1.1 | Acknowledgements

Telemedicine Prototype Facility Planning & Design Project for Arizona Rural Tribes

Prepared for:

Native Peoples Technical Assistance Office
Claudia Nelson, Director

Arizona Telemedicine Program
Ronald Weinstein, MD, Director
The University of Arizona
Tucson, Arizona

Prepared by:

Marilyn Robinson, Project Director
David Bullaro, RA
Kayla Truss, B. Arch

Drachman Institute
College of Architecture, Planning, and Landscape Architecture
The University of Arizona
Tucson, Arizona

Brooks Jeffery, Director
Marilyn Robinson, Associate Director

Drachman Institute is the research-based outreach arm of the College of Architecture, Planning, and Landscape Architecture (CAPLA) at the University of Arizona. The Institute is dedicated to environmentally-sensitive and resource-conscious planning and design with a focus on under-served and vulnerable communities. As an interdisciplinary collaborative, we engage students, staff, faculty, and citizens to work towards making our communities healthier, safer, more equitable, and more beautiful places to live. We embrace a service-learning model of education serving the needs of communities while providing an outreach experience for students. This model is a fundamental educational goal consistent with the mission of CAPLA and The University of Arizona.

All photos, renderings, drawings, charts, GIS layers, or other content were generated by Drachman Institute staff unless otherwise noted.

June 2013
1.1 | Acknowledgements ........................................................................................................ i
1.2 | Table of Contents ........................................................................................................ iii

1 | Telemedicine ......................................................................................................................... 1
   1.1 | About Telemedicine and Telehealth .................................................................................. 2
   1.2 | Benefits of Telemedicine .................................................................................................. 3
   1.3 | Types of Telemedicine & Services .................................................................................... 5
   1.4 | Communities that Benefit Most ....................................................................................... 7

2 | Case Studies .......................................................................................................................... 11
   2.1 | Case Study 1: Native American Health Care Center ........................................................ 12
   2.2 | Case Study 2: Large Clinic with Telemedicine ................................................................. 14
   2.3 | Case Study 3: Small Rural Health Care Center ................................................................ 16

3 | Prototypes ............................................................................................................................ 19
   3.1 | Section Overview .............................................................................................................. 21
   3.2 | Prototype 1: Basic ............................................................................................................ 22
   3.3 | Prototype 2: Multiuse ....................................................................................................... 24
   3.4 | Prototype 3: Telemedicine + Telehealth .......................................................................... 26
   3.5 | Typical Design Timeline .................................................................................................. 28

4 | Appendix .............................................................................................................................. 31
   4.1 | Resources .......................................................................................................................... 32
This section introduces the topic of telemedicine and its benefits, services provided, and different applications for small communities.

In this section...

1.1 | About Telemedicine and Telehealth ........................................... 2
1.2 | Benefits of Telemedicine ................................................................. 3
1.3 | Types of Telemedicine & Services ....................................................... 5
1.4 | Communities that Benefit Most ......................................................... 7
ACCESS TO HEALTH CARE

Access to quality health care is an important achievement in establishing health equity for Americans. Improving health care access is shown to have a positive impact on people’s lives by:

- Improving the overall physical, social, and health status
- Preventing diseases and disabilities
- Improving the detection and treatment of health conditions
- Improving quality of life
- Decreasing the number of preventable deaths
- Increasing life expectancy

One of the ways that access to health care can be expanded to areas with limited or no access to medical care is through the provision of telehealth and telemedicine services.

1 List Source: HealthyPeople.gov. “Access to Health Services.”

TELEHEALTH VERSUS TELEREMEDICINE

The Health Resources and Services Administration defines telehealth as the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration. Technologies include video conferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications.

Telemedicine is similar to telehealth, although the latter refers to a broader scope of health care services. Telemedicine most specifically refers to remote clinical services, but can also be used in reference to remote non-clinical services such as provider training, administrative meetings, and continuing medical education.


3 HealthIT.gov. “What is telehealth? How is telehealth different from telemedicine?”
1.2 | Benefits of Telemedicine

OVERVIEW
The idea of using televisions to improve health care has been around since the late 1950’s. However, it isn’t until more recently when advances in technology, price reductions in equipment costs, and improved data transmissions have allowed telecommunications technologies to become a much more feasible option. As a result, telemedicine and telehealth have been able to spread rapidly as a health care solution.

The biggest benefit of telehealth is that it provides access to health services for areas that have traditionally had limited or no access due to lack of availability and/or other barriers such as travel distance. The benefits of telemedicine can be explored through three different perspectives: economic development and quality of life, patients, and providers. A brief summary of the benefits of telemedicine are outlined below.

