

# **MOTORSPORTS TASK FORCE REPORT AND RECOMMENDATIONS (March 7, 2007)**

## **INTRODUCTION**

The Lancaster County Board of Commissioners established the Motorsports Task Force to assist the Board in addressing the complex issues involved with motorsports facilities. The Task Force was asked to address the following questions:

1. Potential demand for motorsports facilities in Lancaster County
  - a. Examine spectator as well as participant demand
  - b. Review existing facilities in the region
2. Economic, fiscal, social and environmental benefits and costs to the community
  - a. Based on different types of facilities and activity levels
3. Pros and Cons of providing motorsports activities in one general location as opposed to decentralized facilities for a specific motorsport activity
4. Identify and rank the most promising and acceptable locations in Lancaster County for motorsports facilities and/or activities
5. Evaluate and make recommendations on the most appropriate business model for providing new facilities for participants and spectators, e.g., public, private, public/private partnership.

The Task Force was directed by the Lancaster County Board to complete its work and submit a final report to the Board by March 1, 2007.

## **TASK FORCE MEMBERS**

### **Regular Members**

Russ Bayer, Chair  
Carol Brown  
Dave Dykmann  
Randy Harre  
Gary Juilfs  
Chris Kingery  
Karen Kurbis  
Larry Lewis  
Greg Osborn  
Stan Patzel  
Michael Tavlin

### **Ex-Officio Members**

Mike DeKalb, Planning Department  
Kerry Eagan, County Chief Administrative Officer  
Scott Holmes, Environmental Division Manager, Health Department  
Jeff Maul, Executive Director, Convention and Visitors Bureau  
Darl Naumann, Lincoln-Lancaster County Economic Development Coordinator

## TASK FORCE PROCESS

As a preliminary matter, the Task Force discussed a definition of "motorsports". Although motorsports can be broadly defined as any motor vehicle used competitively or by a hobbyist, the charge to the Task Force is focused on motorsports facilities. Thus a more appropriate definition of motorsports for purposes of the Task Force would involve racing of motor vehicles on circle tracks, drag racing strips, and road courses. Throughout discussions it was emphasized the Task Force report and recommendations will not be limited to a drag racing facility.

Given the broad scope of the Task Force charge and the limited time to complete the final report and recommendations, the Task Force identified and prioritized the most important issues for discussion. Three subcommittees were formed to focus attention on the following areas of concern:

- Economic, fiscal, social and environmental impacts
- Location
- Demand

The subcommittees met separately and reported back to the entire Task Force. Each subcommittee also produced a written report, copies of which are included with this report.

Additionally, the Task Force heard the following presentations from individuals with expertise in noise, economic development, and development and operation of motor sports facilities:

- Findings of previous motorsports committee - Dr. Darl Naumann, Economic Development Coordinator
- Motorsports facility overview - Rob Wolters, Brainard International Raceway; and Dave Holtgrave, architect with the firm of Holtgrave & Associates, P.C.
- Environmental Impact Considerations: Sound, noise, and drag racing- Dr. Dominique J. Chéenne, Ph.D., Director of Acoustics, Audio, Arts and Acoustics Department, Columbia College, Chicago
- Economic Impact Analysis: The Potential Impact of an NHRA Drag Racing Facility in Lancaster County - Dr. Eric Thompson, Director, UNL Department of Economics, Bureau of Business Research

## FINDINGS

Based on the subcommittee reports, special presentations, general Task Force discussions, and other information, the Motorsports Task Force has determined the following key points must be considered in formulating recommendations to the County Board:

### Location

- Approximately 280 acres is required for a facility that can accommodate a multiple-use facility

- A stand alone drag strip requires approximately 160 acres, and at least one mile of length
- The most important criteria in locating a facility include:
  - Close access to a major paved road, preferably along I-80, with adequate traffic control to prevent highway congestion
  - Locate near existing noise sources to mask track noise
  - Low impact on residential areas and uses
- Potential sites exist in Lancaster County, including sites near Lincoln, which meet the location criteria for a facility
  - Potential sites are shown on the Location Opportunities Map contained in the Location Subcommittee Report (See Attachment A). The map is a preliminary identification of potential sites, and further review of all sites is required to determine feasibility for a motorsports facility

### **Economic Impact**

- A motorsports facility, whether stand alone or multi-use, has the potential to produce a significant economic impact.
  - Thompson study conservatively estimated an annual impact in Lancaster County from a NHRA-sanctioned drag strip of \$9.9 million in tourism spending \*
  - Multiplier effect from tourism spending produces secondary positive economic impacts
  - Public funding for development and operation of a facility may reduce the economic impact
  - Other studies indicate positive secondary business development
- Location within five (5) miles of existing hotels, restaurants, and other travel-related services produces a higher impact from tourism spending

### **Environmental and Social Impacts**

- Noise (unwanted sound) from a motorsports facility poses a significant issue for compatibility with surrounding land uses.
  - Existing environmental noises can help mitigate the negative effects of motorsports noise (See Attachment C for a complete discussion of the noise issue as it relates to motorsports)
  - Noise standards need to be established, with allowances to exceed the standards for certain events

### **Demand**

- Nationally there is a high demand from both participants and spectators for motorsports.
- Participation at public hearings and correspondence to the County Board indicate a strong local interest in motorsports
- A well-designed survey with adequate controls can help measure the demand for motorsports facilities in Lancaster County

\* Thompson study was commissioned by Nebraska Motorplex

## RECOMMENDATIONS

Based on the foregoing discussion, the Motorsports Task Force hereby tenders the following recommendations to the Lancaster County Board:

### 1. LOCATION

Potential locations of opportunity for motorsports exist in Lancaster County. Additional study is required to determine the feasibility of developing a motorsports facility at a specific location

### 2. ENVIRONMENTAL IMPACTS

A. Although noise is a significant issue, a well-designed facility in the right location can help mitigate the impact on surrounding land uses. Regulations should be developed which help mitigate the impact of noise, while at the same time allowing enough flexibility to attract regional and national events

B. Additional study is needed to help determine the potential of other environmental and social impacts, including the potential impact on surrounding property values

C. Noise testing of simulated race noise should be done for any proposed location under atmospheric conditions most favorable for sound propagation (temperature inversion, humidity, etc.)

### 3. ECONOMIC POTENTIAL

The Motorsports Task Force believes motorsports presents a unique economic development opportunity for Lancaster County and the City of Lincoln, and strongly recommends the Lancaster County Board take the following actions in the next thirty (30) days to encourage the development of motorsports:

- Begin working closely with the City of Lincoln to maximize the possibility of developing a motorsports facility
- Declare by resolution the County Board's support for motorsports, and pledging its intent to assist the private sector with the appropriate use of County resources in locating and developing a motorsports facility
- Complete the proposed amendment of the Lancaster County Zoning Resolution to allow motorsports facilities by special permit

## CONCLUSION

The foregoing recommendations are based on the extensive information presented to the Motorsports Task Force through subcommittee reports, special presentations, and thorough discussions. The Task Force encourages members of the Lancaster County Board to carefully read this entire report, including all attachments

Respectfully submitted on behalf of the Motorsports Task Force this 7<sup>th</sup> day of March, 2007.

  
Russell J. Bayer, Chair

# LIST OF ATTACHMENTS

- A. Location Subcommittee Report
- B. Economic, Fiscal, Social and Environmental Subcommittee Report
- C. Environmental Impact Considerations: Sound, Noise, and Drag Racing - Dr. Dominique J. Chéenne, Ph.D., Director of Acoustics, Audio, Arts and Acoustics Department, Columbia College, Chicago
- D. Economic Impact Analysis: The Potential Impact of an NHRA Drag Racing Facility in Lancaster County - Dr. Eric Thompson, Director, UNL Department of Economics, Bureau of Business Research

F:\files\COMMISS\COMMITTEES\Motorsports Task Force\Report-Recommendations.wpd

Motorsports Task Force, Feb 21, 2007

## Location subcommittee report

The committee has met on Jan 3( post task force), 10<sup>th</sup> and 17<sup>th</sup>, Feb 7 and 14.

We have reviewed

- the proposed Lancaster County zoning criteria
- the existing City of Lincoln zoning criteria
- Cass County, Crow Wing (Brainerd MN), and Shanwee Co KS codes

We have reviewed

- a map developed for the motocross committee using 6 criteria (the "red" map)
- a map using the proposed Lancaster County criteria with no wavers (this shows about 232 square miles would meet the criteria)
- a map using the existing Lincoln criteria (showing about 11 square miles)

We have attended and incorporated presentations to the larger Task Force on the needs of a motorsports location. Sound impacts and characteristics of motorsports facilities. And economic impacts of such facilities.

We have discussed impacts, needs and general area requirements. The subcommittee notes that many criteria can be applied to the siting of a motorsports facility. The subcommittee listed the following critical siting criteria.

### 1. Criteria to use in locating or reviewing a motorsports application

	<b>criteria</b>	<b>issue</b>	<b>importance</b>
	close to existing noise	minimize noise	
	close to industrial/commercial areas	less impact on future development	
	Traffic flow	multiple exits for large crowds.	
	Major paved road close	access	very high
	next to noise source	noise "masking"	high
	away from "noise sensitive" areas	noise and complaints	
	Along interstate access	Noise - diff	very
	access	moving traffic	

	Low residential #s	noise	very
	Major roadway	access	
	low residential #	# people impacted	
	available for purchase	For sale?	
	5 miles or less from Lincoln	Proximity to service	
	large enough size	expansion room	
	near services	economic	some
	Noise	noise	very 5
	access to I-80	access	very 5
	economic impact	economic impact	very 5
	noise	noise masking	very 5
	traffic flow	multiple exists	pretty important 4
	Major paved roads	access	very 5
	Large enough site		4

This listing should be taken with the understanding that the subcommittee has not contacted owners or noted the availability of land. Land area/size would also be a factor depending on what type or combination of facilities that may be located.

Some common preferences for an optimum location where, 1) close to Interstate access, 2) Utilizing the Interstate noise to "mask" motorsports noise 3) an optimum distance to support services such as hotels and restaurants of 3 - 5 miles.4) away from residential uses and 5) at least a mile in length.

2. See separate map of "opportunity areas" , as suggested by the subcommittee. "Scoring" is the number of times it was suggested by a member. Note; the sites located on the Bluff Road landfill could impact the long term viability of the landfill and/or the Northeast Treatment Plant and its associated sludge field and thus City growth.

