides to other site(s) for monitoring, as per monitoring protocol	10/31/2020	5.0.19	3.2	Review/ Approve	Govt purpose
4.0.28	2	Perform field screening of (b) (4) and serum with initial microarrays (b) (4)	11/30/2020 - 12/31/2020	5.0.19	3.2	Review/ Comment	Govt purpose
4.0.29	1	Device history record for three (3) lots LFI/ELISA	12/31/2020	5.16	3.1	Review/ Comment	Limited
4.0.30	1	Final closeout report - due 30 days after completion of effort	6/30/2021	5.16	3.1	Review/ Approve	Govt purpose
4.0.31	2	Review data/information, as per protocol	2/28/2021	5.0.15	3.2	Review/ Comment	Govt purpose
4.0.32	2	Modify target peptides based upon data/information from on-going monitoring	3/31/2021	5.0.15	3.2	Review/ Comment	Govt purpose
4.0.33	2	Produce revised second protype peptide microarray slides	4/30/2021	5.0.15	3.2	Review/ Comment	Govt purpose
4.0.34	2	Perform verification studies in NHD of revised peptide microarray slides	4/30/2021	5.0.19	3.2	Review/ Comment	Limited
4.0.35	2	Supply revised peptide microarray slides to field users	5/31/2021	5.0.38, ,	3.2	Review/ Approve	Govt purpose

		for verification and use					
4.0.36	2	Review data/information. as per protocol/prepare additional slides peptide microarray for field use	5/31/2021	5.0.32	3.2	Review/ Approve	Govt purpose
4.0.37	2	Prepare, evaluate, and supply modified microarrays, as needed, based upon mutations	5/31/2021	5.0.23	3.2	Review/ Comment	Limited
4.0.38	2	Provide data/information to other agencies, as required (continuous)	5/31/2021	5.0.32	3.2	Review/ Comment	Limited

5.0 MILESTONE PAYMENT SCHEDULE

5.0 LFI / ELISA (Phase 1) and Peptide Microarray (Phase 2)

Milestone	Phase	Task #	Milestone Description (Deliverable Reference)	Due Date	Total Program Funds
5.0.1	1	3.1	FDA EUA Discussions, Initial Team Teleconference, FDA EUA Teleconference Meeting Minutes; Deliverable 4.0.1	6/15/2020	(b) (4)
5.0.2	1	3.2 3.3	Initial LFI Prototype, Initial ELISA Prototype, Design Specifications; Deliverable 4.0.2 Preliminary Design Review Meeting Minutes; Deliverable 4.0.3	6/30/2020	(b)
5.0.3	1		Quarterly Report; Deliverable 4.0.4	6/30/2020	(b) (4)
5.0.4	2	3.0	SOW Meeting Minutes; Deliverable 4.0.5	7/15/2020	(b) (4)
5.0.5	1	3.2 3.3	Optimization Data, Revised Design Specifications, Revised Design Plan, Initial Positive/Negative Controls, Initial Clinical Matrices, Initial Draft Package Inserts; Deliverable 4.0.6	7/31/2020	(b)

5.0.6	1, 2		Monthly Report; Deliverable 4.0.4	7/31/2020	(b) (4)
5.0.7	2	3.1 3.2 3.3	Initial Prototype Design and Testing/Monitoring Protocol with ELISA and Other Tools (if needed); Deliverable 4.0.7 Determine Targets on the SARS-CoV-2 and Select/Produce Peptides; Deliverable 4.0.8 Select Microarray Readers and Equipment; Deliverable 4.0.9	7/31/2020	(b)
5.0.8	1	3.5 3.3	Bench Study Meeting Minutes; Deliverable 4.0.12 Bench Study Protocols; Deliverable 4.10 Optimize for Clinical Matrices; Deliverable 4.11 First Prototype Pre-Clinical Testing, Revised Draft Package Insert, Initiate Bench Study Reports; Deliverable 4.5 Risk Analysis Master Record; Deliverable 4.0.11	8/31/2020	(b)
5.0.9	1, 2		Monthly Report; Deliverable 4.0.4	8/31/2020	(b) (4)
5.0.10	2	3.4	Preliminary Design Review Minutes; Deliverable 4.0.15	8/31/2020	(b)
5.0.11	1	3.5 3.3	Remaining Bench Study Reports; Deliverable 4.0.19 Prototype Selection Meeting Minutes; Deliverable 4.0.16. Design Transfer Meeting Minutes; Deliverable 4.0.17 SOPs, Design Verification Meeting Minutes; Deliverable 4.0.18	9/30/2020	(b)
5.0.12	1, 2		Annual Report; Deliverable 4.0.4	9/30/2020	(b) (4)
5.0.13	2	3.5 3.6	Perform Verification Studies in NHD; Deliverable 4.0.20 Perform Verification Studies at Other Site(s); Deliverable 4.0.21	9/30/2020	(b)
5.0.14	1	3.5 3.4 3.3	Operator Training, Training AAR, Initiate FDA EUA Phase, Device Master Record; Deliverable 4.0.22	10/31/2020	(b)