Economic Development and Quality of Life
From an economic perspective, telemedicine offers cost savings for both providers and patients, while simultaneously bolstering the local economy. It also has the ability to improve quality of life because of increased access to health care services. The list below briefly outlines the economic and quality of life benefits of telemedicine. For more information, please refer to the resources in the appendix.

Telemedicine:
- Helps hospitals to save on costs by outsourcing specialty physician services
- Enhances health services such as home health care
- Allows more dollars to be captured in the local economy from the increased use of local health services
- Aids in the recruitment and retention of businesses locally
- Aids in workforce development and jobs if teleconferencing abilities are shared with educational institutions to help train people for locally available jobs in health care
- Improves people’s individual health which impacts the economy through improvements in life expectancy and social productivity
- Allows rural, remote and underserved areas to become part of clinical trials, which is a multi-billion dollar business

5 Britain, Catherine, John Irwin and Erwin Parker. “Benefits of Telemedicine.”
6 Specialists usually command large salaries that a rural hospital struggles to pay. By outsourcing these types of services via telemedicine, smaller hospitals and rural areas can still offer these services as a pay-per-use model rather than having the burden of the salaries for specialists.
7 Whiteacre, Brian, et al. “Evaluating the Economic Impact of Telemedicine in a Rural Community.”
8 Britain, Catherine, John Irwin and Erwin Parker. “Benefits of Telemedicine.”
9 Studies have shown that laboratory or pharmacy work is performed in the area where the patient’s initial screening was performed. Because the initial exam is done locally, the resulting follow-up work is also done locally. This translates into money captured locally that would have normally been captured elsewhere.
10 Locally available quality healthcare and schools are the two key factors when it comes to the attracting new businesses, especially in a rural community.
Patient Perspective
From a patient perspective, telemedicine offers cost savings by significantly decreasing transportation costs while increasing access to health care services. The list below briefly outlines the benefits of telemedicine from a patient’s perspective. For more information, please refer to the resources in the appendix.

Telemedicine:
- Improves access to quality medical care and treatment by specialists\(^{11}\)
- Saves patients on travel time and expenses\(^{12,13}\)
- Saves patients money by reducing the number of hours that they would miss from work\(^{12,14}\)
- Improves collaboration by care providers which increases patients’ confidence that they are getting the best treatment available\(^{11}\)
- Is becoming more accepted and patients are becoming more comfortable with the use and application of this technology\(^{11}\)

Provider Perspective
From a provider perspective, telemedicine improves the quality of health care through increases in system efficiency, reductions in medical errors, and improved educational opportunities. The list below briefly outlines the benefits of telemedicine from a health care provider’s perspective. For more information, please refer to the resources in the appendix.

Telemedicine:
- Provides life-saving support in emergency situations, especially when the nearest emergency room/trauma center is too far away\(^{15}\)
- Helps to reduce medical errors by making it easier for doctors to get a second opinion on their diagnosis\(^{15}\)
- Increases efficiency in the health care system by reducing traveling times and “paper-based” data transfer\(^{15}\)
- Enhances educational opportunities for “health care providers, patients, and families which improves clinical outcomes and reduces hospitalizations”\(^{15}\)

---
\(^{11}\) Britain, Catherine, John Irwin and Erwin Parker. “Benefits of Telemedicine.”
\(^{12}\) Whiteacre, Brian, et al. “Evaluating the Economic Impact of Telemedicine in a Rural Community.”
\(^{13}\) When considering a community as a whole, a telemedicine facility has the potential to have a substantial impact in transportation savings.
\(^{14}\) When patients have to travel for medical services, they are missing time at work. By reducing the amount of travel time, a telemedicine facility can save patients from missing a substantial number of hours at work which translates into increased income.
\(^{15}\) Britain, Catherine, John Irwin and Erwin Parker. “Benefits of Telemedicine.”
1.3 | Types of Telemedicine & Services

TYPES OF TELEMEDICINE
A telemedicine facility can take on various forms, but the primary goal is to improve communication between the patient and local health care provider in one location and a physician or specialist in another location. There are three broad forms of telemedicine: store-and-forward, remote patient monitoring, and interactive health care services.16 Each of the different types of telemedicine offers a range of benefits to patients and doctors. A brief explanation of each is provided below:

Store-and-Forward
Store-and-forward consists of capturing and storing a patient’s medical data, such as diagnostic images, and then securely storing and transmitting the image to another location where a physician or specialists makes an assessment.17 The advantage to this type of telemedicine is that it is not required for both parties to be present at the same time.18 Store-and-forward telecommunication is most commonly used in disciplines where direct contact with the patient is not required.