### Conclusion:

There are several potential locations where a motorsports facility might be located in the Lincoln/Lancaster area.

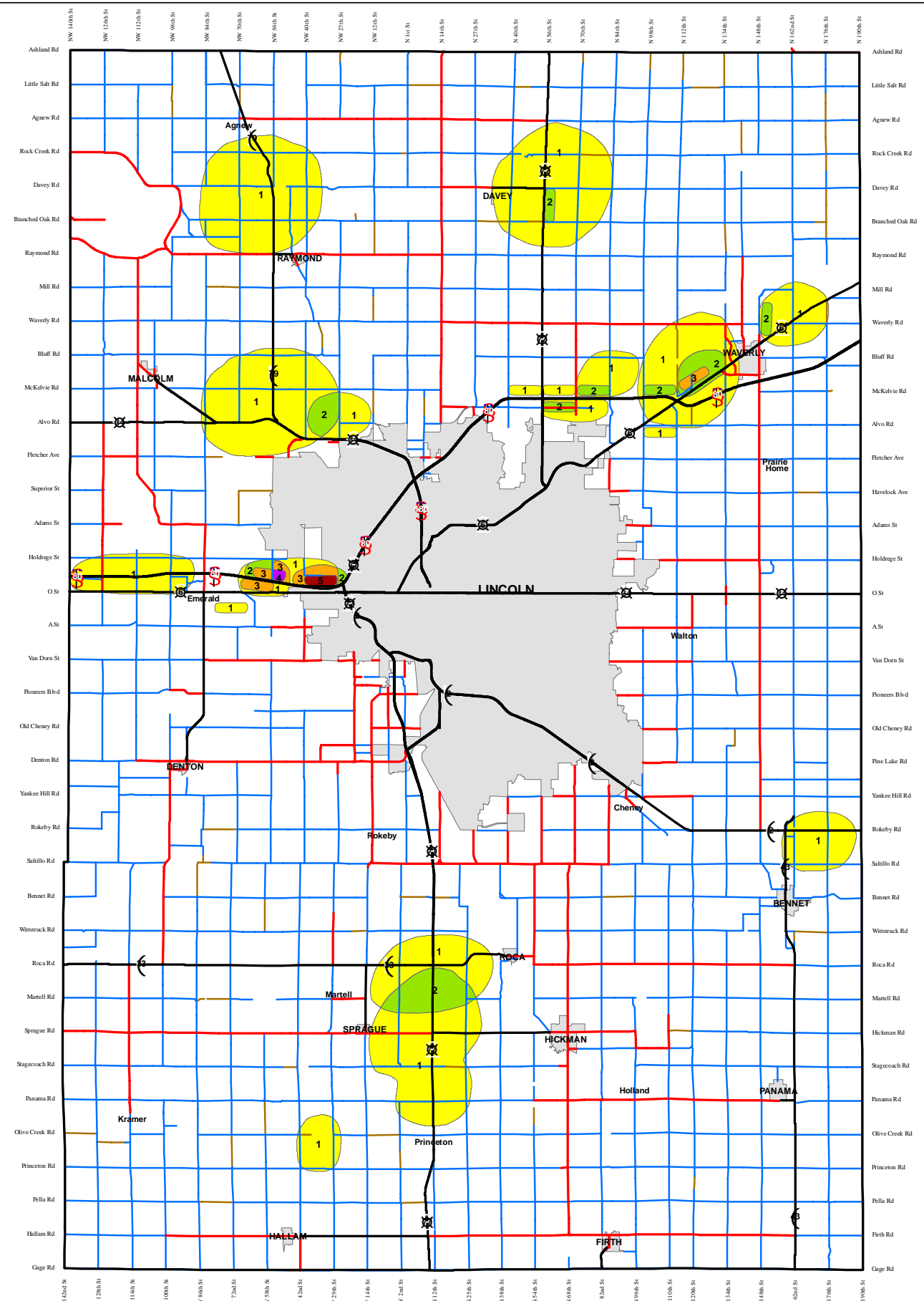
Adjustments/waivers will likely be required for sites in either the county or the city.

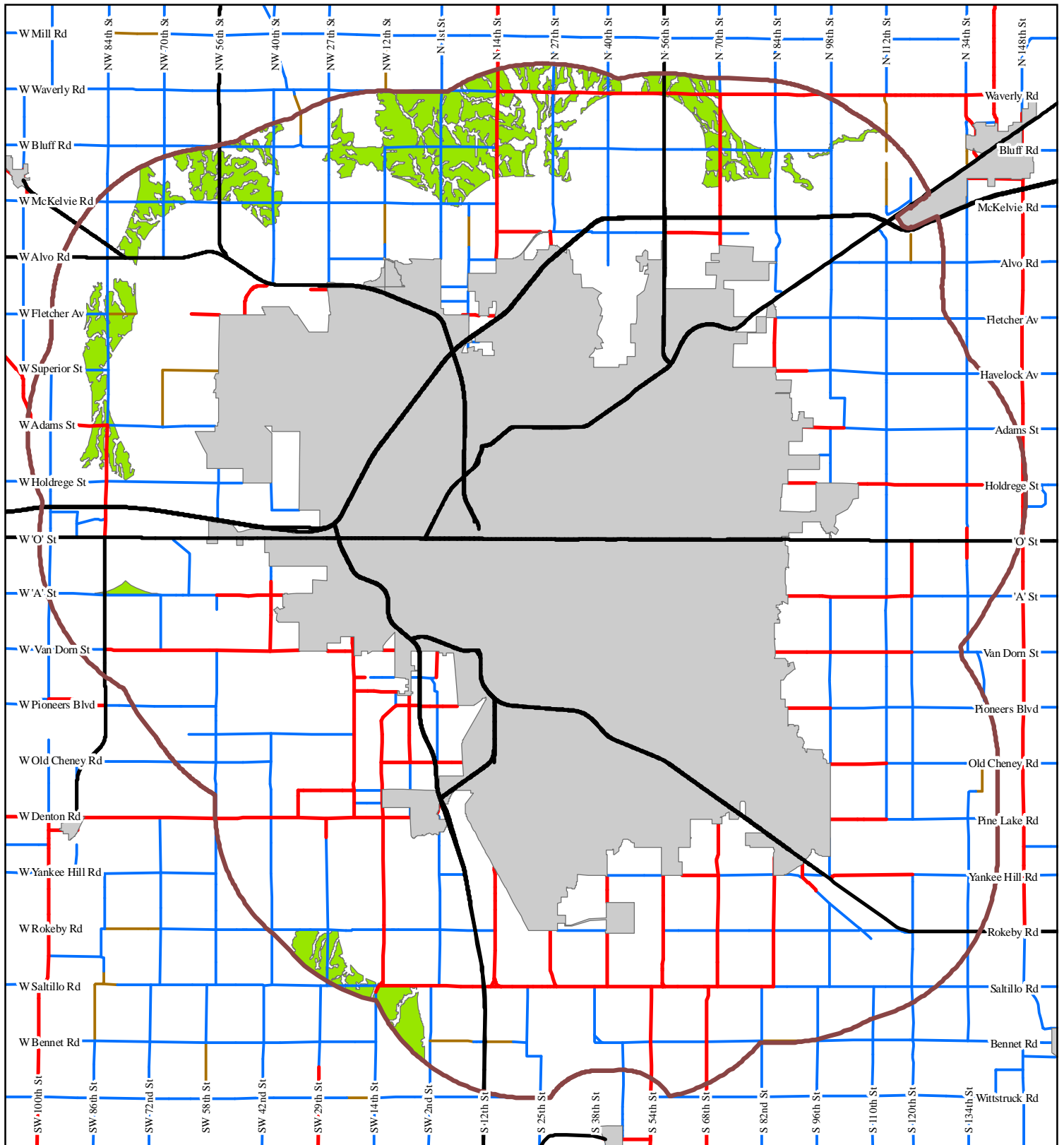
Further review of site needs and opportunities needs to be done by those seeking to build such a facility, whether that be private , public or joint.



Respectfully submitted, February 21  
Mike DeKalb  
for the **Location Subcommittee**