		3.2	Final Bench Study Protocols; Deliverable 4.0.23 Limit of Detection/Matrix Comparison; Deliverable 4.0.24 Final Clinical Study Protocol; Deliverable 4.0.25 Clinical Study Report; Deliverable 4.0.26 Lot 1 - Initiate Production of 1,000 LFI Devices/100 ELISA Devices, Second Gen Clinical Study; 4.0.26		
5.0.15	1, 2		Monthly Report; Deliverable 4.0.4	10/31/2020	(b) (4)
5.0.16	2	3.7	Produce/Supply Microarray Slides to Other Site(s) for Monitoring (as per monitoring protocol); Deliverable 4.0.27	10/31/2020	(b)
5.0.17	1	3.6	Lot 2 - Initiate Production of 1,000 LFI Devices/100 ELISA Devices, Deliver 1,000 LFI Devices/100 ELISA Devices	11/30/2020	(b)
5.0.18	1	3.3	Monthly Report; Deliverable 4.0.4	11/30/2020	(b) (4)
5.0.19	2	3.8	Perform Field Screening of (b) (4) and Serum with Initial Microarrays ((b) (4) Deliverable 4.0..8	11/30/2020	(b)
5.0.20	1	3.6	Lot 3 - Initiate Production of 1,000 LFI Devices/100 ELISA Devices	12/31/2020	(b)
5.0.21	1, 2	3.8	Quarterly Report; Deliverable 4.0.4	12/31/2020	(b) (4)
5.0.22	2	3.8	Perform Field Screening of (b) (4) and Serum with Initial Microarrays ((b) (4) Deliverable 4.0.28	12/31/2020	(b)
5.0.23	1, 2	3.6 3.7 3.8	LFI/ELISA FDA; Closeout Report Microarry Monthly Report; Deliverable 4.0.29, 4.0.30, 4.0.28, 4.0.4	1/31/2021	(b) (4)
5.0.24	1	3.6 3.7	FDA EUA Submission Package, FDA Comments, FDA Response Document, Device History Record; Deliverable 4.0.29 Closeout Report; Deliverable 4.0.30	1/31/2021	(b)

5.0.25	2	3.8	Perform Field Screening of (b) (4) and Serum with Initial Microarrays (b) (4) Deliverable 4.0.28	1/31/2021	(b)
5.0.26	2		Monthly Report; Deliverable 4.0.4	1/31/2021	(b)
5.0.27	2	3.9	Review Data/Information (as per protocol); Deliverable 4.0.31	2/28/2021	(b)
5.0.28	2		Monthly Report; Deliverable 4.0.4	2/28/2021	(b) (4)
5.0.29	2	3.10	Modify Target Peptides Based Upon Data/Information from On-Going Monitoring; 4.2.10	3/31/2021	(b)
5.0.30	2		Quarterly Report; Deliverable 4.0.32	3/31/2021	(b) (4)
5.0.31	2	3.11 3.12	Produce Revised Second Prototype Peptide Microarray Slides; Deliverable 4.0.33 Perform Verification Studies in NHD of Revised Peptide Microarray Slides; Deliverable 4.0.34	4/30/2021	(b)
5.0.32	2		Monthly Report; Deliverable 4.0.4	4/30/2021	(b) (4)
5.0.33	2	3.13 3.14 3.15 3.16	Supply Revised Peptide Microarray Slides to Field Users for Verification and Use; Deliverable 4.0.35 Review Data/Information (as per protocol)/Prepare Additional Slides Peptide Microarray for Field Use; Deliverable 4.0.36 Prepare, Evaluate, and Supply Modified Microarrays (as needed, based upon mutations); Deliverable 4.0.37 Provide Data/Information to Other Agencies (as required) (continuous); Deliverable 4.0.38	5/31/2021	(b)
5.0.34	2		Monthly Report; Deliverable 4.0.4	5/31/2021	(b) (4)
5.0.35	2	3.17	Closeout/Final Report; Deliverable 4.0.4	6/30/2021	(b) (4)
				Total Cost (FFP):	**$2,909,759**
				Period of Performance:	**13 Months**

*The Due Dates and Funding Amounts listed in this Milestone Schedule are contingent upon funds available. In accordance with Section 5, Incremental Funding, this Project Agreement is funded at the amount specified, and any work performed in excess thereof shall be at the Project Agreement Holder's risk.

6.0 SHIPPING PROVISIONS

The contractor shall submit Quarterly, Annual, and final reports in accordance with the Base Agreement to deliverables.mcdc.ati.org. All deliverables intended for the AOR shall be delivered in electronic format to the AOR and alternate AOR, as identified within this document.