Store-and-forward is most commonly used for:

- Radiology
- Pathology
- Dermatology
- Ophthalmology19

Remote Patient Monitoring
Remote patient monitoring uses devices to remotely collect, store, and transmit a patient’s health information to health care providers.20 The data is monitored and evaluated, and if necessary, an intervention takes place to small health concerns before they turn into larger health problems.

Remote patient monitoring is most beneficial for monitoring chronic conditions, such as:

- Diabetes
- Heart disease
- Asthma
- Sleep apnea
- And others21

Studies have shown that remote patient monitoring provides patients with chronic diseases improved levels of care and “could reduce health care costs in the U.S. by almost $200 billion over the next 25 years.”22

16 Downey, Roger. “Types of Telemedicine.”
18 Downey, Roger. “Types of Telemedicine.”
22 Downey, Roger. “Types of Telemedicine.”
**Interactive**

Interactive health care services allow for the physician to interact with the patient in real time through telemedicine and other technology. Technology can include phone calls, online communications, medical quality video equipment, and standard video conferencing equipment.

Interactive telemedicine can be used to perform services such as:

- Medical history reviews
- Physical examinations
- Psychiatric evaluations
- Consultation Services
  - Primary care providers can consult with medical specialists not available locally
  - Patient examinations can be conducted with medical specialists when distance is a barrier
  - Care can be coordinated with patients who may be reluctant to keep appointments in person
  - Access to care can be better provided for patients with limited mobility
- Educational Services
  - Special medical education seminars for patients and their families
  - Training seminars for remote facility operators

---

23 Downey, Roger. “Types of Telemedicine.”

---

**Specialties Offered Via Telemedicine**

<table>
<thead>
<tr>
<th>Allergy/Immunology</th>
<th>Family/General Practice</th>
<th>Orthopedics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesia</td>
<td>Gastroenterology</td>
<td>Pathology</td>
</tr>
<tr>
<td>Cardiology</td>
<td>Infectious Diseases</td>
<td>Pediatrics</td>
</tr>
<tr>
<td>Critical Care</td>
<td>Internal Medicine</td>
<td>Psychiatry</td>
</tr>
<tr>
<td>Dentistry</td>
<td>Maternal/Fetal Medicine</td>
<td>Pulmonology</td>
</tr>
<tr>
<td>Dermatology</td>
<td>Mental/Behavioral Health</td>
<td>Radiology</td>
</tr>
<tr>
<td>Otolaryngology (ENT)</td>
<td>Neurology</td>
<td>Rehabilitation Medicine</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>Oncology/Hematology</td>
<td>Rheumatology</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>Ophthalmology/Optometry</td>
<td>Urology</td>
</tr>
</tbody>
</table>

---

Specialties that are often offered via telemedicine
1.4 | Communities that Benefit Most

OVERVIEW

One of the greatest benefits of telemedicine is that it provides the ability to offer quality health care services economically. As a result, communities that have limited economic opportunities and no access to medical services can have better access without an extremely large investment.

While there are several types of communities that may have limited or no access to medical services, a majority of people live within three specific communities. These communities are identified and discussed below:

- Rural Communities
- Remote or Isolated Communities/Areas
- Medically Underserved Areas or Populations

**Rural Communities**

Rural Communities are loosely defined as geographic areas located outside of cities and towns. More specifically, these communities are typically associated with characteristics that include:

- Small size
- Sparse settlement
- Limited shopping and service opportunities
- Distant from concentrations of population
- An economic reliance on agricultural industries, sometimes in tandem with tourism

A rural community with characteristics similar to those listed above would value a telemedicine/telehealth facility that:

- Is easily accessible for residents
- Is inexpensive to build and operate
- Provides a wide range of services
- Provides education opportunities via telecommunication technologies

Rural communities that are small and sparsely settled do not have the population count or density to offer a large range of traditional medical services. There may or may not be a general practitioner located in close proximity to the community, and any specialty care is typically referred to the closest city, which may be an hour or more away. As a result, a telemedicine facility that provides access to specialist care would be beneficial to a rural community.

---

*Five Categories of Health Care Barriers*

- Transportation difficulties
- Limited health care supply
- Lack of quality health care
- Social isolation
- Financial constraints

*Barriers to health care in rural areas*

Stanford School of Medicine. "Healthcare Disparities & Barriers to Healthcare."