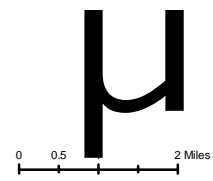


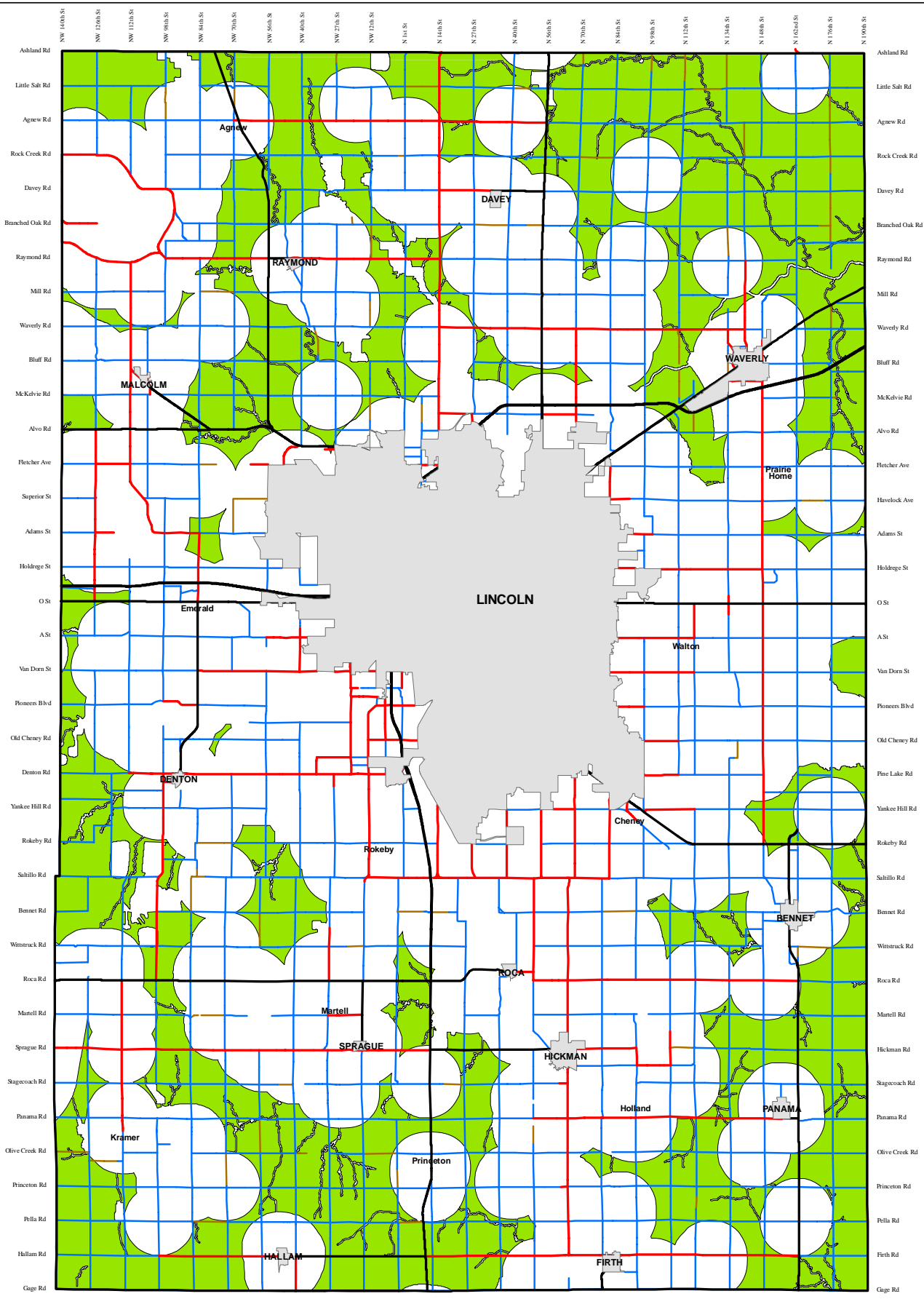


# CITY ZONING RACETRACK ANALYSIS: COMPOSITE

CRITERIA: AG or I-1 zoning; 20/30 acres (I-1), 35/50 acres (AG); not within airport inner approach zones; not within prime agricultural land (LESA); not within Comp Plan major ecological/environmental areas; center of track at least one mile from existing hospitals and churches; center of track at least one mile from residential areas, rural use areas, and parks and open space as designated by the Comp Plan; and readily accessible from a major street or paved road.

- US / State Highway
- Gravel County Road
- Incorporated Place
- Paved County Road
- Dirt County Road
- Areas Meeting Criteria (11.8 Sq. Miles)





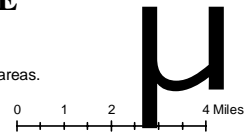
# PROPOSED COUNTY RACE TRACK ZONING ANALYSIS: COMPOSITE

## County Change of Zone #06065

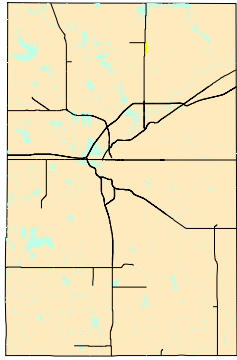
CRITERIA: At least 70 acres in size; at least one mile from existing cemeteries, hospitals and churches; at least one mile from residential areas \*, rural use/acreage areas, schools and parks and open space as designated by the Comp. Plan; and not within major ecological and environmental areas.

\* Residential area = density of 6 or more dwellings per 45 acres.

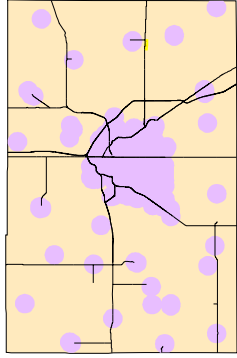
- US / State Highway
- Gravel County Road
- Incorporated Place
- Paved County Road
- Dirt County Road
- Areas Meeting Criteria (232.3 Sq. Miles)



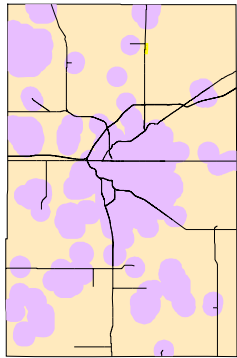
JANUARY 3, 2007



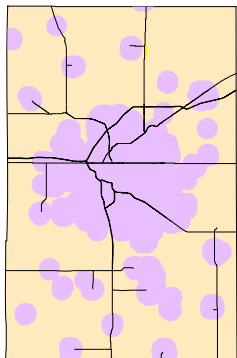
**ENVIRONMENTALLY SENSITIVE AREAS AND AIRPORT INNER APPROACH ZONES**



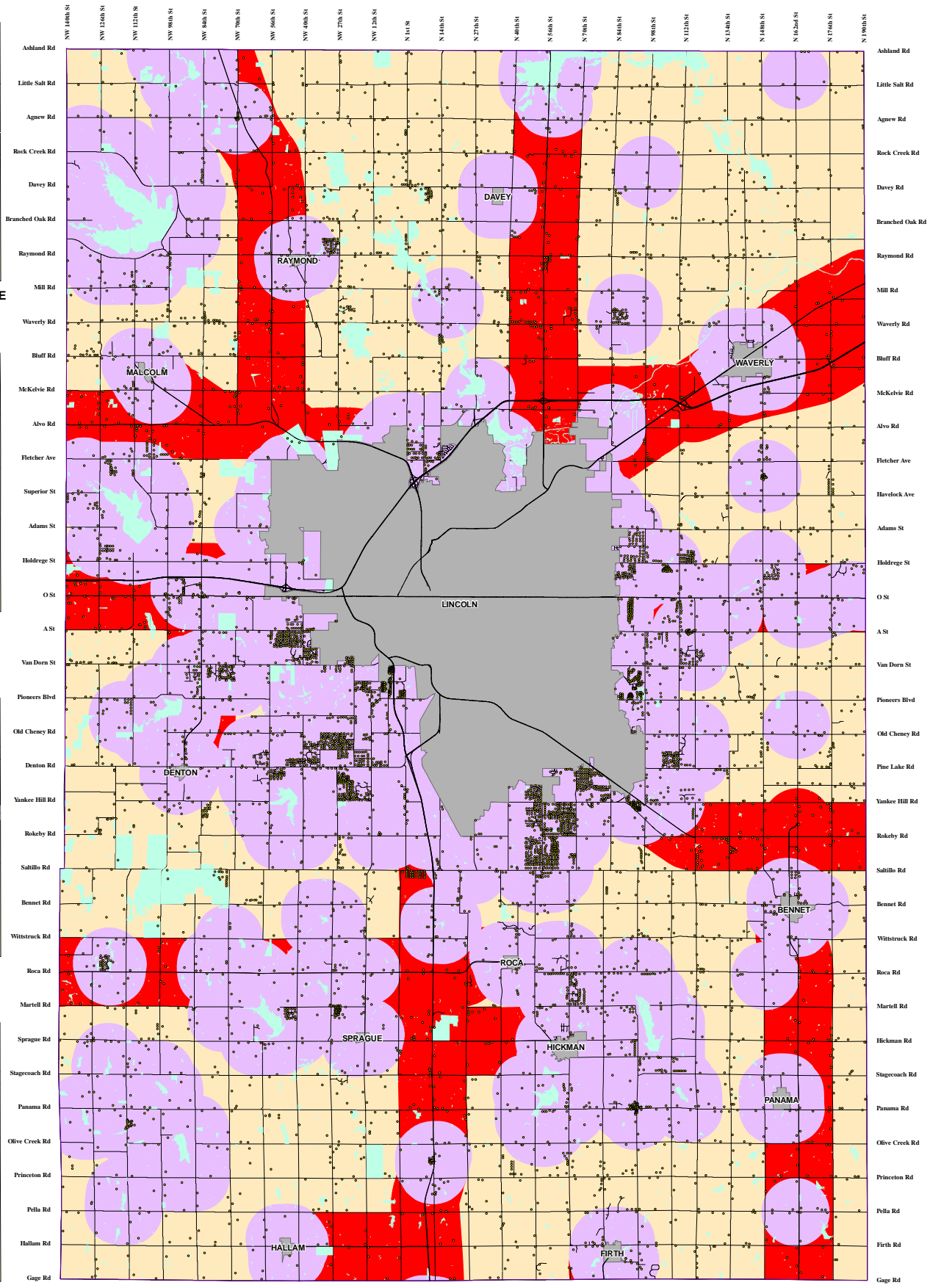
**1 MILE BUFFER: CHURCHES AND HOSPITALS**



**1 MILE BUFFER: PARKS**



**1 MILE BUFFER: RESIDENTIAL ZONING DISTRICTS**



# MOTOR SPORTS TASK FORCE : LOCATION ANALYSIS

- Area Within 1 Mile of State or Federal Highway
- Area Within 1 Mile of Specified Zoning Criteria (LMC 27.63.570)
- Environmentally Sensitive Areas And Airport Approach Zones
- Existing Dwelling Unit

0 0.5 1 2 3 4 Miles

## MOTORSPORTS TASK FORCE

### ECONOMIC, FISCAL, SOCIAL & ENVIRONMENTAL SUBCOMMITTEE REPORT

February 26, 2007

The impact of noise will be an important issue in the location of a motor sports facility in Lincoln or Lancaster County. Certain events may come to a motor sports facility that will create noise levels that may exceed the 65 (one minute Leq) noise limit (proposed language in 13.016 for Motor Sports Facilities).

Motorsports venues, whether stand alone (such as drag strips, road course, or oval tracks) or multi-use facilities, have been demonstrated as having the potential for significant economic impact. A Motorsports venue won't realize its full economic impact without city services.