A copy of all data deliverables shall be sent to:

usarmy.detrick.dod-jpeo-cbrnd.mbx.otadeliverable@mail.mil

7.0 DATA RIGHTS AND COPYRIGHTS

The contractor shall comply with the terms and conditions defined in the MCDC Base Agreement. The table below identifies pre-existing technical data and computer software with restrictions that may be used during performance of this Agreement. The Government shall receive a Government Purpose Rights license to all technical data and computer software developed and delivered under this Agreement, except for the pre-existing technical data and computer software that was previously developed exclusively at private expense and identified in the table below. To the maximum extent practicable, segregable portions of deliverables that will be restricted shall be clearly identified and labeled. If, after award, the contractor wishes to use any other internally developed technical data or computer software, or any other pre-existing proprietary information not identified in the table below, then the contractor shall disclose its intent in writing to the MCDC CMF prior to its use, and shall receive written approval from the Agreements Officer prior to proceeding. All technical data and computer software developed or delivered under this Agreement shall have appropriate data rights markings in accordance with DFARS 252.227-7013(f) and 7014(f). The contractor asserts that all contractor owned or background patents that affect the Government's rights in the deliverables anticipated under this Agreement are identified in the table below.

Technical Data to be Furnished with Restrictions	Basis for Assertion	Asserted Rights Category	Name of Corporation Asserting Restrictions	Deliverables Affected
Assay production methods	Developed at private expense	Limited rights	NHD Corp.	3.2, 3.3, 3.4, 3.4.4, 3.5, 3.6, 3.7, 3.8
(b) (4)	Developed at private expense	Limited rights	NHD Corp.	3.2, 3.3, 3.4, 3.4.4, 3.5, 3.6, 3.7, 3.8
Use of (b) (4) for detection of (b) (4) Covid-19	Developed at private expense	Limited rights	NHD Corp.	All

7.1 Government Rights

The Project Agreement Holder (PAH) agrees to the following:

a. The PAH will provide to the Government all data including top-line summaries and key conclusions from all studies supporting the regulatory filing and commercial approval to the extent that such data, summaries, and conclusions are funded by this agreement. In addition, the PAH will offer the Government the opportunity to review and provide comments on a final draft of regulatory submissions which include data funded by this agreement. The Government will review any such submissions promptly upon receipt. The PAH will reasonably consider any comments provided by the Government, and prior to submission will provide notification to the Government of any additional edits or revisions. The PAH will keep the Government apprised of planned FDA meetings and post-meeting outcomes relating to activities funded by this agreement.

b. Communications. PAH will provide the Government with copies of all communications, both formal and informal, to or from FDA, regarding the Technology within 48 hours, and ensure that the Government representatives are invited to participate in any formal or informal Sponsor meetings with FDA;

c. Non-compliance with section (a. & b.) may result in termination of the agreement.

d. Product Development Failure. Certain product development failures may trigger certain remedies in Section "e." below for the Government advanced developer funding the development of this Technology. This remedy is not available to the Government for any cause outside of the following:

(i) if this agreement is terminated for nonperformance,

(ii) the PAH fails to obtain FDA approval within the operationally relevant timeframe determined by the Government after the award of this agreement (e.g., 3 years), when FDA approval is a requirement;

(iii) the PAH fails to commercially market or provide an acceptable life cycle plan for continued supply of the Technology within three (3) years after FDA approval, licensure or clearance;

(iv) the PAH gives notice, required to be submitted to the Government no later than thirty (30) business days, of any formal management decision to terminate this product development effort pre-market or to file for Federal bankruptcy protection.

e. If any of the product development failures listed in Section "d." occur, the PAH, upon the request of the Government:

(i) shall transfer possession, ownership and sponsorship or holdership of any Regulatory Application (including any associated expedited review designation, priority review voucher, or marketing exclusivity eligibility or award), regulatory correspondence, and supporting regulatory information related to the Technology, to the Government or its designee;

(ii) shall inform FDA of the transfer of sponsorship or holdership of the Regulatory Application transferred under section (e)(i) above;

(iii) shall negotiate in good faith a non-exclusive license, at customary industry rates and under reasonable terms and conditions, to any patent, copyright or other intellectual property owned or controlled by the PAH, developed prior to or outside the scope of this agreement, or any technical data that is necessary for the Government to pursue commercialization of this technology with a third party for sale to the Government or otherwise.

f. This clause will survive the acquisition or merger of the PAH by or with a third party. This clause will also be included in any subcontracts/sub-agreements relating to the development of the Technology. This clause will survive the expiration of this agreement.

8.0 SECURITY

The security classification level for this effort is UNCLASSIFIED. The contractor shall comply with the terms and conditions defined in the MCDC Base Agreement, as applicable.

9.0 MISCELLANEOUS REQUIREMENTS (SAFETY, ENVIRONMENTAL, ETC.)

N/A

10.0 GOVERNMENT FURNISHED PROPERTY/MATERIAL/INFORMATION

N/A