---

25 List Source: Monk, David H. “Recruiting and Retaining High-Quality Teachers in Rural Areas.”

---

*Image Source: http://www.albafarmers.org/farms.html*
**Remote or Isolated Communities/Areas**

Remote or Isolated Communities are areas that are considerably far from other populations and have limited access to and from the area. More specifically, these types of areas are associated with characteristics that include:

- Limited transportation example: road, rail, air
- Limited access to a commercial or service hub
- Limited infrastructure example: water, off-grid, health care, schools, internet
- A single, primary employer

Types of remote communities may include:

- Communities built around a single employer or industry such as a mining town
- Some Native American Tribes
- Research outposts

A remote or isolated community with characteristics similar to those listed would value a telemedicine/telehealth facility that:

- Is easily accessible to the community
- Is easily constructed with local materials
- Is as off-grid as possible
- Provides a wide range of services, which may also include some emergency services
- Provides education opportunities via telecommunication technologies

Because remote or isolated communities have limited transportation, access to infrastructure, and availability of medically trained people to staff the facility, the facility would have to be self-sustaining and easy to use. The facility would need to be able to be operated and services rendered by someone with minimal training. As a result, it is crucial for the telecommunications technologies to be able to capture high quality images for diagnosis.


**Medically Underserved Areas or Populations**

A medically underserved area or population is, by definition, a geographic location (urban or rural) or population that has insufficient health resources (manpower and/or facilities) to meet the medical needs of the resident population. Insufficient access can be due to location, economic, cultural, and/or linguistic barriers. These designations are applied based on the demographic characteristics of the area/population. Characteristics include one or more of the following:

- Too few primary care providers
- High infant mortality rate
- High percentage of the population living below the federal poverty level
- High elderly population

An underserved area and/or population would value a telemedicine/telehealth facility that provides:

- Primary care services
- Access to specialists
- Education opportunities via telecommunication technologies

27 Montana Primary Care Association, Inc. “MPCA.”
28 List Source: Montana Primary Care Association, Inc. “MPCA.”
29 Arizona Department of Health Services. “Shortage Designation Program: Federal Medically Underserved Areas/Populations (MUA/P).”

![Medically Underserved Areas and Populations in the U.S., 2013](http://www.raonline.org/racmaps/)
10 Benefits of Telemedicine

1. Enables more informed decision making and enhanced quality of care

2. Saves lives through remote consultations, whether urgent or diagnostic

3. Creates more efficient, convenient and potentially more cost effective delivery of care

4. Facilitates earlier – and more accurate – diagnoses

5. Provides greater, and faster, access to a patient’s medical history, reducing the risk of negative drug interactions or poor response to a course of treatment

6. Improves administrative efficiency and coordination

7. Allows rural residents to receive expert diagnosis and treatment from distant medical centers

8. Increases timeliness of treatment and decreases transfer rates while reducing medical costs through video technology

9. Supports real-time treatment by first responders through the use of wireless devices

10. Enhances senior wellness and preventative care through telemedicine and remote in-home monitoring

Ten Benefits of Telemedicine
List Source: Business Wire. “10 Benefits of Telemedicine, eHealth and Health IT.”
This section presents different case studies of telemedicine facilities and other facilities that are similar in size and program.

In this section...

2.1 | Case Study 1: Native American Health Care Center .............. 12
2.2 | Case Study 2: Large Clinic with Telemedicine ..................... 14
2.3 | Case Study 3: Small Rural Health Care Center ..................... 16
2.1 | Case Study 1: Native American Health Care Center

Oneida Community Health Center, Wisconsin

![View from the exterior](Image Source: http://www.oneidanation.org/healthcenter/page.aspx?id=4766)

**OVERVIEW**

The Oneida Community Health Center in Wisconsin provides comprehensive outpatient and inpatient medical services to Indian people living on or near the Oneida Reservation. Care is provided by a staff of full-time physicians, nurse practitioners, physician assistants, registered nurses and ancillary health care providers.¹

¹ Sovereign Oneida Nation of Wisconsin. “Oneida Community Health Center.”
**Facility History**

Provision of health services began in a small suite of rooms with only eight employees: a director, a secretary, four community health representatives, a RN, and a LPN. They offered very limited services.

As the need for health services grew, they were able to move to a new location and add a small laboratory. The medical staff consisted of: volunteer doctors, nursing staff, alcohol and drug abuse counselors, and social workers. Dental services were provided by volunteer dentists from a neighboring city on weekend. Many of the specialist services were contracted out.

Due to increased growth, the Oneida Nation was able to build a Community Health Center in 1978. This facility served as the hub for health care services for the next 25 years until the facility was outgrown. They were then able to open the current ambulatory health clinic in 2002.