1. Highlights of Dr. Thompson's presentation and report with comments from Rod Wolter
  - a. Quality of life benefit when more entertainment opportunities present themselves
  - b. Affordable entertainment options must be made available to local residents, but importantly a motor sports venue encourages new visitor dollars to the community via hotels, restaurants, shopping, etc.
    - i. The Randal Travel Marketing Report of 2003 stated that visitors spend \$286.14 in Lincoln per night, per travel party (Tourism Spending)
    - ii. Per Dr. Thompson, the low figure from drag race related events was \$91 per day
    - iii. Many, but not all, visitors will stay in hotels. The Topeka study states out-of-state visitors accounted for 53.2% of total visitors (of which 75% stayed overnight) and out-of-county visitors accounted for 33.2% (of which 49% stayed overnight). Overall, 56% of visitors stayed overnight: 72% of those at hotel/motels, 20% @ on-site campgrounds and 8% elsewhere.
  - c. A 60 day racing schedule has more impact when they are regional and national events vs. Wed/Fri street drags.
    - i. Rod Wolter (consultant for Brainerd International Raceway) said that while it would be somewhat difficult to get a big national event to the area, especially during the early years in the life of the venue, the location would be immediately suitable for events such as Super Chevy or Fun Ford weekends.
    - ii. Street drag events have minimal economic impact, mainly concessions, but serve the purpose of helping to decrease illegal street racing.
  - d. Dr. Thompson's study titled "Economic Impact Analysis: Potential Impact of a NHRA Drag Racing Facility in Lancaster County", prepared for the Nebraska Motorplex, focused on the annual tourism economic impact and did not provide any estimate of construction impact, track operation impact or job or business creation related to a drag racing facility. The study did include the following:

- i. New Economic Impact to Lincoln is \$7.8 million.
  - ii. Total Economic Impact of New and community dollars spent is \$9.9 million.
  - iii. State wide Economic Impact is \$4.5 million in new and \$5.9 in total economic impact.
2. Public funding issues
  - a. Public funding (infrastructure, ownership) for a motorsports venue takes away from overall economic impact, thus economic impact is maximized when private dollars or investment is made.
  - b. The Lincoln Growth Report stated that, as a general rule, private investing will offset public outflow of dollars
3. Venue management ability is critical. Quality management is more likely to result in a significant economic impact. Topeka nearly closed in 2003 due to poor management, but has responded very well under the leadership of Ray Irwin. Brainerd International Raceway experienced difficulties in the last few years as well according to Rod Wolter.

#### Social and Environmental Concerns:

1. Traffic flow is critical. The design of the venue should provide turn lanes and cue areas to facilitate efficient entrance/exit of traffic onto public streets and highways (Rod Wolter). Operator may need to provide traffic directors.
2. Noise, lighting issues and PA systems need to be evaluated, especially in terms of hours of use.
  - a. Suggest use of existing recreational lighting standards
3. Environmental concerns and regulations to be addressed by appropriate government agencies.
4. Social issues, such as impact to surrounding resident' quality of life, and potential property valuation impact, should be considered when determining locations of motor sports venues.

#### Noise Recommendations:

1. Sites that are selected for consideration of a motor sports facility should have noise testing conducted using sound equipment that can generate noise levels and frequencies that would likely be created by specific motor sports events projected to be held at the site before any approval is granted. Such testing should be conducted under "worst case" weather conditions (high humidity, inversion) known to propagate sound. Expert consultation on how to do such mock testing is a must.
2. The zoning resolution text amendment that establishes a noise level of 65dBA at one mile from the track and for any existing home located within a one mile radius of the track is supported. However, it should be modified to either:

- a. Allow for variances, which should be heard before an elected body. Variances could be granted for a certain number of events per year, days per year, and/or contain specific restrictions on noise levels, time of day, etc. (The variance language of the city ordinance 8.24.150 should be duplicated in the proposed County SP 06051.) ;or
- b. Create performance based noise criteria (in essence a noise “bank” or “points” system that would allow noise louder than the standard up to a certain amount per year. This as well would need to be heard before an elected body, or some method of approval of public officials established . Approaches to this could vary, but examples of such an approach are available for review and consideration.

Which ever approach is utilized, penalties and enforcement provision must be clearly prescribed and easily applied with limited staff resources.

3. The issue of requiring ‘muffled’ vehicles is a complex one. In one respect, you could recommend muffling of certain types of vehicles, perhaps during purely local events. Unfortunately, a purely local event is difficult to define. Friday night street drags would be a potential. However, there are other cars at those events that may be using the night as a means of ‘test and tune’ opportunities and those would not be muffled. Outside of the top 3 to 5 classes about 50% of regular drags will be muffled. We should avoid recommending that specific rules be established that might conflict with the rules of a nationally recognized sanctioning organization. This would prevent an unneeded level of complexity and possible conflict.
4. Noise control and monitoring
  - a. Operator of track responsible for monitoring and controlling noise
  - b. Periodic monitoring from health department/law enforcement for compliance to noise limits (process should be defined upfront and not wait for the problem to occur to figure out how to address it)
  - c. Consequences for failure to comply with noise limits from owner (such as not allowing racer to participate).
  - d. City/county fines should be established for failure to comply with noise limits (something needs to be defined to assist law enforcement and health dept officials deal with noise complaints in the most cost effective manner possible) OR monetary penalties for overdrafts on the noise bank account
5. The impact of noise from a motor sports venue on the surrounding neighborhood must be taken into consideration. While oval tracks or road courses typically hold races one night per week, drag strips often hold events on Friday, Saturday and Sundays, as well as potential test and tune sessions on week days.

Due to limited resources and time, more work needs to be done in some of the areas that we have discussed:

- fiscal impact of city and/or county
- property value impact
- what the addition of tracks, businesses etc would add to economic impact

**Summary Points - Environmental Noise presentation by Dr. Dominique Cheenne  
Created by Scott E. Holmes, February, 20, 20007**

Sound is a wave phenomenon. Noise is unwanted sound and is measured in decibels (dB). A 10 dB differential equates a noise about half as loud (or quiet) or twice as loud (or noisier). The frequency of noise (length of the sound wave) is measured in Hertz (Hz), with levels of 40 Hz (deep bass), 200 Hz (lower, mid-range), 1,000 Hz (center of pitch range) and 5,000 Hz (high pitch sound). Top fuel dragsters can generate noise of 140 dB. Muffled drag race cars will generate noise in the 100 to 115 dB range. Noise ordinances in most communities usually limit outdoor noise levels at 65 dB during the day and 55 dB at night. Noise levels in excess of 120 dB will damage hearing.

Higher frequency noises tend to be more annoying, but they are easier to abate than low frequency rumbles. Noise that is of short duration is more tolerable.

Sound propagation is affected by environmental conditions, including wind, humidity and temperature. Temperature inversions, which may occur commonly in the evenings of summer months, create conditions in which sound waves are reflected back down to the ground, increasing noise problems over longer distances. Wind bends sound waves, causing the waves to bend down downwind (propagating sound longer distances) and up upwind (reducing the noise levels). In Nebraska during July, 40-50% of the days have air stagnation. This means conditions are very good for long term stagnation of air. Sound propagates farther on hot and humid days than cool and dry days. Rumble and bass sounds (lower Hertz) travel farther than high pitch sounds.

The following scenarios were offered:

With a sound source of 115 dB (louder than a motorcycle but quieter than a dragster) on a hot and humid day, a rumble and bass sound (<200 Hz) would measure 56 dB at one mile (audible, but not really bothersome). On a cool and dry day, the same sound would measure 53 db at one mile. He added on a hot and humid day, the measurements for a mid-range to high frequency noise would be 49 dB at one mile.

Thick grass and soft ground reduce noise, but only for higher frequency sound waves. Trees and other vegetation provide very little reduction in noise. In order for berms and barriers to be effective, they must be located in very close proximity (within feet) of the sound source and need to be very tall to impact lower frequencies.

Consideration should be given to testing noise at locations that are going to be considered for the drag strip using sounds similar to those generated at events and to do this testing under inversion conditions. Sensitive locations should also be tested. Once the final location is selected, on-site monitoring during events should be conducted.

An oval track would create more continuous sound versus a drag strip, but the sound spectrum (quality) would be much different - higher pitches as opposed to lower rumbles. Building a track in a bowl or depression will help mitigate high frequency noise but would do very little for low frequency noise.



**Bullets of the Environmental Noise presentation by Dr. Dominique Cheenne  
Created by Scott E. Holmes, February, 20, 20007**

**Environmental Noise**

- Sound is a wave phenomenon.
- Noise is unwanted sound and is measured in decibels (dB).
- A 10 dB differential equates a noise about twice as loud (or noisier).
- Higher frequency noises tend to be more annoying to people.
- Noise that is of short duration is more tolerable.
- Noise is affected by environmental conditions, including wind, humidity and temperature.
- Temperature inversions increase noise problems over longer distances.
- Wind bends sound waves.
- Noise propagates farther on hot and humid days
- Rumble and bass sounds (lower Hertz) travel farther than high pitch sounds.
- Thick grass and soft ground reduce noise, but only for higher frequencies.
- Trees and other vegetation provide very little reduction in noise.
- Berms/barriers must be very close and tall to reduce lower frequency noise.
- Noise testing should be conducted at locations that are going to be considered for the drag strip. Testing should be done under inversion conditions.
- On-site monitoring during drag events should be conducted.
- An oval track would create more continuous sound versus a drag strip and would be higher frequency noise.
- Building a race track in a bowl or depression will help mitigate high frequency noise but would do very little for low frequency noise.

**NHRA drag strip noise information:**

NHRA championships or Division 5 nationals all require super classes and under be 3" pipe and muffled (95 dba at 50 feet at 3000 to 3500 rpms. This means the Friday night local drags would more than likely be 95% muffled along with most of the regular weekend drags being muffled and as the day goes on the top 3 classes none muffled will be fewer and fewer cars participating if there are any to begin with. The national meets there will be lots of cars in the top 3 classes during qualification days and will be again fewer and fewer throughout the day. Bringing the muffled cars more into play.

Starting out with the nationals may be 50% but as the days go on the percentage of muffled cars greatly rise.

Explanation of Classes (I am getting a new rule book for 2007)

NHRA

Top Fuel

Funny Car

ProStock

Muffled (3" pipes with at least 3" racing mufflers) Most will be high flow street mufflers.

All other classes

Division 5

Acohol Rails

Acohol Funny Cars

Comp Eliminator (ProStock) This class may be muffled in the future

Muffled (3" pipes with at least 3" racing mufflers) Most will be high flow street mufflers

All other classes

All the sanctioning organizations are working hard to make these rules more enforceable. Currently it is the responsibility of the track operator to meet and enforce these specifications. If a car comes non-muffled for a specific muffled class, it would not be able to compete in that class and would be put into a class they could not be competitive in and would either the next time come prepared or not come back.