**Location**

- Oneida, Wisconsin

**Facility Size**

- Approx. 55,000 sf (Opened 2002)

**Governing Entities**

- Oneida Comprehensive Health Division
  - Combines four health programs within the Oneida Nation
- Indian Health Services & Indian Health Service Commission Corps
  - Provides for limited holistic health services

**Services Offered**

- Diagnosis
- Treatment
- Well child care
- Immunizations
- Family planning
- Minor surgical procedures
- Preventive care

**Specialist Services**

- Internal Medicine
- Pediatrics
- Podiatry
- Obstetrics
- Gynecology
- ENT
- Urology
- Endocrinology
- Asthma and Immunology

---

2 Oneida Comprehensive Health Division Patient Handbook
3 Sovereign Oneida Nation of Wisconsin. “Oneida Community Health Center.”

* Note: Physicians are contracted to provide specialized services
La Clinica de la Raza, California

OVERVIEW
La Clinica de La Raza (La Clinica) is a community based clinic and provides primary care and other specialist services to low income and medically underserved populations across the East Bay of Northern California. La Clinica has grown from a single storefront clinic in 1971 to one of the largest community-based clinic agencies, encompassing 26 service delivery sites in Alameda, Contra Costa, and Solano counties.4


Image Source: http://www.roebbel.com/la-clinica/
Location

- La Clinica de la Raza operates across the East Bay in Northern California
- Pictured facility is in Concord, California

Services Provided

- Medical
- Dental
- Optical
- Women’s Health
- Prenatal and Postnatal
- Preventive Medicine
- Health and Nutrition Education
- Adolescent Care
- Mental Health
- Behavioral Health
- Case Management
- Referral
- Pharmacy
- Radiology
- Laboratory

Telemedicine Program: Teledermatology

La Clinica addressed the implementation of a telemedicine program in 2007 to improve operational efficiency and access to health care.

The top three telehealth programs identified were:
- Health education
- Dental services
- Dermatology

Although health education and dental services were eliminated on the basis of low clinical importance (education) and complexity of implementation (dental), they were able to implement a telemedicine program for dermatology.

Funding

Funding to implement the pilot telehealth program was provided by a grant from:
- Californial HealthCare Foundation (CHCF)

La Clinica developed a budgeting model based on payer reimbursement for regular follow-up with primary care providers to keep the program sustainable after the end of CHCF funding terms.

Dermatology Service Contract

La Clinica was able to form a relationship with the University of California, San Francisco to provide teledermatology consultations. Method used:
- Store and Forward model
- In person follow up visits if required

OVERVIEW
This health care center, designed by Flying Elephant Studios, addresses the multitude health care problems that exist in India with a level of architectural sophistication that can be studied and implemented in other countries.  

6 Detail Daily. Rural Health Care Centre, Bangalore, India by Flying Elephant Studio.
Case Study 3: Small Rural Health Care Center

**Architect**
- Flying Elephant Studios

**Location**
- Bangalore, India

**Design Objectives**
The design of this building was conceived based on three primary objectives:
- Low Budget
- Economy of Operation
- Sustainability

**Impact of Budget**
A compact footprint was required for this program because of the relatively low budget for the size and scale of the building. The compact linear footprint proved to be beneficial in terms of allowing better daylighting into the building and cross ventilation.

**Economy of Operation**
The clinic consists of two exam/hospital bed areas that can support four beds, a physicians office, a business office, and other supporting functions. The core clinic program spaces are located within the interior building with circulation and waiting area located around the building core in outdoor spaces.

**Sustainability**
Sustainability was one of the primary objectives of this design. As a result, the building relies on passive systems to regulate the internal environment and incorporates several sustainable strategies:
- Double skin system to shade the building core
- Natural cross ventilation
- Water catchment system
- Uses locally available materials

**Cultural Sensitivity**
The building uses local, vernacular materials in order to give it a sense of identity within the community.

---

7 List Source: Detail Daily. Rural Health Care Centre, Bangalore, India by Flying Elephant Studio.
8 Flying Elephant Studio. Projects: Healthcare Centre.
9 Detail Daily. Rural Health Care Centre, Bangalore, India by Flying Elephant Studio.
Prototypes

Basic Design Prototypes for Telemedicine and Telehealth Facilities

In this section...

3.1 | Section Overview..................................................21
3.2 | Prototype 1: Basic..................................................22
3.3 | Prototype 2: Multiuse..............................................24
3.4 | Prototype 3: Telemedicine + Telehealth.......................26
3.5 | Typical Design Timeline..........................................28
3.1 | Section Overview

POSSIBILITIES

The nature of the Telehealth design model allows for a vast variety of layouts, from a minimal stand-alone telemedicine clinic that can be inserted almost anywhere in a community to a telemedicine facility with standard medical examination capacities and Telehealth/TeleEducation components for community education and advancing community health programs.

This section shows the potential of this design model by highlighting a few prototypes of minimum requirements that are possible across this range.

METHODOLOGY

Each prototype is described with the following information:

- Its potential application in the community
- Minimum spaces/rooms required are described and annotated as needed
- Minimum equipment for each space/room listed and referenced to Prototype plan
- Basic design issues and impact on site and community
- Prototype plans
- Prototype area analysis

Plans are design to convey the following:

- Basic minimum prototype layout
- General space/room relationships
- Minimum equipment required per space/room annotated and referenced to the list in description
- Dimensions in feet indicate each space/room’s minimum practical dimensions
- Space/Room relationships, equipment, area and facility design will change after completion of Design Program and initiation of the Design Phase

Area Analysis includes the following:

- Net area (interior area) of all space/rooms
- Total facility net area (square feet)
- Grossing factor range (percentage used to determine approximate gross area)
- Gross area range for the Prototype incorporating minimum required space/rooms and equipment.
3.2 | Prototype 1: Basic

**LAYOUT**

Prototype 1 is a minimal Telemedicine Clinic designed to fit within a small budget and to work in collaboration with either an existing medical clinic or to work as an advanced option for remote communities or under-served communities. Showcasing only the most needed elements, it serves to show how easy and possible it would be to add a Telemedicine clinic to any community.

**Spaces/Rooms**

- Telemedicine Clinic with integral Medical Professional Station
- Main Entry and Waiting Room
- Toilet and Lavatory with Janitorial Supply Closet (Alternate: if retrofitting existing facility, the existing Toilets and Lavatory would be utilized as long as code requirements are met)

**Space/Room Equipment**

**Examination Room**

A. Gurney/Examination Table  
B. Mobile Telemedicine Unit  
C. Patient Interview Table and Chair  
D. Medical Professional Workstation and Storage  
E. Medical Storage/Cart  
F. Auxiliary Seating

**Restroom/Storage**

G. Accessible toilet with grab bars  
H. Accessible lavatory, mirror, and soap dispenser  
I. Locking janitorial storage cabinet  
J. Water heater

**Waiting Room**

K. Seating for two occupants  
L. Table

**DESIGN**

Prototype 1 has the potential to either be a stand-alone clinic, a clinic retrofitted to any existing building or complementary to an existing Medical Facility.

As a stand-alone facility, the footprint is extremely small allowing it to share space with an existing building on its site as a satellite or to be accommodated on any small undeveloped site within the community. As it is intended to be a Telemedicine only facility, parking requirements would be minimal, requiring parking for the current patient, a waiting patient, and the medical professional(s). Site sanitation needs and noise impact would be extremely small.

Retrofitting this prototype into an existing building would require that the appropriate space relationships are maintained, that the Examination Room maintains auditory privacy, and the Clinic itself is physically securable within the parent facility.

For addition to an existing Medical Facility, verification would be required to ensure that the parent facility can accommodate the extra burden on its electrical, mechanical and structural capabilities and that any extra load on its physical capabilities, including toilet capacity and parking, are acceptable and within the limits established by local Building Codes.

As long as the prior parameters are met, the Waiting Room and the Restroom can be eliminated for Prototype 1.
Prototype 1 Area Analysis

<table>
<thead>
<tr>
<th>Room Name</th>
<th>Net Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination Room</td>
<td>220SF</td>
</tr>
<tr>
<td>Restroom Storage</td>
<td>64SF</td>
</tr>
<tr>
<td>Waiting Room</td>
<td>66SF</td>
</tr>
<tr>
<td><strong>Total Net Area</strong></td>
<td><strong>350SF</strong></td>
</tr>
<tr>
<td><strong>Grossing Factor</strong></td>
<td><strong>1.3-1.5</strong></td>
</tr>
<tr>
<td><strong>Total Calculated Gross Area</strong></td>
<td><strong>455-675SF</strong></td>
</tr>
</tbody>
</table>

* Grossing Factor percentage range accounts for wall materials and thickness, facility climatic requirements, Building Code requirements, circulation areas, mechanical and structural clearances and spaces and facility size.
3.3 | Prototype 2: Multiuse

**LAYOUT**
Prototype 2 is a stand-alone Telemedicine Clinic designed to fit within any community and to be used for both Telemedicine needs and standard medical uses. Multiple uses allow the facility to be more economically practical for a community and to be more functional than with just one use.