References:

Speaker: Dr. Dominique Cheenne, Environmental Noise

Speaker: Rod Wolter and Dave Holtgrave, Dragstrip overview

Speaker & Study: "Economic Impact Analysis: Potential Impact of a NHRA Drag Racing Facility in Lancaster County", prepared for Nebraska Motorplex, Dr. Eric Thompson, January 23, 2007

Study: "Estimated Economic Impact to Crow Wing County from a National Hot Rod Association Event, Brainerd Interantional Raceway", Daniel Erkkila, Ph.D., Tourism Center, University of Minnesota, March 15, 2006

Study: "Economic Impact of Motor Sports on Shawnee County, Paul Byrne, Assistant Professor of Economics, Washburn University School of Business, 2004

Pacific Raceway Expansion Project, Seattle, Washington, review of facility and communication with owner

Lancaster County proposed "County Change of Zone # 06065"

Lancaster County Noise Control Ordinance, Charppter 8.24

City of Lincoln Municipal Code: 27.63.570 Permitted Special Use: Race Tracks for Motorized Vehicles

Diagram: Stand Alone Dragstrip Proposed 2007 Schedule Noise and Traffic Impact  
(based on data from County Special Permit 06051 application)

NHRA Marketing Overview, 'NHRA has the power to move your brand' July-2006

NHRA 2006 Rule book

# Environmental Noise

*An Introduction*

Prepared for

The Lancaster County Motor Sports  
Task Force

By









Dominique J. Chéenne, *Ph.D.*  
C & C Consultants

*Lincoln . Chicago . Puïsserguier*





## DEFINITIONS & UNITS

- **Level:** the “strength” of a sound. It is measured in Decibels (dB).
- **Frequency:** the “pitch” of a sound. It is measured in Hertz (Hz)
- **Spectrum:** which frequencies are in the sound. The “type” of the sound.
- **Duration:** how long does the sound last. It is measured in seconds.
- **Noise:** unwanted sound.

## A FEW EXAMPLES

- A sound pressure level of **85 dB** 
- A sound pressure level of **65 dB** 
- Two sounds that are **10 dB** apart 
- Two sounds that are **1 dB** apart 
- A **40 Hz** pure tone 
- A **200 Hz** pure tone 
- A **1,000 Hz** pure tone 
- A **5,000 Hz** pure tone 

## A FEW MORE EXAMPLES

- A top-fuel car (burnout) 
- A jet car (afterburner pops) 
- A pro-stock car (pass-by) 
- A pro-stock motorcycle (pass-by) 

**These examples were NOT played  
back at the actual level**

All sounds from the National Hot Rod Association website  
<http://www.nhra.com/sounds/index.htm>

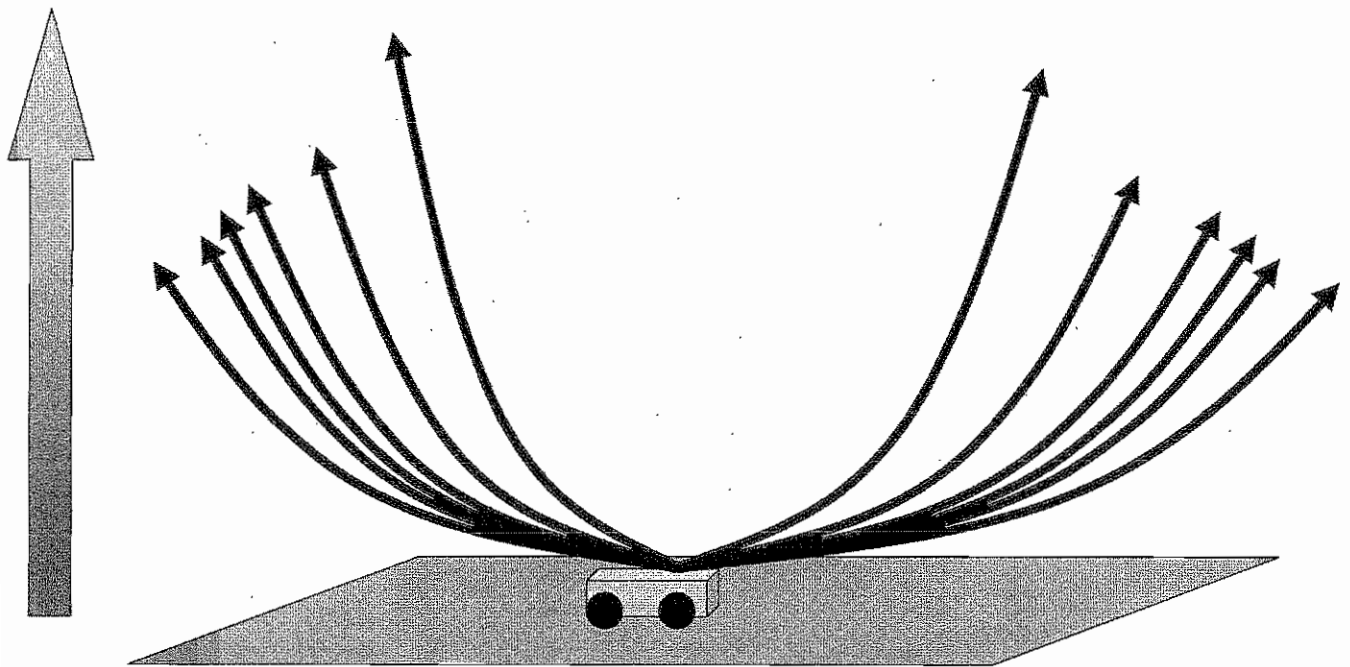
C & C Consultants © 2007

## HOW LOUD IS LOUD?

- Indoor noise levels below **35 dB** are recommended for optimum sleep.
- Local ordinances usually limit outdoor noise levels to **55 dB** during nighttime & **65 dB** during the daytime.
- Federal mandates limit work-related noise exposure to be less than **90 dB/8** hours.
- Levels in excess of **100 dB** are considered unsafe under prolonged exposure.
- Levels in excess of **120 dB** are considered dangerous under any exposure.

# SOUND PROPAGATION OUTDOORS. Part I

Under **normal** temperature conditions

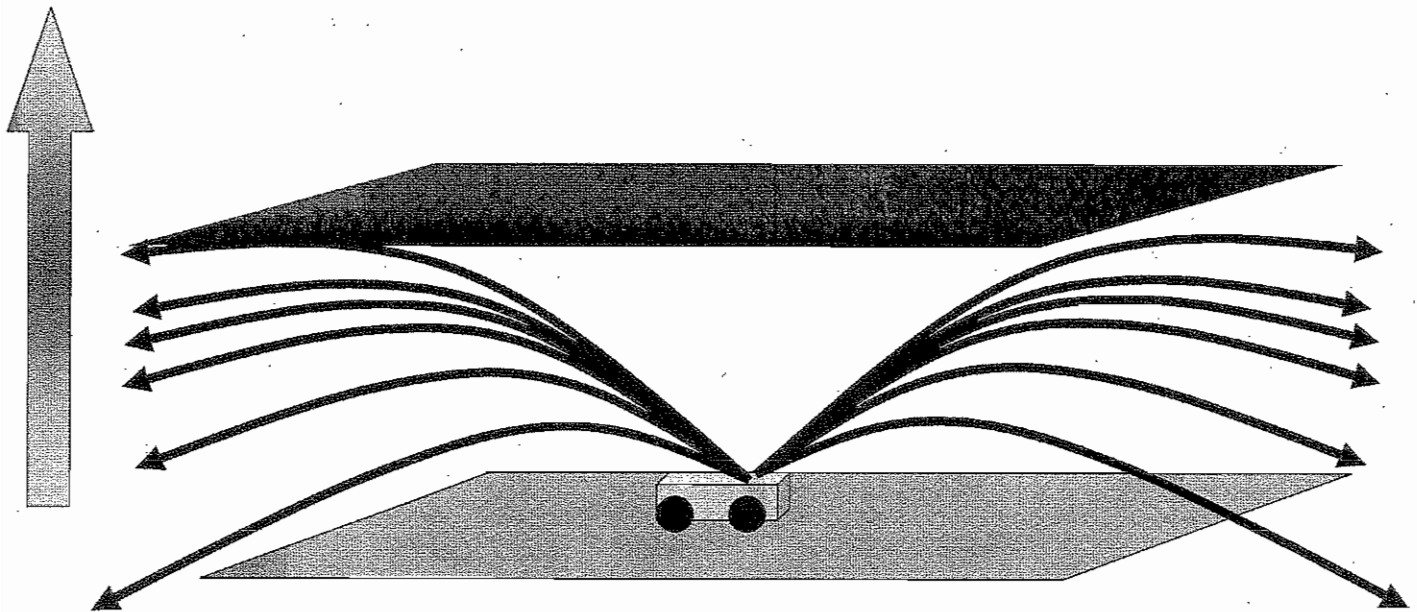


C & C Consultants © 2007



# SOUND PROPAGATION OUTDOORS. Part II

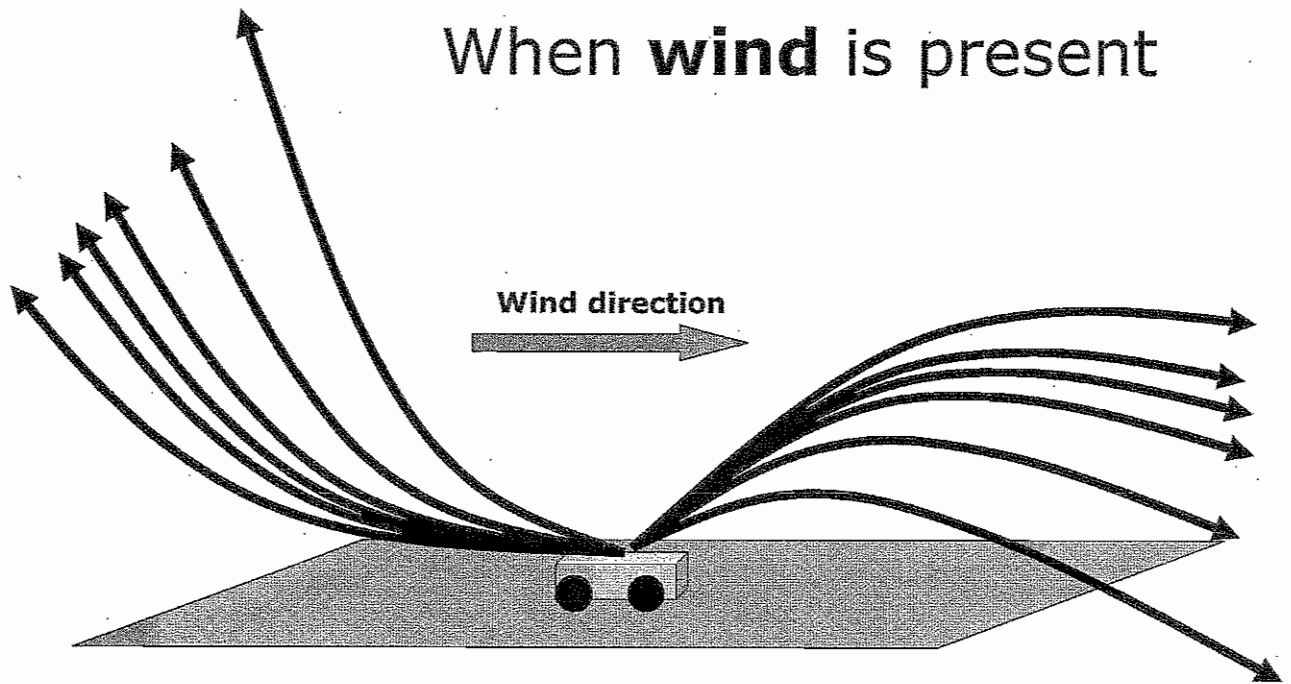
Under temperature **inversion** conditions