**Spaces/Rooms**
- Examination Room with Telemedicine capabilities and direct access to Restroom
- Reception Room with file storage
- Main Waiting Room with access to Restroom
- Accessible Restroom
- Maintenance Closet/Linen Storage
- Medical Professional Office with direct access to Examination Room and integrated separate Pharmaceutical Dispensary Room

**Space/Room Equipment**

**Examination room**
- A. Gurney/Examination table
- B. Mobile Telemedicine Unit
- C. Patient interview table and chair
- D. Storage cabinets and counter top
- E. Auxiliary seating

**Medical Professional Office**
- F. Workstation
- G. Secured medical storage

**Secured Pharmaceutical Dispensary Room**
- H. Automated Pharmaceutical Dispensary or Secured Pharmaceutical Dispensary Cabinet
- I. File Cabinet and/or computer terminal if needed

**Storage Room**
- J. Soiled/clean linen storage
- K. Janitorial cleaning supplies storage
- L. Water heater

**Design**
Prototype 2 has the potential to either be a stand-alone clinic or to be retrofitted to an existing building.

As a stand-alone, the footprint is small which would lead to a low site impact. Minimal parking, site sanitation needs, and noise impact would make it feasible in a variety of locations within a community.

Retrofitting this prototype into an existing building would require that the appropriate relationships are maintained, as well as ensuring that the main Examination Room has aural privacy, and the Medical Professional Office and the Pharmaceutical Dispensary Room are physically secure.
Prototype 2 Area Analysis

<table>
<thead>
<tr>
<th>Room Name</th>
<th>Net Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination Room</td>
<td>190 SF</td>
</tr>
<tr>
<td>Medical Professional Office</td>
<td>64 SF</td>
</tr>
<tr>
<td>Pharmaceutical Dispensary Room</td>
<td>18 SF</td>
</tr>
<tr>
<td>Storage Room</td>
<td>20 SF</td>
</tr>
<tr>
<td>Restroom</td>
<td>56 SF</td>
</tr>
<tr>
<td>Reception</td>
<td>50 SF</td>
</tr>
<tr>
<td>Waiting Room</td>
<td>94 SF</td>
</tr>
<tr>
<td><strong>Total Net Area</strong></td>
<td>492 SF</td>
</tr>
<tr>
<td><strong>Grossing Factor</strong></td>
<td>1.5-1.75</td>
</tr>
<tr>
<td><strong>Total Calculated Gross Area</strong></td>
<td>740-860 SF</td>
</tr>
</tbody>
</table>

* Grossing Factor percentage range accounts for wall materials and thickness, facility climatic requirements, Building Code requirements, circulation areas, mechanical and structural clearances and spaces and facility size.
3.4 Prototype 3: Telemedicine + Telehealth

LAYOUT
Prototype 3 is similar to the multiuse Prototype 2 but with the addition of a Telehealth/TeleEducation Room. This combination of a Telemedicine Facility with Telehealth/TeleEducation capacity can help a community organize beneficial health programs without leaving their community as well as creating an adaptable informal gathering place for other community uses.

Spaces/Rooms
- Examination Room with Telemedicine capabilities, medical workstation and direct access to Restroom
- Reception Room with file storage
- Main Waiting area with access to restroom
- Multiple Accessible Restrooms
- Multiple storage areas for medical, janitorial and other supplies
- Medical Professional Office with an integrated secure Pharmaceutical Dispensary Room and direct access to Examination Room
- Telehealth Room with extra chair/table storage

Spaces/Room Equipment
Examination room
- Gurney/Examination table
- Mobile Telemedicine Unit
- Patient interview table and chair
- Medical workstation with computer
- Medical storage/cart
- Auxiliary seating

Medical Professional Office
- Workstation
- Secured medical storage

Secured Pharmaceutical Dispensary Room
- Automated Pharmaceutical Dispensary or Secured Pharmaceutical Dispensary Cabinet
- File cabinet and/or computer terminal if needed

Restroom(s)
- Accessible toilet with grab bars
- Accessible lavatory, mirror, and soap dispenser
- Soiled/Clean linen storage
- Water heater
- Janitorial cleaning supplies storage

Waiting Room
- Seating for 2+ occupants
- Table

Reception
- Desk/Work station
- Computer terminal
- File cabinets
- Secured storage

Telehealth Room
- Seating for 16
- Monitor and sound system connected to Telemedicine/Telehealth Network

DESIGN
Prototype 3 has the potential to be a Telemedicine clinic and a standard medical clinic as well as a community education facility and a gathering place for community events. Separation between these two programmed uses allow either use to occur without interrupting the other.

Securable medical facilities allow the education areas to be used during off-hours, which could potentially increase sources of revenue through rental of those spaces to other users.