C & C Consultants © 2007

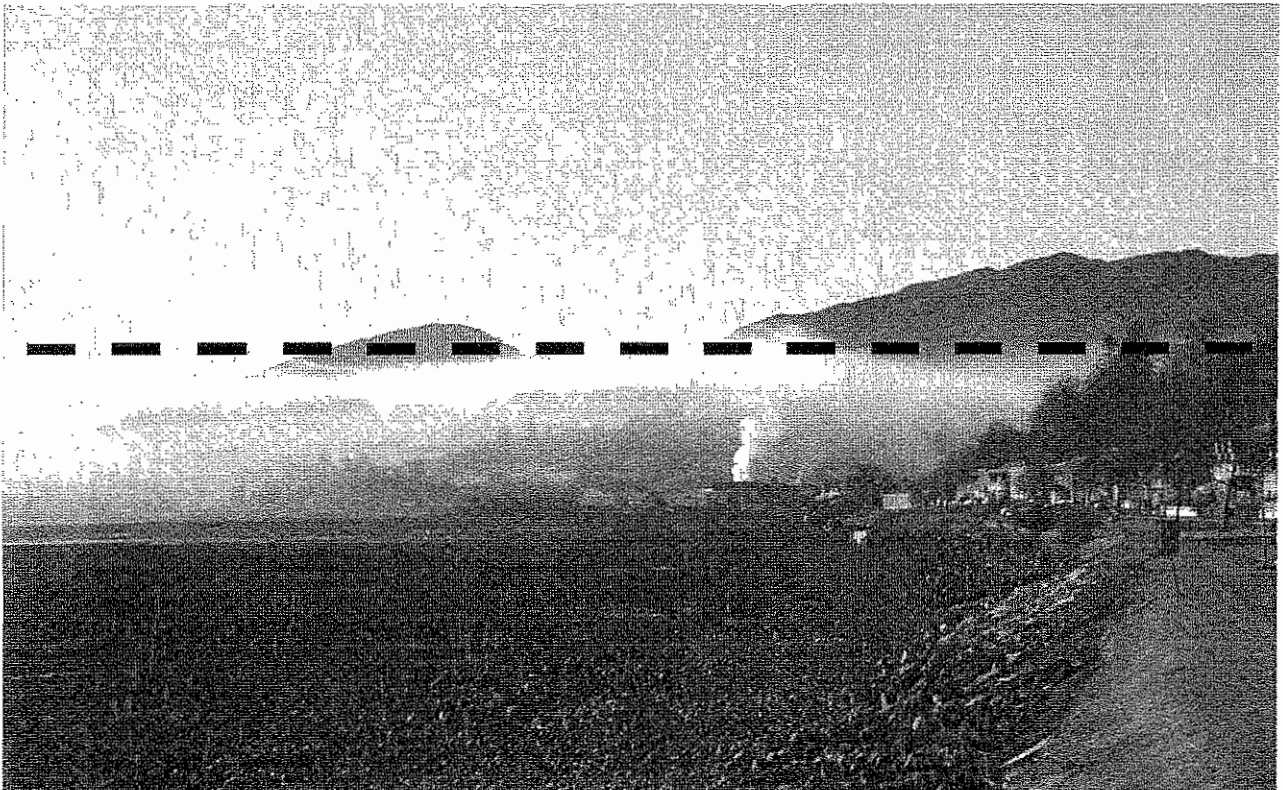
# SOUND PROPAGATION OUTDOORS. Part III

When **wind** is present



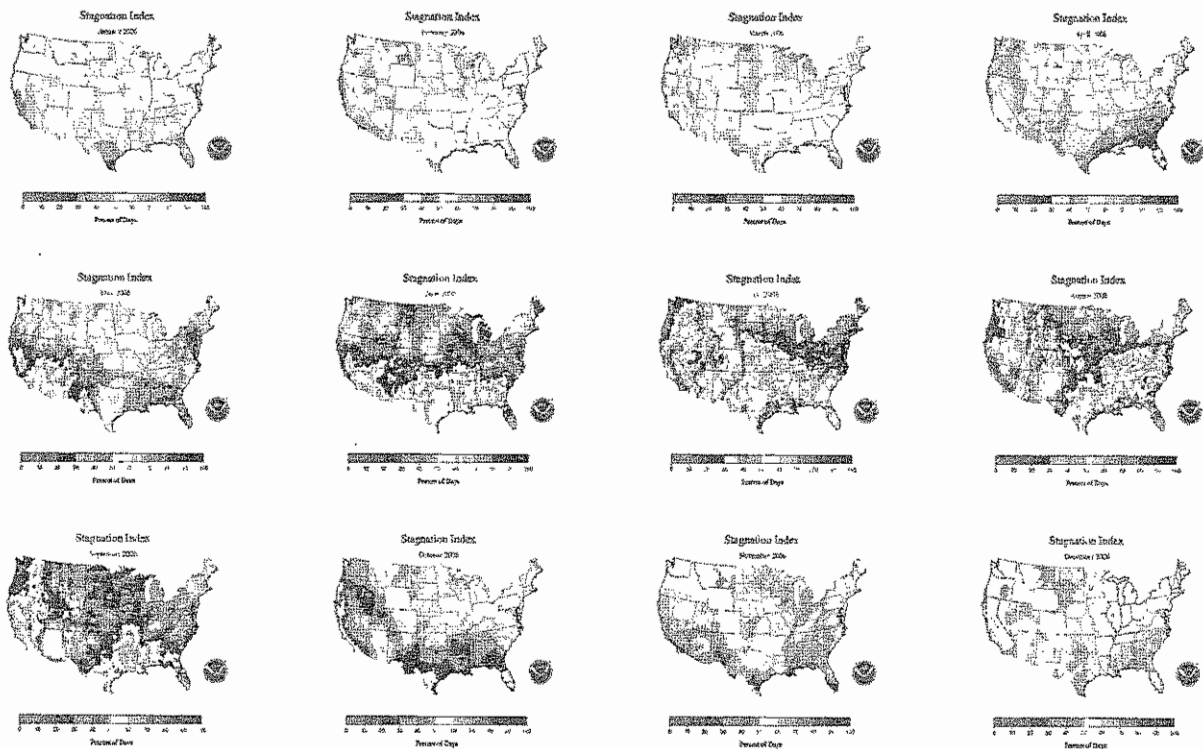
C & C Consultants © 2007

# AN EXAMPLE OF INVERSION



C & C Consultants © 2007

# WHERE & WHEN DO INVERSIONS OCCUR?



2006 Air stagnation maps from the National Oceanic & Atmospheric Administration

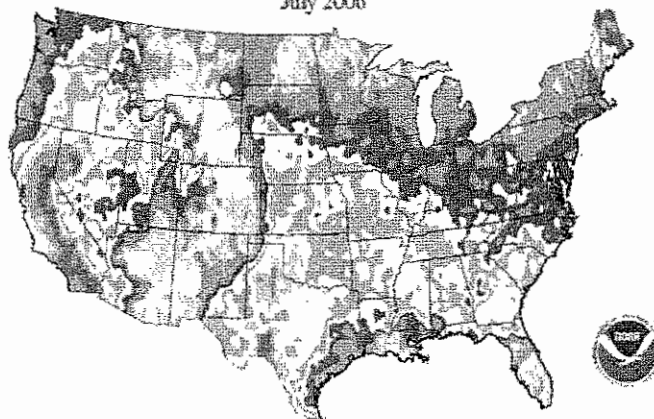
C & C Consultants © 2007

# A SPECIFIC SCENARIO

(July 2006 data)

## Stagnation Index

July 2006

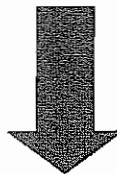


Percent of Days

C & C Consultants © 2007

# TEMPERATURE & HUMIDITY EFFECTS. Part I

The attenuation of sound by the atmosphere is strongly dependent on the **frequency** of the sound and on the **relative humidity** in the air

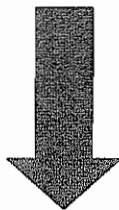


When predicting sound propagation outdoors, the weather is a critical factor, and the predictions for one type of noise may not apply to other noises

C & C Consultants © 2007

# TEMPERATURE & HUMIDITY EFFECTS. Part II

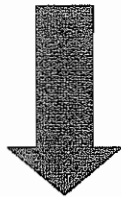
Under *normal* conditions, and for a given temperature, dry air provides more sound absorption than humid air



Sound will **propagate farther** during hot and humid days than it will during cool and dry days

# TEMPERATURE & HUMIDITY EFFECTS. Part III

For a given temperature and humidity scenario, high frequencies get attenuated much faster than low frequencies.

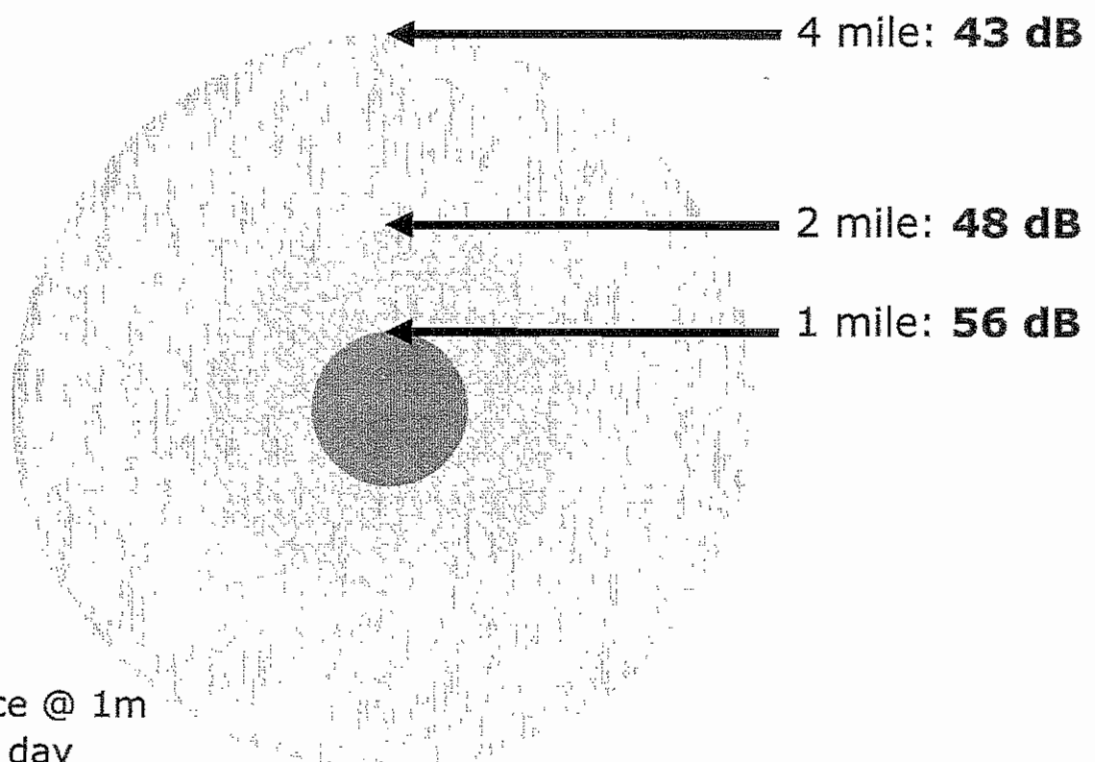


“Rumble and bass” sounds will always travel **farther** than high-pitched sounds under identical temperature & humidity scenarios.

C & C Consultants © 2007



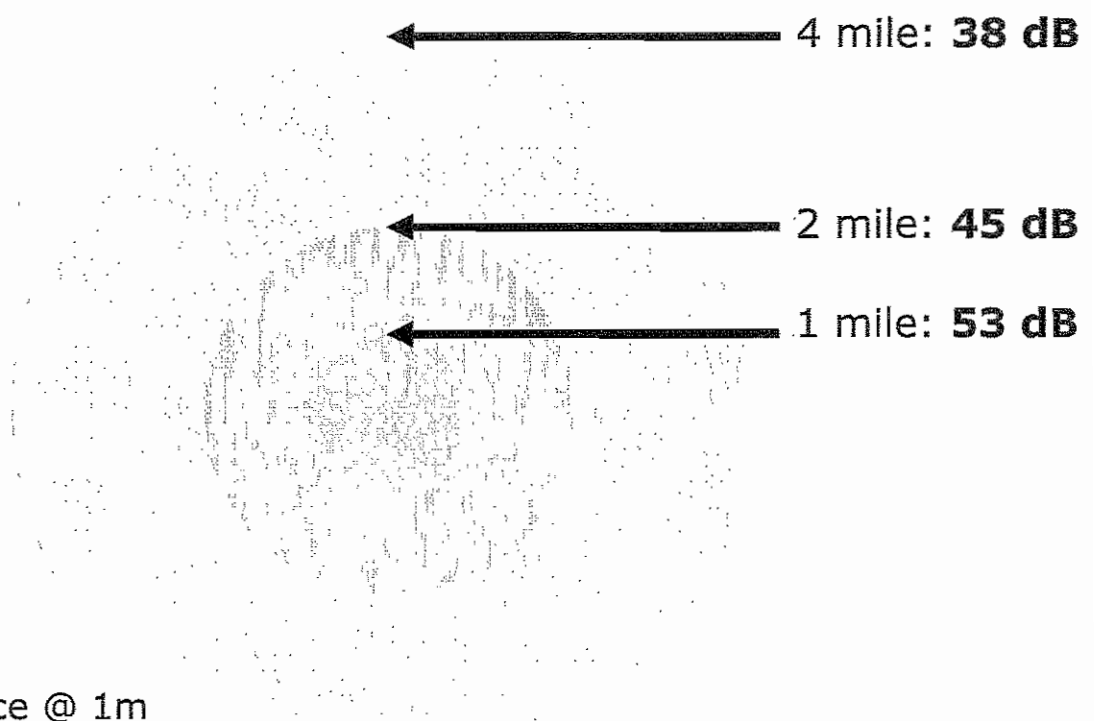
# PROPAGATION EXAMPLE #1



- 115 dB source @ 1m
- Hot & humid day
- Favorable propagation conditions (ISO 9613)
- Most frequencies < 200 Hz (bass & rumble)

C & C Consultants © 2007

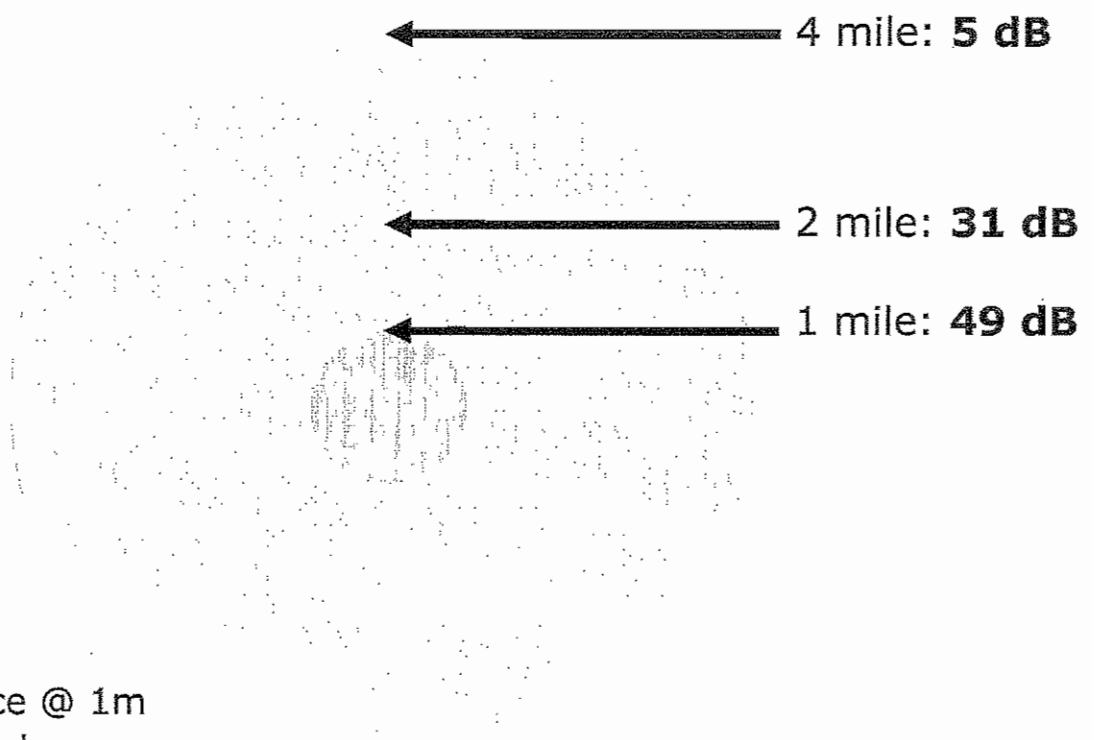
## PROPAGATION EXAMPLE #2



- 115 dB source @ 1m
- Cool & dry day
- Favorable propagation conditions (ISO 9613)
- Most frequencies < 200 Hz (bass & rumble)

C & C Consultants © 2007

# PROPAGATION EXAMPLE #3



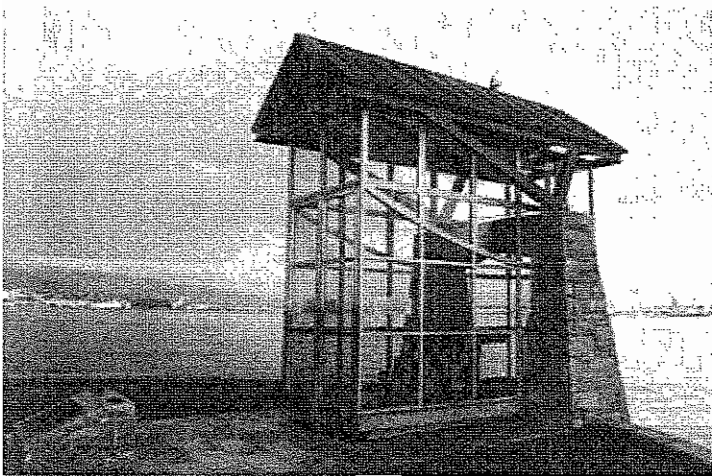
- 115 dB source @ 1m
- Hot & humid day
- Favorable propagation conditions (ISO 9613)
- Few frequencies < 200 Hz (mostly midrange & high)

C & C Consultants © 2007

# OTHER FACTORS

- Ground absorption
  - Thick grass and soft ground provide effective sound attenuation at high frequencies
  - Trees and vegetation provide very little sound attenuation at low frequencies
  - Ground effects are complex to model accurately
- Berms and barriers
  - Must be placed close to the source
  - Must be very tall to be effective at low frequencies

# A FINAL EXAMPLE



- 1 mile away
- 6 miles away
- 12 miles away
- 38 miles away

“Today, more than 100 years after its arrival in Stanley Park [...] the Nine O’Clock Gun booms out its nightly message—a message heard at **Granville and Hastings** five seconds after nine o’clock, in **Marpole** 30 seconds after that, in **New Westminster** a full minute after nine and in **Mission** (it’s been heard there more than once) more than three minutes after nine.”