Due to its large capacity, there is the possibility that fire sprinklers would be needed to be Local Building Code compliant. Sanitation capacity and storage and adequate Local Building Code compliant parking would also be needed with this prototype.
Prototype 3: Telemedicine + Telehealth

3 PROTOTYPES

NPTAO - Telemedicine Program
Drachman Institute

<table>
<thead>
<tr>
<th>Room Name</th>
<th>Net Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination Room</td>
<td>315 SF</td>
</tr>
<tr>
<td>Medical Professional Office</td>
<td>75 SF</td>
</tr>
<tr>
<td>Pharmaceutical Dispensary Room</td>
<td>18 SF</td>
</tr>
<tr>
<td>Telehealth Room</td>
<td>300 SF</td>
</tr>
<tr>
<td>Restrooms</td>
<td>190 SF</td>
</tr>
<tr>
<td>Reception</td>
<td>50 SF</td>
</tr>
<tr>
<td>Waiting Room</td>
<td>100 SF</td>
</tr>
</tbody>
</table>

Total Net Area: 1048 SF

Grossing Factor*: 1.5-1.75

Total Calculated Gross Area: 1570-1835 SF

* Grossing Factor percentage range accounts for wall materials and thickness, facility climatic requirements, Building Code requirements, circulation areas, mechanical and structural clearances and spaces, and facility size.

Prototype 3 Area Analysis
### 3.5 | Typical Design Timeline

This timeline represents the steps to move forward, beginning with gathering data to be inserted into the Framework Program to the start of Construction. It is represented graphically on the left with a bar indicating business days from start of project and on the right with text referring to Phases, major milestones, and important meetings and presentations.

<table>
<thead>
<tr>
<th>Business Days</th>
<th>Milestones</th>
</tr>
</thead>
</table>
| 1             | Start Programming for Telemedicine/Telehealth Facilities  
Begin gathering data from Administration, Staff and Typical Users via interviews and questionnaires  
End of data gathering  
Begin incorporation of gathered data into the Framework Program  
Draft Program Presentation  
Final Program Presentation  
- Including incorporation of comments from Draft Program |
| 18            | Start Conceptual Design Development of Selected Telemedicine Facility  
Conceptual Design Presentation.  
- Design Team will create a series of concepts based on information from the Program for the Owner to review and decide upon. This concept sets the direction for the future design Phases |
| 26            | Start Schematic Design  
Schematic Design Presentation  
- Working from the selected Conceptual Design prototype, the design is advanced into a more normalized product |
| 41            | Start Design Development  
50% Design Development Presentation  
- This is the intermediate step from Design Exercise to Construction Documents. Drawings are less stylistic with normalized dimensions, specific annotations and rigid execution. Photo-realistic renderings become available for fund-raising and promotional use. Engineering, site and other specialty design consultants will begin contributing to the design. |

Continued next page
Typical Design Timeline

66

- 100% Design Development Presentation
  - Comments received during the 50% Design Development Presentation will be incorporated into design. At this point preliminary cost estimation can begin
  - Any major design changes will need to be implemented before this point to not affect the schedule

Start Construction Documents

50% Construction Documents Presentation and Review
- Production will be biased towards completing a draft set of Construction Documents and Specifications for review by the Owner
- Design Consultants will be at meetings to present and receive comments
- Construction Document reviews can be incremental, divided into smaller percentage of completion for review depending on the Owner’s preferences but it will affect the schedule.

100% Construction Documents Presentation and Review
- Final review set of the Construction Documents and Specifications. All consultants will be available for presentation and comments. Documents at this point will be available for estimating purposes or bidding purposes.

Beginning of Commenting Period by Owner

End of Commenting Period by Owner

Continued

85

Submit Permitting Set to local Development Services/Permitting Board and Develop Bid Set

142

- Release Request for Qualifications (RFQ)
  - 7 days for responses but depending on market and conditions up to 30 days or more may be needed to get appropriate number of interested Contractors to submit qualifications

162

End of RFQ Submittal period

165

Start Construction Administration

End Permit Acquisition Period
- Depending on speed of local Development Services or Permitting Board, duration can vary from 1 month to 3 months or more

Contractor selection and contracting for services

Certification of Occupancy Issued and Project Complete

Construction Begins
- Determined by Contractor’s Construction Schedule

End of Selected Contractor Bid Proposal Period
- Duration is typically 1 month
- During this period, bidding Contractors will submit Requests for Information (RFI) regarding the Bid Documents and the Design Team will issue Addenda and Supplemental information to all bidding Contractors.
Appendix

In this section...

4.1 | Resources.................................................................32
4.1 | Resources

1 | TELEMEDICINE

1.1 | About Telemedicine and Telehealth


1.2 | Benefits of Telemedicine


1.3 | Types of Telemedicine and Services


1.4 | Communities that Benefit Most


2 | CASE STUDIES

2.1 | Case Study 1


2.2 | Case Study 2


2.3 | Case Study 3