C & C Consultants © 2007

# ASSESSING NOISE

- Three fundamental factors to consider when dealing with noise in general
  - The **LEVEL** of the noise (**HOW MUCH**)
  - The **SPECTRUM** of the noise (**WHAT**)
  - The **DURATION** of the noise (**HOW LONG**)
  
- Three fundamental factors to consider when dealing with environmental noise
  - **WHERE** to measure
  - **WHEN** to measure
  - **HOW** to measure

# RECOMMENDATIONS

- Consider **TESTING** the proposed site(s)
  - Generate (in a realistic fashion) sounds that are representative of the events being planned
  - Use weather conditions that are favorable to the propagation of sound (inversion)
  - Measure the noise at sensitive locations
- Consider on-site **MONITORING** during events
  - Levels
  - Duration
  - Use metrics that are tailored to the activity

C & C Consultants © 2007

# Thank You



C & C Consultants © 2007





A Bureau of Business Economic Impact Analysis  
From the University of Nebraska-Lincoln

---

# **Economic Impact Analysis: The Potential Impact of an NHRA Drag Racing Facility in Lancaster County**

Dr. Eric Thompson  
Seth Freudenburg  
Travis Heller

Prepared for  
**Nebraska Motorplex**

January 23, 2007  
Bureau of Business Research  
Department of Economics  
College of Business Administration  
University of Nebraska-Lincoln  
Dr. Eric Thompson, Director

---

Entertainment venues are an important component to the quality of life in cities and states. Venues provide local residents with an opportunity to attend events that interest them without requiring them to travel to another city. This saves local residents money and allows residents to attend more events. Both factors increase the quality of life for local citizens, in much the same way that having more local shopping options raises the quality of life.

Lincoln's need for new entertainment venues to improve the quality of life and to retain or attract younger residents has been a recent topic of discussion in the city. For example, a new arena and other facilities have been discussed for the downtown area. This analysis considers another potential entertainment venue for the Lincoln area: a National Hot Rod Association (NHRA) Motorplex Facility. In particular, Nebraska Motorplex has recently proposed developing and operating a motorplex venue in Lancaster County. This analysis considers the annual economic impact of such a NHRA Motorplex Facility. That is, the jobs, income, and economic activity that would be generated each year as a drag racing facility attracts visitors to the Lincoln area or helps retain the spending of local motorsports enthusiasts within the county. Such an economic impact would be in addition to the quality-of-life benefits discussed above.

The economic impact estimate focuses on the potential "tourism" impact of the drag racing facility due to the spending at area restaurants, lodging places, and retail outlets either by 1) tourists attracted to the area, or 2) local residents who would otherwise travel out of town to Topeka, Denver, or other regional tracks to attend or participate in drag racing events. The report uses **conservative** assumptions and focuses on the tourist impact.

The analysis does not consider any economic impact:

- 1) during the construction of the facility, or
- 2) from track personnel and operations expenses.

Four steps were taken to estimate the spending by visitors or retained spending from local residents. Throughout the steps, we utilized **conservative** assumptions to estimate spending:

- 1) We estimated the total number in attendance at a NHRA Drag Racing Facility over the course of a year. We differentiated between regional and local races, which are held regularly, and periodic divisional events.
- 2) We estimated the share of those in attendance who reside outside of Lancaster County or outside of Nebraska. Note that even local events attract some out-of-state attendance and participation.
- 3) We estimated spending profiles for those visitors from outside the area to calculate total new “tourist” spending for Lancaster County due to drag racing events.
- 4) We estimated spending retained by local residents who are now able to attend or participate in more events locally.

### *Events*

We analyzed the schedule of 8 other drag racing facilities in Nebraska’s NHRA region to determine the number of events held including regional races, local races and periodic divisional-type events. The 8 drag racing facilities on average hosted two divisional-type events each year, in addition to dozens of regional and local events.

Based on this data, we estimated that a typical track would host approximately 60 days of racing per year, though more successful tracks hosted more days. We utilized 60 days of racing in our baseline analysis. Most of those days represented local and regionally-oriented events. We conservatively estimated approximately 1,000 in attendance for local race days based on data taken from a questionnaire of drag racing facilities within Nebraska’s NHRA Division. We estimated 8,000 in attendance on

average for race days for the two divisional-type events.<sup>1</sup> Note that this was less than the average reported by other tracks for major events in existing research studies.<sup>2</sup>

### *Residence of Those in Attendance*

We utilized data from two studies of a drag racing facility in the Topeka, Kansas area to determine attendance patterns for the divisional-type events. Those studies used survey methods to determine the percentage of fans that came to a NHRA Championship Event from outside of the state and outside of the county to attend racing events. We utilized these percentages for our analysis of divisional-type events at a NHRA Racing Facility in Lancaster County, due to similarities between Topeka and Lincoln. These percentages were applied directly for the divisional-type events. For local events, a breakdown for the origin of spectators and participants was developed using data from a questionnaire of drag racing facilities in Nebraska's NHRA region.

In all cases, we multiplied the estimated event attendance from above by these percentages to estimate the number of visitors to the drag racing facility from outside Nebraska, outside of Lancaster County (but within Nebraska), and within Lancaster County.

The Topeka study also had an estimate of the number of local residents who attended the NHRA Championship rather than traveling to other races out of state. We used these data to estimate the number of local persons in attendance that are retained in the area.

### *Spending Profiles*

The Topeka studies, and other studies for drag racing facilities in Brainerd, Minnesota and Immokalee, Florida<sup>3</sup>, also provided profiles for visitor spending on lodging, retail, and food. We took the lowest estimate of total spending besides ticket

---

<sup>1</sup> We assumed that rain would affect attendance in one out of every 6 days of racing.

<sup>2</sup> Lilley, William III, and Laurence J. DeFranco, 1995. *The Economic Impact of NHRA Races on Topeka, Kansas*. InContext, Inc. Political Economic Analysis. Washington, D.C.  
Byrne, Paul F., 2005. *The Economic Impact of Motor Sports on Shawnee County*. Washburn University, School of Business.

<sup>3</sup> Weinstein, Bernard, and Terry Clower, 2000. *Economic Impact Analysis Proposed Autoracing Complex in Immokalee, Florida*. Center for Economic Development and Research, University of North Texas.

purchases per visitor per day from the four studies (\$91) as the basis of our visitor spending estimate for a NHRA Drag Racing Facility in Lancaster County.

One of the Topeka studies also estimated, based on surveys, separate spending profiles for out-of-state visitors, out-of-county (but in-state) visitors, and in-county visitors. Again, the profiles included spending on lodging (for out-of-state and out-of-county visitors), retail, and food. We used these estimates to differentiate between the spending patterns of out-of-state, in-state and in-county visitors.

These spending profiles were multiplied by the number of annual visitors that were calculated earlier in order to estimate the total spending by out-of-state, out-of-county (but in-state), and in county visitors of the proposed Motorplex Facility. This was the basis for our economic impact estimate.

### *Economic Impact*

#### *Direct Economic Impact*

The direct annual economic impact of the proposed NHRA Motorplex Facility on Lancaster County is the sum of the estimated spending by out-of-state visitors, out-of-county (but in-state) visitors, and retained in-county visitors. This sum is estimated at \$7.8 million. The direct annual economic impact of the proposed drag racing facility on the State of Nebraska is the sum of out-of-state visitors and retained in-state visitors. This is estimated at \$4.5 million per year. Both estimates are provided in Table 1 below. The direct impact on Lancaster County is greater due to spending by out-of-county residents from other parts of Nebraska, such as Norfolk or Omaha.

**Table 1**

Direct Annual Economic Impact  
from Visitors and Retained Spending

	Spending (millions)
<b>Lancaster County</b>	\$7.8M
<b>Nebraska</b>	\$4.5M

Sources: Event schedules and attendance from other regional drag racing facilities and spending profiles from studies of other drag racing facilities.

### *Total Economic Impact*

In addition to this direct effect, there is an additional “multiplier effect” on the local and state economy. The multiplier effect occurs as money attracted to or retained in the area by the drag racing facility “circulates” through the Lancaster County economy. For example, restaurants, lodging places, and retail stores that gain customers due to the drag racing facility make additional purchases of supplies and services from other Nebraska businesses. Similarly, restaurant, hotel, or store employees also spend their paychecks at other Nebraska businesses. Both types of spending contribute to the multiplier effect.

Such multiplier effects are typically modest for entertainment venues, roughly 25% as large as the direct effect. We calculated relevant economic multipliers for Lancaster County (and the state) using the IMPLAN software and applied them to the direct economic impacts from Table 1. We then added the multiplier effect to the direct economic impact to yield an estimate of the total economic impact.

Our estimate of the total annual economic impact of the proposed drag racing facility is provided in the first column of Table 2 below. The table shows the estimated impact for both Lancaster County and the State of Nebraska using our conservative approach. The total annual impact for Lancaster County is \$9.9 million, a substantial tourism impact for the county. The total annual economic impact for Nebraska is \$5.9 million.

**Table 2**

Estimated Total Annual Economic Impact  
from Visitors and Retained Spending

	Total Economic		
	Activity (millions)	Equivalent Jobs	Wages (millions)
<b>Lancaster</b>			
<b>County</b>	\$9.9M	200	\$3.5M
<b>Nebraska</b>	\$5.9M	120	\$2.1M

Sources: Spending estimates in Table 1, IMPLAN software and Bureau of Business Research calculations.

Note that Table 2 also provides an estimate of the total annual wages and employment associated with the economic impact. There is an estimated annual impact of \$3.5 million on wages in Lancaster County. This is the earnings of approximately 200 full-year jobs in the relevant industries. Note, however, that these earnings would actually accrue to an even larger number of workers during those days that the Motorplex is open for racing. The earnings could mean additional employment during these days or simply more hours worked (and more earnings) by year-round employees. For the State of Nebraska overall, there is an estimated annual impact of \$2.1 million worker earnings, which is the equivalent of 120 full-year jobs.

#### *Full Potential Economic Impact Estimate*

Throughout the analysis we have utilized a **conservative** approach to estimating economic impact. It is possible that a NHRA Motorplex Facility in Lancaster County could have a much higher annual economic impact than we estimated in Tables 1 and 2. For example, one other regional track we examined had twice as many large divisional-type events as we used in our baseline estimates. Under such a full potential scenario, the estimated economic impact would be \$23.2 million for Lancaster County and \$14.6 million for the State of Nebraska. The associated worker earnings and employment impacts also would be higher.